

Freeman 1592 Baler Operating System Manual

The following pages detail how to use the 1592 Big Baler Control Monitor. Read entire manual before operating baler. Consult operator's manual for more information, including SAFETY.



This manual is for balers running program 1592_0.45.3. See page iii for instructions on how to find the program your baler is running.



WARNING

California Proposition 65 Warning

Diesel engine exhaust and some of its constituents are known to the State of California to cause cancer, birth defects, and other reproductive harm.

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

Other chemicals in this vehicle are also known to the State of California to cause cancer, birth defects, and other reproductive harm.



WARNING

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

Program Identification

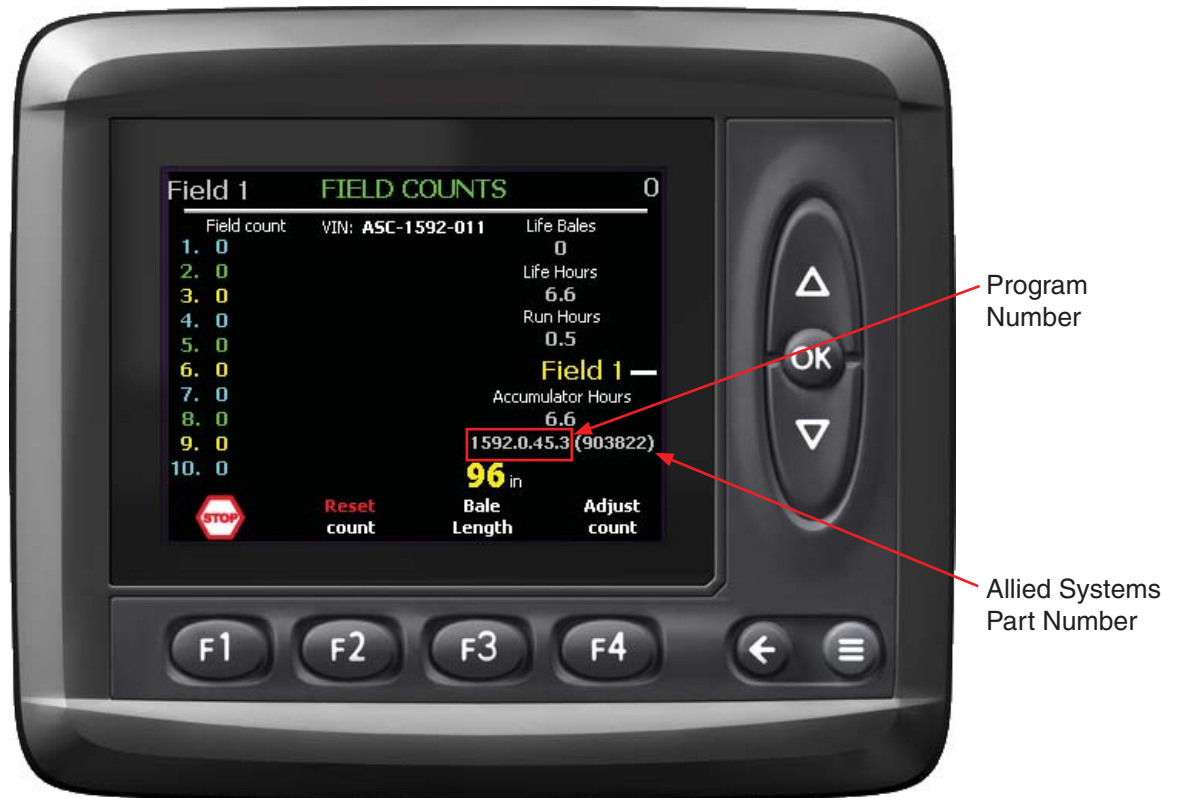



Figure 0-1 Program Identification

1. Press the  button repeatedly until the FIELD COUNTS screen comes up (see Figure 0-1).
2. The program number is listed here, followed by the Allied Systems part number for that program.
3. This manual is intended to be used with program number 1592.0.45.3.

SAFETY

General

The following pages contain general safety warnings which supplement specific warnings and cautions appearing elsewhere in this manual. All electrical and hydraulic equipment is potentially hazardous. You must thoroughly review and understand this Safety Section before attempting to operate, troubleshoot, maintain or service this baler.

Time, money and effort have been invested in making your Baler a safe product. The dividend from this investment is **YOUR PERSONAL SAFETY**.

However, it must be realized that no power-driven equipment can be any safer than the person behind the controls. If you don't operate and maintain your Freeman Baler safely, our efforts will have been in vain.

The safety instructions and warnings, as documented in this manual and shipped with the machine, provide the most reliable procedures for the safe operation and maintenance of your Baler. It's your responsibility to see that they are carried out.

Allied Systems Company cannot anticipate all worksite conditions, local regulations, etc. It is the responsibility of the end user to be aware of and obey any specific worksite, local, state, or national regulations or procedures that are applicable to operating this baler.

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



Safety Symbols

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



DANGER

The “**DANGER**” symbol indicates a hazardous situation which, if not avoided, will result in death or serious injury. Carefully read the message that follows to prevent serious injury or death.



WARNING

The “**WARNING**” symbol indicates a hazardous situation which, if not avoided, could result in death or serious injury. Carefully read the message that follows to prevent serious injury or death.



CAUTION

The “**CAUTION**” symbol indicates a hazardous situation which, if not avoided, could result in minor or moderate injury, or equipment damage. Carefully read the message that follows to prevent minor or moderate injury.

NOTICE

The “NOTICE” symbol alerts to a situation that is not related to personal injury but may cause equipment damage.

NOTE: ...

The term “**NOTE**” highlights operating procedures or practices that may improve equipment reliability and/or personnel performance, or to emphasize a concept.

Intended Use Statement:

This baler is intended to gather and compress loose, fibrous material (i.e., hay) and form it into rectangular bales. Use in any other way is considered to be contrary to the intended use. If you are unsure of the material you intend to bale, consult the factory.

SAFETY

Operation Warnings



WARNING

Failure to observe the following safety rules may result in extreme personal injury, dismemberment or death. It is the operator's responsibility to understand the proper and safe use of this baler.

Make sure that you read, understand, and obey all of the safety precautions and operating instructions in this Operator's Manual.

Keep this Operator's Manual with the baler at all times.

Do not operate the baler unless you are authorized and trained to do so. If it has been some time since you last operated the baler, re-familiarize yourself with the baler before starting, then proceed slowly.

Do not operate the baler if you are aware of any malfunctions, needed maintenance or repairs.

Stop the baler immediately if any problems arise.

Never allow others to ride on the baler.

Never allow anyone within 10 ft of the baler while the baler is in operation.

Never operate the baler without all safety shielding in place.

- Keep hands, feet, hair, jewelry and clothing away from moving parts, including but not limited to the pickup, knottter, and PTO shaft.
- Avoid wearing loose clothing which can easily be caught in moving parts.
- Use appropriate signs (i.e., Slow Moving Vehicle sign), signals or warning lights when transporting on highways.
- Always use lights when working at night or in low light conditions.



- Do not start the tractor if the key had been marked with a "DO NOT START" or "RED" tag.
- Know your job-site rules. Some have site specific directions and procedures. The methods outlined in this manual provide a basis for safe operation of the baler. Because of special conditions, your company's baling procedures may be somewhat different from those shown in this manual.
- Never operate any of the tractor's controls from anywhere other than the operator's seat.
- Alert personnel in the area before starting the engine, and make sure everyone is clear. Be sure that all controls are in neutral and the baler is disengaged before starting the engine.
- Each country has its own safety legislation. It is in the operator's own interest to be conversant with these regulations and to comply with them in full. This also applies to local bylaws and regulations in force on a particular worksite.
- Should the recommendations in this manual deviate from those in the user's country, the national regulations should be followed.
- Never attempt to disconnect any of the safety devices built into the baler or tractor.
- Maintain proper clearance from energized equipment, energized power lines or other power sources. High voltage electricity can discharge to ground without direct contact with the baler's or tractor's structure. If the baler or tractor contacts energized equipment, or if electrical energy does discharge through the machine—stay clear, and prevent anyone else from coming in contact with the baler or tractor. If you are on the tractor, stand fast, avoid contact with metal surfaces, and do not permit anyone to come into contact with the tractor or baler. Finally, **Do not jump off.**

SAFETY

Hydraulic Hazards

Be aware of the hazards of pressurized hydraulics:

- Wear personal protective equipment, such as gloves and safety glasses, whenever servicing or checking a hydraulic system.
- Assume that all hydraulic hoses and components are pressurized. Relieve all hydraulic pressure before disconnecting any hydraulic line.
- Never try to stop or check for a hydraulic leak with any part of your body; use a piece of cardboard to check for hydraulic leaks.
- Small hydraulic hose leaks are extremely dangerous, and can inject hydraulic oil under the skin, even through gloves.
- Infection and gangrene are possible when hydraulic oil penetrates the skin. See a doctor immediately to prevent loss of limb or death.



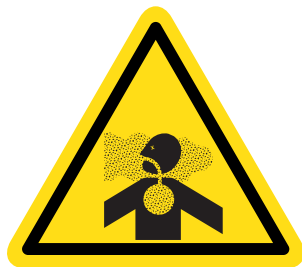
Maintenance Safety

- Perform all routine maintenance outlined in this Operator's Manual in the time intervals indicated.
- Maintenance, lubrication and repair of this machine can be dangerous unless performed properly. In order to ensure safety, each person working on this baler must have the necessary skills, information, tools and equipment, and satisfy himself that his work method is safe, correct, and meets his own company's requirements.
- Do not attempt to make adjustments, or perform repairs unless you are authorized and qualified to do so.
- Never attempt to service energized equipment.
- Do not rely on the hydraulic system to support any part of the baler during maintenance or lubrication. Never stand under a baler component that is supported only by the hydraulic system. Ensure components are resting on their mechanical stops or supported with appropriate safety stands during maintenance or lubrication.
- Never attempt servicing while the baler is moving. Shut off the tractor and secure power.
- Shut off tractor engine, engage the parking brake, disengage the baler, and wait for all movement to stop before adjusting, lubricating, cleaning, or servicing the baler.
- Tag the key switch with a "DO NOT START" sign and/or remove the key.
- Always perform all maintenance and lubrication procedures with the baler on level ground, parked in a safe area.
- Block the tires to keep the machine from rolling.

SAFETY

- Any unauthorized modifications made to the baler by the customer or parties other than Allied Systems will relieve Allied Systems Company and your Freeman dealer of any liability for damage or injury.
- Replace any worn parts only with genuine Freeman parts. Call your dealer for assistance.
- Unless specified in service procedures, never attempt maintenance or lubrication procedures while the baler is moving or the engine is running.

- Engine exhaust fumes can cause death. If it is necessary to run the engine in an enclosed space, remove the exhaust fumes from the area with an exhaust pipe extension. Use ventilation fans and open shop doors to provide adequate ventilation.



- Batteries contain sulfuric acid which can cause severe burns. Avoid contact with skin, eyes or clothing.
- Batteries produce explosive gases. Keep sparks, flame and cigarettes away. Ventilate when charging or servicing in an enclosed space. Always shield your eyes when working near batteries. When removing battery cables, disconnect the negative (-) cable first. When installing a battery, always connect the positive (+) cable first. This procedure will help to prevent a spark which could cause an explosion.



- Before making adjustments to the electrical system, disconnect the battery. An electrical spark could cause a fire, explosion or severe burns.

Safety Equipment

- Ensure test equipment is in good condition.
- If an instrument must be held while taking measurements, ground the case of the instrument before energizing equipment.
- Do not touch live equipment or personnel working on live equipment while holding a multimeter. Some types of measuring devices should not be grounded—do not hold such devices while taking measurements.
- Prevent personal injury or equipment damage by using a lifting device with a lifting capacity greater than twice the weight of any equipment to be lifted.
- Always use personal protective equipment (PPE) appropriate to the situation. This may include the use of hearing protection, eye protection, a respirator, a hard hat, leather gloves, steel toed boots, etc.



SAFETY

Electrical Hazards

- An electric shock could be fatal. Ensure power to the baler is “OFF” before opening electrical panels.
- All electrical cables and connectors must be in good condition (free of corrosion, damage, etc). Use caution in wet weather to avoid danger from electrical shock. Never attempt electrical testing or repair while standing in water.
- Do not wear electrically conductive jewelry, clothing, or other items while working on the electrical system.



Hot Oil Hazards

- Burns from hot oil can be severe—Always allow lubricating and hydraulic oil to cool before draining.

Compressed Air Hazards

- When using compressed air to dry parts, pressure should not exceed 30 psi (200 kPa).
- Air pressure penetrating your skin can be fatal. Never direct compressed air at anyone.

Fire Safety



WARNING

Diesel fuel and hydraulic oil are flammable. Never smoke while handling fuel or working on the fuel system. The fumes in an empty fuel container are explosive. Never cut or weld on or near fuel lines, tanks, or containers. Keep open flames and sparks away from the machine.

Reduce the Risk of Fire

- Keep the baler free of oil, grease, hay, and trash accumulations. Regular cleaning is recommended for fire prevention and general safety. Use an approved solvent to clean machine parts. Never use gasoline or diesel fuel.
- Shut off the engine and electrical equipment while filling the fuel tank. Use extra caution when fueling a hot engine. Always ground the fuel nozzle against the filler neck to avoid sparks.
- Never overfill the fuel or hydraulic tanks. Any overflow could cause a fire. Immediately repair any hydraulic or fuel leaks and clean up any spills.
- Handle all solvents and dry chemicals according to procedures identified on manufacturer’s containers. Work in a well-ventilated area. Make sure you know where fire extinguishers are kept and how to use them.
- Avoid spilling fuel or other hazardous liquids. If a spill occurs, follow local or state regulations for clean-up. Contact your state’s OSHA office for details.
- Always ensure that excess grease and oil accumulation, including spillage, is cleaned up immediately.
- Inspect the baler daily for potential fire hazards and make any necessary repairs immediately.

SAFETY

- Check all the electrical wiring and connections for defects, and repair or replace as necessary. Keep battery terminals clean and tight.
- Never perform welding operations until the entire machine has undergone a thorough cleaning. In addition, cover rubber hoses, disconnect the battery, and have at least a fire extinguisher at hand.
- Never perform welding operations until all sensitive electronic components have been electrically disconnected, including but not limited to; computers, modules, displays, monitors, controllers, cameras, batteries...
- Hydraulic fluid is flammable. Do not weld on or near pipes, tubes, or hoses that are filled with fluid. Do not smoke when checking or filling the tank. Keep open flames and sparks away from the baler.
- Hay dust is combustible. Do not have an open flame or weld in dusty environments.
- Maintain the engine cooling system to avoid overheating.
- Remember, there is always a risk of fire.

Fire Fighting Equipment

- It is recommended to carry an “ABC” fire extinguisher on the baler or in the pull vehicle at all times. Install it within easy reach of the operator in a position that protects it from damage. Use only a “quick release” type of mount. It is also recommended to carry a four gallon water container with a pump, or as required by local and state law.
- Keep your fire extinguisher(s) fully charged and in good working order. Know how to use them.
- Read and understand the instructions printed on the canisters and learn how to operate them. Learn how to remove the canisters from their mounting brackets in the shortest amount of time.
- Service the extinguisher according to the manufacturer’s specifications. Service after every use, no matter how short a time.

Fire Suppression

- Do not panic. At the first sign of trouble (burning smell, smoke, visible flame, etc), stop the tractor and turn off the engine in the clearest area available, with the tractor upwind from the baler if possible.
- If the fire cannot be extinguished safely, immediately evacuate the area. DO NOT attempt to extinguish it. DO NOT risk personal injury. Contact your local fire department.
- If you have determined that the fire may be safely extinguished, use the fire extinguisher according to the manufacturer’s instructions, or use the water pump, aiming water at the base of the fire.
- When the baler has fully cooled, thoroughly inspect, and make all necessary repairs to return the baler to normal operation.
- Recharge or replace the extinguishers before returning to work.

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INTRODUCTION TO THE BALER OPERATING SYSTEM

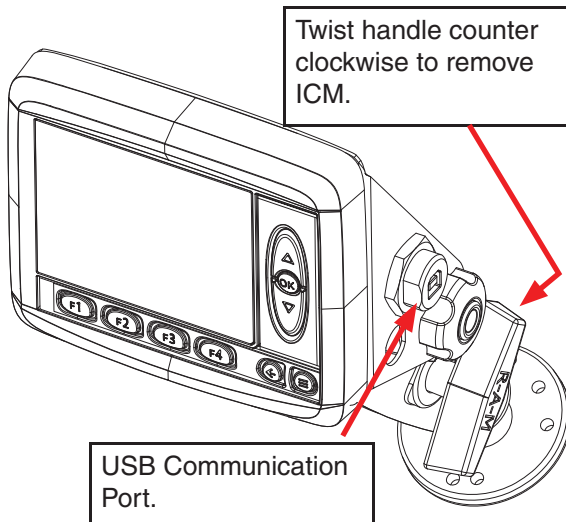


Figure 1-1 In-Cab Monitor (ICM)

The Baler Operating System consists of:

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

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

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

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

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

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

- Receives commands from the ICM
- Monitors signals from the machine sensors
- Sends control signals to machine components (i.e. pump, tension manifold, etc.)
- The ICM uses a CAN-bus cable to communicate with the XA2 modules.

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

USING IN-CAB MONITOR (ICM) AS REMOTE CONTROL

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

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

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

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

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



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



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

NOTICE

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

NOTICE

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

Shutdown Procedure

1. Stop the tractor in a level and safe location.
2. Lock the tractor brakes.
3. Disengage the tractor PTO.
4. Turn the tractor off.
5. Allow the ICM to stay powered on.
6. Allow the bale to expand out the back of the baler. This typically takes 1 to 5 minutes.
7. Once the bale is finished expanding out the back of the baler, shut off power to the ICM.

BALER SEQUENCE OF OPERATION

Sequence 1 - Pause/Manual

1. ICM is turned on and in Pause/Manual operation
 - a. Sensors are monitoring the status of the baler systems

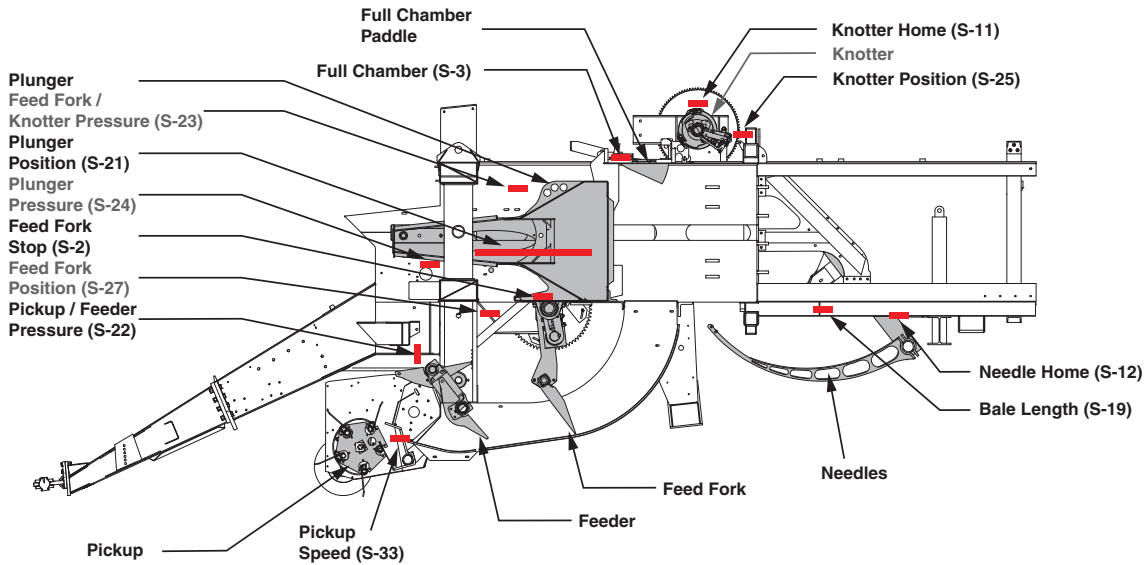


Figure 1-2 Pause/Manual

Sequence 2 - Forks Cycle

1. Material enters the baler and is moved into the In-feed Chute.
 - a. Feeder Rotates
 - i. Pickup speed monitored by Pickup Speed Sensor (S-33).
 1. Stall Warning (optional)
 2. Auto Unplug (optional)
 - ii. Feeder pressure is monitored by Feeder Pressure transducer (S-22).
 - b. Feed Fork Rotates
 - i. Position and monitored by Feed Fork Tooth Count sensor (S-27).
 - ii. Feed Fork pressure is monitored by Feed Fork / Knotter pressure transducer (S-23).

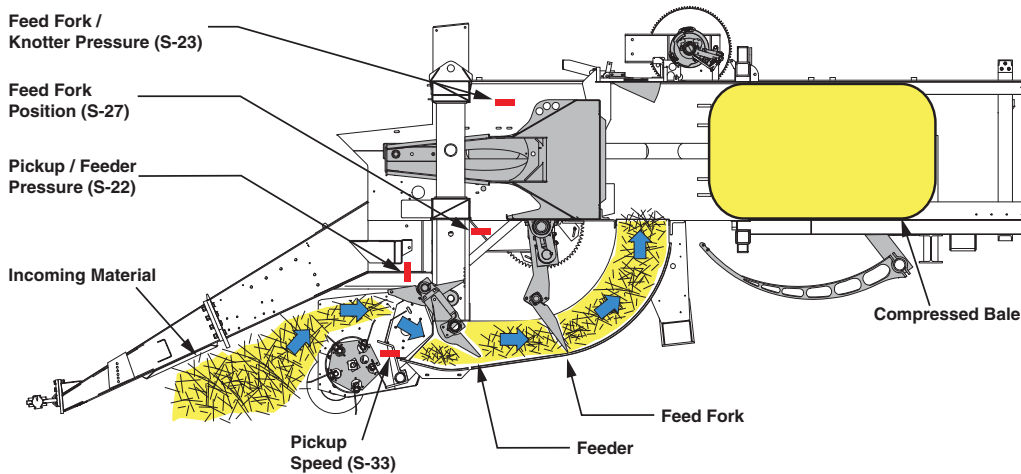


Figure 1-3 Forks Cycle

Sequence 3 - Feed Fork Stop

1. Material fills the Compression Chamber.
 - a. Feeder continues to rotate.
 - b. Full Chamber Paddles raise and activate Full Chamber Paddle sensor (S-3).

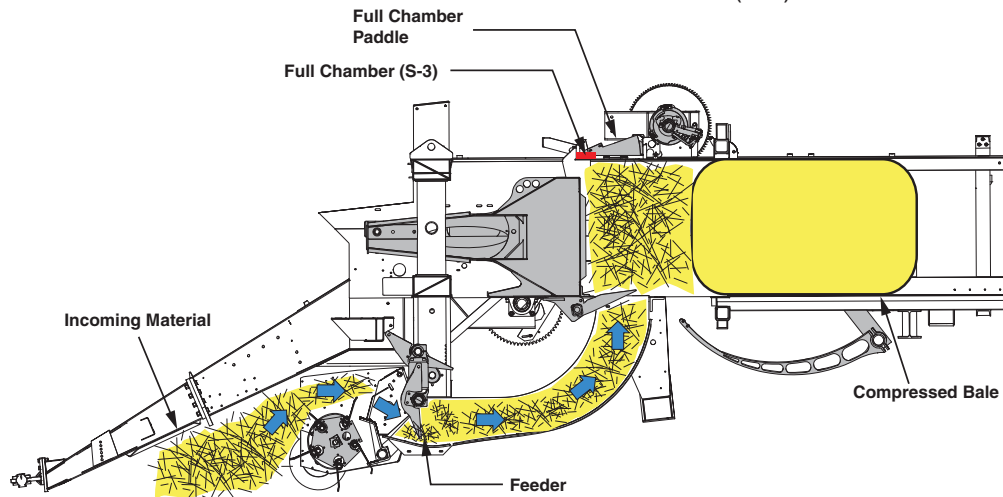


Figure 1-4 Feed Fork Stop

Sequence 4 - Plunger Extending

1. Plunger Compresses Material.
 - a. Feed Fork Stops at Stop Pad sensor (S-2).
 - b. Feeder continues to rotate.
 - i. Feeder will stop rotating if Plunger does not reach the Plunger Stop Position within the time interval specified under the setting Stall Time to Stop Feeder.
 - c. Position monitored by Plunger Position Sensor (S-21).
 - i. Plunger will not extend if either the Knotter Stop / Home sensor (S-11) or the Needle Home sensor (S-12) is deactivated.
 - d. Plunger extends at regenerative speed until it reaches approximately 2000 psi when valve number 8 opens and the plunger regenerative period ends.
 - e. Plunger extends at full speed to Plunger Decel Position.
 - f. Plunger ramps to decel speed until Plunger Extend Stop Position.
 - g. Plunger comes to rest at Plunger Extend Cushion.
 - h. Peak Plunger Pressure is recorded.

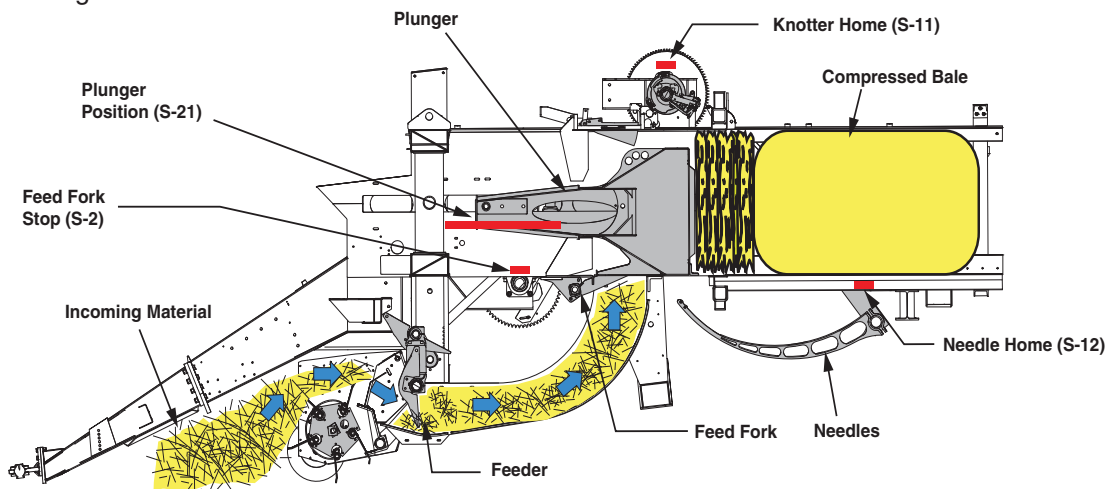


Figure 1-5 Sequence 4 Plunger Extending

Sequence 5a - Plunger Retracting

1. Plunger Retracts (bale forming)

- a. Position monitored by Plunger Position Sensor (S-21).
 - i. Plunger retracts at full speed to Plunger Decel Position.
 - ii. Plunger ramps to decel speed until Plunger Retract Stop Position.
 - iii. Plunger comes to rest at Plunger Retract Cushion.
 - iv. Tension system adjusts percent tension based on the difference between the last Peak Plunger Pressure and the Target Plunger Pressure.
- b. Feed Fork start rotating when plunger reaches Plunger Start Forks.

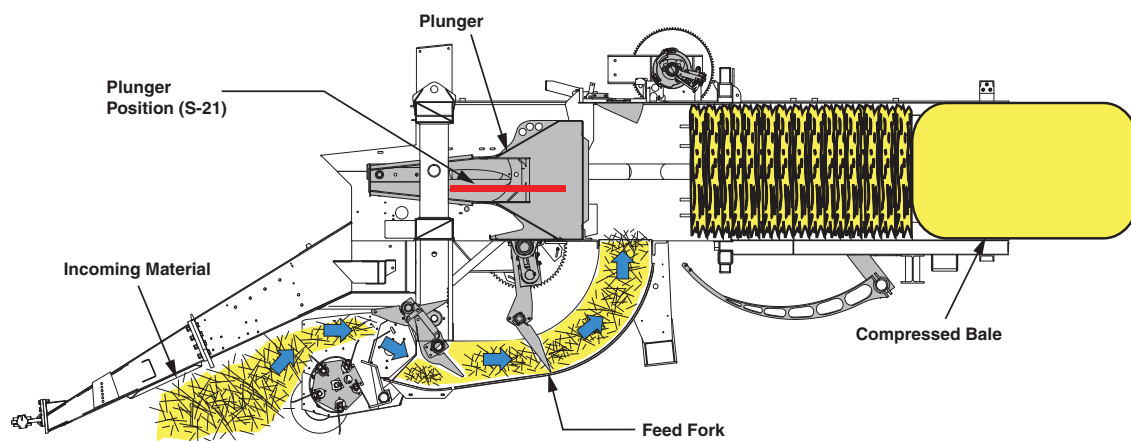


Figure 1-6 Plunger Retracting

Sequence 5b - Plunger Retracting / Knotter Tying

1. Plunger Retracts (bale formed & knotter cycles)
 - a. Forming bale in chamber turns star wheel.
 - i. Star wheel turns bale length potentiometer (S-19).
 - ii. Bale length is calculated and compared to desired bale length.
 - iii. Signal to tie is given when bale length is greater than desired length or “Tie next/now” is activated.
 - iv. Once tie cycle is complete, bale length is reset to zero and a new potentiometer start value is recorded.
 - b. Knotter begins to cycle once plunger begins retracting.
 - i. Knotter position monitored by Knotter Tooth Count (S-25).
 1. Knotter Stop / Home sensor deactivated (S-11).
 2. Needle Home sensor deactivated (S-12).
 - c. Plunger Retracts
 - ii. Position monitored by Plunger Position Sensor (S-21).
 - iii. Plunger retracts until it reaches the Plunger Stop for Knotter (S-21) From Ext. and waits until the Knotter Tooth Count (2-25) reaches Knotter Mid Cycle (S-25).
 - iv. Plunger retracts at full speed to Plunger Decel Position.
 - v. Plunger ramps to decel speed until Plunger Retract Stop Position.
 - vi. Plunger comes to rest at Plunger Retract Cushion.
 - vii. Tension system adjusts percent tension based on the difference between the last Peak Plunger Pressure and the Target Plunger Pressure.
 - d. Feed Fork starts rotating once plunger reaches Plunger Start Forks Tie Cycle.

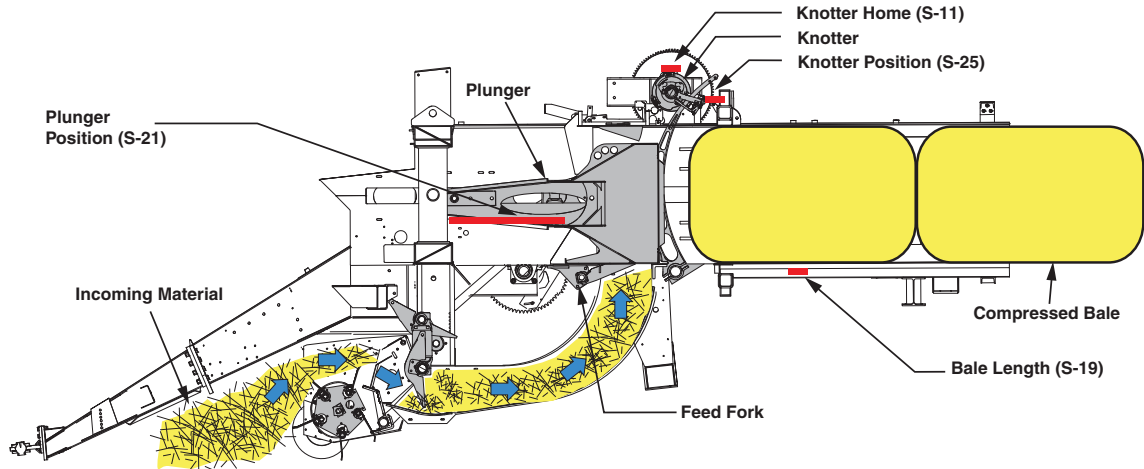


Figure 1-7 Knotter Tying

MONITOR OVERVIEW



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

BALE SCREEN - FUNCTION BUTTONS & MANUAL CONTROL



Figure 2-1 Bale Screen

Theory of Operation

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

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

F1 1. CONTROL OUTPUT DISABLE

Function:

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

Adjustment Objective:

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



CAUTION

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

Adjustment Procedure:

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

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

F2 2. CLEAR PLUNGER

Function:

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

Adjustment Objective:

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

Adjustment Procedure:

Press and hold **F2** to fully extend the Plunger.

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

F3 3. PLUNGER PRESSURE

Function:

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

Adjustment Objective:

To establish a target for the Plunger Pressure

Adjustment Procedure:

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

[See page 21-1 for default setting]

F4 4. GO

Function:

Begin or pause baling

Adjustment Objective:

To start or pause the baling operation.

Adjustment Procedure:

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

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

1. **DISABLED:** Disables all outputs from the XA2 modules. No functions can be run in this sequence.
2. **Pause:** Baler not in the Automatic mode; operator presses F4 to GO and baling process sequence starts.
3. **Forks Cycle:** Feed Fork rotates (cycles) until enough material is gathered to raise Full Chamber Paddles which activate sensor S-3 (See Operators Manual, Maintenance and Adjustments).
4. **Feed Fork Stop:** The ICM receives a signal from the Feed Fork Stop sensor S-2 (See Operators Manual, Maintenance and Adjustments) and sends signal to XA2 to stop Feed Fork (valve is shifted to neutral).
5. **Plunger Extends:** When feed fork stops, plunger extends until it reaches the extend cushion set point (see page 6-2).
6. **Plunger Retracting:** plunger retracts until it reaches the retract cushion set point (See page 6-2). Sequence repeats until bale is determined to be correct length.
7. **Knotter Tying:** knotter cycles completing entire bale sequence.



5. FUNCTION SELECT FOR MANUAL OPERATION

Function:

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

Adjustment Procedure:

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

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

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



Proceeds to the Auto Statistics screen



Proceeds to the Main Screen



BALE SCREEN - DISPLAYS, INDICATORS, & GRAPHS



Figure 2-2 Bale Screen

Theory of Operation

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

1. % TENSION DISPLAY

Function:

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

With the Tension Control set to “Auto” from the Auto Statistics screen (see reference #4 on Auto Statistics screen page 3-1) the tension % will adjust automatically as conditions (moisture) change in order to maintain the desired Target Plunger Pressure.

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

2. PREVIOUS BALE FLAKE COUNT DISPLAY

Function:

Displays the number of flakes in the previous bale.

