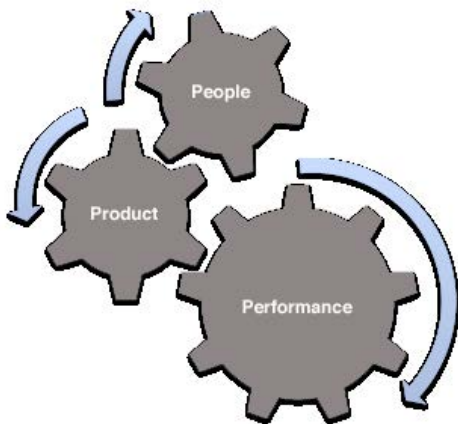




SERVICE MANUAL

81710A Bale
TexMax 2 Microwave Scanner
*Installation, Wiring, and
Operation Guide*



SAMUEL JACKSON

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We appreciate your business and hope you enjoy your TexMax 2

This manual contains information on the installation, wiring and use of your TexMax 2. Included are sections on:

- Understanding the TexMax 2 readings
- How it works
- Assembly and installation
- Calibration and programming
- Operation tips

In the future when you require service, technical support, or parts please contact us by phone, fax, or the internet. Our engineers and service people are available to assist you in obtaining the best performance from your Samuel Jackson, Inc. products.

Again, thanks for choosing a Samuel Jackson TexMax 2

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Understanding the TexMax 2 Readings

The TexMax 2 antennas are approximately 8 inches wide and 11 inches tall. The TexMax 2 is measuring average moisture through the bale in a volume approximately as wide and as high as the antenna dimensions.

The TexMax 2 calculates a moisture value approximately 10 times a second (once every 100 milliseconds). Within each of these 100 millisecond readings, thousands of microwave readings are made and many microwave readings are averaged to get the best moisture reading. If the moisture distribution along the bale varies significantly as the bale moves by, then the output from the TexMax 2 may be unpredictable. Significant variation is greater than 0.5%.

Moisture restoration that is poorly distributed throughout the bale is likely to cause the TexMax 2 to give unpredictable results which may be higher or lower than the true average. If you are adding moisture in an uneven method to the bale (for example, spray systems in the lint slide), then the variability of the moisture distribution along the bale will be more than 0.5% resulting in erroneous readings. By using Samuel Jackson Humidaire Systems and industry best ginning practices moisture variability along the bale is normally not an issue. If water spray on lint slide is used tests have shown that the moisture variations within the bale are considerable. This moisture variation inside a bale subjected to a spray moisture restoration system is a well known and well documented fact.

The TexMax 2 introduces a feature that starts its microwave readings automatically and completes its readings according to the value of TAnalysis. This value should be selected so that it will finish its readings approximately 1 foot prior to the trailing edge of the bale. Like any electromagnetic signal, the radio waves transmitted by the TexMax 2 will always take the easiest path available. If measurements are taken too close to the end of the bale, the signal may go around the bale rather than through it.

The temperature of the bale should also be consistent within +/- 10 degrees Fahrenheit to ensure that any bias taken out during calibration remains constant. The dielectric constant for moisture changes with temperature, however these changes are small for normal bale temperatures during ginning. Internal bale temperatures close to or beyond freezing or boiling will not provide reasonable readings.

The TexMax 2 instrument is an extra tool, which should assist the ginner in assessing and controlling the operational status of his gin. The values provided by the TexMax 2 instrument should not be used to determine contractual or custody transfer issues. These issues should be determined by statistically representative sampling and laboratory analysis carried out to national or international standards.

Readings from this instrument are not certified to be used for contractual purposes.

Samuel Jackson Incorporated, its employees, its suppliers, and its contractors shall not be responsible for any consequential damage caused by the use of this device.

How it Works

The TexMax 2 uses microwave measurement techniques to measure the moisture content of cotton lint in a pressed bale. The instrument measures the speed of the microwaves and the amount of microwave energy absorbed through the cotton.

The speed of microwaves through air is very close to the speed of light through space and the speed of microwaves through dry cotton is a little slower than through air. However, the speed of microwaves in water is considerably slower than in dry cotton. The difference in this speed is attributed to a value known as the dielectric constant (sometimes called relative permittivity). The dielectric constant for air is close to 1, for dry cotton it is closer to 2 while for pure water it is approximately 80.