3. CURRENT BALE FLAKE COUNT DISPLAY

Function:

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

4. NEEDLE HOME INDICATOR

Function:

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

5. BALE LENGTH GRAPH & DISPLAY

Function:

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

6. TYING NEXT CYCLE



Function:

This illuminates when the machine will tie on the next cycle. This will display when the bale has reached the preset length, and the XA 2 has been signaled to start the knotter after the next plunger stroke, or the Tie Knot Next function has been activated (See page 3-1 for more information).

7. KNOTT INDICATORS (Double Knotters Only)

Function:

The six knotters are represented by six squares at the top of the home screen. The squares represent the position of the top twine puller.

1.  Green: Slack puller all the way down - bale is pulling on the twine.
2.  White: Slack puller not all the way down - pulling slack out of the twine.

As the needles come up into the chamber, the indicators should stay green.

After the needles start heading down and the first knot is tied, the indicators should turn white as the pullers take up the slack.

The indicators should stay white as the needles continue down and the second knot is tied.

As the twine gets pulled tight by the growing bale, the indicators should turn green as the slack pullers bottom out. This should take one or two plunger strokes.

If an indicator stays white for more than 2 or 3 plunger strokes, there is likely either a miss-tie, broken twine, or that knotter is out of twine.

8. KNOTTER HOME INDICATOR

Function:

This indicator will turn green when the knotter has rotated to the home position and the stop pad has activated the S-12 knotter home sensor (See Operators Manual, Maintenance and Adjustments). This indicator will illuminate green when the knotter is away from the home position

9. CURRENT BALE LENGTH DISPLAY

Function:

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

10. KNOTTER POSITION INDICATOR

Function:

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

11. FULL CHAMBER INDICATOR

Function:

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

12. PLUNGER POSITION GRAPH

Function:

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

13. BALE COUNT DISPLAY

Function:

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

14. FIELD BEING BALED AND COUNTED

Function:

Displays the name of the field being baled and counted. Field name can be changed in the Field Counts screen (see page 4-1).

15. PLUNGER PRESSURE DISPLAY & GRAPH

Function:

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

16. PICK UP / FEEDER PRESSURE GRAPH

Function:

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

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

17. PICKUP INDICATOR

Function:

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

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

18. FEEDER INDICATOR

Function:

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

19. FEED FORK PRESSURE (CURRENT) INDICATOR

Function:

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

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

20. FEED FORK PRESSURE (PREVIOUS) INDICATOR

Function:

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

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

21. FEED FORK INDICATOR

Function:

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



Proceeds to the Auto Statistics screen



Proceeds to the Main Screen



BALE SCREEN - SERVICE INDICATORS & WARNINGS



Figure 2-3 Bale Screen

Theory of Operation

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

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

1. ACCUMULATOR LOW PRESSURE WARNING INDICATOR

Function:

Monitors the hydraulic system for low pressure. If the hydraulic system pressure drops below 200 psi, the warning indicator will be illuminated. The indicator will be illuminated if the main pump charge pressure drops below 200 psi. See Operating Troubleshooting section for more information regarding the warning screen.

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

2. OIL COOLING FAN ON / OFF INDICATOR

Function:

Displays the status of the Oil Cooling Fan, and will be illuminated when the fan is on. The fans are controlled by settings entered in the Oil Cooler screen (see page 10-1).

3. KNOTTER FAN ON / OFF INDICATOR

Function:

Displays the status of the Knotter Fans, and will be illuminated when the fans are on. The fans turn on when "GO" (F4) is activated and turn off when "PAUSE" (F4) is selected again to pause baling. The fans can also be controlled from the Functions screen (see page 5-1). There is also a manual switch located near the rear left-hand service ladder for turning the fans ON and OFF.

4. OIL OVER TEMPERATURE INDICATOR

Function:

This will illuminate when the temperature is above the Overheat Temp setting (see page 10-1). When the temperature exceeds the Oil Over Temperature the machine will cease operation after the current plunger cycle to protect the hydraulic system from damage from heat. See the Operating Troubleshooting section for more information regarding the warning screen.

5. OIL TEMPERATURE INDICATOR

Function:

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

6. LOW OIL INDICATOR

Function:

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

7. BATTERY LOW VOLTAGE INDICATOR

Function:

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

8. WORK LIGHTS ON / OFF INDICATOR

Function:

Displays the status of the Work Lights, and will be illuminated when the lights are on. See the Functions screen for operating the Work Lights (see page 5-1).

9. TIME

Function:

Displays the current time. The time can be set from Preferences on the Main screen (see page 14-1).



Proceeds to the Auto Statistics screen



Proceeds to the Main Screen

NOTES

AUTO STATISTICS



Figure 3-1 Auto Statistics Screen

Theory of Operation

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

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

Note: If you wish to periodically reset the Average Plunger Pressure and Average Tension while in the same field, you must periodically go into the Field Count Screen and reset the field count which also resets these two items for this screen. If you do not want to reset the field you are counting, select another field and reset, and then return to the field you desire. See page 4-1 item 2 for information on resetting the field count.

F1 1. CONTROL OUTPUT DISABLE

Function:

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

Adjustment Objective:

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



CAUTION

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

Adjustment Procedure:

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

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

F2 **2. TIE KNOT NEXT / NOW**

Function:

Allows the operator to tie the bale at any time before it has reached its predetermined length, but it must have minimum of three flakes. This function has two options; Tie Knot Now or Tie Knot Next. Both options occur like a normal knotter cycle except the Tie Knot Now option starts the plunger cycle as soon as the Feed Fork activates SW-2 Feed Fork Stop. This occurs regardless of condition of the SW-3 Full Chamber Paddles. See page 9-9 for more information.

Adjustment Objective:

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

Adjustment Procedure:

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



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

F3 **3. BALE LENGTH**

Function:

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

Adjustment Objective:

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

Adjustment Procedure:

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

[See page 21-1 for default setting]

F4 **4. TENSION CONTROL**

Function:

To set the Tension System to Automatic or Manual mode. In Automatic Mode, the control system will adjust the tension pressure to maintain the Target Plunger Pressure (see page 12-1).

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

Adjustment Objective:

To set operating mode for the Tension Pressure.

Adjustment Procedure:

1. Press **F4**. The "Tension Pressure Control" box will appear.
2. Press **▲▼** to adjust the value to the desired setting (auto or manual).
3. Press **OK** to save the setting.
4. If "auto" is selected, the control system will automatically adjust the tension pressure to maintain the Target Plunger Pressure (see page 12-1).
5. If "manual" is selected, Press **OK** and use **▲▼** to adjust the setting for the Tension Pressure (%). The higher the setting the more pressure that is applied when forming a bale.

5. AVERAGE CYCLES / PLUNGE DISPLAY

Function:

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

6. AVERAGE STROKES PER BALE DISPLAY

Function:

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

7. AVERAGE PLUNGER PRESSURE DISPLAY

Function:

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

8. STROKES PER MINUTE DISPLAY

Function:

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

9. AVERAGE FLAKE DISPLAY

Function:

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

10. LAST BALE LENGTH DISPLAY

Function:

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

11. CURRENT BALE LENGTH DISPLAY

Function:

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

12. PLUNGER POSITION DISPLAY AND INDICATOR

Function:

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

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

13. TENSION MONITOR DISPLAY

Function:

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

TENSION = Current Output (%) setting if Manual Tension Mode is selected (see reference #4 on Figure 3-1). NOTE: This value is not displayed with the Automatic Tension Mode is selected.

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

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

A lower pressure will indicate less Tension Pressure is required and the material is wetter.

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

Avg. Out = Average Tension Output (%). This is the average percentage of Full Tension Pressure being applied for a selected field. The value is reset when the Field Count for the selected field is reset (see page 4-1).

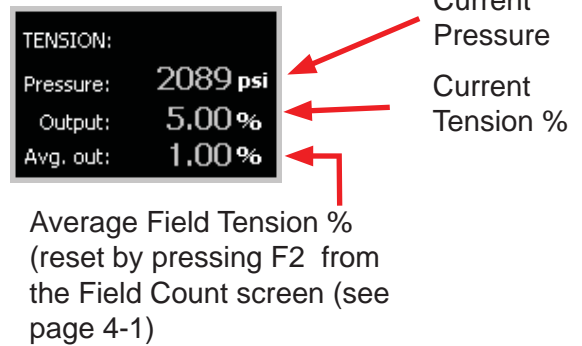


Figure 3-2 Tension



Returns to the Field Counts screen



Proceeds to the Main screen

FIELD COUNTS



Figure 4-1 Field Counts Screen

Theory of Operation

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

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

F1 1. CONTROL OUTPUT DISABLE

Function:

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

Adjustment Objective:

Halts all baler operations controlled by the system.



CAUTION

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

Adjustment Procedure:

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

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

F2 2. RESET COUNT

Function:

Resets the Field Count to zero (0) for the selected field (see reference #8 on Figure 4-1). Resetting the count will also reset the calculations for Average Plunger Pressure and Average Tension (see page 3-1).

Adjustment Objective:

Reset the Field count to zero (0) for the selected field (see reference #8 on Field Counts screen page 4-1).

Adjustment Procedure:

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

F3 3. CHANGE NAME

Function:

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

Adjustment Objective:

Create a unique identification for a specific field.

Adjustment Procedure:

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

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

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

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

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

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

*NOTE: Upon entering the Field Names screen, use to select the “Delete” command, and repeatedly press the **OK** button to remove the current name.*

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

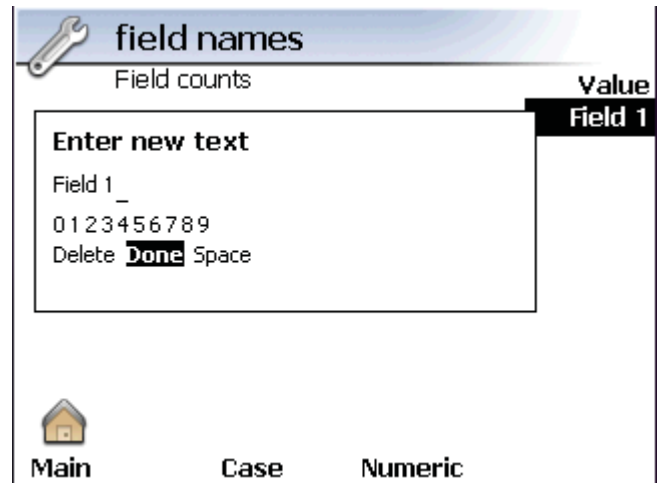


Figure 4-2 Field Names

F4 4. ADJUST COUNT

Function:

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

Adjustment Objective:

Set the current field count to a different number.

Adjustment Procedure:

1. Press and hold **F4**.
2. Use the **▲▼** arrow to adjust the bale count. The Bale Count (see reference #11 on Field Counts screen page 4-1) value in the upper right hand corner of the screen will change as the buttons are used.

5. PROGRAM VERSION DISPLAY

Function:

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

6. RUN HOURS DISPLAY

Function:

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

7. FIELD SELECT (OK)

Function:

Changes the selected field when baling.

Adjustment Objective:

Changes the selected field displayed.

Adjustment Procedure:

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

8. FIELD NUMBER DISPLAY

Function:

Displays the Field Number for the selected field.

9. LIFE HOURS DISPLAY

Function:

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

10. LIFE BALES DISPLAY

Function:

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

11. BALE COUNT DISPLAY

Function:

Displays the current bale count for the selected field.

12. FIELD COUNT DISPLAY

Function:

Displays the current bale count for a field.


13. FIELD NAME

Function:

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

14. LIFE BALES AT START DISPLAY

Function:

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



Returns to the Bale Screen



Proceed to the Main screen



Figure 5-1 Functions Screen

Theory of Operation

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

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

F1 1. CONTROL OUTPUT DISABLE

Function:

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

Adjustment Objective:

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



CAUTION

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

Adjustment Procedure:

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

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

F2 2. OPEN RAILS

Function:

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

Adjustment Objective:

To open the tension rails

Adjustment Procedure:

1. Press **F2**. The tension rails will fully open.
2. Press **F2** again to close the tension rails, or start the baler using the “GO” button (see page 2-3)

F3 3. WORK LIGHTS / KNOTTER FAN

Function:

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

Adjustment Objective:

To operate the Work Lights and Knotter Fans

Adjustment Procedure:

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

F4 4. MACHINE SETTINGS MENU

Function:

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

Adjustment Objective:

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

Adjustment Procedure:

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

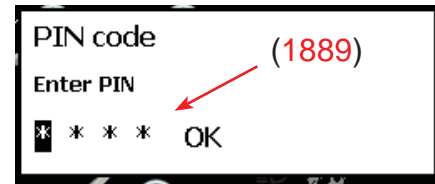


Figure 5-2 Pin Code Screen

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

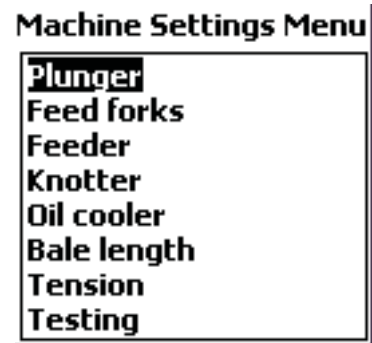


Figure 5-3 Pin Code Screen

OK 5. FUNCTION SELECT FOR MANUAL OPERATION


Function:


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


Adjustment Procedure:

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

Steps

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

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

2. Use  to control the system.

6. CONTROL SYSTEM VOLTAGE DISPLAY

Function:

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

7. SYSTEM DATE

Function:

Displays the current date.

8. LOW OIL INDICATOR

Function:

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

9. BATTERY LOW VOLTAGE INDICATOR

Function:

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

10. OIL OVER TEMPERATURE INDICATOR

Function:

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

11. OIL TEMPERATURE INDICATOR

Function:

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

12. SYSTEM TIME

Function:

Displays the current time.

13. OIL OVER TEMPERATURE INDICATOR

Function:

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

14. NEEDLE HOME INDICATOR

Function:

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

15. KNOTTER HOME INDICATOR

Function:

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

16. KNOTTER POSITION INDICATOR

Function:

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



Returns to the Bale Screen



Return to the Main screen

Section 6

PLUNGER SETTINGS



Figure 6-1 Bale Screen

Theory of Operation

The plunger position is continuously monitored by a linear position sensor. The following text and diagram shows the position (% of Stroke) of the Plunger versus the control signal, and is valid for when the Plunger is extending or retracting:

1. At rest, the Plunger will begin to ramp up to full speed by an increase the control signal Modulation Ratio (MR) of the pump controller. Full speed of the plunger is based on a percentage of the full pump flow called the MR (see page 6-27).
2. At full speed, the Plunger will extend until a defined point is reached where it will begin to decelerate. This is usually a few inches from the end of the stroke (see page 6-5).
3. The Plunger will decelerate (Decel) by ramping down its speed to a pre-defined Decel Output setting (see page 6-19 and 6-23).
4. At a point half-way between the start of the Plunger deceleration and the Stop position the, the Plunger will stop its deceleration and continue at a constant speed until it reaches the Stop position.
5. At the Stop position the pump controller will cut back to zero (0) flow and begin to stop the Plunger.
6. The Plunger speed will decrease as the pump controller moves to its zero (0) flow position. Due to the time it takes the swash plate in the pump to return to neutral, combined with the inertia of the 1400lb plunger, the Plunger will not stop instantly and its movement will continue past the Stop position before coming to rest.
7. The Plunger should stop at the Cushion located approximately 1" from the end of the Plunger Cylinder stroke (32.0 inches).

Note: All Plunger position triggers are based from the calibrated minimum and maximum positions of the plunger linear position sensor. To setup or check key Plunger positions refer to the Plunger Positions screen (see page 6-5).

Note: The plunger linear position sensor and subsequent plunger cushions are the most important values and must be re-set after any of the following occur:

- Replacement or adjustment of the plunger linear position sensor.
- Servicing of the plunger cylinder.

Note: A typical time for retracting is 900ms, and 1,200ms for extending. With no material in the chamber, the time will be approximately 800 - 1,000ms for both directions. The actual values will depend upon baling conditions and material. These values are approximate and based on a tractor PTO speed of 1000 RPM.

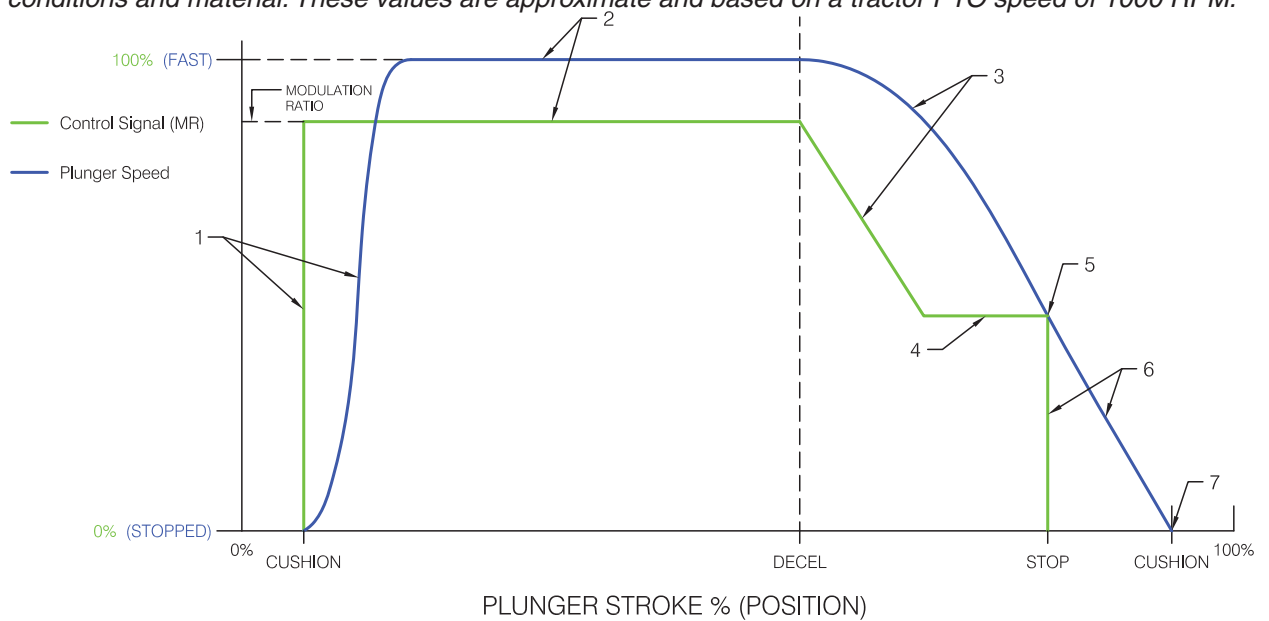













Figure 6-2 Plunger Stroke and Positions Diagram

PLUNGER SETUP:

1. Use the  button to scroll to the Functions screen
2. Select "Machine Settings Menu" .
3. Enter the pass code.
4. Select "Plunger" from the pop-up menu (you may have to scroll away from the Plunger selection, then back to it before hitting  to select it).
5. Select "Plunger Positions" .
6. Select "Plunger Limits" .
7. Set Plunger Retract Bottom to 1.00
8. Set Plunger Extend Bottom to 99.00
9. Go back to Plunger Settings screen ( twice).
10. Activate Plunger Stop Override .
11. Go to Plunger Positions Screen .
12. Select the Plunger for manual control by using the  button to scroll through the options in the top right of the screen, until it reads "Plunger".
13. Run the tractor and set the PTO to 500 RPM.
14. Using the Up/Down Arrows, retract plunger until it bottoms out and reaches the physical limit of the cylinder stroke.
15. Verify that the Position bar at the top of the Plunger Position screen reads 1.0%
16. From the Plunger Position screen, select Position Sensor .
17. Adjust position sensor minimum value, using the up/down arrows, until the Actual value [%] displays 1.00% +0.1/-0.0. Save this value by pressing  twice.
18. This will take you back to Plunger Position screen.
19. Using the Up/Down Arrows, extend the plunger until it tops out and reaches the physical limit of the cylinder stroke.
20. Verify that the Position bar at the top of the screen reads 99.0%.

21. From the Plunger Position screen, select Position Sensor **F1**.
22. Adjust position sensor maximum value, using the up/down arrows, until the Actual value [%] displays 99.00% +0.0/-0.1. Save this value by pressing **OK** twice.
23. Go To Plunger Settings **←**.
24. Deactivate the Plunger Stop Override **F3**.
25. Select Plunger Set-up **F4**.
26. Select Extend Cushion **F2**.
27. Using Up/Down arrows, set Extend Cushion to "2.5". Press OK.
28. Select the Plunger for manual control by using the **OK** button to scroll through the options in the top right of the screen, until it reads "Plunger".
29. Using the Up/Down Arrows, retract plunger until it bottoms out and reaches the physical limit of the cylinder stroke.
30. Select Auto Setup **F3**. Confirm that Plunger is selected in the top right corner.
31. Verify Plunger Retract Time and Extend Time are set to 2000 ms.
32. Set the PTO RPM to 1000.
33. Select Auto Learn **F1**. See "PLUNGER AUTO SETUP" on page 6-21.
34. Continue running Auto Learn **F1** until Auto Learn indicates that setup is complete.

F1 1. PLUNGER POSITIONS

Function:

This allows the user to advance to the “Plunger Position” screen; see page 6-5 for more information.

Adjustment Objective:

Advance to the Plunger Position screen to see details about the plunger positions.

Adjustment Procedure:

1. Press **F1** to advance to the Plunger Position screen.
2. See Plunger Position screen for additional information.

F2 2. PLUNGER DRIFT COMPENSATION

Function:

When activated, this will retract the plunger to the home position when the “GO” button is pressed. This is a convenient function as the plunger will automatically retract without requiring the plunger to be manually retracted before the baling sequence may proceed.

Adjustment Objective:

To return the plunger automatically to the home position when the “GO” button is pressed.

Adjustment Procedure:

1. Press **F2**. An informational popup will appear in the bottom right of the Plunger Settings Screen.



Figure 6-3 Plunger Stop at Cushions

2. Use **▲▼** to activate and deactivate.
3. Press **OK** to select the value.

[See page 21-1 for default setting]

F3 3. PLUNGER STOP AT CUSHIONS

Function:

This determines whether the plunger disregards the stops and continues on to bottom out at both ends of its travel.

This must always be set at “Yes” unless the Plunger Stop Cushions are being setup. Damage to the cylinder will result if the plunger is left to bottom out continuously.

Adjustment Objective:

1. Press **F3**. An informational pop up will appear.

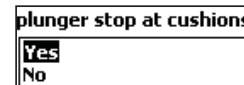


Figure 6-4 Plunger Stop at Cushions

2. Use **▲▼** to select the option. If “No” is selected red text will appear in this window called “CUSHION STOP OVERRIDE” alerting you that you are overriding the cushion stop.

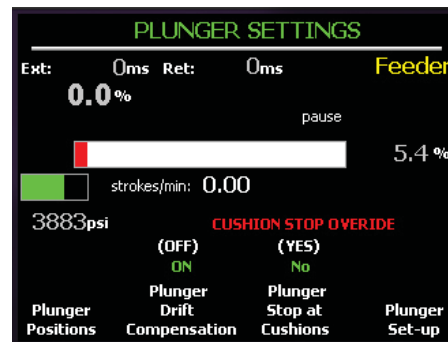


Figure 6-5 Plunger Settings Screen

3. Press **OK** to make the selection.

F4 4. PLUNGER SET-UP

Function:

This advances to the Plunger Set-up screen.

Adjustment Objective:

To advance to the Plunger Set-up screen.

Adjustment Procedure:

1. Press **F4**.
2. See Plunger Set-up screen for more information.

5. PLUNGER POSITION DISPLAY & GRAPH

Function:

Displays the current position (%) of the Plunger during its stroke. The graph will be initially white and will turn red as the plunger is stroked. It will start on the left at the start of a cycle, move to the right as the Plunger compresses the crop in the chamber.

The plunger position sensor puts out a 0 - 100% signal over its full range, but the plunger cylinder restricts this full travel to approximately 5 - 95%. This means 3% of sensor travel is about 1" of plunger travel.

6. FUNCTION SELECT FOR MANUAL OPERATION



Function:

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

Adjustment Objective:

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

Adjustment Procedure:

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

7. SELECTED MANUAL CONTROL ASSEMBLY DISPLAY

Function:

Indicates the assembly selected for manual control (see Reference #6 on Figure 6-1).

8. PLUNGER RETRACT TIME DISPLAY

Function:

This is the time (ms) for the plunger to retract from full extension to full retract. This value is measured from the point the Plunger is commanded to retract to the point where the plunger has reached the Retract Stop Position.

9. PLUNGER EXTEND TIME DISPLAY

Function:

This is the time (ms) for the plunger to extend from full retract to full extension. This value is taken from the point the Plunger is commanded to extend to the position where the Plunger has reached the Stop Position on extension.

10. HYDRAULIC FLOW DISPLAY

Function:

Displays the percentage of hydraulic flow (%) being requested from the pump for the Plunger Cylinder. The range is from -100% to 100%. A minus (-) value indicates the cylinder is retracting and a positive (+) indicates the cylinder is extending. At 0% the pump is at its neutral position. This value only indicates the relative input signal to the pump controller and is not the actual output from pump.

11. PLUNGER PRESSURE GRAPH AND DISPLAY

Function:

This displays the current plunger pressure (psi). The graph will turn green as the pressure increases. The value is shown below the graph.

12. PLUNGER STROKES/MIN DISPLAY

Function:

This displays the number of plunger strokes per minute. A plunger stroke is calculated as a full extension and retraction.



Returns to the Functions Screen



Returns to the Main Screen

PLUNGER POSITIONS



Figure 6-6 Plunger Positions Screen

Theory of Operation

This screen provides detailed information about important positions in the plunger travel process measured in % of the total plunger position sensor. These points include:

- Plunger Retract and Extend Cushions
- Default values for Plunger Extend and Retract-Stops and Decel points
- Learned values for Plunger Extend and Retract Stops and Decels
- Feed Fork Start values during bale forming cycle and tie cycle
- Plunger Tie Cycle Stop Position

All default plunger travel positions are measured towards the center of travel from user-defined values for the Plunger Retract and Extend Cushions. The Plunger Retract Stop position, Plunger Retract Decel position and the Feed Fork Start position are all measured from the Plunger Retract Cushion. The Plunger Extend Decel position, Plunger Extend Stop position and the Plunger Tie Cycle Stop position are

measured from the Plunger Extend Cushion. These default values should remain fairly consistent from machine to machine because they are based off the user set cushions. Setting the cushion positions accommodates mounting variations with the plunger position sensor. The main variable between machines that would then affect default positions is the efficiency of the plunger drive circuit.

The numbers shown in green are the “Learned” values that are the Plunger Stop and Decel positions used. The values in parenthesis are the distance from the default values that the system has learned. The learned value (that is always used) is calculated by adding/subtracting the learned distance from default and then adding/subtracting the user set cushion position. The “Learned” positions are in % of the full travel of the Plunger Position Sensor.

The “Learned” values for the Plunger Decel positions as mentioned before can be either selected for Auto Adjust or Default Setting. If the Default Setting is selected, the learned distance from default is set to 0 so the position used is the default plus/minus the cushion setting. If the Auto Adjust is selected, then every plunger cycle, the decel positions will adjust in attempt to stop the plunger at the cushion positions. This is achieved by monitoring the plunger position sensor as the plunger stops, comparing where it stops to where it should stop (the user set cushion position), and then making small changes in the decel position to get there. How small these changes are may be controlled by adjusting the “Plunger decel auto adjust sensitivity” where a smaller number is a smaller change.

Note: A typical value for the sensitivity would be 0.20.

The auto adjust feature is useful as it automatically adjusts the Plunger Decel Positions to compensate for changing field conditions without requiring the operator to make continual adjustments to these positions.

When using the automatic plunger setup feature, the plunger stop positions (especially retract stop) may learn points too close to the cushions making it impossible for the plunger decel positions to take up the slack. If this occurs, the Plunger Decel positions will continue adjusting away from the Plunger Stop Positions until the entire plunger stroke will be at the Plunger Decel speed.

The “Forks Start” position is the point on Plunger Retract Stroke that the Feed Fork start cycling AGAIN. The “Forks Start” position should be set so that they enter the In-feed Chute and begin pushing material as soon as the Plunger reaches home. Depending on how the plunger is set up to retract on a tie cycle, there is a different fork setting for tie cycle, which would typically start the Feed Fork later. Since this is the distance from the Plunger Retract Cushion, a larger value will start the Feed Fork earlier and possibly increase throughput where a smaller value will start the Feed Fork later. On a tie cycle the Feed Fork must start after the Plunger Stop for Knotter to prevent the Feed Fork from cycling while the Plunger is waiting for the Needles to advance. The Extend Cushion - Plunger Stop for Knotter must be greater than Retract Cushion + Feed Fork Start Cycle.

To protect the Knotter Needles as they pass through the top chamber, the plunger should be near full extension until the needles are halfway through their travel. This is controlled by the “Plunger Stop for Knotter (LS6) from Ext.” This is the position on a tie cycle where the plunger will come to a stop to wait for the knotter to finish one-half of the cycle. This distance is measured from the Plunger Extend Cushion and should be about 9” (25%) back

Note, on average 3% of the Plunger Position Sensor travel is equal to approximately 1 inch.

F1 1. STALL TIME

Function:

This is the amount of time allowed for the plunger to reach the extend stop position. If the plunger does not make it to the extend stop position in the “Stall Time”, the system will continue to command the plunger to extend, and a stall warning pop up will appear on the screen (see Trouble Shooting section page 23-1). At the same time, the feeder will stop moving and the % Tension will drop to 0% until the plunger reaches the extend stop position. Stopping the Feeder prevents the in-feed from plugging. Allowing the tension to drop to 0% allows the plunger to move the material easier through the chamber.

Note: It is recommended that the Stall Time be set at least 2000 ms.

The stall warning pop up will disappear once the plunger reaches the extend stop position. If the plunger stall warning appears often during baling refer to the Trouble Shooting section page 23-1 for possible causes.

[See page 21-1 for default setting]

F2 2. EXTEND DECEL

Function:

This controls the ability of the system to automatically adjust the Extend and retract Decel positions of the plunger by a factor proportional to the Plunger Decel Auto Adjust Sensitivity (see Plunger Auto Setup screen). On each plunger stroke, the system records the final plunger position on both extend and retract from the position sensor and compares that to the Extend and Retract Stop Positions. The difference between these two values is then multiplied by the Plunger Decel Auto Sensitivity and added or subtracted to the Decel positions. This brings the next plunger cycle closer to Extend and Retract stop positions.

Adjustment Objective:

This settings allows the computer to take control of the plunger decel positions, adjusting them to maximize machine efficiency and protection.

Adjustment Procedure:

1. Press **F2**. A pop up will appear (see below).
2. Use **▲▼** to select the setting within the pop up window.
3. Press **OK** to save the setting.

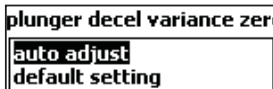


Figure 6-7 Plunger Decel Variance

[See page 21-1 for default setting]

F3 3. POSITION SETTINGS

Function:

This allows access to the Plunger Position Settings screen.

Adjustment Objective:

Access this screen to change the Plunger Position Settings.

Adjustment Procedure:

1. Press **F3**.
2. See Plunger Position Settings screen for more information.

F4 4. AUTO SETTINGS

Function:

This allows access to the Plunger Auto Settings screen.

Adjustment Objective:

Access this screen to make changes to the Plunger Auto Settings. The plunger auto settings are related to how the plunger sets up its stop positions, decel positions, and decel speeds.

Adjustment Procedure:

1. Press **F4**.
2. See Plunger Auto Settings screen for more information.

5. FUNCTION SELECT FOR MANUAL OPERATION

Function:

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

Adjustment Objective:

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

Adjustment Procedure:

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

6. PLUNGER POSITION DISPLAY & GRAPH

Function:

Displays the current position (%) of the Plunger during its stroke. The graph will be initially white and will turn red as the plunger is stroked. It will start on the left at the start of a cycle, and move to the right as the Plunger compresses the crop in the chamber.

7. SELECTED MANUAL CONTROL ASSEMBLY DISPLAY

Function:

Indicates the assembly selected for manual control (see reference #5 Figure 6-6).

8. PLUNGER CUSHIONS DISPLAY AND GRAPH

Function:

This is a visual display of the Plunger Stop Cushions values setup on the machine. The cushion positions are shown in red on the graph. Below the graph are the cushion values shown as a percent of the total travel of the Plunge Position Sensor.

9. RETRACT AND EXTEND DEFAULT STOP/DECEL DISPLAY

Function:

This displays the default values for Retract and Extend positions for the Stop and Decel points in percent of the total travel of the Plunger Position Sensor.

Note that the values shown are measured from the cushions.

For example if the Retract Stop value of 8.0 and the Retract Cushion is 2.0, then the value of the Retract Stop in terms of the total travel of the Plunger Position Sensor is 10.0 (Retract Stop position in full travel % = Retract Stop + Retract Cushion).

10. LEARNED RETRACT AND EXTEND STOP VALUE DISPLAY

Function:

This displays the values for the Learned Stop Position in percent of the total travel of the Plunger Position sensor. The values in parentheses are the difference between the default Stops and the Learned Stops taking in consideration the cushion (Default Stop position in full travel – Learned Stop – Cushion).

For example, if the Default Stop is 8.0, the Learned Stop is 12.0, and the cushion is 2.0, then the difference (the value in the parenthesis) would be 0 (12.0 - 8.0 - 2.0 = 2.0).

11. LEARNED RETRACT AND EXTEND DECEL VALUE DISPLAY

Function:

This displays the values for the Learned Retract position in percentage of the total travel of the Plunger Position sensor. The values in the parentheses are the difference between the Default Decel values in full travel, the Learned Decel values, and the cushions. For example, if the Default Retract Decel value in full travel was 42.0, the Learned Retract Decel value was 46.0, and the cushion was 2.0, then the difference would be 2.0 (46.0 - 42.0 - 2.0 = 2.0).

12. FORKS START DISPLAY

Function:

This displays the value of the Forks Start. This is Plunger Position value (%), measured from the retract cushion, at which the Feed Fork start cycling as the plunger is retracting during the end of a plunger cycle.

13. PLUNGER STOP FOR KNOTTER DISPLAY

Function:

This displays the value in Plunger Position (%), measured from the Extend Cushion where the plunger will stop and wait for the knotter to reach Top Dead Center, or half-way through its tie cycle before continuing to retract on a tie cycle.



Returns to the Plunger Settings Screen



Returns to the Main Screen

PLUNGER POSITION SETTINGS



Figure 6-8 Plunger Positions Settings Screen

Theory of Operation

This screen allows access to values associated with Plunger Position Settings. All of the values in this screen must be adjusted here with the exception of the Plunger Retract and Extend Cushion Positions. The remaining values are set as defaults. These default values affect the timing of various components on the machine with the plunger cycle. It is not recommended that these values be changed unless compelled by necessity and conducted by experienced service personnel with intimate knowledge of the system.