Similarly, the amount of microwave energy absorbed in air is less than dry cotton and dry cotton is much less than in water. Other factors, such as the density of the bale, temperature of the cotton and even the way the bale is pressed also need to be taken into account.

These factors, and many more, have been taken into account in the TexMax 2 moisture measurement system to give you an accurate, reliable, on-line cotton moisture measurement system.

Assembly and Installation

Assembly and installation of the TexMax 2 microwave moisture sensor is very straightforward. A TexMax 2 only needs about 12-18" of space along the conveyor. Measurements are not affected by bagging or ties so it can be placed anywhere after the press. It is necessary that the bales move through the TexMax 2 at a constant speed in order to insure an accurate reading every time. If the reading occurs once the bale has stopped, results may not be as accurate.

The TexMax 2 is shipped in two boxes.

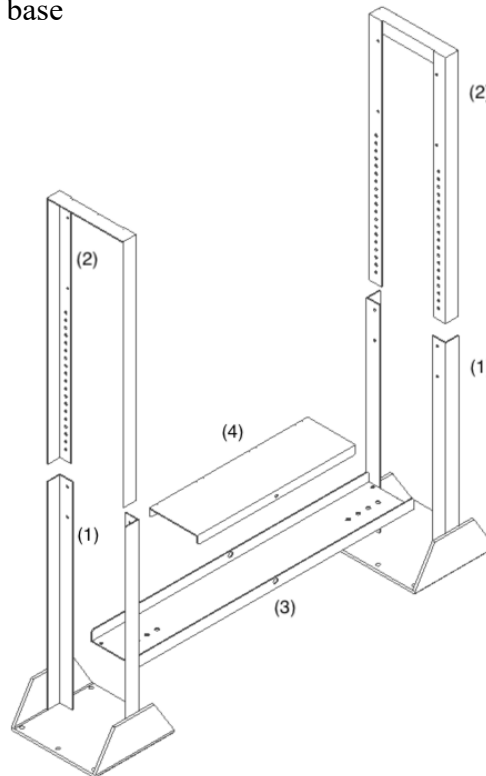
Box 1 contents:

- 1 TexMax 2 Transmitter with touchscreen
- 2 TexMax 2 Receiver
- 3 RF Coax cable in non-metallic conduit

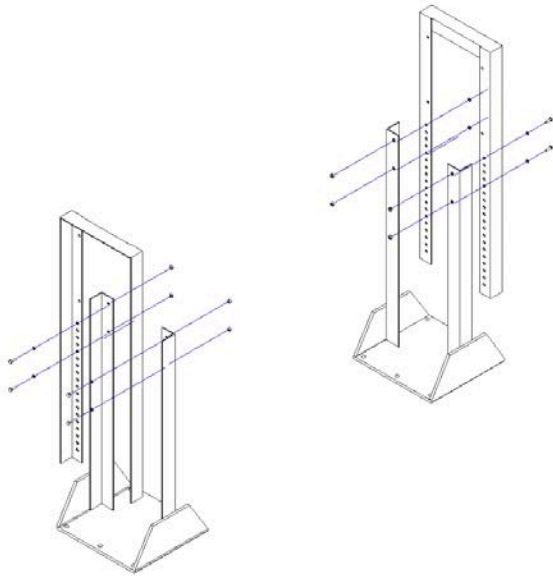


Box 2 contents:

- 1 (2) Lower frames
- 2 (2) Upper frames
- 3 Alignment and wire tray base
- 4 Wire tray cover
- Fastener kit