1. Plunger Retract Cushion Position

Function:

This sets the Plunger Retract Cushion Position (%), which is the target position for the plunger to come to a complete stop.

Adjustment Objective:

This value is selected 1 inch from the end of the cylinder travel when retracting. This value must be smaller than the Plunger Retract Stop Position (see reference #2 on Figure 6-8).

Adjustment Procedure:

See Plunger Cushions Setup screen page 6-15 or Adjust screen page 15-1 for more information.

[See 21-1 for default setting]

2. PLUNGER RETRACT STOP POSITION

Function:

This sets the Plunger Retract Stop Position (%) which is the point along the plunger travel that signals the plunger to stop moving.

Adjustment Objective:

This value is selected so that the plunger does not travel passed the Plunger Retract Cushion. This value must be greater than the Plunger Retract Cushion

Position (see reference #1 on Figure 6-8) and smaller than the Plunger Retract Decel Position (see reference #3 on Figure 6-8).

Adjustment Procedure:

See Adjust screen page 15-1 for more information.

[See page 21-1 for default setting]

3. PLUNGER RETRACT DECEL POSITION

Function:

This sets the Plunger Retract Decel Position (%), which determines where the plunger will be signaled to enter into Decel speed. This is required to make sure the plunger does not overshoot the Plunger Retract Cushion when the Plunger is signaled to stop moving when it reaches the Plunger Retract Stop Position.

Adjustment Objective:

This value is selected so that the plunger does not travel past the Plunger Retract Cushion. This value must be greater than the Plunger Retract Stop position (see reference #2 on Figure 6-8), but less than the Plunger Extend Decel Position (see reference #7 on Figure 6-8).

Adjustment Procedure:

See Adjust screen page 15-1 for more information.

[See page 21-1 for default setting]

**4. PLUNGER STOP FOR KNOTTER
“LS6” FROM EXT.**

Function:

This sets the stop position (%) for the Plunger to stop and wait for the Knotter Needles to make it halfway through the knotter cycle before continuing retracting. This is to protect the needles when they travel through the chamber.

Adjustment Objective:

This value should be selected so that the Plunger is approximately 9 inches from full extension and the Needles are inside the plunger while they are completing the first half of a knotter cycle.

Adjustment Procedure:

See Adjust screen page 15-1 for more information.

[See page 21-1 for default setting]

5. PLUNGER START FORKS TIE CYCLE

Function:

This sets the position (%) where the Feed Fork is signaled to begin cycling. When the plunger reaches this position on the Plunger Position Sensor, the Feed Fork will begin cycling.

Adjustment Objective:

This value should be set so that the Feed Fork begin after the plunger has reached the Plunger Retract Cushion Position. This value should be smaller than the Plunger Start Forks (see reference #6 on Figure 6-8).

Adjustment Procedure:

See Adjust screen page 15-1 for more information.

[See page 21-1 for default setting]

6. PLUNGER START FORKS

Function:

This sets position (%) on the Plunger Position Sensor where the Feed Fork will start on a bale forming cycle.

Adjustment Objective:

This value is selected so that the plunger reaches the Plunger Retract Cushion Position before the Feed Fork begins cycling. This value should be greater than the Plunger Starts Feed Fork Tie Cycle (see reference #5 on 6-8).

Adjustment Procedure:

See Adjust screen page 15-1 for more information.

[See 21-1 for default setting]

7. PLUNGER EXTEND DECEL POSITION

Function:

This sets the Plunger Extend Decel Position (%) which determines where the plunger is signaled to go into Decel speed on the Extend portion of its cycle.

Adjustment Objective:

This value is selected so that the plunger does not travel past the Plunger Extend Cushion.

Adjustment Procedure:

See Adjust screen page 15-1 for more information.

[See page 21-1 for default setting]

8. PLUNGER EXTEND STOP POSITION

Function:

This sets the Plunger Extend Stop Position (%) which is the point along the plunger travel that signals the plunger to stop moving.

Adjustment Objective:

This value is selected so that the plunger does not travel past the Plunger Extend Cushion. This value must be greater than the Plunger Extend Decel Position (see reference #7 on Figure 6-8) but smaller than the Plunger Extend Cushion Position (see reference #9 Figure 6-8).

Adjustment Procedure:

See Adjust screen page 15-1 for more information.

[See page 21-1 for default setting]

9. PLUNGER EXTEND CUSHION POSITION

Function:

This sets the Plunger Extend Cushion Position (%), which is the target distance for the plunger to come to a complete stop.

ADJUSTMENT OBJECTIVE:

This value is selected 1 inch from the end of the cylinder travel when extending. This value must be greater than the Plunger Extend Stop Position (see reference #8 on Figure 6-8).

Adjustment Procedure:

See Plunger Cushions Setup screen page 6-15 or Adjust screen page 15-1 for more information.

[See page 21-1 for default setting]



Returns to the Plunger Positions Screen



Returns to the Main Screen

NOTES



PLUNGER AUTO SETTINGS



Figure 6-9 Plunger Auto Settings Screen

Theory of Operation

This screen allows the adjustment of values associated with the Plunger Auto Settings. These values are accessible through the Plunger Auto Setup and Plunger Positions screen, except for the following:

- Plunger Stop Auto Adjust Sensitivity
- Plunger Decel Time Auto Adjust Sensitivity
- Plunger Decel Auto Adjust Sensitivity

**1. PLUNGER EXTEND DECEL TIME
(SEE ADJUST PAGE 15-1)**

Function:

This sets the target time for the Plunger to Extend at the extend decel speed. The plunger will set the Extend Decel Speed and both Plunger Stop Positions based on this target time when using Plunger Auto Setup.

Adjustment Objective:

See The Plunger Auto Setup screen page 6-19.

Adjustment Procedure:

See the Adjust screen page 15-1.

[See page 21-1 for default setting]

**2. PLUNGER RETRACT DECEL TIME
(SEE ADJUST PAGE 15-1)**

Function:

This sets the target time for the Plunger to Retract at Retract Decel speed. The plunger will set the Retract Decel Speed and both Plunger Stop Positions based on this target time when using Plunger Auto Setup.

Adjustment Objective:

See The Plunger Auto Setup screen page 6-19.

Adjustment Procedure:

See the Adjust screen page 15-1.

[See page 21-1 for default setting]

3. PLUNGER STOP AUTO ADJUST SENSITIVITY

Function:

This sets the multiplier that affects how quickly the program makes changes to the Plunger Stop Position during Plunger Auto Setup.

Adjustment Objective:

See the Plunger Auto Setup screen page 6-19.

Adjustment Procedure:

See the Adjust screen page 15-1.

[See page 15-1 for default setting]

4. PLUNGER DECEL TIME AUTO ADJUST SENSITIVITY

Function:

This sets the multiplier that affects how quickly the program makes changes to the Plunger Decel Time.

Adjustment Objective:

See the Plunger Auto Setup screen page 6-19.

Adjustment Procedure:

See the Adjust screen page 15-1.

[See page 21-1 for default setting]

5. PLUNGER DECEL AUTO ADJUST SENSITIVITY

Function:

This sets the multiplier that affects how quickly the program makes changes to the Plunger Decel Position.

Adjustment Objective:

See the Plunger Auto Setup screen page 6-19.

Adjustment Procedure:

See the Adjust screen page 15-1.

[See page 21-1 for default setting]

6. PLUNGER DECEL VARIANCE ZERO

Function:

This sets the method of determining the Plunger Decel Positions. This selects between Auto Adjust and Default Setting.

Adjustment Objective:

See the Plunger Auto Setup screen page 6-19.

Adjustment Procedure:

See the Adjust screen 15-1.

[See page 21-1 for default setting]



Returns to the Plunger Positions Screen



Returns to the Main Screen

PLUNGER CUSHIONS SETUP

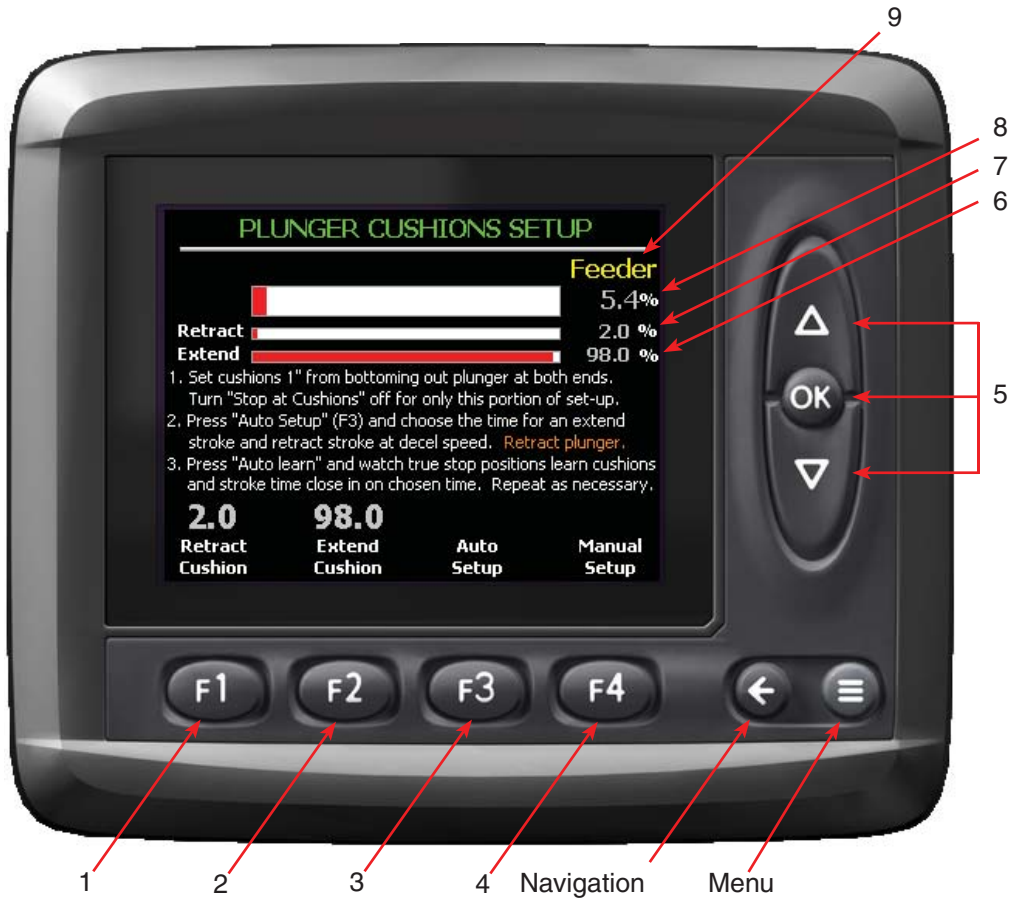


Figure 6-10 Plunger Cushions Setup Screen

Theory of Operation

This screen is used to set up the plunger cushions, which prevent the cylinder from bottoming out during normal operations. Cushions are the points where the plunger attempts to stop during the Plunger cycle.

Establishing the cushions is the first step in setting up the plunger, and should also be checked if the Plunger Position Sensor has been moved, adjusted, or replaced.

Note: Both the Extend Cushion and Retract Cushion should be 1 inch back from bottoming out the plunger cylinder. All plunger position triggers are based off of these cushion positions.

Default Plunger positions are measured distances from the cushion positions. The Retract Stop and Retract Decel, as well as the Feed Fork start positions, are distances from the Retract Cushion.

The Extend Decel” and Extend Stop, as well as Plunger Stop for Knotter (LS6), are distances from the Extend Cushion.

All of these positions, which are based off of cushions, have default settings which are very similar from machine-to-machine. The Plunger Linear Sensor may be installed in slightly different locations for each baler relative to the plunger. However, for all machines, the linear sensor should be centered so the final cushion settings should be within (+/-) a small percentage from each other. Properly setting the cushions will compensate for these differences in the sensor location.

F1 1. RETRACT CUSHION

Function:

Sets the Plunger Retract Cushion position. The position is a percentage of the total usable stroke of the cylinder (30.0 inches).

Adjustment Objective:

To set the Plunger Retract Cushion position.

Adjustment Procedure:

1. Press **←** to return to Plunger Settings screen and adjust Plunger stop cushions to NO.
2. Press **F4** and press **OK** until Plunger function is selected and bottom out plunger.
3. Pick part of the plunger, possibly the slot scraper, and mark its location relative to the frame. Then measure back 1" and mark the location to become the cushion.
4. Move the plunger to this position and note the plunger position % at the top right of the screen.
5. Repeat this for the extend and retract positions and enter the cushion values in **F1** and **F2**. Move the plunger to this position and note the plunger position % at the top right of the screen.
6. To enter the retract cushion value, press **F1**. The value above **F1** will turn red.
7. Press **▲▼** to adjust the value (%) to the desired setting.
8. Press **OK** to save the setting.

[See page 21-1 for default setting]

F2 **2. EXTEND CUSHION**

Function:

Sets the Plunger Extend Cushion position. The position is a percentage of the total usable stroke of the cylinder (30.0 inches).

Adjustment Objective:

To set the Plunger Extend Cushion position.

Adjustment Procedure:

1. Press **←** to return to Plunger Settings screen and adjust Plunger stop cushions to NO.
2. Press **F4** and press **OK** until Plunger function is selected and bottom out plunger.
3. Pick part of the plunger, possibly the slot scraper, and mark its location relative to the frame. Then measure forward 1" and mark the location to become the cushion.
4. Move the plunger to this position and note the plunger position % at the top right of the screen.

5. Repeat this for the extend and retract positions and enter the cushion values in **F1** and **F2**. Move the plunger to this position and note the plunger position % at the top right of the screen.
6. To enter the extend cushion value, press **F1**. The value above **F1** will turn red.
7. Press **▲▼** to adjust the value (%) to the desired setting.
8. Press **OK** to save the setting.

[See page 21 for default setting]

F3 **3. AUTO SETUP**

Function:

Goes to the Plunger Auto Setup screen (see page 6-19).

Adjustment Objective:

Goes to the Auto Learn screen for setting up the cushions.

Adjustment Procedure:

1. Press **F3**. An information window will appear (see below) to have the operator confirm the Plunger is in the fully retracted position and to observe the messages on the screen during the Auto Learn setup.
2. Press **F2** to acknowledge the Information window.
3. See the Plunger Auto Learn screen for additional information.

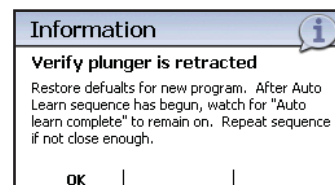


Figure 6-11 Information

F4 4. MANUAL SETUP


Function:

Goes to the Plunger Manual Setup 1 screen (see page 6-23).

Adjustment Objective:

Goes to the Manual Setup screen for setting up the cushions.

Adjustment Procedure:

1. Press . The Plunger Cushions Setup screen will appear.
2. See the Plunger Cushions Setup screen for additional information.



5. FUNCTION SELECT FOR MANUAL OPERATION

Function:

Selects the system for manual control of Feed Fork, Feeder, and Plunger.

Adjustment Procedure:

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

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

6. PLUNGER EXTEND CUSHION POSITION DISPLAY & GRAPH

Function:

Displays the position (%) of the Plunger Extend Cushion. Value displayed is a percentage of the usable Plunger Cylinder stroke (30.0 inches).

7. PLUNGER RETRACT CUSHION POSITION DISPLAY & GRAPH

Function:

Displays the position (%) of the Plunger Retract Cushion. Value displayed is a percentage of the usable Plunger Cylinder stroke (30.0 inches).

8. PLUNGER POSITION DISPLAY & GRAPH

Function:

Displays the current position (%) of the Plunger during its stroke. The graph will be initially white and will turn red as the plunger is stroked. It will start on the left at the start of a cycle, and move to the right as the Plunger compresses the crop in the chamber.

9. SELECTED MANUAL CONTROL ASSEMBLY DISPLAY

Function:

Indicates the assembly selected for manual control.



Returns to the Plunger Settings Screen



Returns to the Main Screen

PLUNGER AUTO SETUP



Figure 6-12 Plunger Auto Setup Screen

Theory of Operation

The Auto Setup routine is used to automatically setup the Plunger values that affect its cycle speed and stopping positions.

Note: As you complete the cushions setup procedure, confirm that the “Plunger Stop At Cushions” feature is set to “Yes” (see page 6-1).

The Auto Learn is intended to use the values for the Retract and Extend Times and make adjustments to the control system to achieve those desired times. The Auto Learn routine cycles the Plunger and makes adjustments to system variables to achieve the desired times. The Auto Learn routine may need to be repeated several times to reach the desired Retract and Extend Times.

The Retract and Extend Times are the desired times for the plunger to run from one stop to the other stop at the decel speed. Initially, these times are set at 2000ms. If set above 2400ms, the Plunger may develop a sort of “hiccup” when slowing down. If set

too low, the plunger may attempt to stop too early if running at low PTO speeds.

To run the Auto Learn sequence, the baler must be running at full baling rpm (1000+ rpm @ PTO).

If the adjustments made do not have the desired effects, it is recommended that the operator restore the default system values (F2) and change the Retract and Extend Time values back to 2000 ms. This would also be recommended if the system is out-of-adjustment to a point that it will take too long to come in on its own, or if a program with new ID is loaded.

When starting the Auto Learn routine, the operator must verify that the plunger is fully retracted, and then press F1 to begin.

The Plunger will extend and retract five (5) times at the decel speed. During each stroke, the system will monitor the position of the Plunger, make adjustments to the stop positions so that the Plunger will stop at the desired cushion location, and make adjustments to the decel speed to achieve the desired stroke times.

As the routine is being performed, the operator can monitor the values for the displayed on the screen. The green value is the current (Learned) value and the gray values are the default values.

The red text “Continue Auto Learn” will change green to “Auto Learn Complete” when the values get within an acceptable range. It is important for the operator to verify that the text remains green for several cycles before stopping the calibration.

After it finishes 10 strokes (5 cycles), the Auto Learn routine will stop. If the green values are not close to the grey values, repeat the Auto Learn routine until the green values are as close as possible to the grey value.

As noted under “Plunger Positions” (see page 6-5), the operator should ensure that the Plunger does not consistently retract beyond the retract cushion, which would lead to the Learned (green) Retract decel position eventually taking over the entire stroke. To perform this check, at the conclusion of the Auto Learn routine, perform the following steps:

1. Go to the “Plunger Positions” screen.
2. Select “Plunger Limits” (F3).
3. Add 1% to 4% (3/8” to 1 3/8”) to “Plunger Retract Stop Position”.

After the plunger positions are set, the Extend decel (which includes retract) should be set to “Auto Adjust”, and the baler has been operated for some time (20+ bales). The operator should verify the Plunger Position Screen (see page 6-5). The learned decel positions should be stabilized at a reasonable distance from the stops. In the “Auto Statistics” screen, the “Stops vs. Cushions” should be close to each other, revealing the system is adjusting properly.

F1 1. AUTO LEARN

Function:

Activates the Auto Learn routine

Adjustment Objective:

Use the Auto Learn routine to set the Plunger settings to achieve the desired Retract and Extend Times.

Adjustment Procedure:

1. Press **F1**. The Auto Learn routine will start.

2. Press **F1** to run the Auto Learn routine again.

F2 2. RESTORE DEFAULTS

Function:

Restores the Plunger system variables.

Adjustment Objective:

Restores the Plunger system variables if the current settings do not achieve the desired performance.

Adjustment Procedure:

Press and hold **F2**. The default system variables will be automatically changed.

F3 3. RETRACT TIME

Function:

Enter the desired time for the Plunger Cylinder to retract at retract decel speed. The green number is the value achieved during the Auto Learn routine, and the yellow number is the desired performance time.

Adjustment Objective:

Set the desired time for the Plunger Cylinder to retract.

Adjustment Procedure:

1. Press **F3**. The value above **F3** will turn red.
2. Press **▲▼** to adjust the value to the desired setting.
3. Press **OK** to save the value.

[See page 21-1 for default setting]

F4 4. EXTEND TIME

Function:



Enter the desired time for the Plunger Cylinder to extend at extend decel speed. The green number is the value achieved during the Auto Learn routine, and the yellow number is the desired performance time.

Adjustment Objective:

Set the desired time for the Plunger Cylinder to extend.

Adjustment Procedure:


1. Press **F4**. The value above **F4** will turn red.

2. Press  to adjust the value to the desired setting.
3. Press  to save the value.

[See page 21-1 for default setting]

5. FUNCTION SELECT FOR MANUAL OPERATION



Function:

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

Adjustment Objective:

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

Adjustment Procedure:

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

6. PLUNGER POSITION DISPLAY & GRAPH

Function:

Displays the current position (%) of the Plunger during its stroke. The graph will be initially white, and will turn red as the plunger is stroked. It will start on the left at the start of a cycle, and move to the right as the Plunger compresses the crop in the chamber.

7. SELECTED MANUAL CONTROL ASSEMBLY DISPLAY

Function:

Indicates the assembly selected for manual control (see #6).

8. HYDRAULIC FLOW DISPLAY

Function:

Displays the percentage of hydraulic flow (%) being requested from the pump for the Plunger Cylinder. The range is from -100% to 100%. A minus (-) value indicates the cylinder is retracting, and a positive (+) value indicates the cylinder is extending. At 0%, the pump is at its neutral position. This value indicates the relative input signal to the pump controller and is not the actual output from pump.

9. CUSHION POSITION DISPLAY

Function:

Displays the desired final stopping point (cushion) for the Plunger Cylinder at both the extended and retracted position. The green values are those that were learned from the Auto Learn routine. The grey values are the default values.

10. STOP POSITION (DEFAULT & LEARNED) DISPLAY

Function:

Displays the desired point where the Plunger Cylinder begins to stop before reaching the cushions. The green values are those that were learned from the Auto Learn routine. The grey values are the default settings. The blue values are the calculated differences between the "Default Output" minus the "Learned Output".

11. HYDRAULIC FLOW (DEFAULT & LEARNED) DISPLAY

Function:

Displays the desired and actual settings (%) of the signal to the Pump Controller to operate the Plunger Cylinder. This value indicates the relative input signal to the pump controller and is scaled so that at 100% output the pump controller is receiving 6 volts. The green values are those that were learned from the Auto Learn routine. The grey values are those that are the default values.

This value should always be positive. A negative value suggest that the setup was done incorrectly and that the default values should be restored and the Auto Learn routine redone.

12. AUTO LEARN CYCLE COUNT

Function:

Shows the current cycle in the sequence. The auto sequence will shut off after 10 cycles and await reactivation or exit.



Returns to the Plunger Cushions Setup Screen



Returns to the Main Screen

PLUNGER MANUAL SETUP 1



Figure 6-13 Plunger Manual Setup 1 Screen

Theory of Operation

The plunger slows from full speed to a deceleration speed based on set positions in the stroke. This screen is used to manually adjust the Plunger Deceleration Speed. The plunger deceleration speed is unique for the retract and extend stroke.

Once the plunger has begun to decelerate, it should reach the deceleration speed prior to reaching the stop position where the speed signal is removed and the plunger coasts toward the cushion (approximately 1" from the end of the stroke for the Plunger Cylinder).

The values entered for the Extend and Retract Deceleration Outputs are percentages of the Modulation Ration (MR) (see page 6-27) which defines the maximum operating speed of the Plunger Cylinder.

When making adjustments to the deceleration output, the Plunger can be operated in one of two modes:

- Normal – Deceleration ramping is used as described above

- Decel – The plunger operates only at the deceleration speed

If the stop positions require adjustments, they can be set up manually in the “Plunger position” screen (see page 6-5). In order to activate the default values, go to “Plunger Auto Setup” (see page 6-19) and hold “Restore Defaults”. This zeros out learned values and uses adjustable default values.

To set up the Deceleration (decel) speed, change “Decel Speed Override” from “normal” to “decel”. This runs the plunger in extend at the set “Extend output” (F2) and in retract at the “Retract Output” (F3). These will become the default decel outputs.

Manually actuate the Plunger with the tractor running, PTO engaged and operating at baling rpm. Extend and retract the Plunger while noting the stroke time displayed at the top of the screen.

The plunger stops will need to be adjusted concurrently because as the plunger speed changes, the

stops change, and as the stops change, the stroke time changes.

If left in the “decel” mode, the Plunger will still operate at full speed when the baler operates, but will operate at the constant deceleration speed when manually operated.

F1 1. DECEL SPEED OVERRIDE

Function:

Controls the Plunger Deceleration Speed Override Setting between NORMAL and DECEL. NORMAL mode is the setting used for when baling, and DECEL when setting up the Plunger decel outputs.

Adjustment Objective:

To adjust the Plunger Deceleration Speed Override for manual setup

Adjustment Procedure:

1. Press **F1**. A separate window will open to select available options.
2. Use **▲▼** to select the desired mode of the Decel Speed Override.
3. Press **OK** to save the setting.

[See page 21-1 for default setting]

F2 2. EXTEND OUTPUT

Function:

Sets the value for the output signal to control the Plunger during deceleration when extending. The value entered is a percentage of the Modulation Ratio (MR) (see page 6-27).

Adjustment Objective:

To adjust the output signal for controlling the Plunger when extending.

Adjustment Procedure:

1. Set “Decel Speed Override” to “decel”.
2. With the Function Selector set to “Plunger”, fully retract the plunger, and then fully extend noting the “Ext. time” (see reference #12 on Figure 6-13).
3. Adjust the Extend Decel Output to achieve the desired extend time (see reference #12 on Figure

6-13) (generally about 2000ms). If the time is too long, increase the Extend Decel Output, and if the time is too short, decrease the output.

4. To adjust the Extend Decel Output, press **F2**. The text above the window will be highlighted in red.
5. Use **▲▼** to enter the value (%) of the Extend Decel Output.
6. Press **OK** to save the setting.

Note: After the Extend and Retract Outputs have changed, they will affect the stops. Readjusting the stops will again affect the stroke times which will require readjusting the Extend and Retract Outputs. While performing the Plunger auto setup, the extend and retract stops as well as the extend and retract decel speeds will automaticity adjust on every stroke and in time all values will hone within specs.

[See page 21-1 for default setting]

F3 3. RETRACT OUTPUTS

Function:

Sets the value for the output signal to control the Plunger during deceleration when retracting. The value entered is a percentage of the Modulation Ratio (MR) (see page 6-27).

Adjustment Objective:

To adjust the output signal for controlling the Plunger when extending.

Adjustment Procedure:

1. Set “Decel Speed Override” to “decel”.
2. With the Function Selector set to “Plunger”, fully extend the plunger and then fully retract, noting the “Ret. time” (see reference #11 on Figure 6-13).
3. Adjust the Retract Decel Output to achieve the desired retract time (see reference #11 on Figure 6-13) (generally about 2000ms). If the time is too long, increase the decel output, and if the time is too short, decrease the output.
4. To adjust the Retract Decel Output, press **F3**. The text above the window will be highlighted in red.
5. Use **▲▼** to enter the value (%) of the Retract Decel Output.
6. Press **OK** to save the setting.

[See page 21-1 for default setting]

4. NEXT PAGE


Function:

Goes to the Plunger Manual Setup 2 screen (see page 6-27).

Adjustment Objective:

Goes to the Plunger Manual Setup 2 screen.

Adjustment Procedure:

1. Press . The Plunger Manual Setup 2 screen will appear.
2. See the Plunger Manual Setup 2 screen for additional information.



5. PLUNGER PRESSURE DISPLAY & GRAPH

Function:

Displays the current Plunger Pressure.

6. FUNCTION SELECT FOR MANUAL OPERATION




Function:

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

Adjustment Objective:

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

Adjustment Procedure:

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

7. MAXIMUM PLUNGER SPEED DISPLAY

Function:

Displays the maximum Plunger Speed (inches / second) for a the current Plunger stroke (extend or retract).

8. PLUNGER SPEED DISPLAY

Function:

Displays the current Plunger Speed (inches / second) for the Plunger stroke (extend or retract).

9. PLUNGER POSITION DISPLAY & GRAPH

Function:

Displays the current position (%) of the Plunger during its stroke. The graph will be initially white and will turn red as the plunger is stroked. It will start on the left at the start of a cycle, and move to the right as the Plunger compresses the crop in the chamber.

10. PWM OUTPUT % DISPLAY

Function:

This displays the PWM Output % to the pump controller controlling the flow to the plunger cylinder.

11. PLUNGER RETRACT TIMER DISPLAY

Function:

Displays the time (ms) to retract the Plunger during its stroke. The time displayed is the time for the Plunger to stroke between the stop position at each end of the stroke.

12. PLUNGER EXTEND TIMER DISPLAY

Function:

Displays the time (ms) to extend the Plunger during its stroke. The time displayed is the time for the Plunger to stroke between the stop position at each end of the stroke.

13. PLUNGER SCALED OUTPUT DISPLAY

Function:

Displays the scaled output (%) from the pump to control the movement of the plunger. The scaled output is from 0 to 100%, with 100% equal to the current setting of the Modulation Ratio (see page 6-27).



Returns to the Plunger Cushions Setup Screen



Returns to the Main Screen

PLUNGER MANUAL SETUP 2



Figure 6-14 Plunger Manual Setup 2 Screen

Theory of Operation

Sets the limit for the control signal voltage to the pump controller and compensates for inconsistent system voltages. The maximum voltage to the pump controller is set by the Modulation Ratio (MR). A MR Voltage Constant is used to adjust the signal voltage from the XA2 module to an acceptable level for the pump controller.

Note: For maximum life, the pump controller should not see over 6 volts continuous.

Since the system runs at 12+volts, the duty cycle (modulation ratio) to the pump controller is always less than 70%. This adjustment fine tunes and varies that 70% even lower to provide a more constant voltage to the pump controller even with a fluctuating system voltage.

For example, if the voltage to the XA2 module is 13.5v and the MR Voltage Constant was 540, the Modulation Ratio (full stroke on the pump) would be:

$$540/13.5 = 40\%.$$

The maximum voltage to the pump controller would then be the MR multiplied by the control voltage from the XA2 module. For the above example, 40% of 13.5v would provide a maximum input control voltage to the pump controller of 5.4v.

If the voltage to the XA2 module was increased to 14.5v, the MR would be $540/14.5 = 37.2\%$, and the maximum voltage to the pump controller would be $(0.372) \times (14.5) = 5.4v$.

This must be set up experimentally by running the plunger with the pump controller disconnected and checking the voltage to the pump controller. It should not exceed 7 volts, or damage may occur to the pump controller.

F1 1. PLUNGER PRESSURE CALIBRATION


Function:

Goes to the Plunger Pressure Calibration screen (see page 6-29).

Adjustment Objective:

To advance to the Pressure Calibration screen in order to calibrate the Plunger Pressure transducer.

Adjustment Procedure:

1. Press . The Plunger Pressure Calibration screen will appear.
2. See the Plunger Pressure Calibration screen for additional information.

 **2. Adjust for 6 – 7v to Plunger**





Function:

Adjusts the Modulation Ratio Constant used to calculate the Modulation Ratio (MR). The MR is used to determine the maximum signal voltage to the pump controller.

Adjustment Objective:

Set the MR Voltage Constant.


Adjustment Procedure:

1. Set the plunger in the middle of its stroke and then disconnect the pump controller (4-wire lead at the main pump).
2. Connect a voltmeter between either green/white wires and either of the other wires.
3. Operate the plunger with the MD3 controller and observe the voltage. If measuring voltage on blue/red wire, extend the plunger and if measuring on the black/blue wire, retract the plunger to read the voltage. In a plunger screen, make sure the plunger output is 100% to verify you are reading the maximum voltage that will be provided to the pump controller.
4. Press . The text above  will turn red.
5. Press  to adjust the value until the volt meter reads about 7volts when operating the plunger (the plunger will not actually be moving because the pump controller is disconnected). The setting range is 400 to 700.
6. Press  to save the setting.

[See page 21-1 for default setting]



3. FUNCTION SELECT FOR MANUAL OPERATION

Function:

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

Adjustment Procedure:

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

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

4. PWM OUTPUT % DISPLAY

Function:

This displays the PWM Output % to the pump controller controlling the flow to the plunger cylinder.

5. SCALED OUTPUT % DISPLAY

Function:

Displays the scaled output (%) from the pump to control the movement of the plunger. The scaled output is from 0 to 100%, with 100% equal to the current setting of the Max Modulation Ratio.

6. XA2 CONTROL OUTPUT VOLTAGE

Function:

Displays the current voltage (VDC) supplied to the XA2 module.

7. MODULATION RATIO (%) DISPLAY

Function:

Displays the calculated Modulation Ratio (%) based on the voltage from the XA2 module (see reference #6 on Figure 6-14) and the Modulation Ratio Constant (see reference #2 on Figure 6-14).



Returns to the Plunger Manual Setup 1 Screen



Returns to the Main Screen

PLUNGER PRESSURE CALIBRATION



Figure 6-15 Plunger Pressure Calibration Screen

Theory of Operation

The calibration of the Plunger Pressure Sender is checked at the factory prior to shipment, but a standard calibration of 0 v = 0 psi at the low end and 5 v = 7500 psi at the high end can also be used.

The Plunger Setup Calibration is used to fine tune the control system to the specific pressure sender installed on the baler.

- F1** 1. **LOW INPUT (F1) / LOW OUTPUT (F2)**
- F2**

Function:



Using the input from the hydraulic system pressure sender, the low end of the system pressure is calibrated.

Adjustment Objective:

Set the low end of the system pressure.

Adjustment Procedure:

1. Connect a calibrated manual pressure gauge (0 to 10,000 psi) to the hydraulic system near the plunger pressure transducer (plunger pressure port) (Step 1).
2. Confirm that the tractor PTO is disengaged and the system pump is not operating.
3. Read the Pressure Sender Input (see reference #4 on Figure 6-15).
4. Read the pressure on the manual pressure gauge installed for the calibration.
5. Press **F1**. The Plunger Pressure Low Input screen will appear.
6. Use **▲▼** to enter the value (mv) noted for the Pressure Sender Input.
7. Press **OK** to save the value or Press **←** to return to the calibration screen without saving the value.
8. Press **F2**. The Plunger Pressure Low Output screen will appear.
9. Use **▲▼** to enter the hydraulic system pressure (psi) noted in Step #4.

10. Press  to save the value or press  to return to the calibration screen without saving the value.

[See page 21-1 for default setting]

 **2. HIGH INPUT (F3) / HIGH OUTPUT (F4)**














Function:


Using the input from the hydraulic system pressure sender, the high end of the system pressure is calibrated.

Adjustment Objective:

Set the high end of the system pressure.