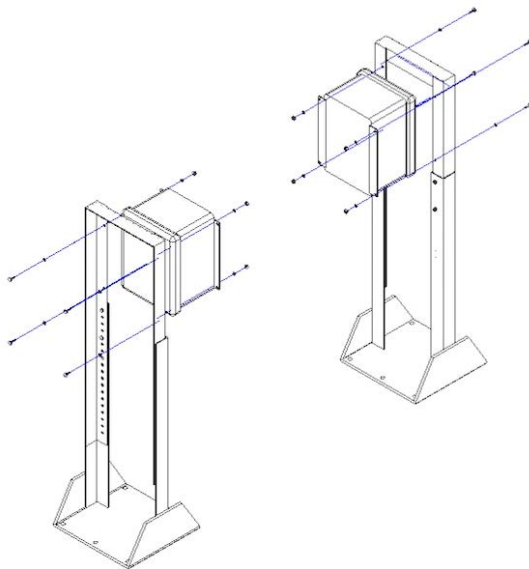


Begin assembly by bolting the upper sensor mounts to the lower bases (Fig.1). Use the set of holes that will align the centers of the TexMax 2 transmitter (box with touchscreen display on face) and receiver with the centerline of the bale on the conveyer. This is the side where all external electrical connections are made, so make sure it is on the correct side of the conveyor for connecting power and communication cables.



(Fig. 1)

Next, mount the transmitter and receiver (sensors) with the decals facing out (Fig. 2) in the upper supports as shown using the bolts supplied.



(Fig. 2)

Place one sensor on each side of the bale conveyer (with the decals facing away from the conveyer) in the desired location. Bolt the alignment and wire tray base to the lower frame bases, setting the width using the pre-punched ½ dia holes so that the transmitter and receiver are between 3 to 4 inches from the sides of a bale on the conveyer. Leave the ½ inch bolts loosely tightened at this time. If the conveyer is too wide, you will need custom extension brackets (Part No. 21932) to move the sensors in. Contact the factory for more information.

The TexMax 2 must be triggered when a bale is approaching the unit. It is recommended that the internal automatic trigger be used if possible. For installations where there is no gap between bales at the TexMax, a user provided momentary dry contact can be sourced from the pusher or bale handling system. For more information on triggering the TexMax 2, call the factory.



User provided bale switch shown located on bale conveyer frame

(Fig.3)

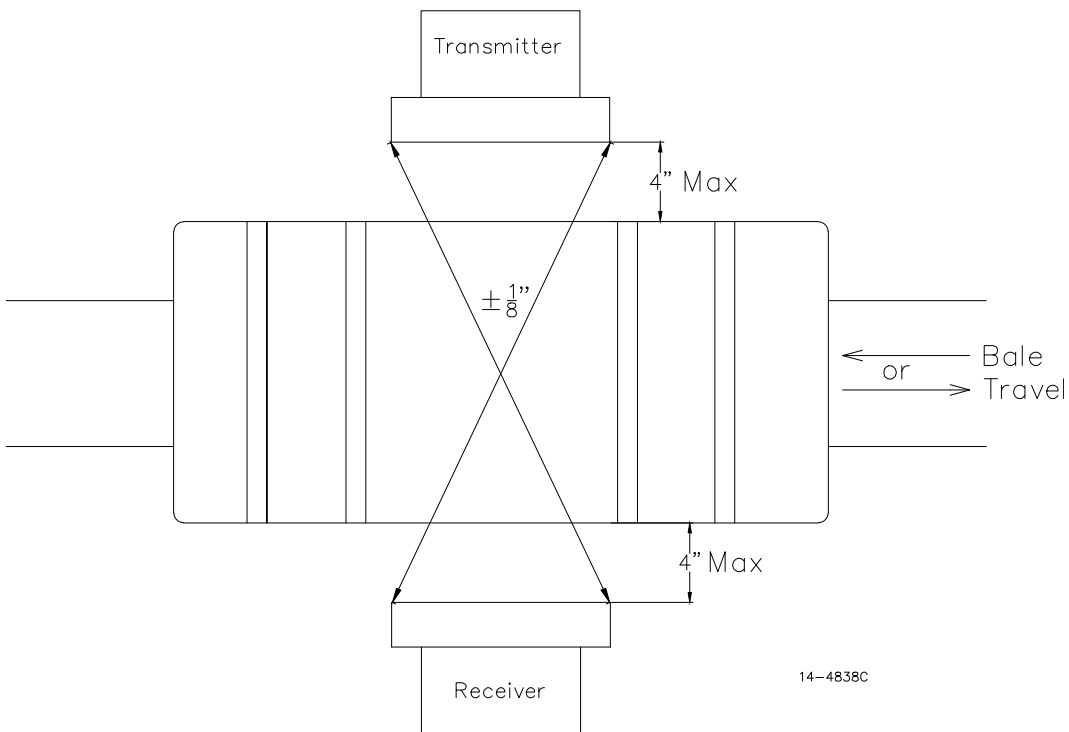
Once the stands are assembled, adjust the feet (Fig. 4) so that they have a solid footing and the receiver and transmitter are level.