Adjustment Procedure:

1. Connect a calibrated manual pressure gauge (0 to 10,000 psi) to the hydraulic system near the plunger pressure transducer (plunger pressure port) (Step 1) .
2. Engage the tractor PTO, and operator the baler.
3. Go to the Plunger Settings screen (see page 6-1), turn the Plunger Stop at Cushions () to "NO".
4. On the Plunger Settings screen (see page 6-1), set the Manual Control System to "Plunger".
5. Return to the Plunger Pressure Calibration Screen.
6. Hold down  to extend the Plunger Cylinder to full extension.
7. Read the Pressure Sender Input (see reference #4 on Figure 6-15).
8. Read the pressure on the manual pressure gauge installed for the calibration.
9. Press . The Plunger Pressure High Input screen will appear.
10. Use   to enter the value (mv) noted for the Pressure Sender Input.
11. Press  to save the value or Press  to return to the calibration screen without saving the value.
12. Press . The Plunger Pressure High Output screen will appear.
13. Use   to enter the hydraulic system pressure (psi) noted in Step #4.
14. Press  to save the value or press  to return to the calibration screen without saving the value.

15. Go to the Plunger Settings screen (see page 6-1), turn the Plunger Stop at Cushions () to "YES".

[See page 21-1 for default setting]

3. PLUNGER PRESSURE FILTER DISPLAY

Function:

Displays the current value (%) used with the Plunger Pressure (see page 6-29). The filter dampens the Plunger Pressure value by removing pressure spikes that might be momentarily recorded by the system which could cause the displayed value to change erratically.

4. PLUNGER PRESSURE SENDER INPUT

Function:

Displays the current value (mv) of the Hydraulic System Pressure Sender without any filtering or calibration.

5. PLUNGER PRESSURE (FILTERED) DISPLAY

Function:

Displays the Plunger Pressure (psi) after the filter has been applied (see reference #3 on Figure 6-15).

6. PLUNGER PRESSURE (CALIBRATED) DISPLAY

Function:

Displays the calibrated Plunger Pressure (psi) from the values entered for the Low and High Input and Output values (see reference #1 & #2 on Figure 6-15).

7. PLUNGER PRESSURE GRAPH & DISPLAY

Function:

Displays the filtered Plunger Pressure (psi) from 0 to 7,500 psi.



Returns to the Plunger Output Setup 2 Screen



Returns to the Main Screen

FEED FORK



Figure 7-1 Feed Fork Screen

Theory of Operation

Monitors, configures, and troubleshoots the operation of the Feed Fork. A speed sensor and pressure transducer are used to monitor the motion and pressure while the Feed Fork is operating.

While operating, the system is monitoring the following areas of the system:

1. Feed Fork / Knotter Pressure
2. Feed Fork RPM
3. Feed Fork Stop Sensor State
4. Full Chamber Paddle Sensor State
5. Feed Fork Position Sensor
6. Feed Fork Valve (100% = Forward, -100% = Reverse)

The Feed Fork Positions Sensor counts sprocket teeth where 72 teeth equal one revolution. The position is recalibrated each time the Feed Fork Stop Sensor is activated, however it does not necessarily take into account drift of the Feed Fork when stopped.

If the Feed Fork is stopped for an extended period of time, the motion of the drift of the Feed Fork may be shown as forward motion.

Feed fork rpm is calculated by recording the time between activations of the Feed Fork Stop Sensor. The value for the rpm is updated after each Feed Fork revolution, but not during a revolution.

Feed Fork Stop Sensor Setup.

The Feed Fork Stop Sensor should be adjusted so that the Feed Fork stops with the tips of the tines near their highest point of travel. The Feed Fork should stop higher than the bottom of the inside of the chamber. This will be the stopping position where the Feed Fork stops on the plunger cycle.

Setup Procedure:

1. With the hydraulic oil at least 150 deg. F engage the tractor PTO at low RPM. Slowly bring the PTO speed up to 1000 RPM.

2. Go to the Testing screen and press **F3** and change the mode from “PAUSE” to “GO”.
3. Press F4 once and the Feed Fork will cycle.
4. Note the stopping position of the Feed Fork. If the Feed Fork Stop Position requires adjustment follow these steps.
5. Reduce the tractor PTO speed to an idle and disengage the PTO from the baler and wait until the PTO and baler Flywheel have come to a complete stop. Turn off the tractor. Open the right-hand side shielding.
6. Locate the Feed Fork Stop Cam on the Feed Fork driven sprocket. Looking at the Feed Fork driven sprocket shaft from the right-hand side of the baler adjust the cam
 - Clockwise if the Feed Fork is stopping too high.
 - Counterclockwise if the Feed Fork is stopping too low.
7. Secure the cam to the sprocket and close the right-hand side shielding.
8. Turn on the tractor and engage the PTO at an idle. Slowly bring the PTO speed up to 1000 RPM.
9. Repeat steps 4 through 11 until the Feed Fork is properly adjusted.

F1 1. CONTROL OUTPUT DISABLE

Function:

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

Adjustment Objective:

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



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

Adjustment Procedure:

1. Press **F1** to disable the control system.
2. Press **F2** to acknowledge the command.
3. To resume operation of the baler, return to the Main Baling Screen by using the arrow button.
4. Press **F4** twice.

F2 2. CYCLE FEED FORK

Function:

Cycles the Feed Fork continuously without holding down a direction button or operating the baler in the auto mode.

Adjustment Objective:

To operate the Feed Fork independently from other assemblies and to observe the operation of the Feed Fork.

Adjustment Procedure:

1. Press **F2** to start operation of the Feed Fork. The indicator light above **F2** should change from red to green.
2. Press **F2** again to stop the operation of the Feed Fork. The indicator light should change from green to red.

F3 3. PLUGGING PRESSURE

Function:

The pressure (psi) at which the Feed Fork may be stalled. When the pressure is reached a warning will appear but the Feed Fork, and baler, will continue operating if possible.

Adjustment Objective:

To set the pressure when a warning will appear indicating that the Feed Fork may be stalled.

Adjustment Procedure:

1. Press **F3**. The text above the button will turn red.
2. Use **▲▼** to set the value
3. Press **OK** to save the value.

[See page 21-1 for default setting]


F4

4. FEED FORK-KNOTTER TRANSDUCER

Function:

Accesses the Feed Fork-Knotter Pressure Transducer Settings Screen

Adjustment Procedure:

1. Press .
2. Refer to the Feed Fork Transducer Screen for additional adjustment information.



5. % OUTPUT DISPLAY

Function:

Displays the output (%) to the Feed Fork control valve. 100% means the feed fork should be running forward, -100% means reverse, and at 0% the Feed Fork valve is not supplied power.

6. FUNCTION SELECT FOR MANUAL OPERATION




Function:

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

Adjustment Objective:

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

Adjustment Procedure:

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

7. % TOOTH COUNT DISPLAY

Function:

Displays the amount of rotation (%) for a complete Feed Fork cycle.

8. FULL CHAMBER INDICATOR

Function:

The indicator will turn red when the Full Chamber Paddles have been activated.

9. STOP SENSOR INDICATOR

Function:

The indicator will turn red when the Feed Fork is stopped at the Feed Fork Stop Position. This is the position where the Feed Fork stops during a plunger cycle.

10. SELECTED MANUAL CONTROL ASSEMBLY DISPLAY

Function:

Indicates the assembly selected for manual control

11. FEED FORK RPM DISPLAY

Function:

Indicates the rpm of the Feed Fork assembly when operating. Feed fork rpm is calculated by recording the time between activations of the Feed Fork Stop Sensor. The value for the rpm is updated after each Feed Fork revolution, but not during a revolution.

12. FEED FORK MOVEMENT INDICATOR

Function:

Indicates movement in the intended direction of the Feed Fork assembly.

13. FEED FORK PRESSURE DISPLAY AND GRAPH

Function:

Displays the current operating pressure of the Feed Fork. The vertical bar display reflects the pressure between 0% and 100% of the calibrated range of the sensor.



Returns to the Functions Screen



Returns to the Main Screen

FEED FORK-KNOTTER PRESSURE TRANSDUCER



Figure 7-2 Feed Fork - Knotter Pressure Transducer Screen

Theory of Operation

To calibrate the Feed Fork and Knotter Pressure transducer for monitoring the operation of the Feed Fork for a stalled condition.

NOTE: This screen is accessed from the Feed Fork screen (see page 7-1) and the input cursor is automatically placed at the Minimum Transducer Setting (see reference #3 on Figure 7-2) upon entering this screen.

F1 1. MAIN

Function:

Returns to the Main Screen

Adjustment Procedure:

1. Press **F1**.
2. See the Main Page screen for more information.

F2 2. RESET

Function:

Resets the transducer settings to the original factory settings

Adjustment Procedure:

1. Press **F2**. An information screen will appear (see below).
2. Press **F2** to reset the value to the factory default or press **F3** to decline the reset.

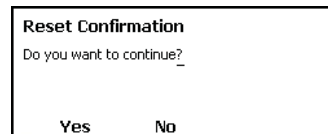


Figure 7-3 Reset Confirmation

3. MINIMUM TRANSDUCER SETTING

Function:

To set the minimum transducer output (mv) setting.



Adjustment Objective:

The objective is to set the Minimum Transducer Setting to the output voltage of the pressure transducer when a calibrated pressure gauge reading of the system is at 0 psi. For the factory transducers used on this machine, they should be set to 0 mV.

If the Minimum Transducer Setting is adjusted above 0 mV, it is possible that when the PTO is disengaged, the Pressure Transducer may output a value that is lower than the Minimum Transducer Setting, which will cause low input error. Therefore, setting this value above 0 mV could result in a voltage error to the MD3 and should therefore be avoided.

The factory settings for this pressure transducer should provide an adequately calibrated output. Therefore it is recommended to use the default setting.

Adjustment Procedure:

1. Use  to adjust the value.
2. Press  to enter the value (mV).
3. The input cursor will automatically go to the Maximum Transducer Setting.

[See page 21-1 for default setting].

4. MAXIMUM TRANSDUCER SETTING

Function:

To set the maximum transducer output (mV) setting.




Adjustment Objective:

The objective is to enter the output voltage of the pressure transducer when a calibrated pressure gauge is reading the maximum system pressure. For the factory Feed Fork and Knotter Pressure pressure transducer, the maximum pressure is 3,000 psi. At 3,000 psi, the transducers outputs a maximum voltage of 5000 mV, or 5 volts.

If the Maximum Transducer Setting is adjusted below 5000 mV, it is possible that a high input error will occur when the pressure of the hydraulic system for the Feed Fork and Knotter as measured by the pressure transducer exceeds 3,000 psi.

The factory settings for this pressure transducer should provide an adequately calibrated output. Therefore it is recommended to use the default setting.

Adjustment Procedure:

1. Use  to adjust the value.
2. Press  to enter the value (mV).
3. Once  is depressed, the display will return to the Feed Fork screen (see page 7-1).

[See page 21-1 for default setting].

5. RAW VALUE DISPLAY

Function:

Displays the current raw value (mV) of the Feed Fork pressure transducer. This is the output of the measuring device typically in units of mV to the ICM. This is the un-scaled value.

[See page 21-1 for default setting].

6. ACTUAL VALUE

Function:

This is the scaled value of the sensor that is used by the ICM in the program. How the output is scaled depends on the minimum and maximum outputs from the sensor for the minimum and maximum conditions that the sensor is capable of reading.

For example, the Feed Fork and Knotter pressure transducer is capable of reading from 0 psi to 3000 psi. The output of the sensor is 0 mV at 0 psi to 5000 mV at 3000 psi. If the pressure was 1,500 psi, the Raw Value (see reference #5 on Figure 7-2) would then be 2500 mV and the Actual value would be 1500 psi.



Returns to the Feed Fork Screen



Returns to the Main Screen

FEEDER SETTINGS 1



Figure 8-1 Feeder Settings 1 Screen

Theory of Operation

The Feeder Settings 1 screen displays the computer signal to the:

- Feeder valve (100% = forward, -100% = reverse)
- Feeder pressure
- Speed of the pickup at the clutch shaft
- State of the pickup speed sensor

The pickup speed sensor measures the time between sensor triggers to calculate speed, and updates the reading approximately 3 times a second at full PTO rpm. Since there is no position sensor on the Feeder, the Feeder display will show rotation whenever the valve is activated to rotate the Feeder. If the Feeder is stalled or the PTO disengaged, the display will still show rotation as long as the valve is activated.

The Pickup indicator shows active motion but is not shown at the actual speed of the pickup.

F1 1. FEEDER

Function:

Turns the auto cycle for the feeder either ON or OFF. This can be used when setting up the feed fork stop at which time the feeder does not need to be running. This setting is reset to its default setting of ON when the power is cycled.

Adjustment Objective:

Toggle the Feeder auto cycle ON and OFF.

Adjustment Procedure:

1. Press **F1**. Feeder will turn OFF if already ON, or ON if already OFF.
2. Press **F1** to go back to the previous setting for the auto cycle.

[See page 21-1 for default setting]

F2 2. CYCLE FEEDER

Function:

Turns on the Feeder so that a direction button does not need pressed to cycle continuously. This function is also cancelled when **F4** on the Bale screen is pressed.

Adjustment Objective:

To turn on the Feeder for continuous operation.

Adjustment Procedure:

1. Press **F2**. Feeder will turn ON and run continuously. Indicator above **F2** will turn green.
2. Press **F2**. Feeder will turn OFF. Indicator above **F2** will turn red.

[See page 21-1 for default setting]

F3 3. FEEDER PLUGGING PRESSURE

Function:

Sets the pressure (psi) that will signal the Feeder stall warning. If the set pressure is reached it will trigger the program as if the full chamber paddles have been lifted. In this situation, as the as forks reach their stop position, the plunger will cycle, regardless if the full chamber paddles have been raised.

Adjustment Objective:

Set the pressure to indicate the Feeder is plugged and stalled.

Adjustment Procedure:

1. Press **F3**. The text above **F3** will turn red.
2. Press **▲▼** to adjust the value to the desired setting.
3. Press **OK** to save the setting.

[See page 21-1 for default setting]

F4 4. NEXT PAGE

Function:

Goes to the Feeder Settings 2 screen (see page 8-5).

Adjustment Objective:

Goes to the Feeder Settings 2 screen

Adjustment Procedure:

1. Press **F4**. The Feeder Settings 2 screen will appear.
2. See the the Feeder Settings 2 Screen for additional information.

5. FUNCTION SELECT FOR MANUAL OPERATION

Function:

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

Adjustment Procedure:

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

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

6. FEEDER PRESSURE GRAPH

Function:

Displays the Feeder Pressure

7. FEEDER INDICATOR

Function:

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

8. PICKUP INDICATOR

Function:

Indicates active motion of the Pickup, although it is not displayed at the actual rotation speed. The pickup speed sensor measures the time between sensor triggers to calculate speed and updates the reading about 3 times a second at full PTO rpm.

9. FEEDER OUTPUT DISPLAY

Function:

Indicates the output signal (%) for the Feeder valve(100% = forward, -100% = reverse).

10. FEED PRESSURE DISPLAY

Function:

Indicates the current Feeder pressure (psi).

11. PICKUP SPEED DISPLAY

Function:

Indicates the average speed (rpm) of the Pickup. The relative speed is also displayed on the graph scaled between 0 to 200rpm.

12. PICKUP SENSOR INDICATOR

Function:

Indicates movement of the Pickup. Indicator is illuminate red when the sensor is activated.



Returns to the Functions Screen



Returns to the Main Screen

NOTES

FEEDER SETTINGS 2



Figure 8-2 Feeder Settings 2 Screen

Theory of Operation

This screen, and the Feeder Settings 3 screen, are used to configure the Auto Pickup Unplug feature. This feature does not eliminate plugging of the Pickup, but does:

- Minimize the chance of plugging the Pickup
- Reduce unplugging time if the Pickup does plug
- Reduce wear on the Pickup Clutch
- Reduce the possibility of a pickup clutch related fire

When the Auto Pickup Unplug feature is turned on, it will monitor the pickup clutch shaft speed. If the speed drops below the “Pickup Plugging Speed” the unplug sequence will be initiated.

An audible alarm will make seven quick beeps and a popup message will notify the operator that the pickup is stalled. The control system will stop the Pickup during a “Reversal Delay” time, and then reverse the direction of the Pickup for the “Max Reverse Duration”.

The Pickup will then pause again for the “Reversal Delay” time again and then attempt to resume operation in the forward direction for the “Forward Plugging Delay Time”.

The control system will monitor the Pickup speed, and as long as the Pickup is operating above the “Pickup Plugging Speed” it will continue operation. If the Pickup is still stalled (the clutch is slipping) then the audible alarm will sound again and the auto unplug cycle will repeat.

Immediately upon the pickup plugging alarm sounding the operator should stop and reverse the tractor while bouncing the pickup to assist the Auto Pickup Unplug feature. If the pickup fails to unplug after several cycles, the PTO will need to be disengaged and the machine allowed to come to a complete stop before unplugging the pickup by hand.

F1 1. **MAX REVERSE DURATION**

Function:

The maximum time (ms) the feeder is allowed to reverse without cycling forward again. This is to help protect Pickups that don't have a reversing Bendix clutch, and is also tied into the Auto Unplug Feature.

When the Auto Unplug Feature is activated, if the Pickup plugs, it will reverse for this time before cycling forward again. Also, if the Auto Unplug Feature is activated and the Feeder is manually reversed, it will continue to reverse for this duration, even if the reverse button is released. The Pickup will reverse directly with the manual reverse button if Auto Unplug Feature is deactivated.

The "Max Reverse Duration" should be set to the minimum time that allows the Feeder to begin reversing, and is dependant on the reaction time of the individual feeder valve.

Note: The value ms (milliseconds is a measurement of time. There are 1000 ms in 1 second.

Adjustment Objective:

Set the Maximum Reverse Duration timer.

Adjustment Procedure:

1. Press **F1**. The text above **F1** will turn red.
2. Press **▲ ▼** to adjust the value (ms) to the desired setting. The setting for the time (ms) must be between 500 to 5000.
3. Press **OK** to save the setting.

[See page 21-1 for default setting]

F2 2. **REVERSAL DELAY**

Function:

The "Reversal Delay" is the time (ms) the Feeder valve is inactive when switching the rotational direction of the Feeder. The delay will extend the life of the feeder motor by reducing hydraulic surges.

Adjustment Objective:

Set the Reversal Delay timer (ms).

Adjustment Procedure:

1. Press **F2**. The text above **F2** will turn red.
2. Press **▲ ▼** to adjust the value (ms) to the desired setting. The setting for the time (ms) must be between 500 to 10000.
3. Press **OK** to save the setting.

[See page 21-1 for default setting]

F3 3. **PICKUP STALL ALARM INDICATOR**

Function:

The "Pickup Stall Alarm" turns on the alarm function as well as automatically shutting off the feeder after 8 seconds of pickup clutch slipping. This feature should always be left on (indicator is illuminated green) unless the pickup speed sensor has failed and bailing must continue.

Adjustment Objective:

Turn ON or OFF the Pickup Stall Alarm.

Adjustment Procedure:

1. Press **F3**. The indicator above **F3** will be illuminated "green" if the Stall Alarm is activated, or "red" if the alarm is off.
2. Press **F3** again to change the condition of the indicator.

[See page 21-1 for default setting]

F4 4. **NEXT PAGE**

Function:

Goes to the Feeder Settings 3 screen (see page 8-9).

Adjustment Objective:

Goes to the next Feeder screen.

Adjustment Procedure:

1. Press **F4**. The Feeder Settings 3 screen will appear.
2. See the Feeder Settings 3 screen for additional information.



5. FUNCTION SELECT FOR MANUAL OPERATION

Function:

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

Adjustment Procedure:

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

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



Returns to the Feeder Settings 1 Screen



Returns to the Main Screen

NOTES

FEEDER SETTINGS 3



Figure 8-3 Feeder Settings 3 Screen

Theory of Operation

This screen, and the Feeder Settings 2 screen, are used to configure the Auto Pickup Unplug feature. This feature does not eliminate plugging of the Pickup, but does:

- Minimize the chance of plugging the Pickup
- Reduce unplugging time if the Pickup does plug
- Reduce wear on the Pickup Clutch
- Reduce the possibility of a related to the pickup clutch fire

When the Auto Pickup Unplug feature is turned on it will monitor the pickup clutch shaft speed. If the speed drops below the “Pickup Plugging Speed”, the unplug sequence will be initiated.

An audible alarm will make seven quick beeps and a popup message will notify the operator that the pickup is stalled. The control system will stop the Pickup during a “Reversal Delay” time, and then reverse the direction of the Pickup for the “Max Reverse Duration”.

The Pickup will then pause again for the “Reversal Delay” time again and then attempt to resume operation in the forward direction for the “Forward Plugging Delay Time”.

The control system will monitor the Pickup speed, and as long as the Pickup is operating above the “Pickup Plugging Speed” it will continue operation. If the Pickup is still stalled (the clutch is slipping) then the audible alarm will sound again and the auto unplug cycle will repeat.

Immediately upon the pickup plugging alarm sounding, the operator should stop and reverse the tractor while bouncing the pickup to assist the Auto Pickup Unplug feature. If the pickup fails to unplug after several cycles, the PTO will need to be disengaged and the pickup unplugged by hand.

F1 1. AUTO PICKUP UNPLUG

Function:

Activates the Auto Unplug Feature as explained in the Feeder 2 screen (see page 8-5).

Adjustment Objective:

Turns ON or OFF the Auto Unplug Feature.

Adjustment Procedure:

1. Press **F1**. Feeder will turn OFF if already ON, or ON if already OFF.
2. Press **F1** to go back to the previous setting for the auto cycle.

[See page 21-1 for default setting]

F2 2. PICKUP PLUGGING SPEED

Function:

The “Pickup Plugging Speed” is the minimum Pickup Clutch Shaft speed (rpm) allowed before the Pickup Stall sequence is activated. The value for the plugging speed should be set below the un-stalled pickup speed with the tractor PTO speed set at idle. This would be typically set at about 50 rpm.

Adjustment Objective:

Set the Pickup Plugging Speed.

Adjustment Procedure:

1. Press **F2**. The text above **F2** will turn red.
2. Press **▲▼** to adjust the value (rpm) to the desired setting. The setting must be between 0 to 500.
3. Press **OK** to save the setting.

[See page 21-1 for default setting]

F3 3. FORWARD PLUGGING DELAY

Function:

Set the time allowed for the pickup to cycle forward after reversing before checking the pickup speed again. This is to allow for the soft start Feeder valves time to engage before monitoring the speed.

It typically would be set from 3 to 8 sec to allow the pickup time to get up to speed if it is not still slipping. For a fast acting feeder, this should be set shorter to prevent excessive slipping if it is still stalled.

Adjustment Objective:

To set the Forward Plugging Delay.

Adjustment Procedure:

1. Press **F3**. The text above **F3** will turn red.
2. Press **▲▼** to adjust the value (ms) to the desired setting. The setting for the time (ms) would typically be between 3000 to 8000.
3. Press **OK** to save the setting.

[See page 21-1 for default setting]

4. FUNCTION SELECT FOR MANUAL OPERATION

Function:

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

Adjustment Procedure:

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

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



Returns to the Feeder Settings 2 Screen



Returns to the Main Screen

KNOTTER



Figure 9-1 Knotter Screen

Theory of Operation

This screen is used for setting up and monitoring the knotter.

F1 1. CONTROL OUTPUT DISABLE

Function:

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

Adjustment Objective:

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



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

Adjustment Procedure:

Used when the operator wants to quickly stop all operations of the baler controlled by the system.

1. Press **F1** to disable the control system. The indicator above **F1** will change to a check mark and a critical message will pop up.
2. Press **F2** to acknowledge the critical message.
3. To resume operation of the baler, return to the Main Baling Screen by using **←**.
4. Press **F4** twice to change the Sequence to Pause. At this point the indicator above **F4** should indicate "GO".

F2 2. CYCLE KNOTTER ONCE

Function:

This will immediately cycle the knotter one full revolution.

CAUTION

Before running this function, the plunger should be fully extended to avoid damage to the needles.

Adjustment Objective:

This button is used to cycle the knotter one full revolution.

Adjustment Procedure:

1. If the plunger is not fully extended, press **OK** until the Plunger function has been selected. When selected, the Plunger function will show at the top of the display (see reference #6 on Figure 9-1).
2. Press **▲** until the plunger reaches full extension.
3. Press and release **F2** to cycle the knotter through one revolution.

F3 3. KNOTTER PARAMETERS

Function:

Accesses the Knotter Parameters screen.

Adjustment Objective:

This allows for the accessing of the knotter Parameters screen.

Adjustment Procedure:

1. Press **F3**.
2. See Knotter Parameters screen for additional information.

F4 4. KNOTTER SETTINGS

Function:

Accesses the Knotter Settings Screen.

Adjustment Objective:

This is used to access the Knotter Settings Screen.

Adjustment Procedure:

1. Press **F4**.
2. See Knotter Settings screen for additional information.

5. PLUNGER POSITION GRAPH

Function:

This graph displays the position of the plunger. The graph will turn from white to red as you extend the plunger.

6. FUNCTION SELECT FOR MANUAL OPERATION

Function:

Selects the system for manual control (Feed Fork, Knotter Feeder, and Plunger). This is one of the six screens where the Knotter can be manually operated.

Adjustment Objective:

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

Adjustment Procedure:

1. Press **OK** to select the system to manually control (Feed Fork, Knotter, Feeder, and Plunger). Selected system will be displayed at the top of the display (see reference #8 on Figure 9-1). When selecting the Knotter, an informational message will pop up (see below). You must acknowledge that you have read this message by pressing **F2** before continuing.

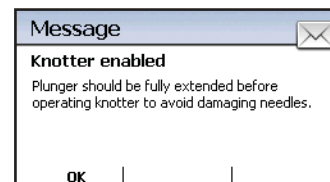


Figure 9-2 Message

2. If you are selecting the Knotter for manual operation, it is highly recommended to extend the plunger before continuing to avoid possible damage to the needles.
3. Use **OK** to select the Plunger.
4. Using **▲** extend the plunger to full extension.
5. Using **OK** select the Knotter.
6. When the informational message appears, verify that the Plunger is fully extended, then acknowledge the message by pressing **F2**.
7. Use **▲▼** to control the Knotter.



CAUTION

To avoid damage to the knotter and knotter components, it is not recommended to run the knotter in reverse. See reference #13 on Figure 9-1 for further details.

7. KNOTTER POSITION INDICATOR AND PRESSURE TRANSDUCER DISPLAY

Function:

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

The value above the indicator is the Feed Fork / Knotter pressure (psi). This is the current pressure in the hydraulic system for the knotter.

8. FUNCTION FOR MANUAL OPERATION DISPLAY

Function:

This displays the system that is currently selected for manual operation.

9. KNOTTER DIRECTIONAL VALVE FLOW DISPLAY

Function:

This displays the flow (%) to the knotter directional valve. This value will be negative if the knotter is being commanded in reverse. The knotter is being driven by the maximum flow possible when the output is at 100% and at the minimum flow possible when the output is at 0%.

It is recommended that the knotter not be run in reverse to avoid damage to the equipment.

10. KNOTTER HOME INDICATOR

Function:

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

11. NEEDLE HOME INDICATOR

Function:

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

12. KNOTTER SPROCKET TOOTH DISPLAY

Function:

This displays the percent of the total number of knotter sprocket teeth counted from the home position. This value is reset when the knotter returns to the home position and activates the knotter stop pad which will be indicated by the Knotter Home Indicator (see reference #10 on Figure 9-1). The Knotter Sprocket Tooth Count sensor is located near the right-hand driven Knotter Sprocket.

13. KNOTTER REVERSE TIME

Function:

This is the duration in milliseconds that the knotter is allowed to travel in reverse each time the knotter is manually operated in the reverse direction (see reference #6 on Figure 9-1). This is the only manual function that cannot be run in reverse indefinitely. In order to protect the knotter, this reverse function time is limited to short cycles.

Note: Reversing the knotter can cause damage to the knotter and its components. Reversing the knotter should always be avoided. However, in general, the only time the knotter can be run in reverse is when the Needle Yoke is slightly forward of the home position and needs to be adjusted to the rear. There are cases where the knotter can be run in reverse, especially when setting up the Twine Fingers, but extreme caution must be exercised, and twine should never be in the knotter when attempting to setup the Twine Fingers. See Trouble Shooting section 23 and 24 for additional information.

[See page 21-1 for default adjustment]



Returns to the Functions Screen



Returns to the Main Screen

KNOTTER PARAMETERS



Figure 9-3 Knotter Parameters Screen

Theory of Operation

This screen accesses the adjustment settings for the knotter and includes the following:

- PWM Knotter Output
- Knotter Reverse Time
- Knotter Release Solenoid Tooth Duration
- Knotter Release Solenoid Time
- Knotter Mid "LS12"

Of the above settings, the "Knotter Release Solenoid Tooth Duration" and the "Knotter Release Solenoid Time" are not used on standard double knotter models and will not be covered in this document.

F1 1. MAIN

Function:

Returns to the Main Screen.

Adjustment Objective:

To return to the Main Screen.

Adjustment Procedure:

1. Press **F1** to return to the Main screen.
2. See Main screen page 14-1 for more information.

F2 2. RESET



Function:

This resets the selected "Value" (see reference #3 on Figure 9-3) to the factory default setting.

Adjustment Objective:

To reset the selected "Value" to the factory default setting.

Adjustment Procedure:

1. Press  to select the value to reset.
2. Press  to reset the value. An informational popup will appear confirming the selection.

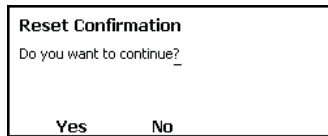




Figure 9-4 Reset Confirmation

3. Press  to confirm the selection therefore re-setting the value, or press  to decline resetting the value.

[See page 21-1 for default values]

3. VALUE DISPLAY

Function:

Displays the current value of the highlighted Knotter Parameter.

Adjustment Objective:

To indicate the current value of the Knotter Parameter.

4. PWM KNOTTER OUTPUT

Function:







This value would be used to control a PWM valve. However, current models of this machine do not use a PWM valve and therefore this value should not be changed from the factory default.



Adjustment Objective:

This set of values are changed to achieve the proper function of a Knotter PWM directional valve.

Adjustment Procedure:

(Refer to Adjust screen page 15-1)

1. Use  to highlight this value.
2. Press  to select this value.
3. Press  to select the first value to change.
4. Use  to adjust the value. Pressing UP will increase the value and the dial indicator will turn clockwise. Pressing  will decrease the value and the dial will turn counterclockwise.
5. Press  to save the value.

6. Use  to select the next value to change.
7. Repeat steps 4 through 7 until the desired values have been changed.
8. Press  when the STOP value is highlighted to return to the Knotter Parameters screen.

[See page 21-1 for default setting]

5. KNOTTER REVERSE TIME

Function:

This is the duration that the knotter is allowed to travel in reverse each time the knotter is manually operated in the reverse direction.

Adjustment Objective:







This value should be kept as small as possible so as to avoid damaging the knotter and knotter components.



This value should not be adjusted greater than the factory default setting.

Adjustment Procedure:

(Refer to Adjust screen page 15-1)

1. Use  to highlight this value.
2. Press  to select this value.
3. Use  to adjust the value. Pressing  will increase the value and the dial indicator will turn clockwise. Pressing  will decrease the value and the dial will turn counterclockwise.
4. Press  to save the value and return to the Knotter Parameters screen.

(See page 21-1 for default setting)

6. KNOTTER RELEASE SOLENOID TOOTH DURATION

Function:

This function is not used in the standard double knotter model.

7. KNOTTER RELEASE SOLENOID TIME

Function:

This function is not used in the standard double knotter model.

8. KNOTTER MID "LS12"

Function:

Knotter mid "LS12" is equivalent to the previous system's LS12 sensor. This setting is measured in "%" where 0% is the start of the rotation and 100% is one complete revolution of the knotter. The counter is set to zero when the Knotter Home switch is activated. The knotter home switch is activated for about 10% of the rotation, and while activated it holds the knotter position sensor value at 0%. Therefore "Knotter Mid LS12" should be set at about 40% so that this signal activates when the knotter is approximately half-way through a full rotation.

The knotter will begin to cycle when the plunger is at full extension. The plunger will then retract and ramp down and stop at a predetermined point (Plunger stop for knotter"LS6" from ext.) and wait. The plunger should be approximately 9 in. from full extension. The plunger will wait for the knotter position sensor to reach the Knotter Mid "LS12" value. This will allow the needles to penetrate up through the top chamber. As soon as the knotter rotation has exceeded the Knotter Mid "LS12" value the plunger will then continue back








to the home position.

Adjustment Objective:

This value should be adjusted so that the needles have penetrated through the top chamber before the plunger is more than approximately 9 in. from its full extension.

Adjustment Procedure:

(Refer to Adjust screen page 15-1)

1. Use   to highlight this value.
2. Press OK to select this value.
3. Use   to adjust the value. Pressing  will increase the value and the dial indicator will turn clockwise. Pressing  will decrease the value and the dial will turn counterclockwise.
4. Press  to save the value and return to the Knotter Parameters screen.

[See page 21-1 for default adjustment]



Returns to the Knotter Screen



Returns to the Main Screen

NOTES

KNOTTER SETTINGS



Figure 9-5 Knotter Settings Screen

Theory of Operation

This page displays many of the same features that appear on the Knotter screen. These following features are unique to this page:

- Tie Next Plunge
- Tie This Fork Cycle
- Knot Cycle Buzzer
- Double Knotter

The first feature allow the knotter to be cycled in special circumstances which are explained below. The third feature allows the buzzer indicating that a knot has been tied to be activated or deactivated. The fourth feature pages to the Double Knotter screen.

F1 1. TIE KNOT

Function:

This button allows the selection of two types of methods for triggering the knotter.

Next = Cycles the knotter and ties off a bale during a plunger cycle. The system must have counted at least three plunger strokes after the last knotter cycle before this function will operate. The Full Chamber Paddle switch must be activated and the Feed Fork must activate the Feed Fork Stop sensor before this function will initiate.

When Next is activated red text “TYING NEXT CYCLE” will appear on the Bale Screen.

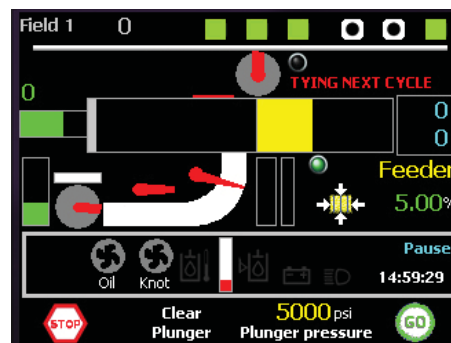


Figure 9-6 Bale Screen

Now = Cycles the knotter and ties off a bale during a plunger cycle. The system must have counted at least three plunger strokes after the last knotter cycle before this function will operate. Once "Now" is activated, the next instance the Feed Fork activates the Feed Fork Stop sensor the plunger and knotter will cycle.



CAUTION

Once either of these function are activated, the machine will immediately go into this mode of operation once the above conditions are met. If the machine is in the "Pause" mode and the "GO" button on the Bale Screen is pressed, the machine will automatically enter a plunger and tie cycle.

Adjustment Objective:

This function cycles the knotter regardless of the bale's length.

Adjustment Procedure:

1. Press **F1** once to activate "Next". The indicator above **F1** will turn green.
2. Press **F1** again to deactivate "Next" and select "Now". The indicator above **F1** will turn red.
3. Press **F1** again to deactivate "Now". The indicators above **F1** should not be lit.



CAUTION

Once either of these function are activated, the machine will immediately go into this mode of operation once the above conditions are met. If the machine is in the "Pause" mode and the "GO" button on the Bale Screen is pressed, the machine will automatically enter a plunger and tie cycle.

F2

2. KNOTTER MID CYCLE

Function:

"Knotter Mid Cycle" is equivalent to the previous LS12 sensor on the old systems. This setting is measured in "%" where 0% is measured at the Knotter Home Position and 100% is one complete revolution of the

knotter. This value is zeroed out when the knotter home switch is activated, which may account for about 10% of the rotation. "Knotter Mid Cycle" should be set at about 40% and it signals the knotter is halfway through its cycle. This protects the Needles while they swing through the chamber and to the knotter.

The knotter will begin cycling when the plunger is at full extension. The plunger will then retract but ramp down and stop at (Plunger stop for knotter"LS6" from ext.) and wait for the knotter to get the needles up though the top chamber. As soon as the knotter has rotated more than the Knotter Mid Cycle % value, the plunger will be allowed to continue back home.

Adjustment Objective:

This value should be adjusted so that the needles have penetrated through the top chamber before the plunger continues retracting from the Plunger stop for knotter "LS6" from ext. position.

Adjustment Procedure:

1. Press **F2** to activate this function. The indicator above **F2** will turn green when activated.
2. The indicator above **F2** will turn to black once the function is complete.

F3

3. KNOT CYCLE BUZZER

Function:

This sounds the buzzer continuously while the knotter is cycling.

Adjustment Objective:

This signals that the knotter is cycling.

Adjustment Procedure:

1. Press **F3** to activate the Knot Cycle Buzzer. The indicator above **F3** will turn green when this function is activated.
2. Press **F3** to deactivate the Knot Cycle Buzzer. The indicator above **F3** will turn black when this function deactivated.

[See page 21-1 for default adjustment]

F4

4. DOUBLE KNOTTER

Function:

This allows the user to advance to the Double Knotter screen.

Adjustment Objective:

Allow access to the Double Knotter screen.

Adjustment Procedure:

1. Press **F4**.
2. See the Double Knotter screen for more information.

5. PLUNGER POSITION GRAPH

Function:

This graph displays the position of the plunger. The graph will turn from white to red as the plunger extends.

6. FUNCTION SELECT FOR MANUAL OPERATION

Function:

Selects the system for manual control (Feed Fork, Knotter Feeder, and Plunger). This is one of the four screens where the Knotter can be manually operated.

Adjustment Objective:

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

Adjustment Procedure:

1. Press **OK** to select the system to manually (Feed Fork, Knotter, Feeder, and Plunger). Selected system will be displayed at the top of the display (see reference #8 on Figure 9-5). When selecting the Knotter, an informational message will pop up. You must acknowledge that you have read this message by pressing **F2** before continuing.

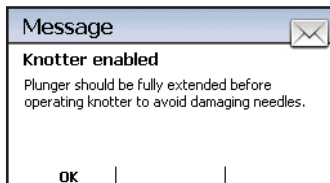


Figure 9-7 Message

2. If you are selecting the Knotter for manual operation, you must first extend the plunger.
3. Use **OK** to select the Plunger assembly.

4. Using **▲** to extend the plunger to full extension.
5. Using **OK**, select the Knotter.
6. When the informational popup appears, verify that the Plunger is fully extended, then acknowledge this by pressing **F2**.
7. Use **▲▼** to control the selected system.



To avoid damage to the knotter and knotter components, it is not recommended to run the knotter in reverse. See item #13 on page 9-12 for further details.

7. KNOTTER POSITION INDICATOR AND PRESSURE TRANSDUCER DISPLAY

Function:

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

The value above the indicator is the Feed Fork / Knotter pressure (psi). This is the current pressure in the hydraulic system for the knotter.

8. FUNCTION FOR MANUAL OPERATION DISPLAY

Function:

Displays the function that is currently selected for manual operation.

9. OUTPUT DISPLAY

Function:

This displays the flow (%) to the knotter directional valve. This value will be negative if the knotter is being commanded in reverse. The knotter is being driven by the maximum flow possible when the output is at 100% and at the minimum flow possible when the output is at 0%.

It is recommended that the knotter not be run in reverse to avoid damage to the equipment.

10. KNOTTER HOME INDICATOR

Function:

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

11. NEEDLE HOME INDICATOR

Function:

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

12. KNOTTER TEETH DISPLAY

Function:

This displays the number of knotter teeth (%) from the home position. This value is reset when the knotter returns to the home position.

13. KNOTTER REVERSE TIME

Function:

This is the duration that the knotter is allowed to travel in reverse each time the knotter is manually operated in the reverse direction (see reference #6 on Figure 9-5).

Note: Reversing the knotter can cause damage to the knotter and its components. Reversing the knotter should always be avoided. However, in general the only time the knotter can be run in reverse is when the Needle Yoke is slightly forward of the home position and needs to be adjusted to the rear. See Trouble Shooting sections 23 and 24 for additional information.

[See page 21-1 for default adjustment]



Returns to the Knotter Screen



Returns to the Main Screen

NOTES

DOUBLE KNOTTER



Figure 9-8 Double Knotter Screen

Theory of Operation

This page displays many of the same features that appear on the Knotter and Knotter Settings Screen. These following features are unique to this page:

- Knotter Release
- Flow Valve
- Percent Flow Valve Display
- Detailed Knotter Position Indicator

The first feature is not used on the standard model of double knotter and therefore will not be covered here. During a typical knotter cycle, the knotter begins to rotate with full flow driving the knotter. When the knotter sprocket Tooth Count reaches the “Flow Valve Trip” (reference #4 on Figure 9-8) value, the knotter is driven at a decel speed with the flow to the knotter limited. This reduced flow allows the knotter to properly come to a stop and allow the Knife Arm to adequately wipe the second knot off of the Bill Hook (see Double Knotting Process section in Operators Manual PB1592OP09).

Setup Procedure for Double Knotter Stop Position

This procedure should be used when setting the stopping position of the Double Knotter. This requires adjusting the right-hand driven knotter sprocket tooth counter sensor and the Knotter Top Pad.



Before continuing with this setup always follow all of the safety guidelines as stated in the Operator’s Manual for this machine.

1. Engage tractor PTO and run the baler at 1000 to 1100 PTO RPM. Confirm the hydraulic oil is at least 150° F before proceeding.
2. Manually extend the Plunger to full extension (see reference #6 on Figure 9-8).
3. Press **F2** to energize the flow valve continuously (see reference #2 on Figure 9-8).
4. Press **F3** to cycle the knotter once. Note the lo-

cation of where the Knife Arm roller stopped in relation to the Knoll on the cam.

5. Adjust the Knotter Stop Pad until the Knife Arm roller is riding on the knoll or slightly forward of the knoll. The following are referenced looking at the Knotter Shaft from the left-hand side of the baler.

- a. If the Roller is stopping passed the Knoll the Knotter Stop Pad should be rotated clockwise.
- b. If the Roller is stopping before the Knoll the Knotter Stop Pad should be rotated counterclockwise.

6. Repeat steps 4 and 5 until the desired stopping location has been attained.

7. Press **F2** to deactivate the Flow Valve. The indicator above **F2** should turn off.

8. Press **F3** to cycle the knotter once. Note the position where the Knife Arm roller stopped in relation to the Knoll of the cam.

9. Press **F4** and adjust the Flow Valve Trip value until the Knife Arm Roller comes to rest on the Knoll or slightly after. Refer to item #4 below for adjustment procedure.

- a. If the Roller is stopping passed the Knoll the Flow Valve Trip value should be decreased.
- b. If the Roller is stopping before the Knoll the Flow Valve Trip value should be increased.

10. Repeat steps 9 and 10 until the desired stopping location has been attained.

F1 1. KNOTTER RELEASE

Function:

The first feature is not used on the standard model of double knotter and therefore will not be covered here.

[See Page 21-1 for default setting]

F2 2. FLOW VALVE

Function:

The Flow Valve reduces the amount of flow to the knotter from the full flow condition to the decel flow condition. This is used to slow down the knotter near the end of its cycle to a consistent speed to help make a repeatable stop position.

Adjustment Objective:

To slow the knotter down and determine the home position of the knotter.

Adjustment Procedure:

1. Press **F2**. The indicator above **F2** will turn green when the Flow Valve is activated.
2. Press **F2** again to deactivate the flow valve. When deactivated the indicator above **F2** will turn black.

[See Page 21-1 for default setting]

F3 3. CYCLE KNOTTER ONCE

Function:

This will immediately cycle the knotter one full revolution. This will stop the knotter just as it would during a tie cycle, using the flow valve on double knotter models.



CAUTION

Before running this function, the plunger should be fully extended to avoid damage to the needles.

Adjustment Objective:

This button is used to cycle the knotter one full revolution.

Adjustment Procedure:

1. If the plunger is not fully extended, press **OK** until the Plunger function has been selected. When selected the Plunger function will show at the top of the display (see reference #8 on Figure 9-8).
2. Press **▲** until the plunger reaches full extension.
3. Press **F2** to cycle the knotter through one revolution.

F4 4. FLOW VALVE TRIP

Function:

This is the percent of the knotter's full revolution at which the Flow Valve (see reference #2 on Figure 9-8) will activate and restrict the flow to the knotter from the full flow condition to the decel flow condition. The decel flow is required to ensure that the knotter stops at the Knotter Stop Switch and in the correct position to adequately wipe the second knot off the Bill Hook (see Maintenance and Adjustment section in Operators Manual PB1592OP09).

Adjustment Objective:

To activate the Flow Valve such that the knotter stops at the Knotter Stop Switch and the Knotter Home Position is such that the Knife Arm Roller is at the tip of the Cam Knoll.

Adjustment Procedure:

1. Press **F4** to select the Flow Valve %. The text above **F4** will highlight in red.
2. Use **▲▼** to adjust the value.
3. Press **OK** to save the value.

[See Page 21-1 for default setting]

5. PLUNGER POSITION GRAPH

Function:

This graph displays the position of the plunger. The graph will turn from white to red as the plunger extends.

6. FUNCTION SELECT FOR MANUAL OPERATION

Function:

Selects the system for manual control (Feed Fork, Knotter Feeder, and Plunger). This is one of the four screens where the Knotter can be manually operated.

Adjustment Objective:

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

Adjustment Procedure:

1. Press **OK** to select the system to manually (Feed Fork, Knotter, Feeder, and Plunger). Selected system will be displayed at the top of the display (see reference #8 on Figure 9-8). When selecting the Knotter, an informational message will pop up. You must acknowledge that you have read this message by pressing **F2** before continuing.

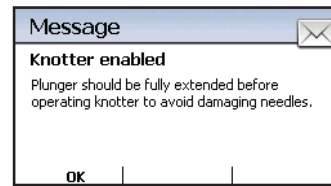


Figure 9-9 Message

2. If you are selecting the Knotter for manual operation, you must first extend the plunger.
3. Use **OK** to select the Plunger.
4. Using **▲** extend the plunger to full extension.
5. Using **OK** select the Knotter.
6. When the informational popup appears verify that the Plunger is fully extended then acknowledge this by pressing **F2**.
7. Use **▲▼** to control the selected system.



CAUTION

To avoid damage to the knotter and knotter components, it is not recommended to run the knotter in reverse.

7. KNOTTER POSITION INDICATOR AND PRESSURE TRANSDUCER DISPLAY

Function:

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

The value above the indicator is the Feed Fork / Knotter pressure (psi). This is the current pressure in the hydraulic system for the knotter.

8. FUNCTION FOR MANUAL OPERATION DISPLAY

Function:

Displays the function that is currently selected for manual operation.

9. KNOTTER POSITION INDICATOR

Function:

This shows the position of the knotter.

10. FLOW VALVE INDICATOR

Function:

This indicates when the Flow Valve has been activated. The indicator will illuminate green when activated and black when not activated.

11. KNOTTER HOME INDICATOR

Function:

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

12. NEEDLE HOME INDICATOR

Function:

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

13. KNOTTER TEETH DISPLAY

Function:

This displays the number of knotter teeth (%) from the home position. This value is reset when the knotter returns to the home position.

14. OUTPUT DISPLAY

Function:

This displays the flow (%) to the knotter directional valve. This value will be negative if the knotter is being commanded in reverse. The knotter is being driven by the maximum flow possible when the output is at 100% and at the minimum flow possible when the output is at 0%.



To avoid damage to the knotter and knotter components, it is not recommended to run the knotter in reverse.



Returns to the Knotter Screen



Returns to the Main Screen

OIL COOLER



Figure 10-1 Oil Cooler Screen

Theory of Operation

The oil cooler fan operates to prevent the hydraulic oil from overheating. It uses an oil temperature sender to monitor the oil and operate the fan. With cold oil, the fans will remain off, and as the oil heats up above the “oil cooler temp turn on” set point, the fans will turn on. Then as the oil temperature begins to fall below the “oil cooler temp turn off” set point, they will shut off.

While the Cooling Fans are running, they will operate in the following sequence:

1. Cycle in the forward direction for a set time (oil cooler fan max forward time)
2. Pause for a set time (oil cooler fan idle time)
3. Reverse for a set time (oil cooler fan reverse time)
4. Pause for a set time (oil cooler fan idle time)
5. Cycle in the forward direction again

If the oil temp drops below the “oil cooler temp turn off” set point, it will save its place in the forward/reverse sequences and start where it left off. The settings for when to turn the Cooling fan on and off are adjustable.

F1 1. OVERHEAT TEMP

Function:

Sets the temperature (°F) at which an alarm will be activated indicating that the hydraulic oil is too hot to continue operation. This value sets the temperature that will trigger the overheat warning. If the oil temperature is above this setting, it will shut down the machine, but will only take effect after the plunge cycle is complete. In this condition, only the Feeder will be allowed to operate manually. This setting is adjustable, but can not be set above 220°.

Note: See “Trouble Shooting Section 23 and 24” for more information.

Adjustment Objective:

Input the set point (°F) at which the temperature alarm will turn on.

Adjustment Procedure:

1. Press **F1**. The value of the Oil overheat temp should be highlighted in red.
2. Use **▲▼** to adjust the value (°F).
3. Press **OK** when done.

[See page 21-1 for default setting]

F2 **2. OIL PARAMETERS**

Function:

Accesses the Oil Parameters Screen (see page 10-3).

Adjustment Procedure:

Press **F2**.

F3 **3. TEMPERATURE CALIBRATION**

Function:

Accesses the Temperature Calibration Screen

Adjustment Procedure:

Press **F3**.

F4 **4. OIL SETTINGS**

Function:

Accesses the Oil Settings Screen

Adjustment Procedure:

Press **F4**.

5. COOLING FAN REVERSE INDICATOR

Function:

Indicates when the Cooling Fan is operating in the reverse direction.

6. COOLING FAN MANUAL CONTROL

Function:

Manual operation of the Cooling Fan.

Adjustment Objective:

Allows manual operation of the Cooling Fan in the forward and reverse directions.

Adjustment Procedure:

1. Press **▲** to operate the Cooling Fan in the forward direction. The Cooling Fan will continue to

run as long as **▲** is depressed.

2. Press **▼** to operate the Cooling Fan in the reverse direction. The Cooling Fan will continue to run as long as **▼** is depressed.

7. COOLING FAN TIMER SETTINGS DISPLAY

Function:

Settings for the Cooling Fan Timer are displayed along with the current value of each timer. Settings for the timers are set in the Oil Parameters Screen (see page 10-3).

8. COOLING FAN FORWARD INDICATOR

Function:

Indicates when the Cooling Fan is operating in the forward direction.

9. FAN TURN OFF TEMPERATURE SETTING DISPLAY

Function:

Indicates the temperature (°F) setting when the Oil Cooling Fan will turn off (see also #2). Settings for the timers are set in the Oil Parameters Screen (see page 10-3).

10. FAN TURN ON TEMPERATURE SETTING DISPLAY

Function:

Indicates the temperature (°F) setting when the Oil Cooling Fan will turn on (see also #2). Settings for the timers are set in the Oil Parameters Screen (see page 10-3).

11. OIL TEMPERATURE INDICATOR

Function:

Indicates the temperature (°F) of the hydraulic reservoir.

12. OIL OVERHEAT TEMPERATURE SETTING DISPLAY

Function:

Indicates the temperature (°F) setting for activating the Oil Over Heat Alarm.



Returns to the Functions Screen



Returns to the Main Screen

OIL PARAMETERS



Figure 10-2 Oil Parameters Screen

Theory of Operation

Allows for adjustment to the set points for operating the cooling fan, and calibration of the temperature sender.

1. OIL OVERHEAT TEMP

Function:

Sets the temperature (°F) at which an alarm will be activated indicate the hydraulic oil is too hot to continue operation. This will be the same value as entered as “overheat temp” on the Cooling Fan screen.

Adjustment Objective:

Input the set point (°F) at which the temperature alarm will turn on.

Adjustment Procedure:

1. Use to adjust the value (°F).
2. Press when done.

[See page 21-1 for default setting]

2. OIL COOLER TEMP TURN ON

Function:

Sets the temperature (°F) at which the hydraulic oil must reach before the cooling fan will turn on. (see also page 10-1 – Oil Settings)

Adjustment Objective:

Input the set point (°F) at which the cooling fan will turn on. (see also page 10-9 – Oil Settings)

Adjustment Procedure:

1. Use to adjust the value (°F).
2. Press when done.

[See page 21-1 for default setting]

3. OIL COOLER TEMP TURN OFF



Function:

Sets the temperature (°F) at which hydraulic oil must reach to turn off the cooling fan if it is on. (see also page 10-9 – Oil Settings)

Adjustment Objective:

Input the set point (°F) at which the cooling fan will turn off. The value entered must be less than the Oil Cooler Temp Turn On value (see #2) (see also page 10-9 – Oil Settings)

Adjustment Procedure:

1. Use  to adjust the value (°F).
2. Press  when done.

[See page 21-1 for default setting]

4. OIL COOLER FAN MAX FORWARD TIME



Function:

Sets the maximum time (secs) the oil cooler fan will cycle in the forward direction before reversing.

Adjustment Objective:

Input the set point (secs) for the maximum time the oil cooling fan will operate in the forward direction.

Adjustment Procedure:

1. Use  to adjust the value (secs).
2. Press  when done.

[See page 21-1 for default setting]

5. OIL COOLER FAN REVERSE TIME



Function:

Sets the time (secs) for the oil cooler fan to run in reverse for cleaning off debris that may have collected on the screen.

Adjustment Objective:

Input the set point (secs) at which the cooling fan will operate in reverse.

Adjustment Procedure:

1. Use  to adjust the value (secs).
2. Press  when done.

[See page 21-1 for default setting]

6. OIL COOLER FAN IDLE TIME



Function:

Sets the time (secs) the fan sits idle between direction changes to allow the fan blades to come to a complete stop.

Adjustment Objective:

Input the time (secs) for the fan blades to come to a complete stop.

Adjustment Procedure:

1. Use  to adjust the value (secs).
2. Press  when done.

[See page 21-1 for default setting]

7. OIL TEMP LOW INPUT

Function:

Sets the low value (mv) for calibrating the temperature sender.

Adjustment Objective:

Input the low value (mv) for calibrating the temperature sender.

Adjustment Procedure:

It is recommended that this adjustment be done from the Temperature Calibration Screen (page 10-7).

8. OIL TEMP HIGH INPUT

Function:

Sets the high value (mv) for calibrating the temperature sender.

Adjustment Objective:

Input the high value (mv) for calibrating the temperature sender.

Adjustment Procedure:

It is recommended that this adjustment be done from the Temperature Calibration Screen (page 10-7).

9. OIL TEMP LOW OUTPUT

Function:

Sets the low temperature (°F) for calibrating the temperature sender.

Adjustment Objective:

Input the low temperature (°F) for calibrating the temperature sender.

Adjustment Procedure:

It is recommended that this adjustment be done from the Temperature Calibration Screen (page 10-7).

10. OIL TEMP LOW OUTPUT

Function:

Sets the high temperature (°F) for calibrating the temperature sender.

Adjustment Objective:

Input the high temperature (°F) for calibrating the temperature sender.

Adjustment Procedure:

It is recommended that this adjustment be done from the Temperature Calibration Screen (page 10-7).



11. VALUE


Current value of selected variable


 **12. MAIN**

Press  to go back to the Main screen.

 **13. RESET**

Press to reset the selection variable to the factory default setting. A dialog box will be displayed to confirm the change. Use  to confirm the change back to the factory default setting, or  to cancel the change.

 Returns to the Oil Cooler Screen

 Returns to the Main Screen

TEMPERATURE CALIBRATION



Figure 10-3 Temperature Calibration Screen

Theory of Operation

This screen is used to calibrate the oil temperature sender which is designed for operation between 100° to 280°F. When calibrating the display, the low temperature reading should be as close to 100°F as possible, and the high temperature should be above at least 130°F. A greater span between the high and low temperature readings will produce a more accurate result.

After two temperature readings have been entered, the calibration is complete. The gauge will extrapolate if above or below the two set points. If desired, this may be calibrated in °C, but note that the labeling will still read °F.

When calibrating the display, a high quality temperature probe or infrared thermometer should be used.

Low Temperature Calibration

- F1** 1. LOW INPUT
- F2** 2. LOW OUTPUT

Function:

Set the low temperature set point






Adjustment Objective:

Calibrate the temperature display with the output from the temperature sensor for the Low Temperature Calibration.

Adjustment Procedure:

1. Operate the baler until the hydraulic temperature is about 100°F.
2. Use a temperature probe or infrared thermometer to measure the temperature (°F) of the side of the hydraulic reservoir near the temperature sender.
3. Note the value (mv) of the Temperature Sender

(see reference #5 on Figure 10-3).

4. Press .
5. Using  enter the value of the temperature sender (mv).
6. Press .
7. Press .
8. Using  enter the measured temperature (°F).

High Temperature Calibration

 3. HIGH INPUT

 4. HIGH OUTPUT






Function:

Set the high temperature set point.

Adjustment Objective:

Calibrate the temperature display with the output from the temperature sensor for the High Temperature Calibration.

Adjustment Procedure:

1. Operate the baler until the hydraulic temperature is above 140°F (preferably this point should be set as high as the machine may comfortably run up to 220). You may increase the “fan turn on temp” to 200 to let the machine heat up faster (see page 10-9).
2. Use a temperature probe or infrared thermometer to measure the temperature (°F) of the side of the hydraulic reservoir near the temperature sender.
3. Note the value (mv) of the Temperature Sender (see reference #5 on Figure 10-3) .
4. Press .
5. Using  enter the value of the temperature sender (mv).
6. Press .
7. Press .
8. Using  enter the measured temperature (°F).

5. TEMPERATURE SENDER OUTPUT INDICATOR

Function:

Indicates the value (mv) of the Temperature Sender.

6. TEMPERATURE INDICATOR

Function:

Indicates the value (°F) of the hydraulic oil temperature.



Returns to the Oil Cooler Screen



Returns to the Main Screen

OIL SETTINGS



Figure 10-4 Oil Settings Screen

Theory of Operation

Adjusts the settings for operating the Oil Cooler Fan. Also disables the Hot Oil and Low Oil Level alarms.

The Oil Cooler fan uses only a temperature sender to sense the temperature of the oil. With cold oil, the Oil Cooler Fans will remain off. As the oil heats up above the “oil cooler temp turn on” set point, the fans will turn on. Then as the oil temperature begins to fall below “oil cooler temp turn off” set point, they will shut off.

The Hot Oil and Low Oil Level alarms are utilized to protect the baler from conditions that could damage the hydraulic system. Both of these alarms can be disabled, but are reset if the power to the control system is cycled.

CAUTION

Disabling of the Hot Oil and Low Oil Level of the alarms is not recommended except under closely monitored conditions. Severe dam-

age to the hydraulic system can occur when operating at too high of a temperature or with an insufficient capacity of hydraulic oil.

F1 1. FAN TURN ON

Function:

Sets the temperature (°F) at which the hydraulic oil must reach to turn on the fan.

Adjustment Objective:

Input the set point (°F) at which the temperature alarm will turn on.

Adjustment Procedure:

1. Press **F1** .
2. Use **▲ ▼** to adjust the value (°F). – (see reference #8 on 10-4).
3. Press **OK** when done.

[See page 21-1 for default setting]

F2 2. FAN TURN OFF

Function:

Sets the temperature (°F) at which the hydraulic oil must reach before the cooling fan will turn off if it is already on.

Adjustment Objective:

Input the set point (°F) at which the cooling fan will turn off. The value entered must be less than the value entered for Fan Turn On (see reference #9 on Figure 10-4).

Adjustment Procedure:

1. Press **F2**.
2. Use **▲** **▼** to adjust the value (°F). – (see reference #9 on Figure 10-4).
3. Press **OK** when done.

[See page 21-1 for default setting]

F3 3. HOT OIL BYPASS

Function:

Disables the hot oil alarm and shutdown. Used if the temperature switch malfunctions or for troubleshooting system problems.

Adjustment Objective:

To disable the hot oil alarm.

Adjustment Procedure:

1. Press **F3**.
2. The Hot Oil indicator should remain off (see reference #6 on Figure 10-4).

F4 4. LOW OIL BYPASS

Function:

Disables the low oil alarm and shutdown if the level switch malfunctions.

Adjustment Objective:

To disable the low oil level alarm.

Adjustment Procedure:

1. Press **F4**.
2. The Low Oil indicator should remain off (see reference #5 on Figure 10-4).

5. LOW OIL INDICATOR

Function:

Indicates the hydraulic oil level is below the minimum recommended level. The indicator will turn on if the oil level is below that level.

[See page 21-1 for default setting]

6. HOT OIL INDICATOR

Function:

Indicates the hydraulic oil temperature is above the maximum recommended operating temperature. The indicator will turn on if the temperature is above that level.

[See page 21-1 for default setting]

7. OIL TEMPERATURE INDICATOR

Function:

Indicates the current temperature (°F) of the hydraulic oil.

8. FAN TURN ON TEMPERATURE SETTING INDICATOR

Function:

Indicates the temperature (°F) setting when the Oil Cooling Fan will turn on. (see reference #1 on Figure 10-4).

9. FAN TURN OFF TEMPERATURE SETTING INDICATOR

Function:

Indicates the temperature (°F) setting when the Oil Cooling Fan will turn off (see reference #2 on Figure 10-4). The value entered must be less than the value entered for Fan Turn On (see reference #9 on Figure 10-4).



Returns to the Oil Cooler Screen



Returns to the Main Screen

BALE LENGTH SETUP 1



Figure 11-1 Bale Length Setup 1 Screen

Theory of Operation

The bale length is monitored and determined using a 0 to 5 volt, 360° rotating potentiometer, which is connected to the Star Wheel Shaft mounted in the bottom of the bale chamber. As the bale is formed in the chamber, it rotates the Star Wheel and potentiometer. The ICM receives the voltage signal from the potentiometer and determines a full revolution once the signal reaches 5 volts at the Upper Transition, and drops to 0 volts at the Lower Transition.

When a new bale begins to form, the computer records the current output from the potentiometer. The computer uses the calibrated “Star Wheel Circumference” and multiplies it by the number of revolutions of the Star Wheel and subtracts the start position of the bale from the instantaneous position to compute the bale length. The star wheel circumference is approximately 46” but can deviate based on variations in the mounting position. If during bale forming the Star Wheel rotates backwards the ICM will not adjust the recorded length unless the Star Wheel rotates backwards passed a preset trigger in the program. See Bale Length Setup 2 for more information.

F1 1. ZERO BALE LENGTH

Function:

Resets the current bale length to 0 and records a new start position as if it had just tied off a bale.

Adjustment Objective:

This function is used to zero the bale length when servicing the bale length mechanism when there is a partially formed bale in the chamber.

Adjustment Procedure:

If the potentiometer requires service and there is a partial bale in the chamber, record the current bale length. After completion, the bale length may be reentered to salvage the forming bale length. To do this:

1. Record the Current bale length (see reference #9 on Figure 11-1).
2. First press Zero Bale Length (F1) in the Bale length screen.
3. Using the Current Bale Length (see reference #9 on Figure 11-1) rotate the Star Wheel slowly by hand.

- Continue this until the recorded bale length as noted above is reached.

F2 2. BALE DROP BUZZER

Function:

This toggles on a short double beep buzzer to indicate when the bale is about to drop off of the bale chute.

Adjustment Objective:

This is adjusted to sound the double beep just prior to the bale dropping off the bale shoot.

Note: When using the rear camera, this double beep signals the time to watch the monitor and check the condition and appearance of the bale. Knowing when a bale is about to drop off may also be helpful when re-baling so the dropping bale can be moved out of the way.

Adjustment Procedure:

- Refer to screen Bale Length Setup 2. Bale drop Chamber Length (see reference #4 on Figure 11-3) to calibrate the double beep.
- It should be set so the buzzer sounds one to two Plunger stokes before the bale drops off.
- If the bale is dropping off before the double beep, shorten this value and if the bale is holding on long after the alarm, lengthen this value.

Note: A typical value for Bale drop chamber length would be about 110" to 120" for using a Roller-style Bale Chute.

[See page 21-1 for default setting]

F3 3. STAR WHEEL CIRCUMFERENCE

Function:

This function calibrates the Star Wheel Circumference (in) which sets the desired bale length with the measured bale length at the Star Wheel sensor.

Adjustment Objective:

The Star Wheel Circumference (in) is adjusted so that the measured length of an actual bale is equal to the bale length set by the user and within the length error of +/- 3 flakes.

Adjustment Procedure:

- Set the desired Bale Length from the Auto Statistics page (see page 3-1).
- Measure several bales in a row and take the average length.
- Take the difference of the average measured bale length and the desired Bale Length.
- Divide this difference by the number of revolutions of the Star Wheel required to make the bale (about two revolutions for a 96" bale). If the bales were too long, add this value to the Star Wheel Circumference (see reference #3 on Figure 11-1). If the bales were too short, subtract this value from the Star Wheel Circumference (see reference #3 on Figure 11-1).
- This adjustment procedure should be made until the length error of the bale is within +/- 3 inches.

[See page 21-1 for default setting]

F4 4. NEXT PAGE

Function:

Press **F4** to move to Bale Length 2 Screen. See Length Setup 2 screen for more information.

5. STAR WHEEL INFO

Function:

Press **Info** to see information about adjusting the Star Wheel Circumference (see below). Press **F2** to clear screen.

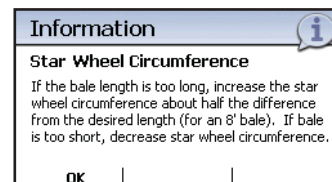


Figure 11-2 Information

6. ADJUST BALE LENGTH





Function:

This function adjusts the desired length of bale.

Adjustment Objective:

This function is to be adjusted to match the desired length of bale.

Adjustment Procedure:

1. Use  to highlight the value.
2. Press   to adjust the value.
3. Press  to save the value.

[See page 21-1 for default setting]

7. PREVIOUS BALE LENGTH

Function:

This value shows the previous length (in) of the bale after the bale has been fully formed and the knotter has tied.

8. BALE LENGTH REFERENCE MARKER DISPLAY

Function:

This value indicates if the potentiometer has rotated more than 1/2 of a full revolution.

9. CURRENT BALE LENGTH

Function:

This value indicates the current length (in) of the bale in the chamber.

10. BALE LENGTH GRAPH

Function:

This graph is a visual indication of the length of the bale. The graph will be initially black and will turn yellow to indicate the presence of the bale.

11. PLUNGER POSITION

Function:

This graph is a visual indication that shows the position of the plunger. The graph is initially white and will turn red as the plunger extends.

12. STAR WHEEL POSITION GRAPH

Function:

This graph is a visual indication of the current position of the Star Wheel. This is the uncorrected position of the Star Wheel Position.

13. STAR WHEEL REVOLUTIONS

Function:

This value indicates the number of revolutions of the Star Wheel during the forming of the bale. This value will reset after a tie cycle is complete.

14. STROKE

Function:

This value indicates the number of strokes. This value will reset after a tie cycle.

15. STROKES/BALE

Function:

This value indicates the number of strokes for the previous bale. This value resets after a tie cycle.



Returns to the Functions Screen



Returns to the Main Screen

BALE LENGTH SETUP 2



Figure 11-3 Bale Length Setup 2 Screen

Theory of Operation

This screen is primarily for setting up the potentiometer Upper and Lower Transitions, and for checking an existing sensor. When replacing a potentiometer, the Upper and Lower Transitions must be set.

The Upper and Lower Transitions are the maximum and minimum values that the potentiometer is capable of producing. These values are unique to each sensor and must be set anytime the sensor is changed.

The ICM will only register an increase in bale length while the Star Wheel is rotating in the positive direction (normal direction of rotation during bale forming). If the Star Wheel rotates more than 1/2 of a revolution in the reverse direction a Star Wheel revolution will be added to the Bale Length.

F1 1. SENSOR LOWER TRANSITION

Function:

Stores the lowest value that the Bale Length Potentiometer is capable of producing.

Adjustment Objective:

This is adjusted to the lowest value that the Bale Length Potentiometer can produce.

Adjustment Procedure:

1. Make sure the Star Wheel Shaft is free to rotate.
2. Referencing the Star Wheel Position Graph (see reference #8 on Figure 11-3), rotate the Star Wheel opposite its normal direction of travel until the Bale Length Potentiometer (see reference #10 on Figure 11-3) produces its smallest reading.
3. Note this value.
4. Press **F1** and use to enter the value noted above.
5. Press **OK** to save the value.

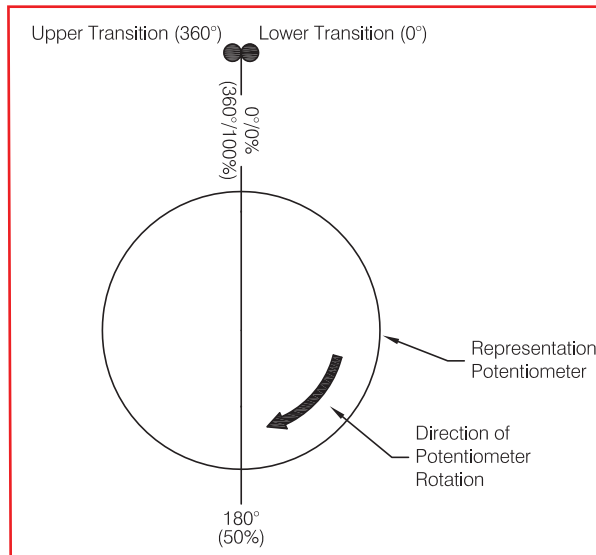


Figure 11-4 Star Wheel Potentiometer Values (not to scale)

[See page 21-1 for default setting]

F2 2. SENSOR UPPER TRANSITION

Function:

Stores the highest value that the Bale Length Potentiometer is able to produce.