Alignment and wire tray base

(Fig. 4)

Next, measure the diagonal distance between all four corners of the transmitter and receiver as shown in Figure 5 below. Adjust the sensors so that the diagonal measurements are within 1/8" of each other. You should use a straightedge to make sure the sensors are pointing directly at each other. Drill 5/16 holes into the lower frame bases using the pre-punched holes in the wire tray base as guides. Install 5/16 bolts and tighten. Tighten the 1/2 inch bolts also.



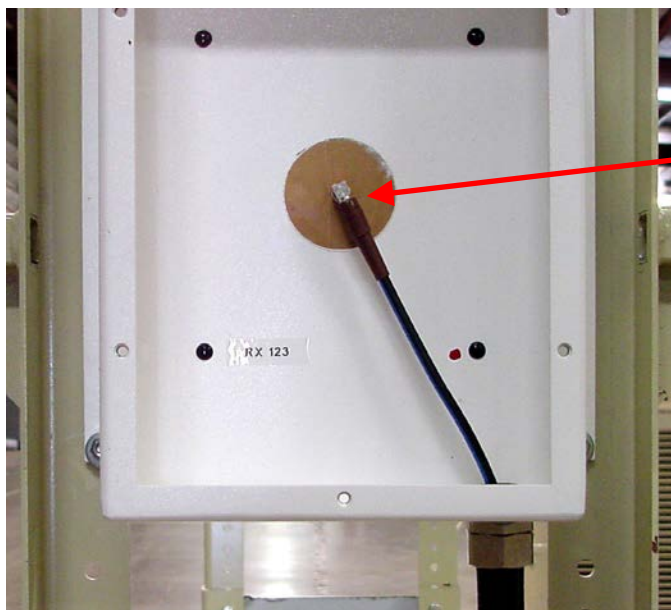
(Fig. 5)

For the next steps, you will need to remove the 6 screws (Fig. 6) holding the faceplates on the transmitter and receiver so that you can attach the special coax antenna cable and conduit from the receiver to the transmitter.



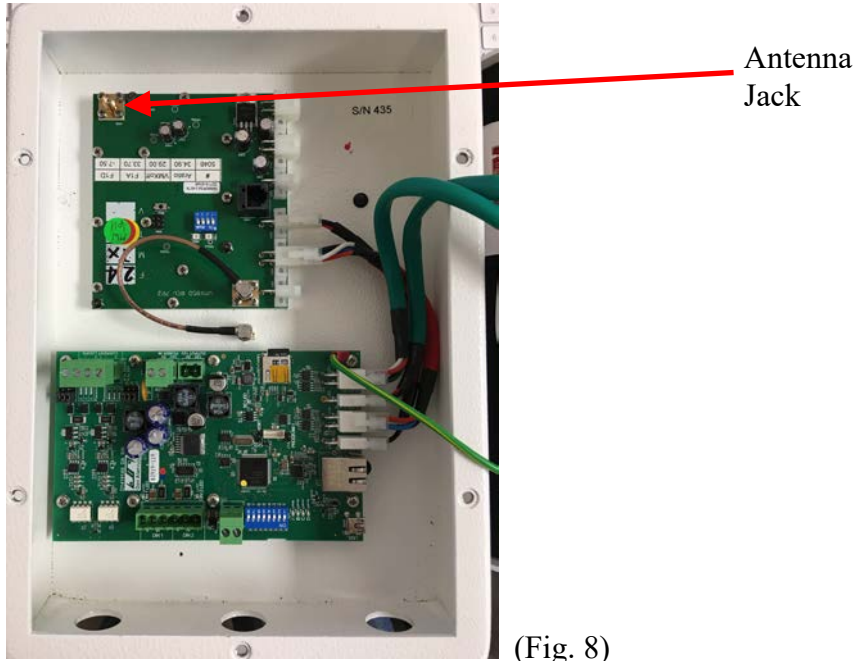
(Fig.6)

The unit is shipped with an antenna cable already pulled inside a special non-metallic, flexible conduit. Do not attempt to remove antenna wire from this conduit or modify its length. Mount one end of the conduit into the hole in the bottom of the receiver and attach the antenna cable to the jack (Fig. 7). Tighten the cable finger-tight then carefully turn one quarter of a turn with a wrench. Be sure the antenna cable is connected firmly, but do not over-tighten as the circuit board is easily broken.