Adjustment Objective:

This is adjusted to the highest value that the Bale Length Potentiometer can produce.

Adjustment Procedure:

1. Make sure the Star Wheel Shaft is free to rotate.
2. Referencing the Star Wheel Position Graph (see reference #8 on Figure 11-3), rotate the Star Wheel opposite its normal direction of travel until the Bale Length Potentiometer (see reference #10 on Figure 11-3) produces its largest reading.
3. Note this value.
4. Press **F1** and use **▲▼** to enter the value noted above.
5. Press **OK** to save the value.

[See page 21-1 for default setting]

F4 3. BALE DROP CHAMBER LENGTH

Function:

This value calibrates the double beep indicating that a bale is exiting from the chamber and is about to drop off the bale chute.

This value, once adjusted, should stay fairly consistent but may require adjustment when factors affecting the dropping off of the bale occur. These factors include varying crop conditions, different crops, and different styles of bale chutes. This setting may also require adjustment when the Star Wheel Circumference is modified or the bale length potentiometer is replaced.

Adjustment Objective:

The value should be adjusted such that the bale exits the chute and drops to the ground within two strokes after the double beep.

Adjustment Procedure:

1. Press **F4**.
2. Use **▲▼** to adjust the value.
3. Press **OK** to save the value.

Note: This value should be decreased if the bale is dropping off too soon and increased if it is dropping off too late.

[See page 21-1 for default setting]

▼ 4. TRANSITION INFO

Function:

Press **▼** to activate the informational message regarding adjustments for setting up the Sensor Upper and Lower transition values (see reference #1 and 2 on Figure 11-3). See below. Press **F2** to clear screen.

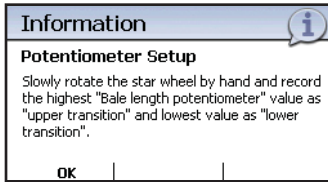


Figure 11-5 Information

5. PREVIOUS BALE LENGTH DISPLAY

Function:

This value shows the previous length (in) of the bale after the bale has been fully formed and the knotter has tied.

6. BALE LENGTH REFERENCE MARKER DISPLAY

Function:

This value indicates if the potentiometer has passed through 1/2 of a full revolution.

7. CURRENT BALE LENGTH DISPLAY

Function:

This value indicates the current length (in) of the bale in the chamber.

8. BALE LENGTH GRAPH

Function:

This graph is a visual indication of the length of the bale. The graph will be initially black and will turn yellow to indicate the presence of the bale.

9. STAR WHEEL POSITION GRAPH

Function:

This graph is a visual indication of the current position of the Star Wheel based on the potentiometer output.

10. BALE LENGTH POTENTIOMETER DISPLAY

Function:

This value shows the current reading of the Bale Length Potentiometer as produced by the sensor.



Returns to the Bale Length Setup 1 Screen



Returns to the Main Screen

NOTES

TENSION SETTINGS 1



Figure 12-1 Tension Settings 1 Screen

Theory of Operation

The Tension Settings 1 screen is used in conjunction with the Tension Settings 2 screen (see page 12-5) to adjust items related to the tension system and their relation to the plunger pressure as it is designed to hold a constant pressure during each plunger stroke.

There is a proportional relief valve between the tension pump and tension cylinders. The relief valve will operate between 0 to 100% of the system pressure (3,000 psi) and is the % Tension reading displayed on the ICM.

The tension pressure will typically operate between 75 to 90% of the tension relief valve setting where 100% is equal to full pump pressure (about 3,000 psi) and 0% allows approximately 200 psi to the tension system.

When the Target Plunger Pressure is set with the ICM each time the Plunger strokes in the automatic mode, the control system records the maximum Plunger Pressure during the stroke. When the Plunger is at

full extension a comparison is made between the measured pressure and the Target Plunger Pressure. Small proportional adjustments are made at each cycle to keep the actual Plunger Pressure as close as possible to the Target Plunger Pressure.

In this way, the tension pressure is constantly adjusting to suit the crop conditions by maintain a relatively constant plunger pressure. As moisture increases the tension pressure will decrease, and as the moisture decreases the tension increases.

The operator can also refer to the Average Tension on the Auto Statistics screen (see page 3-1). The Average Tension is the average tension value for a field based on when the last count reset was made. The Average Tension value can be compared to the current tension to gauge changing crop conditions.

If the current tension value is higher than the average, then there is less moisture in the crop as more pressure is required to reach the Target Plunger Pressure. If the current tension value is lower, then there is

more moisture as less tension pressure is required to achieve the same Target Plunger Pressure.

If the difference between the Plunger Pressure and the Target Plunger Pressure is greater than the Plunger Relief Pressure, the tension system will dump a larger portion (Relief % cut) and then go back to its fine adjustment based on the “Tension Multiplier”. If the plunger stall warning comes on the tension will drop to 0% until the plunger has cleared and then return to the last tension pressure.

F1 1. MAX PRESSURE

Function:

Set the Maximum Pressure (%) of the full tension system pressure. This is to protect the tension system, and a setting of 92% is recommended for normal baling.

Adjustment Objective:

To set the Maximum Pressure set point.

Adjustment Procedure:

1. Press **OK**.
2. Use **▲▼** to select “manual”.
3. Press **OK** to select “manual”.
4. Hook up a pressure gauge to the tension system. If the control system has a pressure transducer as part of the system, then the pressure can be read directly from the ICM (see reference #6 on Tension Settings 1 screen page 12-1).
5. Press **F3**. The text above the button will turn “red”.
6. Use **▲** to raise the Manual Tension Pressure to 100%.
7. Press **OK** to save the setting.
8. Press **F1**. The text above the button will turn “red”.
9. Use **▲▼** to set the desired Maximum Pressure. As the Maximum Pressure value is adjusted, the Tension Pressure will change at the same time. It is recommended that the Tension Pressure setting is 2,100 psi to 2,500 psi, but should not exceed 2,500 psi.
10. Press **OK** to save the setting.

[See page 21-1 for default setting]

F2 2. OPEN PRESSURE

Function:

Set the Maximum Pressure (%) allowed to the tension rail cylinders when opening. This is to prevent damaging the baler when raising the top tension rail, which may collide with the Chamber Tie Channel when opening. This should be set below 60% and may be set as low as 0% because there is always some pressure for overcoming the relief valve.

Adjustment Objective:

To set the Maximum Pressure when opening the tension rails.

Adjustment Procedure:

1. Press **F2**. The text above the button will turn “red”.
2. Use **▲▼** to set the Open Pressure.
3. Press **OK** to save the setting.

[See page 21-1 for default setting]

F3 3. MANUAL TENSION PRESSURE

Function:

Set the Manual Tension Pressure (%) allowed when operating in the Manual Tension Mode. It is recommended to start with a setting from 75% to 90%.

Adjustment Objective:

To set the Manual Tension Pressure (%).

Adjustment Procedure:

1. Press **F3**. The text above the button will turn “red”.
2. Use **▲▼** to set the Manual Tension Pressure (%).
3. Press **OK** to save the setting.

[See page 21-1 for default setting]

F4

4. TENSION 2 SCREEN


Function:

Goes to the Tension Settings 2 screen (see page 12-5).

Adjustment Objective:

Goes to the next Tension screen.

Adjustment Procedure

1. Press . The Tension Settings 2 screen will appear.
2. See the Tension Settings 2 Screen for additional information.

5. TENSION CONTROL MODE DISPLAY

Function:

Displays the current mode (auto or manual) of the Tension System.

6. TENSION PRESSURE DISPLAY AND GRAPH

Function:

Displays the current Tension Pressure. The vertical bar display reflects the pressure from 0% to 100% of the tension pressure range.

This display and graph are only useful if the system is equipped with a Tension System Pressure Transducer. This graph and display can be switched on and off from the Adjust group under Machine Configurations. See the Adjust screen page 15-1 for more information.

7. BALE LENGTH GRAPH

Function:

Displays a visual indication of the length of the bale. The graph will be initially black and will turn yellow to indicate the presence of the bale. It will start on the left with a new bale, and end at the right when the knotter is cycled completing the bale.

8. PLUNGER POSITION GRAPH

Function:

Displays the current position of the Plunger during its stroke. The graph will be initially white and will turn red as the plunger is stroked. It will start on the left at the start of a cycle, and move to the right as the Plunger compresses the crop in the chamber.

9. MAXIMUM PLUNGER PRESSURE PER CYCLE DISPLAY

Function:

Displays the maximum Plunger Pressure per cycle. The system monitors the Plunger Pressure during a cycle, and displays the highest recorded Plunger Pressure value during that cycle.

10. PLUNGER PRESSURE GRAPH

Function:

Displays the current Plunger Pressure.

11. PLUNGER POSITION AT MAX PRESSURE DISPLAY

Function:

Displays the position (%) of the Plunger where the Maximum Plunger Pressure occurred during a stroke. The position is stated as a percentage of the total plunger stroke (32.0 inches).

12. TARGET PLUNGER PRESSURE DISPLAY

Function:

Displays the target pressure (psi) for the Plunger and is set by the operator (see page 2-3).

13. TENSION RELIEF DISPLAY

Function:

Displays the set point (%) for the Tension Relief Plunger Pressure, and is set by the operator (see page 12-1).



Returns to the Functions Screen



Returns to the Main Screen

TENSION SETTINGS 2



Figure 12-2 Tension Settings 2 Screen

Theory of Operation

The Tension Settings 2 screen is used in conjunction with the Tension Settings 1 screen to adjust items related to the tension system and their relation to the plunger pressure as it is designed to hold a constant pressure during each plunger stroke. See “Theory of Operation” for Tension 1 for a complete description of the Tension system.

The graphs and their displayed values on this screen are for reference only, and not adjusted on this screen.

F1 1. TENSION MULTIPLIER

Function:

The value set is used to calculate the amount of adjustment to the Tension Relief Valve based on how far the Maximum Plunger Pressure is from the Target Plunger Pressure (see page 12-5).

A larger value for the Tension Multiplier will be more sensitive in that it will react faster by adjusting the Tension in larger increments. However, this may cause

the Tension system to overshoot and have difficulty stabilizing at a particular plunger pressure. A smaller multiplier value will be less sensitive and make adjusts in small increments. Too small a value may not allow the Tension system to react quickly enough for sudden changes in baling conditions.

Note: The multiplier should be set from 0.05 to 0.1 for a balance between good reaction time and stabilization.

Adjustment Objective:

To set the Tension Multiplier.

Adjustment Procedure:

1. Press **F1**, the text above the button will turn “red”.
2. Use **▲▼** to set the Tension Multiplier.
3. Press **OK** to save the setting.

[See page 21-1 for default setting]

F2 2. PLUNGER RELIEF ABOVE TARGET

Function:

Sets the pressure the Plunger is allowed to go above the Target Plunger Pressure before more action is applied to the tension system adjustment. It is recommended to start at 500 psi. If the Maximum Plunger Pressure (see reference #7 on Figure 12-2) in a cycle is above the Maximum Plunger Pressure plus the Plunger Relief above Target pressure, the tension will immediately drop to the "Relief % Cut" (see reference #3 on Figure 12-2).

Adjustment Objective:

To set the Plunger Relief Above Target set point.

Adjustment Procedure:

1. Press **F2**, the text above the button will turn "red".
2. Use **▲▼** to set the Plunger Relief Above Target.
3. Press **OK** to save the setting.

[See page 21-1 for default setting]

F3 3. RELIEF % CUT

Function:

Sets the value for "Relief % Cut". If the Plunger Pressure is too high, the Relief % Cut is used to reduce the Plunger Pressure on the next plunger stroke.

As an example, if the Tension was at 100% and the "relief % cut" was 95%, and the Plunger Pressure exceeded the Plunger Relief Above Target setting, the very next plunger stroke the Tension will be reduced to 95% of its current value. This reduction by the Relief % Cut in Tension will continue each Plunger stroke until the Tension is below the Plunger Relief Above Target setting.

In most cases, the Plunger Pressure will be reduced to an acceptable level within two Plunger strokes and then resume small tension adjustments until it is stabilized again.

At the start of baling, the Tension will resume where it left off. Since baling conditions are not necessarily the same each time baling is started higher plunger pressures may be reached for a few strokes.

Adjustment Objective:

To set the Relief % Cut (%).

Adjustment Procedure:

1. Press **F3**, the text above the button will turn "red".
2. Use **▲▼** to set the Relief % Cut (%).
3. Press **OK** to save the setting.

[See page 21-1 for default setting]

F4 4. OPEN TENSION RAILS

Function:

Activates the 4-position / 2-way valve on the Tension system which reverses the flow to the Tension Rail Cylinders.

When activated, "OPEN RAILS" in red text will show up in the information box on the main bale screen. The open rail function is automatically canceled when "GO" is activated making it impossible to bale with the Tension Rails open.

Adjustment Objective:

Open the Tension Rails

Adjustment Procedure:

1. Press **F4**. The indicator light above the button will turn "red".
2. Tension rails will fully open.

5. CURRENT TENSION RELIEF PWM DISPLAY & GRAPH

Function:

Displays the Current Tension Relief PWM (%) setting (see page 12-5).

6. CURRENT TENSION PRESSURE DISPLAY & GRAPH

Function:

Displays the Current Tension Pressure (psi) (see page 12-5).

7. TARGET PLUNGER PRESSURE
DISPLAY & GRAPH

Function:

Displays the Target Plunger Pressure (psi) setting (see page 12-5).

8. MAXIMUM PLUNGER PRESSURE
DISPLAY & GRAPH

Function:

Displays the Maximum Plunger Pressure (psi) for the current plunger stroke (see page 12-5).



Returns to the Tension Settings 1 Screen



Returns to the Main Screen

NOTES

TESTING



Figure 13-1 Testing Screen

Theory of Operation

The Testing screen is used for diagnostics and machine setup. If isolated issues arise, this screen may be adjusted by the factory to suite individual needs.

The most important function of this screen is to allow manual triggering of the automatic baling sequences. This means the need for rigging up string to the full chamber paddle and reaching inside the needle yoke to spin the star wheel are not necessary to run the auto baling sequence of the machine.

Reference for Testing: Baling Cycle

1. DISABLED – Disables all outputs from the ICM- Functions cannot be run in this sequence.
2. Pause – Baler is not in the Automatic mode
3. Forks Cycle – Paddles must be lifted to go to Feed Fork Stop
4. Feed Fork Stop – Looking for Feed Fork Stop Sensor to go to Plunger Extending
5. Plunger Extending – Will continue to Plunger Retracting upon completion

6. Plunger Retracting – Will tie knot if bale is correct length, or “Ready To Tie” activated
7. Knotter Tying

F1 1. CONTROL OUTPUT DISABLE

Function:

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

Adjustment Objective:

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



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

Adjustment Procedure:

1. Press **F1** to disable the control system.
2. The symbol above **F1** will change to a check mark and the Sequence (see reference #4 on Figure 2-1 page 2-3) on the Bale screen will change to DISABLED.
3. A warning message will pop up. **F2** will need to be pressed to acknowledge the message.
4. Press **F3** twice to change the Sequence to Pause. At this point, the indicator above **F3** should indicate "GO".

*NOTE: When in the Pause Sequence, **F3** will need to be pressed once more to start baling.*

F2 2. TIE KNOT

Function:

To simulate a full length bale for the knotter to activate on the next plunger sequence. Because the tie cycle requires 3 flakes before activating.

Note: The plunger must be cycled twice between tie cycles, but the "ready to tie" button may be pressed at any time before the 3rd flake is created.

Adjustment Objective:

To tie the bale after the next Plunger Cycle

Adjustment Procedure:

1. Press **F2**, the indicator above the button should turn "green".
2. Press **F3** to start baling. The indicator above **F3** will change from "GO" to "PAUSE".

F3 3. GO

Function:

Begin or pause baling.

Adjustment Objective:

To start or pause the baling operation.

Adjustment Procedure:

1. Press **F3**, the baler should begin operating and the image above the button should change to read "PAUSE".
2. Press **F3** again to Pause the baler. The image above the button should change to read "GO".

F4 4. SEQUENCE

Function:

To Sequence the baler through the baling cycle (see above). The Sequence command will simulate the appropriate signal for allowing the baler to proceed to the next step in the cycle.

Adjustment Objective:

To cycle through the baling sequence.

Adjustment Procedure:

1. Press **F4** to go to the next sequence of the baling cycle.

NOTE: The Sequence command will not work when the Plunger is retracting. In this case the Ready To Tie command needs to be activated.

5. MEMORY UTILIZATION DISPLAY

Function:

Displays amount (%) of the total memory of the ICM allocated to the storage of the display images.

6. CYCLE UTILIZATION DISPLAY

Function:

Displays amount (%) of the total available program utilization of the ICM.

7. FEED FORK CYCLES PER STROKE DISPLAY

Function:

Displays average number of Feed Fork Cycles for the last 5 plunger stroke cycles.

8. FEED FORK MAXIMUM PRESSURE DISPLAY

Function:

Displays the maximum Feed Fork Pressure for the last Feed Fork cycle.



9. FUNCTION SELECT FOR MANUAL OPERATION

Function:

Selects the assembly for manual control (Feed Fork, Feeder, and Plunger).

Adjustment Procedure:

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

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

10. NEEDLE HOME INDICATOR

Function:

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

11. SELECTED MANUAL CONTROL ASSEMBLY DISPLAY

Function:

Indicates the assembly selected for manual control (see reference #9 on Figure 13-1).

12. BALE LENGTH GRAPH

Function:

Displays a visual indication of the length of the bale. The graph will be initially black and will turn yellow to indicate the presence of the bale. It will start on the left with a new bale and end at the right when the knotter is cycled completing the bale.

13. KNOTTER HOME INDICATOR

Function:

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

14. PLUNGER STROKES PER MINUTE DISPLAY

Function:

Displays current speed (strokes / min) for the Plunger. The system measures the cycle time for a Plunger stroke and gives the speed in strokes / min. This value can be used to measure the performance of the plunger and other assemblies involved in the Plunger cycle.

15. KNOTTER POSITION INDICATOR

Function:

Displays a visual indication of the position of the knotter. The straight line of the indicator should be vertical when the knotter is in the home position, and its rotation will match the rotation of the knotter as it is operated.

16. FULL CHAMBER INDICATOR

Function:

The indicator will turn red when the Full Chamber Paddles have been activated, and the paddles will be shown in a raised position on the ICM.

17. PLUNGER POSITION AT MAX PRESSURE DISPLAY

Function:

Displays the position (%) of the Plunger where the Maximum Plunger Pressure occurred during a stroke. The position is stated as a percentage of the total plunger stroke. (30.0 inches is the usable stroke for the Plunger.

18. PLUNGER POSITION GRAPH

Function:

Displays the current position of the Plunger during its stroke. The graph will be initially white and will turn red as the plunger is stroked. It will start on the left at the start of a cycle, move to the right as the Plunger compresses the crop in the chamber.

19. MAXIMUM PLUNGER PRESSURE PER CYCLE DISPLAY

Function:

Displays the maximum Plunger Pressure per cycle. The system monitors the Plunger Pressure during a cycle, and displays the highest recorded Plunger Pressure value during that cycle.

20. HYDRAULIC FLOW DISPLAY

Function:

Displays the percentage of hydraulic flow (%) being requested from the pump for the Plunger Cylinder. The range is from -100% to 100%. A minus (-) value indicates the cylinder is retracting and a positive (+) indicates the cylinder is extending. At 0%, the pump is at its neutral position. This value only indicates the relative input signal to the pump controller and is not the actual output from pump.

21. PLUNGER PRESSURE GRAPH

Function:

A graphical representation of the current Plunger Pressure (0 to 7,500 psi). The pressure is taken from a pressure transducer in the hydraulic system.

22. PLUNGER PRESSURE DISPLAY

Function:

Displays the numerical value for the current Plunger Pressure

23. FEED FORK RPM DISPLAY

Function:

Indicates the rpm of the Feed Fork assembly when operating. Feed fork rpm is calculated by recording the time between activations of the Feed Fork Stop Sensor. The value for the rpm is updated after each Feed Fork revolution, but not during a revolution.

24. PICK UP / FEEDER PRESSURE DISPLAY

Function:

Indicates the current Pick Up / Feeder pressure (psi).

25. PICKUP INDICATOR

Function:

Indicates active motion of the Pickup, although it is not displayed at the actual rotation speed. The pickup speed sensor measures the time between sensor triggers to calculate speed and updates the reading about 3 times a second at full PTO rpm.

26. PICKUP SPEED DISPLAY

Function:

Indicates the average speed (rpm) of the Pickup.

27. FEEDER INDICATOR

Function:

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

28. FEED FORK MOVEMENT INDICATOR

Function:

Indicates movement and intended direction of the Feed Fork assembly.

29. FEED FORK PRESSURE DISPLAY

Function:

Displays the current operating pressure of the Feed Fork.



Returns to the Functions Screen



Returns to the Main Screen

MAIN



Figure 14-1 Testing Screen

Theory of Operation

Main screen for the ICM used to display module information and logs, set preferences, measure system I/O or adjust parameters.

CAUTION

It is recommended that only users who have been trained or under the supervision of factory service personnel access the features of this screen.

1. ADJUST


Function:

Allows access to the Adjust screen for displaying or changing program variables used in the program.

Adjustment Objective:

To display and adjust program variables.

Adjustment Procedure:

Press . The Adjust screen will be displayed (see page 15-1).

2. MEASURE


Function:

Allows access to the Measure screen for displaying the status of program variables or system components.

Adjustment Objective:

To display the status of program variables or system components.

Adjustment Procedure:

Press . The Measure screen will be displayed (see page 16-1).

3. PREFERENCES


Function:

Allows access to adjust the display configuration, date / time, and default language.

Adjustment Objective:

To display and adjust the display configuration, set the date / time, and change the default language.

Adjustment Procedure:

Press . The Preferences screen will be displayed (see page 17-1).

 **4. INFO**


Function:

Displays the control system components, program logs, program version and machine identification information.

Adjustment Objective:

To display a summary of the control system components, program logs, program version, and machine identification information.

Adjustment Procedure:

Press . The Info screen will be displayed (see page 19-1).



Returns to the Bale Screen



Return to the Bale Screen

NOTES

ADJUST



Figure 15-1 Adjust Screen

Theory of Operation

This is a collection of all the adjustable values on the machine that can be changed from the ICM. These values are grouped into “Adjust Groups” based on their function.

Each “Adjust Group” (#2) will have one or more adjustable parameters. Depending on the type of parameter it is and the adjustment that it makes, it will have a different screen for changing the parameter. See Screen Styles 1 through 4 under Adjustment Group Parameter Procedure for the screen types you will encounter and the adjustment procedure for each screen.


There are several parameters that appear in the Adjust Group that are not accessible from any of the screens. These parameters are also only used occasionally. Their use and function are described at the end of this section according to their appearance in the Adjust Group. If your value does not appear in this section, it is best to refer to the Section where this value is used. For example, if you are looking for description of Bale Length Desired refer to the section Bale Length.

1. MAIN

Function:


Returns to the Main menu.

Adjustment Objective:

1. Press  to return to the Main screen.
2. See the Main screen for more information on page 14-1.

2. ADJUST GROUP MENU

Function:

This menu displays all of the “Adjust Groups” and their level of security. If an “Adjust Group” is locked, indicated by a , it can only be accessed using code. Only factory personnel or authorized dealers are able to access the following “Adjust Groups”:

- Count Resets

Adjustment Procedure:

1. Use **▲▼** to scroll through the menu and select the appropriate Adjust Group.
2. Press **OK** to select that Adjust Group and view the individual parameters.
3. Use **▲▼** to scroll through the parameters.
4. Press **OK** to select the parameter to adjust.
5. Follow the instructions below for information on the adjustment procedure associated with a particular parameter.

Note: The Screen Styles shown are for example only and may differ from the appearance of the screen associated with your parameter.

Adjustment Group Parameter Procedure

If you have been referred to this screen because of a value that you need to adjust and/or would like to know what type of adjust screen your parameter is associated with, follow these three steps:

1. Remember the name of the parameter being adjusted and find it in the chart on page 15-13 titled **Adjust Group Adjustment Procedure Chart**.
2. Find the Adjust Group in the first column.
3. Find the description of the parameter that is being

adjusted in the center column.

4. Find the value of the Screen Style and Adjustment Procedure in the third column.
5. Refer to the Screen Styles and Adjustment procedure for specific instructions on making your adjustment.

Note: The Screen Styles shown are for example only may differ from your particular screen.

NOTES

ADJUST (continued)



Figure 15-2 Plunger Decel Speed Override Screen

SCREEN STYLE 1

Theory of Operation

This screen is used to select an option of a 2-option selection and is typically used when selecting an item that has two states. An example of a 2-option selection would be: ON/OFF, YES/NO...

F1 1. MAIN

Function:

Returns to the Main screen.

Adjustment Objective:

To return to the Main screen.

Adjustment Procedure:

1. Press **F1** to return to the Main screen.
2. Refer to the Main screen page 14-1 for more information.

F2 2. RESET

Function:

This resets the selected value to the default setting.

Adjustment Objective:

To reset the selected parameter to the default setting.

Adjustment Procedure:

1. Press **F1** to select the option of resetting the value. A popup window will appear confirming your selection.
2. Press **F1** to confirm the selection or press **F3** to decline resetting the value.

3. SELECTED VALUE DISPLAY

Function:

This displays the selected parameter value.

ADJUST (continued)



Figure 15-3 Plunger Max Modulation Ratio Screen

SCREEN STYLE 2

Theory of Operation

This screen is used for an adjustable value that has a range of possible values. The range of the values is defined by a maximum and minimum value. An example of a Dial Adjustment would be the Oil Cooler Temp Turn on which has a range of 0° F to 300°F.

F1 1. MAIN

Function:

Returns to the Main screen.

Adjustment Objective:

To return to the Main screen.

Adjustment Procedure:

1. Press **F1** to return to the Main screen.
2. Refer to the Main screen page 14-1 for more information.

F2 2. RESET

Function:

This resets the selected value to the default setting.

Adjustment Objective:

To reset the selected parameter to the default setting.

Adjustment Procedure:

1. Press **F1** to select the option of resetting the value. A popup window will appear confirming your selection.
2. Press **F1** to confirm the selection or press **F3** to decline resetting the value.

3. MIN / MAX

Function:

These are the minimum and maximum values that determine the range of the possible values for that parameter.

4. PARAMETER VALUE




Function:

This displays the values that can be selected for that Adjust Group parameter.

Adjustment Objective:

To select the appropriate value.

Adjustment Procedure:

1. Use   to increase or decrease the value.
2. Press  to select and save the value. You will be immediately returned to the Adjust Group parameters.

5. SELECTED PARAMETER DISPLAY

Function:

This displays the current parameter that is selected.

6. ADJUST GROUP DISPLAY

Function:

This displays the name of the Adjust Group that is currently being accessed.

7. ACTUAL VALUE DISPLAY

Function:

This displays the actual value that ICM is reading. This value can be an input to the ICM or an output from the ICM depending on the parameter. This is the value that the ICM uses in the program for making decisions based on the program code.

8. VALUE DIAL INDICATOR

Function:

This indicates the current value of the parameter value. When adjusting a parameter value the dial will rotate clockwise when increasing the value and counterclockwise when decreasing the value.

NOTES

ADJUST (continued)



Figure 15-4 PWM Feed Fork Output Screen

SCREEN STYLE 3

Theory of Operation

This screen is used for adjustable values that are more complex and use several values to control the output of the functions. These are typically used for PWM (pulse-width-modulated) controlled functions.

The Min value and Max value are both in terms of MR (modulation ratio) also known as Duty Cycle. This is the % of a cycle that full voltage is being applied. For example if you are running a function on a 12 volt system and you operate with a PWM signal with a 10 MR (10% Duty Cycle) then the voltage to that function will be 1.2 volts.

The Start and Stop values are measured in ms (milliseconds). The “Start” value determines how long it takes for the voltage output to that function to go from “Min” to “Max” once the output is activated. The “Stop” value is similar and determines how long it takes the output to go from “Max” to “Min” once the output is deactivated.

The “Minus” button selects the values for adjustment for the negative output and the “Plus” button selects the values for adjustment for the positive output. Typically the “Positive” values represent the normal direction of travel for the baler functions and the “Minus” or negative values represent the direction opposite the normal direction of operation.

F1 1. MAIN

Function:
Returns to the Main screen.

Adjustment Objective:
To return to the Main screen.

Adjustment Procedure:

1. Press **F1** to return to the Main screen.
2. Refer to the Main screen page 14-1 for more information.

F2 2. RESET

Function:

This resets the selected value to the default setting.

Adjustment Objective:

To reset the selected parameter to the default setting.

Adjustment Procedure:

1. Press **F1** to select the option of resetting the value. A popup window will appear confirming your selection.
2. Press **F1** to confirm the selection or press **F3** to decline resetting the value. When confirming the reset, all values will reset to the default setting.

3. MIN / MAX

Function:

These are the minimum and maximum values that determine the range of the possible values for that parameter.

4. PLUS

Function:

This selects which direction the parameters values will be changed. Typically the positive or “Plus” values will affect the output when the function is operating in the normal direction of operation. Therefore this allows the parameters only affecting the function in the “forward” direction to be changed independent of the parameters affecting the “reverse” direction.

Adjustment Objective:

It is not recommended to change these values from the default setting.

Adjustment Procedure:

Press **F4** to select parameter values for the negative direction.

5. MINUS

Function:

This selects which direction the parameters values will be changed. Typically the minus values will affect the output when the function is operating in the direction opposite the direction of normal operation. Therefore this allows the parameters only affecting the function in

the “reverse” direction to be changed independent of the parameters affecting the “forward” direction.

Adjustment Objective:

It is not recommended to change these values from the default setting.

Adjustment Procedure:

Press **F4** to select parameter values for the negative direction.

6. STOP

Function:

This is the time (ms) that the output will require to go from the “Max” MR to the “Min” MR.

Adjustment Objective:

It is not recommended to change these values from the default setting.

Adjustment Procedure:

1. Press **F3** to adjust the positive values or **F4** to adjust the negative values.
2. Press **OK** until the value is highlighted.
3. Use **▲▼** to adjust the value.
4. Press **OK** to save the setting.

7. START

Function:

This is the time (ms) that the output will require to go from the “Min” MR to the “Max” MR.

Adjustment Objective:

It is not recommended to change these values from the default setting.

Adjustment Procedure:

1. Press **F3** to adjust the positive values or **F4** to adjust the negative values.
2. Press **OK** until the value is highlighted.
3. Use **▲▼** to adjust the value.
4. Press **OK** to save the setting.

8. MAX

Function:

This value is the Max MR (modulation ratio) or Duty Cycle for the PWM (pulse-width modulation) signal to the function. This determines the maximum MR and therefore voltage for this function. This also determines the upper end of the MR when the “Start” and “Stop” times are used.

Adjustment Objective:

It is not recommended to change these values from the default setting.

Adjustment Procedure:

1. Press **F3** to adjust the positive values or **F4** to adjust the negative values.
2. Press **OK** until the value is highlighted.
3. Use **▲▼** to adjust the value.
4. Press **OK** to save the setting.

9. MIN**Function:**

This value is the Min MR (modulation ratio) or Duty Cycle for the PWM (pulse-width modulation) signal to the function. This determines the lower end of the MR when the “Start” and “Stop” times are used.

Adjustment Objective:

It is not recommended to change these values from the default setting.

Adjustment Procedure:

1. Press **F3** to adjust the positive values or **F4** to adjust the negative values.
2. Press **OK** until the value is highlighted.
3. Use **▲▼** to adjust the value.
4. Press **OK** to save the setting.

10. VALUE DIAL INDICATOR**Function:**

This indicates the current value of the parameter value. When adjusting a parameter value the dial will rotate clockwise when increasing the value and counterclockwise when decreasing the value.

11. SELECTED PARAMETER DISPLAY**Function:**

This displays the current parameter that is selected.

12. ADJUST GROUP DISPLAY**Function:**

This displays the name of the Adjust Group that is currently being accessed.

13. ACTUAL VALUE DISPLAY**Function:**

This displays the actual value that ICM is reading. This value can be an input to the ICM or an output from the ICM depending on the parameter. This is the value that the ICM uses in the program for making decisions based on the program code.

SCREEN STYLE 4**Theory of Operation**

This adjustment screen typically provides adjustment for sensors, for example analog pressure transducers or temperature sensors, which provide a varying voltage input into the ICM.

NOTES

ADJUST (continued)



Figure 15-5 Feed Fork-Knotter Pressure Transducer Screen

F1 1. MAIN**Function:**

Returns to the Main screen.

Adjustment Objective:

To return to the Main screen.

Adjustment Procedure:

1. Press **F1** to return to the Main screen.
2. Refer to the Main screen page 14-1 for more information.

F2 2. RESET**Function:**

This resets the selected value to the default setting.

Adjustment Objective:

To reset the selected parameter to the default setting.

Adjustment Procedure:

1. Press **F1** to select the option of resetting the value. A popup window will appear confirming your selection.
2. Press **F1** to confirm the selection or press **F3** to decline resetting the value.





3. MAX**Function:**

This sets the maximum output value (mV) that a sensor is able to produce at the maximum reading that the sensor is rated for.

Adjustment Objective:

To adjust the value to match the maximum output of the measuring device.

Adjustment Procedure:

1. Press  to select the value to be changed.
2. Use   to adjust the value.
3. Press  to save the changes. You will be returned to the Adjust Group parameter screen.

4. MIN





Function:

This sets the minimum output value in mV (millivolts) that a sensor is able to produce at the maximum reading that the sensor is rated for.

Adjustment Objective:

To adjust the value to match the minimum output of the measuring device.

Adjustment Procedure:

1. Press  to select the value to be changed.
2. Use   to adjust the value.
3. Press  to save the changes. You will be returned to the Adjust Group parameter screen.

5. VALUE DIAL INDICATOR

Function:

This indicates the current value of the parameter value. When adjusting a parameter value the dial will rotate clockwise when increasing the value and counterclockwise when decreasing the value.

6. SELECTED PARAMETER DISPLAY

Function:

This displays the current parameter that is selected.

7. ADJUST GROUP DISPLAY

Function:

This displays the name of the Adjust Group that is currently being accessed.

8. RAW VALUE DISPLAY

Function:

This is the output of the measuring device typically in units of mV to the ICM. This is the un-scaled value.

9. ACTUAL VALUE [%] DISPLAY

Function:

This is the scaled value of the sensor that is used by the ICM. How the output is scaled is depends on the minimum and maximum outputs from the sensor for the minimum and maximum conditions that the sensor is capable of reading.

15.5

ADJUST GROUP ADJUSTMENT PROCEDURE CHART

Adjust Group	Adjust Group Parameter Name	Screen Style & Adjustment Procedure
Plunger Parameters	Plunger Decel Speed Override	1
Plunger Parameters	Plunger Drift Compensation	1
Plunger Parameters	Plunger Stop At Cushions	1
Plunger Parameters	Plunger Pressure Target	2
Plunger Parameters	Plunger Output	3
Plunger Parameters	Plunger Max Modulation Ratio	2
Plunger Parameters	Plunger Stall Time to Stop Feeder	2
Plunger Parameters	Plunger Pressure Filter	2
Plunger Operator Adjustable	Plunger Decel Variance Zero	1
Feed Fork	PWM Feed Fork Output	3
Feed Fork	Feed Fork-Knotter Pressure Transducer	4
Feed Fork	Feed Fork Plugging Pressure	2
Knotter Parameters	PWM Knotter Output	3
Knotter Parameters	Knotter Reverse Time	2
Knotter Parameters	Knotter Release solenoid Tooth Duration	NOT USED
Knotter Parameters	Knotter Release Solenoid Time	NOT USED
Knotter Parameters	Knotter Mid Cycle "LS12"	2
Feeder	PWM Feeder Output	3
Feeder	Pickup-Feeder Pressure Transducer	4
Feeder	Feeder Plugging Pressure	2
Feeder	Feeder Reversal Delay Time	2
Feeder	Feeder Reverse Duration	2
Feeder	Pickup Forward time before Monitoring	2
Feeder	Pickup Minimum Speed / Plugging Speed	2
Oil	Oil overheat temp	2
Oil	Oil cooler temp turn on	2
Oil	Oil cooler temp turn off	2
Oil	Oil cooler fan max forward time	2
Oil	Oil cooler fan reverse time	2
Oil	Oil cooler fan idle time	2
Oil	Oil temp low input	2
Oil	Oil temp high input	2
Oil	Oil temp low output	2
Oil	Oil temp high output	2
Tension	Tension Pressure Manual	2
Tension	Tension Pressure Control	1
Tension	Tension Pressure Max	2
Tension	Tension Pressure Multiplier	2
Tension	Tension Pressure Relief to Open Tension	2
Tension	Tension Pressure % to Cut for Relief	2
Tension	Tension Pressure Max Open %	2

Adjust Group	Adjust Group Parameter Name	Screen Style & Adjustment Procedure
Bale Length	Bale Length Star Circumference	2
Bale Length	Bale Length Desired	2
Bale Length	Bale Length Potentiometer Sensor	4
Bale Length	Bale Potentiometer Lower Transition	2
Bale Length Operator Adjustable	Chamber Length for Bale Drop	2
Bale Length Operator Adjustable	Bale Length / Flake Minimum Value	2
Plunger Outputs	Plunger Retract Decel Output	2
Plunger Outputs	Plunger Extend Decel Output	2
Plunger Position Settings	Plunger Retract Cushion Position	2
Plunger Position Settings	Plunger Retract Stop Position	2
Plunger Position Settings	Plunger Retract Decel Position	2
Plunger Position Settings	Plunger Stop for Knotter "LS6" from Ext.	2
Plunger Position Settings	Plunger Start Forks Tie Cycle	2
Plunger Position Settings	Plunger Start Forks	2
Plunger Position Settings	Plunger Extend Decel Position	2
Plunger Position Settings	Plunger Extend Stop Position	2
Plunger Position Settings	Plunger Extend Cushion Position	2
Machine Configuration	Full Chamber Sensor NO/NC	1
Machine Configuration	Tension Pressure Transducer Option	1
Machine Configuration	Hot Oil Switch NO/NC	1
Machine Configuration	Knotter Sprocket Tooth #	2
Machine Configuration	Feed Fork Sprocket Tooth #	2
Machine Configuration	Latching Knotter Option	1
Machine Configuration	Pressure Transducer Filter	2
Sensor Calibration	Plunger Pressure Low Input	2
Sensor Calibration	Plunger Pressure High Input	2
Sensor Calibration	Plunger Pressure Low Output	2
Sensor Calibration	Plunger Pressure High Output	2
Count Resets	LOCKED	
Double Knotter	Knotter Slow Down Position	2
Double Knotter	Knotter Auto Unlatch Reverse Time	2
Plunger Auto Settings	Plunger Extend Decel Time	2
Plunger Auto Settings	Plunger Retract Decel Time	2
Plunger Auto Settings	Plunger Stop Auto Adjust Sensitivity	2
Plunger Auto Settings	Plunger Decel Time Auto Adjust Sensitivity	2
Plunger Auto Settings	Plunger Decel Position Auto Adjust Sensitivity	2
Plunger Auto Settings	Plunger Zero Decel Variance	1

MACHINE CONFIGURATION

These items are adjustable for specific machines. They will need checked or set up the first time a program with new program ID is loaded on the MD3. Once these items are set for the particular machine, they should not require further adjustment. They are not preferences, but are more mechanical properties about the machine.

- Full Chamber Sensor NO/NC

Function:

This parameter controls how the ICM interprets the signal from the Full Chamber Paddle sensor mounted near the Full Chamber Paddles.

Adjustment Objective:

The proximity sensor on the full chamber paddles may either be set up so as the paddle raises it triggers (NO), or it is always triggered and as the paddle raises it un-triggers (NC).

- Tension Pressure Transducer Option

Function:

Some units come equipped with a pressure transducer mounted on the tension manifold near the rear right-hand side. This parameter controls how the ICM will display certain information regarding the tension pressure signal.

Adjustment Objective:

If the machine includes a pressure transducer on the tension system that is tied into XA2 C1 (pin C1:39) this should be set to "Yes".

- Hot Oil Switch NO/NC

Function:

This allows units to either use a NO (Normally Open) or a NC (Normally Closed) Hot Oil Temperature Switch. Depending on the type of switch that is being used this will control how the ICM interprets the signal from the sensor. Typically units will have a NC-style switch that opens at the Hot Oil Switch setting which is typically 220°F.

Adjustment Objective:

The proper selection should be that when the hydraulic oil temperature is below the Hot Oil Switch setting and the Oil Overheat Temp (see Oil Parameters screen) the ICM does not produce a Hot Oil warning.

- Knotter Sprocket Tooth #

Function:

This is the number of teeth on the right-hand Needle Yoke Drive Sprocket (on a Big Baler Single and Tail-less Knotter), and Knotter Sprocket (on a Double Knotter). This is the sprocket that the position sensor reads off. The number of teeth is used to calibrate the Knotter Tooth Count for determining the position of the Knotter during its cycle.

The typical value for this sprocket is 96 teeth for a Double Knotter and 72 for a Big Baler Single Knotter. If the sensor is set to read off another trigger or sprocket where the number of teeth may vary, it can be entered here to make the program function correctly.

Adjustment Objective:

This value should be entered to match the number of Sprocket Teeth the Knotter Tooth Sensor would count during a full cycle of the knotter.

- Feed Fork Sprocket Tooth #

Function:

This is the number of teeth on the Feed Fork Shaft Sprocket. This value is used to determine the position of the Feed Fork. This is important for both the Feed Fork Display on the ICM.

Typically the sprocket has 72 teeth. However, if the gearing has been changed and affects the number of teeth this value should be adjusted.

Adjustment Procedure:

This value should be adjusted to properly match the number of teeth on the Feed Fork driven sprocket. This value is typically 72.

- Latching Knotter Option

Function:

This is set to either “standard” for convention Single and Double Knotter Balers, or “Latching” for the Double Knotter that mechanically latches the knotter in the home position. This determines how the ICM will control the knotter start and stop procedure.

Adjustment Objective:

This should be set based on the type of latching system the machine is using.

- Pressure Transducer Filter

Function:

This is a filter applied by the ICM to the input signals from the Pressure Transducers which smooths out quickly varying spikes in the signal. A pressure input that is more likely to have spikes would need greater values of filtering for making the signal more viewable on the ICM.

Adjustment Objective:

A value of zero (0) equals not filtering and has no effect and a value of 100 has the maximum filter effect.

A value of 75 is a good starting point for the pressures used on this machine.

BALE LENGTH OPERATOR ADJUSTABLE

- Bale Length/ Flake Minimum Value

Function:

This is the minimum width of a flake that must be met on each plunger stroke or the ICM will generate an informational message. The width of a flake is determined by the change in the Current Bale Length after each plunger cycle.

Adjustment Objective:

This value should be adjusted as necessary to identify malfunctioning sensors or equipment but not produce incorrect error conditions. See the Trouble Shooting section for additional information.



Returns to the Main Screen



Return to the Bale Screens

MEASURE



Figure 16-1 Measure Screen

Theory of Operation

The Measure screen is used to display values for selected input / output channels, and to monitor the voltage at the control modules.

F1 1. MAIN

Function:

Returns to the Main screen (see page 14-1).

Adjustment Objective:

Returns to the Main screen.

Adjustment Procedure:

Press **F1**. The Main screen should appear.

F2 2. MEASURE GROUPS



Function:

Accesses available groups setup for measuring the input / output values of selected system channels.



Adjustment Procedure:

1. Press **Navigation** to select the desired Measure Group.
 - Modules = Displays the voltage at the system components
 - Inputs / Outputs = All the input and output channels used in the program

NOTE: Additional groups may be available to assist with troubleshooting of a problem by the factory. In that instance, a unique program is provided that is configured to measure specific input / output values for diagnostic purposes.

2. Press  to select the module.
3. A list of channels associated with the selected Measure Group will be displayed.
4. Press  to toggle between the “Scaled” and “Raw” value for the channels.

- Scaled = Value displayed in the program
- Raw = Value returned by the sensor before being processed by the controller

5. Press  to return to the Modules screen, or  to go back to the main screen.



Returns to the Main Screen



Return to the Bale Screen

NOTES

PREFERENCES



Figure 17-1 Preferences Screen

Theory of Operation

Displays and allows adjustments to the Display parameters, date / time, and default language for the ICM.

F1 1. DISPLAY

Function:

Sets the backlight intensity for both normal operation and screen saver. Also controls the use of the screen saver and its configuration.

Adjustment Objective:

Configures the display backlight intensity and configures the screen saver of the ICM.

Adjustment Procedure:

Press **F1**. The Display screen will appear (see page 18-1).

F2 2. DATE / TIME

Function:

Displays and sets the time and date used by the ICM.

Adjustment Objective:

Displays and sets the time and date used by the ICM.

Adjustment Procedure:

Press **F2**. The Date / Time screen will appear.

F3 3. LANGUAGE

Function:

Displays the default language for the ICM.

Adjustment Objective:

Displays the default language for the ICM.

Adjustment Procedure:

1. Press **F3**. The Language screen will appear and shows the available languages.
2. Use **▲▼** to select the desired default language. Consult the factory for available languages.
3. Press **OK** to set the default language.
4. Press **←** to return to the Preferences screen.

← Returns to the Main Screen

≡ Return to the Bale Screen

DISPLAY



Figure 18-1 Display Screen

Theory of Operation

Configures the backlight and screen save features of the ICM display. The backlight controls the intensity of the image on the screen. When baling during the day the operator may want a brighter image on the screen, and a dimmer at night.

The screen save is a feature used to extend the life of the ICM display. It is recommended that the screen saver be activated as a ghost picture can occur on the display if a static image is left on for an extended period of time. Although the display would continue to work with the ghost image, it may be a distraction to the operator at times.

If the Screen saver feature is activated, it is recommended that the OK button be pressed to return the screen to an active status. The use of the OK button in this condition will not cause any unexpected command to be started.

F1 1. MAIN

Function:

Returns to the Main screen (see page 14-1).

Adjustment Objective:

Returns to the Main Screen.

Adjustment Procedure:

Press **F1**. The Main screen should appear.

F2 2. BACKLIGHT

Function:

Controls the backlight intensity for the ICM display.

Adjustment Objective:

Sets the default backlight intensity for the ICM display.

Adjustment Procedure:

1. Press **F2**. The value of the backlight will change to white text with a black background.
2. Use **▲▼** to change the value (%) of the backlight. Changes to the setting is in increments of 10% with an adjustment range of 0% to 100%.
3. Press **OK** to save the setting.

F3 3. SCREEN SAVER

Function:

Activates and configures the Screen saver feature of the ICM display.

Adjustment Objective:

Activate and configure the Screen saver feature of the ICM display.

Adjustment Procedure:

1. Press **F3**. The setting of the Screen saver change to white text with a black background
2. Use **▲▼** to change the value of the Screen saver. The settings for the Screen saver are defined as follows:

Off	=	Screen saver is turned off, and the display will always stay on
Dimmed	=	Display will dim after a set period of time (Timeout) at the intensity level entered for the "Dimmed light" variable
Black	=	Screen will go black after a set period of time (Timeout)

If "Off" is selected:

- Press **OK** to save the setting.

If "Dimmed" is selected:

- Press **OK**
- Use the **▲▼** to enter the amount of time (seconds) before the display will dim due to no activity. The value for Timeout is between 5 to 600 seconds
- Press **OK**
- Use the **▲▼** to enter the value for the intensity of the backlight when the screen saver is activated. The value for the "Dimmed Light" variable is between 0% to 80%
- Press **OK**

If "Black" is selected:

- Press **OK**
- Use the **▲▼** to enter the amount of time (seconds) before the display will dim due to no activity. The value for Timeout is between 5 to 600 seconds
- Press **OK**

4. BACKLIGHT DISPLAY

Function:

Displays the current setting of the backlight intensity (10% to 100%) when the display is active.

5. SCREEN SAVER DISPLAY

Function:

Displays the current setting of the Screen saver feature (Off, Dimmed, or Black).

6. TIMEOUT DISPLAY

FUNCTION:

Displays the current setting of the Timeout variable. This variable is only visible if the Screen saver is set to either "Dimmed" or "Black" (see reference #5 on Figure 18-1).

7. DIMMED LIGHT DISPLAY

Function:

Displays the current setting of the Dimmed light variable used to control the intensity of the back light when the screen saver is activated. This variable is only visible if the Screen saver is set to "Dimmed" (see reference #5 Figure18-1).



Returns to the Preferences Screen



Return to the Bale Screen

INFO



Figure 19-1 Info Screen

Theory of Operation

The Information Screen is used to display the program and machine identification. It also provides access to system logs kept by the system during operation of the ICM, and to product information for the system components (display, system modules, etc).

F1 1. MODULES

Function:

Accesses the product information for the system components installed on the baler (display, system modules, etc.)

Adjustment Objective:

To display the following product information for the system components:

- Production date
- Software version
- Bios version
- Serial number
- Temperature (current temperature of unit)
- VRef value (volts)
- VBB (voltage supplied to unit)

Adjustment Procedure:

1. Press **F1**. The Module screen will appear.
2. Press **▲▼** to select the desired module.
3. Press **OK** to select the module.
4. The product information page should be displayed.
5. Press **←** to return to the Modules screen, or **F1** to go back to the main screen.

F3 2. LOGS

Function:

Access the information recorded by the system during operation. Each log can hold 2000 records, and when full, will delete the oldest record first.

Adjustment Objective:

To display the following product information for the system components:

System log – Displays items related to changes in the system such as:

- Loading a program
- Changing the date / time
- Starting the system
- Changing system variables

- Event log – Displays events related to detected system errors or alarms.

NOTE: This log is typically not used except to assist with the troubleshooting of a problem by the factory. In that instance, a unique program is provided that is configured to record specific events for diagnostic purposes.

- Statistics log –Stores the values for specific variables used by the program or system.

NOTE: This log is typically not used except to assist with the troubleshooting of a problem by the factory. In that instance, a unique program is provided that is configured to record specific events for diagnostic purposes.

Adjustment Procedure:

1. Press **F3**. The Logs screen will appear.
2. Press **▲▼** to select the desired log to display.
3. Press **OK** to select the module.
4. The stored information for the selected log should be displayed. The function buttons at the bottom of the screen allows the operator to sort and display the entries:

F2	=	toggles between order of log display (least recent to most recent or most recent to least recent)
F3	=	toggles between date or time stamp for the entry
F4	=	toggles between individual or page display of entries (10 items per page)

5. Press **←** to return to the Logs screen, or **F1** to go back to the main screen.



Returns to the Main Screen



Returns to the Bale Screen

MACHINE SETUP AFTER NEW PROGRAM

Before loading a new program, it is helpful to make a clone or record the settings from the current program. This can speed up setting the machine by re-entering values that may not change with the new program version.

The plunger setup procedure must be performed regardless because the learned values cannot be manually entered. It is also recommended because it will take into account any mechanical/hydraulic changes since the last time it was set up.

1. Machine configuration (only available in the Adjust Groups in the system menu)

Note: These items are adjustable for specific machines. They will need checked or set up the first time a program with new program ID is loaded on the MD3. Once these items are set for the particular machine, they should never need to be adjusted again. They are not preferences, but are more mechanical properties about the machine.

Adjust Procedure:

A. “Full chamber sensor NO/NC”: The proximity sensor on the full chamber paddles may either be set up so as the paddle raises it triggers (NO), or it is always triggered, and as the paddle raises, it un-triggers (NC).

B. “Tension pressure transducer option”: If the machine includes a pressure transducer on the tension system that is tied into XA2 C1 (pin C1:39) this should be set to “Yes”

C. “Hot oil switch NO/NC”: The correct hot oil switch should be NC and open at 220°F. It is possible to use a NO switch that closes when hot if this setting is changed to NO.

D. “Knotter sprocket tooth #”: This is the number of teeth on the needle yoke drive sprocket (on a single/taillless knotter), and knotter sprocket (on a double knotter). This is the sprocket that the position sensor reads. This value should be set to 72 for a Big Baler Single Knotter or Big Baler Tailless Knotter. On a Big Baler Double Knotter this value should be set to 96. If the sensor is set to read off another trigger, it can be entered here to make the program function correctly.

E. “Feed fork sprocket tooth #”: This is the number of teeth on the feed fork shaft sprocket. The stock sprocket has 72 teeth but if the gearing is changed, this number may be adjusted to correct the feed fork position indicator.

F. “Latching knotter option”: This is set to either “standard” for convention single and double knot balers, or “Latching” for the double knotter that mechanically latches in place at home.

1A. Count resets (only if you have the PIN for this operation)

Adjustment Procedure:

A. Before loading new program, record the life hours, run hours, and life bale from the “Field counts screen”

B. Go to Menu / Adjust / count resets and then enter the PIN _____ (contact factory for PIN).

C. Enter the recorded values in for lifetime hour meter reset, baling hour meter reset, and lifetime bale count reset.

D. Select “lifetime counts reset” and toggle it to “reset counts” and press OK.

E. Reselect “lifetime counts reset” and toggle back to “leave here”. If this setting is not left at “leave here” the machine will fail to count time or bales.

F. Exit the menu system.

2. Plunger Setup Procedure

Adjustment Procedure

A. Refer to the Plunger Complete Setup under Plunger Settings screen on page 6-1.

3. Star Wheel

Adjustment Procedure:

A. Setup Sensor Lower Transition. Refer to Bale Length Setup 2 screen on page 11-1 for setting this value.

B. Setup of Sensor Upper Transition. Refer to Bale Length Setup 2 screen on page 11-5 for setting this value.

4. Feed Fork

Adjustment Procedure:

Set feed fork plunging pressure at 3000 psi or higher. It may be adjusted back down later if necessary.

5. Feeder

Adjustment Procedure:

A. Feeder settings 1

- Set feeder plunging pressure to 3000 psi

B. Feeder settings 2

- If feeder valve has soft start, set the “max reverse duration” to about 3000ms. Otherwise, set at about 1 second. This must be checked with the machine running to verify Feeder actually reverses but it should not reverse much more than just bumping backwards.
- “Reversal delay” should be about 800ms.
- Turn “Pickup stall alarm” on.

C. Feeder settings 3

- Turn “Auto pickup Unplug” on
- “Pickup plugging speed” should be about 50 rpm or slower than the pickup speed with the tractor PTO at idle.
- The “Forward Plugging Delay” should be about 3000ms for quick acting feeder valves and at least 6000ms for soft start feeder valves. This must be enough time for the valve to engage and the pickup attempt to turn before the system begins checking the pickup speed.

6. Knotter

Adjustment Procedure:

A. Verify “Knotter mid cycle” is acceptable (40% is generally ok).

B. If a double knotter, verify “Flow valve trip” is set to previous value, or re-run setup (has been set to 40% on some machines).

7. Oil cooler

Adjustment Procedure:

Verify oil overheat, turn on, and turn off temperatures are acceptable.

8. Bale length

Adjustment Procedure:

A. Bale length setup 1: turn on bale drop buzzer and verify star wheel circumference. If original value is not available, start with 45in.

B. Bale length setup 2: set/check upper and lower star wheel potentiometer transitions and when baling check/adjust the “bale drop chamber length”.

9. Tension

Adjustment Procedure:

A. Tension settings 1: verify max pressure about 91% and open pressure below 40%.

B. Tension settings 2: “tension multiplier” is 0.1 or less, “plunger relief above target” is at least 400 psi, and “relief % cut” is about 95% or less.

**Section
21**

DEFAULT SETTINGS

This baler is initially set to factory settings, referred to as “default settings” throughout this manual.

Below is a list of all the settings in order that they appear in the Adjust Group on the ICM. Those settings which are not accessible through the Adjust Group have been marked with an “x” in the first column, column A. In addition, some of the settings that are made during operation will automatically reset to the default setting when the ICM is powered off. Default settings with this feature are marked with an “*” in the second column, column B.

The third column is the Adjust Group. The fourth column is the Parameter Name as it is shown in the Adjust Group, which may be written differently on the user screens because of space constraint reasons. The fifth column is the default value followed by the unit of the value. The sixth column is the factory setting with the date the settings were made and the serial number of the machine the settings were made on. Because of small variations in manufacturing and parts, each machine may have slightly different settings for a properly tuned function. For this reason, this column shows which settings were adjusted for that particular serial number.

1592.0.29 IQAN Program Default Settings				S/N:		
				DATE:		
A	B	Adjust Group	Parameter Name	Default Value	Unit	Factory Setting:
		Plunger Parameters	Plunger Decel Speed Override	Normal		
		Plunger Parameters	Plunger Drift Compensation	ON		
		Plunger Parameters	Plunger Stop At Cushions	YES		
		Plunger Parameters	Plunger Pressure Target	5000	psi	
		Plunger Parameters	Plunger Output (Plus), Min	0	MR	
		Plunger Parameters	Plunger Output (Plus), Max	22	MR	
		Plunger Parameters	Plunger Output (Plus), Start	0	ms	
		Plunger Parameters	Plunger Output (Plus), Stop	0	ms	
		Plunger Parameters	Plunger Output (Minus), Min	0	MR	
		Plunger Parameters	Plunger Output (Minus), Max	22	MR	
		Plunger Parameters	Plunger Output (Minus), Start	0	ms	
		Plunger Parameters	Plunger Output (Minus), Stop	0	ms	
		Plunger Parameters	Plunger Max Modulation Ratio	540		
		Plunger Parameters	Plunger Stall Time to Stop Feeder	2000	ms	
		Plunger Parameters	Plunger Pressure Filter	75		
		Plunger Operator Adjustable	Plunger Decel Speed Override	Normal		
		Plunger Operator Adjustable	Plunger Drift Compensation	ON		
		Plunger Operator Adjustable	Plunger Stop at Cushions	YES		
		Plunger Operator Adjustable	Plunger Pressure Desired	5000	psi	
		Plunger Operator Adjustable	Plunger Decel Variance Zero	Auto Adjust		
		Feed Fork	PWM Feed Fork Output (Plus), Min	0	MR	
		Feed Fork	PWM Feed Fork Output (Plus), Max	100	MR	
		Feed Fork	PWM Feed Fork Output (Plus), Start	0	ms	
		Feed Fork	PWM Feed Fork Output (Plus), Stop	0	ms	
		Feed Fork	PWM Feed Fork Output (Minus), Min	0	MR	
		Feed Fork	PWM Feed Fork Output (Minus), Max	100	MR	
		Feed Fork	PWM Feed Fork Output (Minus), Start	0	ms	
		Feed Fork	PWM Feed Fork Output (Minus), Stop	0	ms	
x	*	Feed Fork	Cycle Feed Fork	OFF		
		Feed Fork	Pressure Transducer, Min	0	mV	
		Feed Fork	Pressure Transducer, Max	5000	mV	
		Feed Fork	Plugging Pressure	2200	psi	

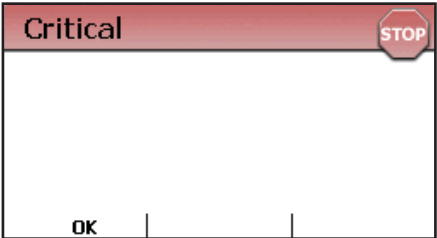
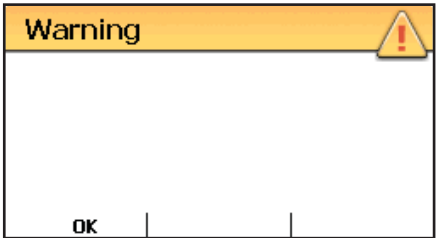
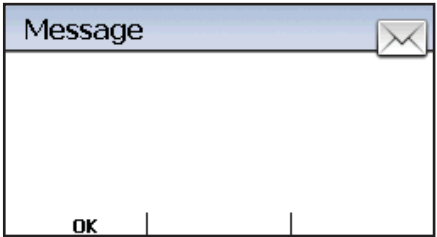
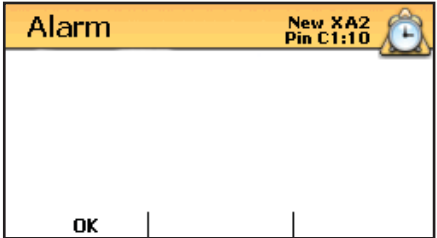
1592.0.29 IQAN Program Default Settings				S/N:		
				DATE:		
A	B	Adjust Group	Parameter Name	Default Value	Unit	Factory Setting:
		Knotter Parameters	PWM Knotter Output (Plus), Min	0	MR	
		Knotter Parameters	PWM Knotter Output (Plus), Max	100	MR	
		Knotter Parameters	PWM Knotter Output (Plus), Start	0	ms	
		Knotter Parameters	PWM Knotter Output (Plus), Stop	0	ms	
		Knotter Parameters	PWM Knotter Output (Minus), Min	0	MR	
		Knotter Parameters	PWM Knotter Output (Minus), Max	100	MR	
		Knotter Parameters	PWM Knotter Output (Minus), Start	0	ms	
		Knotter Parameters	PWM Knotter Output (Minus), Stop	0	ms	
		Knotter Parameters	Knotter Reverse Time	200	ms	
		Knotter Parameters	Knotter Release solenoid Tooth Duration	NOT USED		
		Knotter Parameters	Knotter Release Solenoid Time	NOT USED		
		Knotter Parameters	Knotter Mid Cycle "LS12"	40	%	
		Knotter Parameters	Knotter Release	NOT USED		
x	*	Knotter Parameters	Cycle Knotter Once	OFF		
x	*	Knotter Parameters	Flow Valve	OFF		
		Knotter Parameters	Flow Valve %	40	%	
	*	Feeder	Feeder	OFF		
	*	Feeder	Cycle Feeder	Red		
		Feeder	PWM Feeder Output (Plus), Min	0	MR	
		Feeder	PWM Feeder Output (Plus), Max	100	MR	
		Feeder	PWM Feeder Output (Plus), Start	0	ms	
		Feeder	PWM Feeder Output (Plus), Stop	0	ms	
		Feeder	PWM Feeder Output (Minus), Min	0	MR	
		Feeder	PWM Feeder Output (Minus), Max	100	MR	
		Feeder	PWM Feeder Output (Minus), Start	0	ms	
		Feeder	PWM Feeder Output (Minus), Stop	0	ms	
		Feeder	Pickup-Feeder Pressure Transducer, Min	0	mV	
		Feeder	Pickup-Feeder Pressure Transducer, Max	5000	mV	
		Feeder	Feeder Plugging Pressure	3000	psi	
		Feeder	Max Reverse Duration	3000	ms	
		Feeder	Reversal Delay	800	ms	
x		Feeder	Pickup Stall Alarm	OFF		
x		Feeder	Auto Pickup Unplug	OFF		
		Feeder	Pickup Plugging Speed	50	rpm	
		Feeder	Forward Plugging Delay	3000	ms	
		Oil	Oil overheat temp	180	°F	
		Oil	Oil cooler temp turn on	150	°F	
		Oil	Oil cooler temp turn off	140	°F	
		Oil	Oil cooler fan max forward time	600	sec	
		Oil	Oil cooler fan reverse time	15	sec	
		Oil	Oil cooler fan idle time	5	sec	
		Oil	Oil temp low input	2143	mV	
		Oil	Oil temp high input	1300	mV	
		Oil	Oil temp low output	73	°F	
		Oil	Oil temp high output	125	°F	
x	*	Oil	Hot Oil Bypass	OFF		
x	*	Oil	Low Oil Bypass	OFF		

1592.0.29 IQAN Program Default Settings





1592.0.29 IQAN Program Default Settings				S/N:		
				DATE:		
A	B	Adjust Group	Parameter Name	Default Value	Unit	Factory Setting:
		Tension	Tension Pressure Multiplier	0.1		
		Tension	Tension Pressure Manual	50	%	
		Tension	Tension Pressure Control	Auto		
		Tension	Tension Pressure Relief to Open Tension	500	psi	
		Tension	Tension Pressure % to Cut for Relief	95	%	
		Tension	Tension Pressure Max Open %	40	%	
		Tension Operator Adjustable	Tension Pressure Max	91	%	
		Bale Length	Star Wheel Circumference	46	in	
		Bale Length	Bale Length Desired	96	in	
		Bale Length	Bale Length Potentiometer Sensor	5000	mV	
		Bale Length	Bale potentiometer lower transition	5		
		Bale Length	Bale potentiometer upper transition	95		
		Bale Length Operator Adjustable	Chamber length for bale drop	110	in	
x		Bale Length Operator Adjustable	Bale Drop Buzzer	OFF		
x		Bale Length Operator Adjustable	Bale Length/Flake Minimum Value	1		
		Plunger Outputs	Plunger Retract Decel Output	30	%	
		Plunger Outputs	Plunger Extend Decel Output	40	%	
		Plunger Position Settings	Plunger Retract Cushion Position	2	%	
		Plunger Position Settings	Plunger Retract Stop Position	8	%	
		Plunger Position Settings	Plunger Retract Decel Position	35	%	
		Plunger Position Settings	Plunger Stop for Knotter "LS6" from Ext.	25	%	
		Plunger Position Settings	Plunger Start Forks Tie Cycle	32	%	
		Plunger Position Settings	Plunger Start Forks	62	%	
		Plunger Position Settings	Plunger Extend Decel Position	15	%	
		Plunger Position Settings	Plunger Extend Stop Position	4	%	
		Plunger Position Settings	Plunger Extend Cushion Position	98	%	





1592.0.29 IQAN Program Default Settings					S/N:	
					DATE:	
A	B	Adjust Group	Parameter Name	Default Value	Unit	Factory Setting:
		Machine Configuration	Full Chamber Sensor NO/NC	NO: 12V w/ paddles up		
		Machine Configuration	Tension Pressure Transducer Option	YES		
		Machine Configuration	Hot Oil Switch NO/NC	NC		
		Machine Configuration	Knotter Sprocket Tooth #	72		
		Machine Configuration	Feed Fork Sprocket Tooth #	72		
		Machine Configuration	Latching Knotter Option	Standard		
		Machine Configuration	Pressure Transducer Filter	80		
		Sensor Calibration	Plunger Pressure Low Input	0	mV	
		Sensor Calibration	Plunger Pressure High Input	5000	mV	
		Sensor Calibration	Plunger Pressure Low Output	0	psi	
		Sensor Calibration	Plunger Pressure High Output	75000	psi	
		Count Resets	LOCKED			
		Double Knotter	Knotter Slow Down Position	40	%	
		Double Knotter	Knotter Auto Unlatch Reverse Time	NOT USED		
		Plunger Auto Settings	Plunger Extend Decel Time	2000	ms	
		Plunger Auto Settings	Plunger Retract Decel Time	2000	ms	
		Plunger Auto Settings	Plunger Stop Auto Adjust Sensitivity	0.1		
		Plunger Auto Settings	Plunger Decel Time Auto Adjust Sensitivity	0.5		
		Plunger Auto Settings	Plunger Decel Position Auto Adjust Sensitivity	0.1		
		Plunger Auto Settings	Plunger Zero Decel Variance	Auto Adjust		

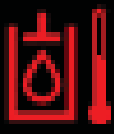

MESSAGES AND MEANINGS






MESSAGE	MEANING
	<ul style="list-style-type: none"> • Requires immediate attention. • Damage to machine is likely to occur.
	<ul style="list-style-type: none"> • Requires attention as soon as possible. • ICM may inhibit further machine operation to prevent damage.
	<ul style="list-style-type: none"> • For information on machine setup.
	<ul style="list-style-type: none"> • May indicate sensor out of voltage range or open/short circuit.
AUDIBLE ALARMS	
<p>1 Long Beep = Tie Knot (see page 9-10 for more information)</p> <p>2 Beeps = Bale Drop (see page 11-1 for more information)</p> <p>7 Short Beeps = Pickup Plugging (see page 8-6 for more information)</p>	

OPERATING SYSTEMS TROUBLESHOOTING

WARNING / SYMPTOM	CAUSE	REMEDY
<p>Critical </p> <p>Outputs are disabled</p> <p>A kill button has been hit. Press the "GO" button twice to reset.</p> <p>OK </p>	<p>This announcement will appear if either the "stop" button on the screen has been pushed or any of the three red "disable" buttons on the baler have been pushed.</p>	<p>After determining and alleviating the cause of the disablement, push the "Go/Pause" button twice to clear the disable feature.</p>
<p>Critical </p> <p>Low Accumulator Pressure</p> <p>Check accumulator pre-charge. Extreme damage to pump and cylinder will occur if operated with low pressure.</p> <p>OK </p> 	<p>If the knotter is not home when the plunger is signaled to extend in an automatic plunge cycle, this warning will appear.</p>	<p>The low accumulator pressure switch is located below the accumulator and is in the charge circuit of the main pump. If the charge pressure drops too low, the hydrostatic pump may cavitate, damaging the pump and any components down stream. The low pressure switch will open on low pressure (below 200psi). If the accumulator is undercharged or damaged, the charge pressure may only drop below 200psi for a fraction of a second as the plunger changes direction requiring maximum change in flow. For this reason, if the switch opens it will trigger the warning which will remain up for three seconds after the switch closes again. If this warning begins showing up often, check the accumulator pre-charge pressure (should be at 180psi) and the condition of the charge pump.</p>
<p>Warning </p> <p>Knotter is not home</p> <p>Check knotter position or knotter home sensor</p> <p>OK </p>	<p>If the knotter is not home when the plunger is signaled to extend in an automatic plunge cycle, this warning will appear.</p>	<p>Visually inspect the knotters to determine if and why they are not home. To bring the knotters home, go to the "Functions" screen and press OK until the Knotter function is selected. Use the up or down arrows to bump the knotter back to home. Only reverse the knotter if it is just past home position, otherwise cycle the knotter forward until it reaches home. The knotter home sensor is located at the to right side needle yoke drive sprocket and should be checked/adjusted if the knotter is home and this warning has appeared.</p>

WARNING / SYMPTOM	CAUSE	REMEDY
<p>Warning 1/2 </p> <p>Needles are not home</p> <p>Check needle rack position or needle home sensor</p> <p>OK Next </p>	<p>If the needles are not home when the plunger is signaled to extend in an automatic plunge cycle, this warning will appear.</p>	<p>Visually inspect the knotters to determine if and why they are not home. To bring the knotters home, go to the "Functions" screen and press OK until the Knotter function is selected. Use the up or down arrows to bump the knotter back to home. Only reverse the knotter if it is just past home position, otherwise cycle the knotter forward until it reaches home. The needle home switch is located on the left and side of the needle yoke and may need checked/adjusted if the needle is home and this warning has appeared.</p>
<p>Warning </p> <p>Pickup is plugging</p> <p>Pickup clutch is slipping. Auto unplug may be set up in feeder settings.</p> <p>OK </p>	<p>The pickup stall alarm will show if the pickup speed drops below the "pickup plugging speed" (F2 in Feeder settings 3 screen) while in auto baling sequence.</p>	<p>The pickup stall warning may be turned off in the "Feeder Settings 2" screen by toggling F3. This warning should remain on unless the pickup speed sensor is failing and baling must continue. If the pickup remains stalled (meaning the pickup clutch is slipping) for more than 10 seconds then the feeder/pickup will be shut off until "Pause/GO" has been cycled. If this warning appears and the "Auto pickup unplug" feature is not activated, the pickup will need manually unplugged by reversing the feeder, raising/lowering the pickup, backing up the baler, and/or shutting off the machine and unplugging the pickup by hand.</p>
<p>Warning </p> <p>Feeder pressure High</p> <p>Plugging pressure may be adjusted under the feeder adjust group.</p> <p>OK </p>	<p>This warning will appear if the feed fork pressure exceeds a pre-set "plunging pressure" (F3 in the Feed Fork screen). It is just a visual warning and will not start or stop any functions.</p>	<p>Raise the feeder plugging pressure if this message comes on too often under normal conditions.</p>
<p>Warning </p> <p>Feed fork plugging</p> <p>Feed fork or knotter has reached plugging pressure.</p> <p>OK </p>	<p>This warning will appear if the feeder pressure exceeds a pre-set "feeder plugging pressure" (F3 in the Feeder settings 1 screen). It is just a visual warning and will not start or stop any functions.</p>	<p>Raise the feeder plugging pressure if this message comes on too often under normal conditions.</p>

WARNING / SYMPTOM	CAUSE	REMEDY
<div style="border: 1px solid black; padding: 5px;"> <p style="background-color: #FFD700; padding: 2px;">Warning </p> <p>Oil Overheat</p> <p>Check oil cooler fan operation.</p> <p style="text-align: center;">OK</p> </div> 	<p>The oil is overheating.</p>	<p>If this warning appears, it will disable the baler the next time the plunger gets home. Baling should cease but the baler should be idled to continue circulating oil and charging the battery to run the cooling fan. This warning will be tripped if either the hot oil switch is closed (mechanically set at 220 F) or the temp sender raises above the operator-set "overheat temp" (F1 in the Oil Cooler screen). Things to look for if overheating:</p> <ul style="list-style-type: none"> • Faulty or miss-calibrated switch – if the temp sender does not agree with the temp switch or an alternate thermometer. The hot oil switched may be bypassed for troubleshooting purposes in the oil settings screen. • Plugged oil cooler – check for material build up and blow out with compressed air if necessary. • Inoperative cooling fan - in the oil cooler screen, the up/down arrows manually control the fan. Run the fan forward and throw a rag flat against the front of the oil cooler and it should stick. The fan cannot be manually operated if the disable button has been pressed. The fan has a dedicated circuit breaker in the control box.
<div style="border: 1px solid black; padding: 5px;"> <p style="background-color: #FFD700; padding: 2px;">Warning </p> <p>Low Voltage</p> <p>Battery is below 9.5 V</p> <p style="text-align: center;">OK</p> </div> 	<p>The low battery voltage warning will display if any of the IQAN modules are supplied with less than 9.5v. Low battery image will illuminate when either of the XA2 module's supply voltage drops below 11.5 volts.</p>	<p>Individual module voltages may be viewed in the Main menu / Info / Modules. Low voltage could be caused by a poor charging system, weak battery, or faulty connection.</p>

WARNING / SYMPTOM	CAUSE	REMEDY
<p>Warning </p> <p>Plunger is not home</p> <p>Check for plunger drifting. Retract plunger or turn on plunger drift compensation.</p> <p>OK</p>	<p>“GO” has been pushed when plunger and plunger is more than 5% beyond the “plunger retract stop learned” position.</p>	<p>If “Plunger drift compensation” is turned on while this warning comes on, the plunger will automatically retract. If not turned on, the plunger must be manually retracted in order for the automatic baling sequence to continue. The warning will turn off when the plunger is nearly retracted.</p>
<p>Warning </p> <p>Plunger Stalled</p> <p>Feeder will resume after plunger clears chamber</p> <p>OK</p>	<p>The plunger stall warning comes on when the plunger takes more than a pre-set time (Stall time – set up under F1 in the plunger position screen) to fully extend.</p>	<p>A typical stall time value would be 2 seconds (2000ms). If the stall warning comes up, the feeder will shut down and the tension rails will drop to 0% until the plunger reaches full extension. As soon as the plunger reaches the extend stop position, the feeder will resume, the tension will return to its last adjustment, and the warning will close. Typically this warning may come while forming a plug and the tension has overcompensated to build plunger pressure. This would be a good time to use the “Clear Plunger” button to quickly clear the chamber and let the auto baling cycle continue.</p>
<p>Warning </p> <p>Flakes are too short</p> <p>Verify bale length is correct. Minimum length may be set under “bale length” adjust group.</p> <p>OK</p>	<p>This message will appear if the current bale’s average flake length gets below a user defined length (approximately 1 inch).</p>	<p>This warning is meant to indicate either a problem with the bale length measuring system or the full chamber paddle system. To adjust the minimum bale length per flake, go to Main menu / Adjust / bale length operator adjustable / “bale length/flake minimum value”.</p>
<p>Warning </p> <p>Low Oil</p> <p>Check Hydraulic Oil</p> <p>OK</p> 	<p>If the oil level drops below the low oil switch (front center of the tank right behind the cooling fan motor), it will open causing the low oil message to appear and disabling the machine after completing the current cycle.</p>	<p>Check/add oil as necessary. The low oil switch may be bypassed for troubleshooting in the oil settings screen.</p>

TROUBLESHOOTING METHOD

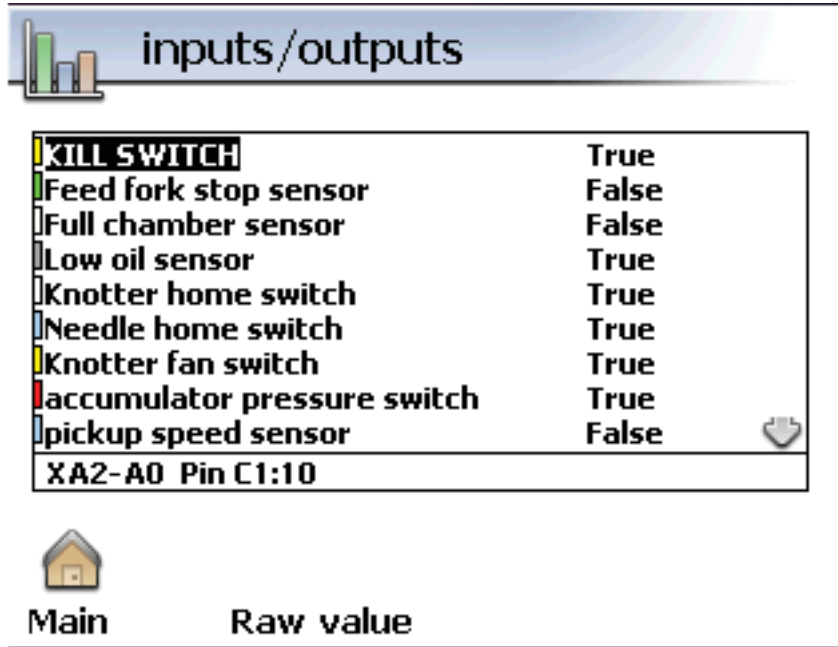


Figure 24-1 Inputs / Outputs Screen

To effectively trouble shoot the electrical controls system, it is essential to obtain both the schematic (PN 903358) and the harness layout (PN 903359). The recommended procedure when starting to troubleshoot a problem is:

1. Verify the system is receiving power
2. Verify the circuit breakers are not tripped
3. Confirm the ICM appears to be operational
4. Verify communication between the ICM and XA2 modules using the CAN-bus

If the ICM and communication system is operating, then isolating a sensor malfunction will be simplified.

All sensor signals run directly from the sensor to the input / output (XA2) module. All inputs and outputs though the XA2 modules may be viewed in Menu / Measure / "inputs/outputs". Input and output values may also be found in various screens related to the particular sensors.

If a certain function begins to malfunction, determine the sensors related to the function. Then in order of highest probability, cycle each sensor while watching the input at the ICM screen. If working, this eliminates the sensor, wiring and all connections. If the sensor does not appear to be working, first check:

1. Power and ground to the sensor.
2. Proper sensor adjustment (if proximity switch).
3. Signal to the sensor (12v if a proximity switch, 0-5v if an analog input).

If the signal is good, trace the signal toward the XA2 module until it is lost.

In the same way the outputs may be checked. Manually run the faulty function. If the MD3 shows an output and the function is not operating, first check:

1. First check for voltage on the output wire at the valve/relay. If no power, check right at the XA2 module.

2. Verify there is not some condition that is preventing the function in the program. For example, the plunger is not allowed to extend if either the needle or the knotter sensors are not activated.

Otherwise, continue following the power in the wire until the problem is found.

If the problem is a short, other electrical troubleshooting techniques will apply such as using a short finder (pulses current down the wire that can be picked up with an inductive meter) and a visual inspection of the harness especially near moving parts, sharp corners, and pinch points.

Proximity sensors (PN 901890) have a light on the back that aids in adjustment. When near the sensor target and activated, the light comes on. When they are pulled back to the edge of their range, the light begins to flash. At this point, slowly move the target back until the light goes from flashing to staying on continuous. This is where they should be adjusted.

When failing, these sensors may illuminate when triggered but still not send a 12v signal so the light cannot guarantee the functionality of the switch. Pulse count sensors (PN 903158) are just used for counting sprocket teeth or other high speed applications. They have no light and they must be adjusted much closer (1/16 – 3/16”) to the target.

Inputs (sensors) and outputs (solenoids/relays) troubleshooting

ICM (In-Cab Monitor)

The ICM is the most important troubleshooting aid on this system. This must be functional in order to solve most controls related issues. If inoperative, first check the 3-amp circuit breaker in the junction box. Next verify power and ground at the ICM and track down the open/short as necessary. If the ICM turns on but displays a CAN bus error or a No Communication error then continue to the CAN section.

CAN (communication circuit):

The CAN bus (Controller-Area Network) is a message based protocol to allow communication between devices. This communication takes place on two wires, the CAN high (V19) and CAN low (V20) wires. The pulsed signal is read as the difference in voltage on the two wires so resistance and interference on these wires greatly effect the communication. If communication is lost, do the following:

1. Determine if the ID tags are in place (between pin 1 and 14 in both XA2 module connectors).
2. Check resistance on both V19 and V20 between the ICM connector and each XA2 module.
3. Check continuity between the CAN wires and ground in case of a short.

See page 24-8 for Sensor Location Diagram

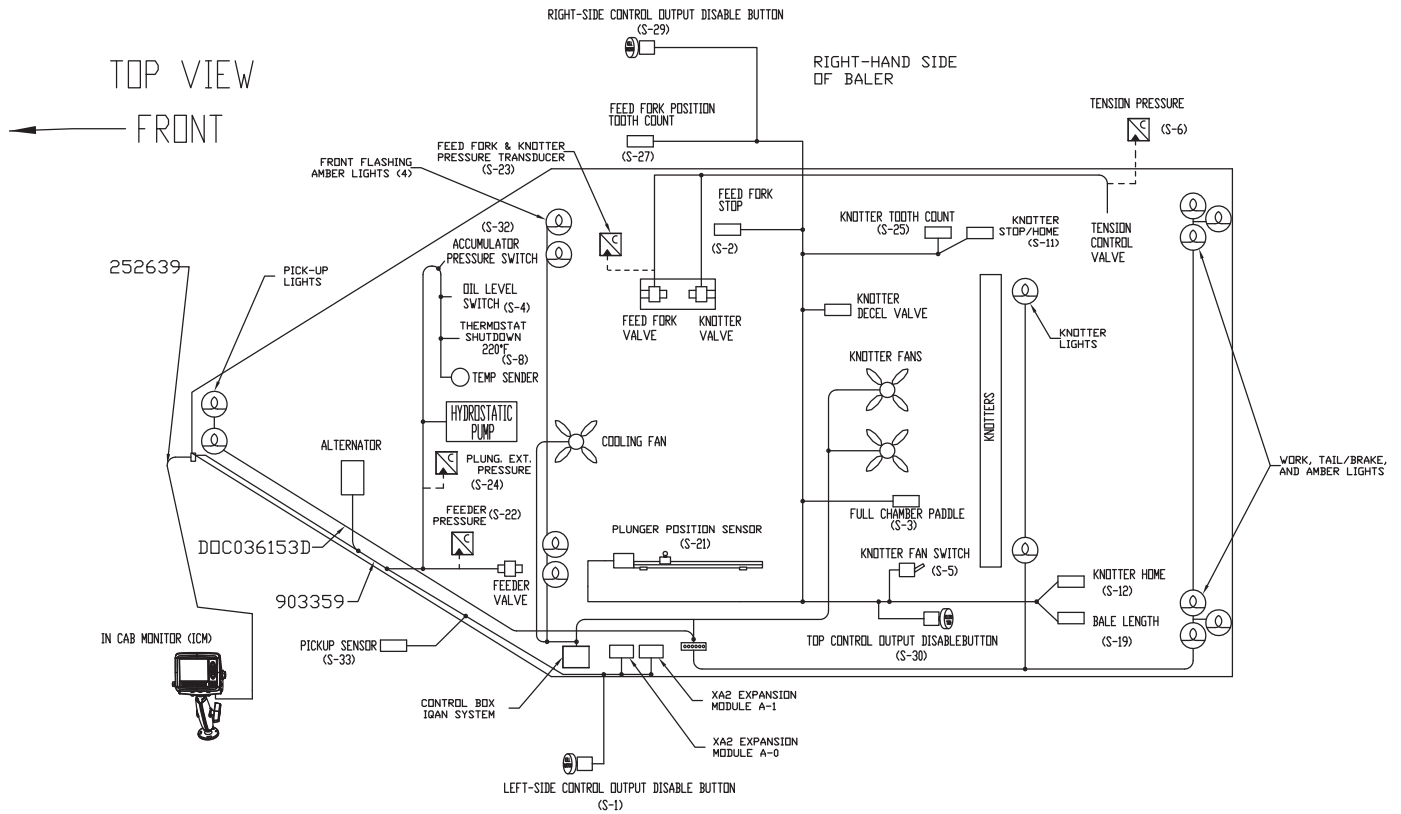
Symptoms	Diagnostics
Bale Length Potentiometer (S-19)	
Bale length ceases to increase while baling. Bale length becomes erratic.	The potentiometer requires 12v power and ground to provide a 0-5v signal back to the XA2 module. As the star wheel rolls in the direction a bale would eject, the voltage climbs from about 0 to about 5 volts and then jumps back to 0 again. At the transition point it is normal to sporadically jump between 0 and 5 volts. For the rest of the rotation there should be a smooth increase in the signal voltage. Another cause of excessive bale length is slipping between the star wheel shaft and the rubber hose to the potentiometer. Knurling the tip of the shaft (clamping with vise grips) before installing and clamping the hose is necessary if not already done.
Kill Switch (S-1,S-29,S-30)	
"Outputs are disabled" critical message pops up when a disable button has not been pressed.	The three kill switches are connected in series starting with 12v power to the RH continuing to the top rear and on to the LH before heading to the XA2 module. Each disable switch opens the circuit. If anywhere in this circuit there is an open, it will signal the disable function. Since this signal wire is also the power wire for the lighted buttons, they act as test lights. If the RH switch is lighted but not either of the others (and the bulbs are good) then the open is somewhere between the RH switch and the top rear switch.
Feed Fork Stop Sensor (S-2)	
Feed fork continues to rotate and won't stop to plunge even though fork symbol on screen rotates and stops. Feed fork stops and plunges at random points in rotation (caused by damaged sensor picking up false triggers).	The feed fork stop sensor requires 12v power and ground, giving a 12v signal to the XA2 module. It should be adjusted from about 3/16" to 7/16" from the trigger pad on the Feed Fork sprocket. It should be set to the high end if there is more play in the bearings/sprocket to protect the sensor.
Full Chamber Paddle Sensor (S-3)	
Chamber is plugging and Feed Fork are stalling (if sensor is inoperative). The plunger is cycling with little material in the chamber (if the sensor is giving a false signal). Possibly cause "bale length/flake too short" warning.	The full chamber paddle sensor requires 12v power and ground, giving a 12v signal to the XA2 module. Depending on the application this sensor may either be triggered when the paddle is down or triggered when the paddle is raised (how the computer uses this signal is set up in "Machine configuration" in the Main Menu / Adjust).
Low Oil Switch (S-4)	
Low oil warning comes on even though oil is in the sight gauge.	The low oil sensor is normally open and when the oil level rises above the sensor the switch closes. If the oil is above the sensor and there is no 12v signal on pin D (at the sensor) verify 12v power (to pin C) and ground (to pin B) at the sensor before replacing.

Symptoms	Diagnostics
Knotter Home Switch (S-11)	
<p>Knotter fails to stop at home when cycled. Plunger fails to extend. Knotter stops somewhere other than home. If the knotter home sensor fails but the knotter position sensor still works, it will stop the knotter 20% past the home position.</p>	<p>The knotter home sensor requires 12v power and ground, giving a 12v signal to the XA2 module. It is normally triggered from a pad on the needle yoke drive sprocket. This sensor both stops the knotter at the home position and it prevents the plunger from extending if not in the home position.</p>
Needle Home Switch (S-12)	
<p>Plunger will not extend. Needle home light on main screen will not be illuminated even though needles appear home.</p>	<p>The needle home sensor requires 12v power and ground, giving a 12v signal to the XA2 module. The purpose of the needle home switch is to help prevent the plunger from extending if the needles are up in the chamber.</p>
Accumulator Pressure Switch (S-32)	
<p>Low accumulator pressure warning either always on or always off while engaging or disengaging the PTO.</p>	<p>The accumulator pressure switch is normally open and adjustable from 50 to 200psi. It should be adjusted fully clockwise (the knob screwed down towards the fitting) to increase set point to 200psi. This switch then closes when the pressure drops below the set point (200psi), signaling the low accumulator pressure warning. Under normal operation, when the MD3 toggle switch is turned on without the PTO engaged the low accumulator warning should appear. As soon as the PTO is engaged and turning the pump, this warning should go out.</p> <p>If the low accumulator warning comes on too often even though the accumulator pre-charge is correct and the charge pump pressures are set to specs, the sensor knob may be screwed out to lower the warning pressure.</p>
Knotter Fan Switch (S-5)	
<p>Knotter fan does not turn on or off when the switch is toggled.</p>	<p>The knotter fan switch is the toggle switch at the top of the LH ladder. It is fed with 12v and sends either an open or 12v signal to the XA2. The computer disregards the position of the switch but rather monitors it for a change of state. If the switch changes state, the fan will also change state as long as a “disable” button has not been pressed.</p>

Symptoms	Diagnostics
Pickup Speed Sensor (S-33)	
<p>Pickup fails to show rotation while operating. Pickup stall warning comes on when pickup is not stalled.</p>	<p>The pickup speed sensor requires 12v power and ground, giving a 12v signal to the XA2 module. The sensor counts the time between triggers by starting and ending only at the leading edge of the trigger. It uses this time to calculate the rpm of the shaft. Because the clutch shaft is spinning about 180 to 220 rpm (depending on the sprockets) at 1000rpm PTO, this speed is updated up to three times a second. While spinning, the light on the back of this sensor should be blinking once per shaft revolution. This light should be blinking in unison with the "Pickup sensor" light in the "Feeder Setting 1" screen.</p>
Hot Oil Shut Down Switch (S-8)	
<p>Hot oil shut down warning comes on at low temperatures.</p>	<p>The hot oil shut down switch is normally closed and opens at 220 F. This switch has an adjustment screw to change the switching temperature. It is possible to use a normally open switch and set up the "Machine configuration" to accommodate for this. The switch is fed with 12v and when closed, sends a 12v signal to the XA2.</p>
Plunger Position Sensor (S-21)	
<p>Plunger position indicator shows full extension even if plunger is retracted (most likely a sensor problem). Plunger position indicator shows fully retracted even if plunger is extended (sensor possibly missing power or ground).</p>	<p>The plunger position sensor is a temposonic linear position sensor. It requires 12v and a ground while providing a 0-5v signal to the XA2. The sensor should be set so the range of plunger travel bottomed out to bottomed out is centered in the available sensor travel. This means that the signal should never be down to 0v or up to 5v but just vary in between relative to plunger position.</p>
Pickup-Feeder Pressure Transducer (S-22)	
<p>Pickup-feeder pressure graph shows full pressure or zero pressure but feeder is operating normally.</p>	<p>The Pickup-feeder pressure transducer requires 12v power and a ground while sending a 0-5v signal to the XA2 module. 0 psi results in a 0v signal and full rated pressure (3000psi) should produce a 5v signal. If this sensor fails, by adjusting the pickup-feeder plugging pressure to avoid pop-up plugging warnings, it is still possible to continue baling.</p>
Feed Fork-Knotter Pressure Transducer (S-23)	
<p>Feed fork-knotter pressure graph shows full pressure or zero pressure but Feed Fork is operating normally. Plunger cycles every feed fork stroke even when chamber is not full. This could also cause the "bale length/flake too short" warning.</p>	<p>The Feed fork-knotter pressure transducer requires 12v power and a ground while sending a 0-5v signal to the XA2 module. 0 psi results in a 0v signal and full rated pressure (3000psi) should produce a 5v signal. If the feed fork plunging pressure is reached, it will automatically plunge the next time the Feed Fork gets up to the stop sensor. If the pressure sensor fails, by adjusting the Feed fork-knotter plugging pressure to avoid pop-up plugging/stall warnings, it is still possible to continue normal baling.</p>

Symptoms	Diagnostics
Plunger Pressure Transducer (S-24)	
<p>Unable to obtain reasonable plunger pressure. Plunger stall warning with low pressure. "Puff" bales even though plunger pressure reads high. Inconsistent plunger pressure readings between manual gauge and ICM screen.</p>	<p>The plunger pressure transducer requires 12v power and a ground while sending a 0-5v signal to the XA2 module. 0 psi results in a 0v signal and full rated pressure (7500psi) should produce a 5v signal. If this sensor fails, it is not possible to bale with the tension control in "Auto". If baling must continue with a failed plunger pressure transducer, Tension Control (F4 in Auto Statistics screen) must be switched to manual. Then tension must be manually adjusted (using "OK" in the Auto Statistics screen) in conjunction with monitoring the manual plunger pressure gauge on the front of the baler to maintain the desired peak plunger pressure.</p>
Oil Temp (S-26)	
<p>Oil temperature reads higher or lower than what would be expected.</p>	<p>The oil temperature sender is basically a variable resistor to ground. The XA2 module only senses voltage inputs so there is a 5v reference voltage supplied to the oil temp sender through a 1000 ohm resistor. The XA2 then monitors the voltage at the sender. If the sender had infinite resistance, it would result in a 5v signal to the XA2 and if the sender had 0 ohms resistance (the 5v input would go directly to ground) it would produce a 0v signal. Now a temp sender would typically be range such as 300 to 700 ohms (for reference only) so the resulting voltage signal would be a very small range, possibly less than a 1 volt difference between 100 to 220 F. This system allows nearly any temp sender with a similar design to be used because of the user adjustable calibration means provided.</p>
Tension System Pressure Transducer (Optional) (S-6)	
<p>The tension pressure reads 0psi or 3000psi but bales remain acceptable.</p>	<p>The Tension pressure transducer requires 12v power and a ground while sending a 0-5v signal to the XA2 module. 0 psi results in a 0v signal and full rated pressure (3000 psi) should produce a 5v signal. If this sensor fails, it will not affect the performance of the machine. This sensor is optional and displays the tension pressure only for reference. Tension pressure is adjusted automatically (or manually) based strictly on the peak plunger pressure.</p>

Symptoms	Diagnostics
Knotter count (position) (S-25)	
<p>The knotter indicator does not show rotation while tying. The plunger does not pause for the knotter on a tie cycle. The plunger pauses too long for the knotter on a tie cycle.</p>	<p>The knotter tooth count / knotter position sensor requires 12v and a ground to provide a 12v signal to the XA2. The sensor counts teeth on the needle yoke drive sprocket to indicate the relative position of the knotter. The count resets when the knotter home switch is activated so the position “recalibrates” itself each revolution. Rotating the knotter should result in an increasing count for “knotter teeth” in any of the Knotter screens.</p> <p>On all models, on a tie cycle, the plunger will wait about 9” back at the “plunger stop for knotter (LS6) from ext.” and wait for the knotter to rotate past the “knotter mid cycle (LS12)” position. If the position sensor is not working at all and remains at 0%, it will treat it the same as 100%, the plunger will fail to stop, and the needles will be left unprotected as they pass through the top chamber. If the sensor is working intermittently and at least counts a couple teeth, the plunger will remain stopped 9” back from full extension for the entire cycle of the knotter before it is allowed to finish retracting. This may slow down the performance on a tie cycle enough to plug up the machine in extreme conditions.</p> <p>On the double knotter, the knotter position sensor is used to trigger the slow down/flow valve. If the sensor is not functioning, it could cause the flow valve to come on late or not at all resulting in the knotter stopping late. With the knotter unstrung, this should be observed in the “Double knotter” screen. The knotter position needle should show smooth rotation without a big jump at the end. A 10% jump is ok because of the width of the home trigger which resets the position to home.</p> <p>When manually operating the Knotter Tooth Count Sensor, it is necessary to have the Knotter Home Sensor deactivated in order for the Knotter Tooth Count to update when activated using a metallic object.</p>
Feed Fork Counter Sensor (Position) (S-27)	
<p>The feed fork indicator does not show rotation, even though the Feed Fork is rotating. The feed fork indicator only shows partial rotation and skips around.</p>	<p>The feed fork tooth count / position sensor requires 12v and a ground to provide a 12v signal to the XA2. The sensor counts teeth on the feed fork drive sprocket to indicate the relative position of the Feed Fork. The count is reset on the leading edge of the feed fork stop sensor. This position is used for nothing else but a visual representation of the feed fork motion.</p> <p>When manually operating the Knotter Tooth Count Sensor, it is necessary to have the Knotter Home Sensor deactivated in order for the Knotter Tooth Count to update when activated using a metallic object.</p>
<p>Excessively long first bale after having shut down the system.</p>	<p>When the baler is turned off, the tension rails will relax and the bale in the chamber will expand out the back of the baler. If the ICM is shut off before the bale has had time to expand (1 - 5 minutes) it will not be able to register that the star wheel has rotated. Upon re-baling, this may cause the star wheel to rotate one extra time, causing that bale to be approximately 4 feet longer.</p> <p>Follow the recommended shutdown procedure (see “Shutdown Procedure” on page 1-2) to avoid this situation.</p>



LEFT-HAND SIDE OF BALER

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

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

Figure 24-2 Sensor Location Diagram and Chart

INSTALLING THE IN CAB MONITOR (ICM)

Mounting Considerations:

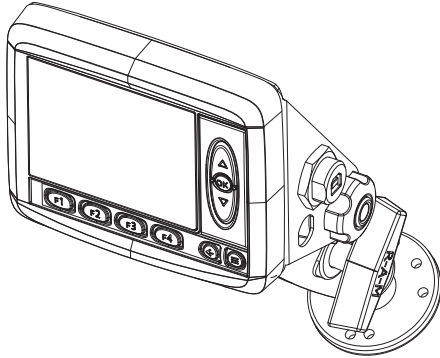


Figure 25-1 In-Cab Monitor (ICM)

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

The unit is designed for outdoor use. Position the unit in desired location and make sure that it is not exposed to mechanical damage.

Mount the ICM above the Rear View Monitor (if so equipped) or in a side-by-side position (see Figure 25-2).

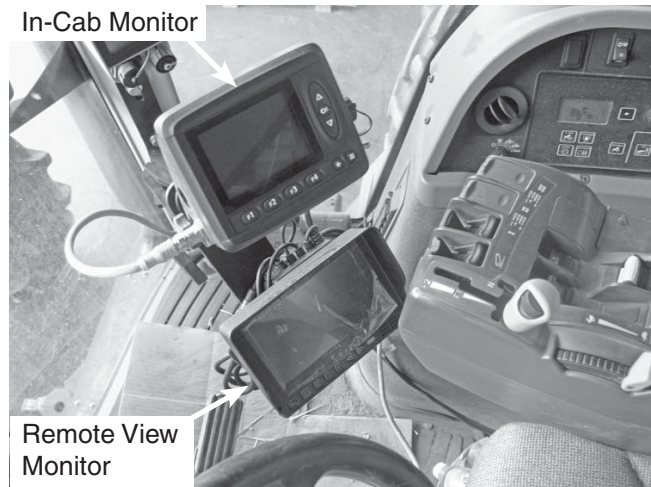


Figure 25-2 Cab Mounted ICM & Remote View Monitor

- Position the unit to prevent cable folding, crushing, wear or damage in any way.
- The connectors on the reverse side of the unit should be accessible.
- Leave sufficient room behind the unit to insert connectors. Less than 3" (75 mm) clearance will stress the cabling and distort the seals in the connectors. This can cause the environmental specification not to be met (see Figure 25-3).
- Position the unit so there is no risk of exposure to external heat, e.g. from the engine or heater.

NOTICE

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

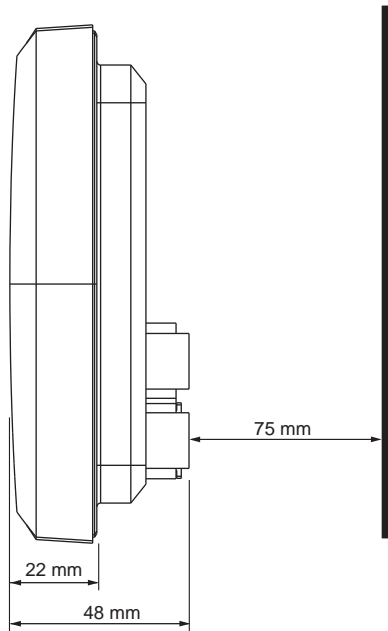


Figure 25-3 ICM Mounting

- The best readability will be achieved by positioning the front face of the unit directly towards the operator.
- Mount the In-Cab Monitor within operator's reach and comfort zone (see Figure 25-2).
- Route and connect In-Cab Monitor cables from baler to cab. (See Figure 25-4).

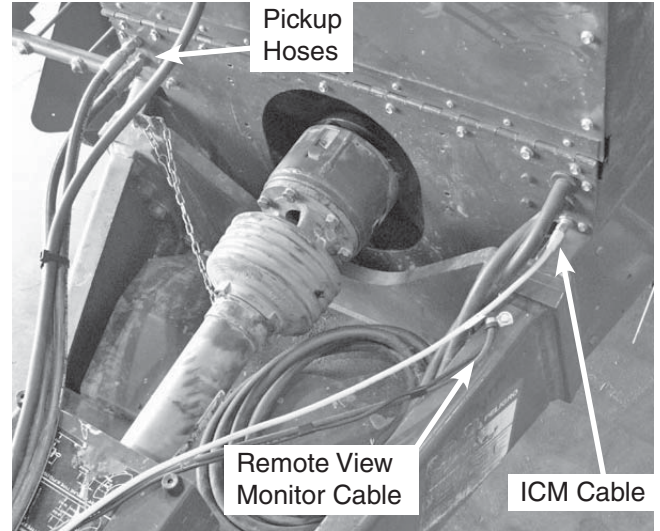


Figure 25-4 Cable Routing

NOTICE

ICM cables should be securely attached from baler to cab out of the way of moving parts to prevent cable damage.

SCREEN MAINTENANCE AND RECOMMENDATIONS

Burn-in

The ICM display, like other computer screens can have a ghost picture occur if a static image is left on the display for extended periods of time. For the best viewing over the life of the product we recommend using the screen saver functionality.

NOTICE

To avoid burn-in, use the screen saver on the display.

Maintenance

The 3.5" transfective display is a high quality viewing interface and reasonable care should be taken to maintain it. The display can be cleaned with an LCD cleaning solution found in many stores. Use a lightly dampened lint-free, non-abrasive cloth when cleaning the display.

NOTICE

To avoid scratches, do not wipe or clean a dry display.

Environment Specification

ICM is a hardened module suitable for outdoor use. However, concentrating cleaning jets on the control surface of the ICM can cause a degradation of the finishing and should be avoided.

NOTICE

To keep the unit's buttons looking their best, do not blast the control surface with cleaning jets.

Back of unit

If the rear surface of the ICM unit is exposed and will be subjected to high pressure steam cleaning, care should be taken around the connector assemblies. The Deutsch DTM connectors are IP67 rated which is suitable for any type of outdoor conditions. However, concentrating the cleaning jets on the connectors of the ICM can cause damage to the connector seals or wire insulation and should be avoided. Use of shielding is recommended to block high pressure cleaning jets, if the rear of the unit is exposed.

NOTICE

To avoid damaging the connector seals or wire insulation, do not blast the connectors with cleaning jets.

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89-062 05/2013
Printed in USA