(Fig. 7)

Run the antenna cable and conduit along the inside of the wire tray base from the receiver to the transmitter. Do not bend the antenna cable any more than necessary. Attach the antenna cable to the jack on the top left corner of the circuit board (Fig. 8). Again, tighten the cable finger-tight then carefully add one quarter turn with a 5/16" (8mm) wrench. Put the faceplates back on the receiver and transmitter.



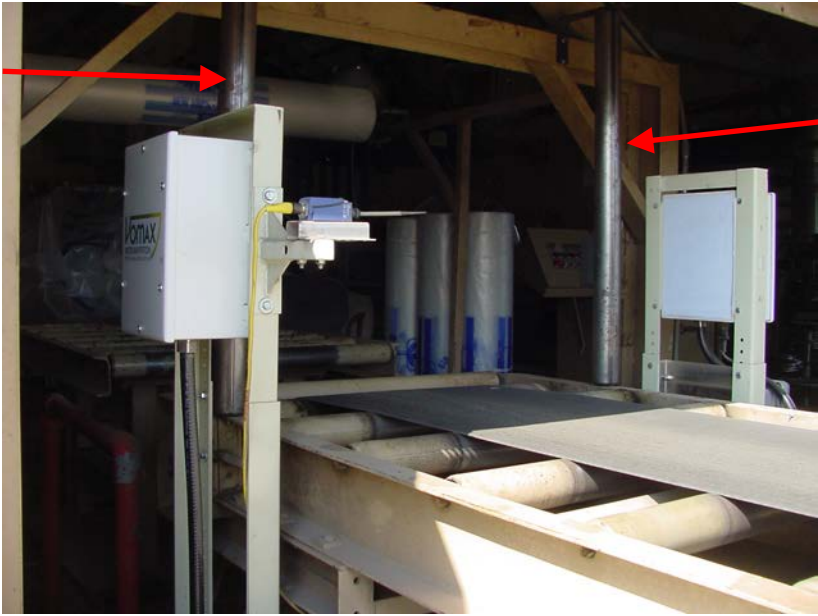
(Fig. 8)

Finally, attach the guard plate across the bottom of the frame (Fig. 10) to protect the wires and keep debris from building up on the stand.



(Fig. 10)

To protect the TexMax 2 from wayward bales and keep bales centered between the antennas, bale guides are recommended. Guiding the bale through the antennas can be accomplished several ways. Fig. 11 shows guide rollers used in one installation.



(Fig. 11)

Make one last check to be sure that the sensors are on steady footing and that they are pointed directly at each other. It is recommended to anchor the stands to the floor with concrete bolts. A completed installation is shown in Fig. 12. With everything hooked up, you can apply power and proceed with calibration.



(Fig.12)

Wiring

If you are using a Moisture Mirror X, it is recommended to pull 3 16GA conductors and one CAT-5E cable between the TexMax 2 and the Mirror Basic panel. The wires will carry 24vdc power for the instrument and the Ethernet cable will communicate the bale-made signal and moisture reading to the Mirror. See the accompanying external wiring diagram for details. Refer to wiring diagram CA13947 later in this manual for details.

If you are using an older Moisture Mirror without Ethernet capabilities, you'll need to run 7 conductors from the TexMax 2 to the Mirror Basic panel. One set will carry 24vdc power and ground, a second pair will carry the 24vdc bale-made signal, and the last pair will carry the moisture value via a 4-20mA signal. Refer to wiring diagram CA13948 later in this manual for more details.

Programming

Now that the TexMax 2 is installed, you must program certain parameters for operation in your gin. The TexMax 2 can be in one of two modes at any given time: Setup mode or Analyze mode. Analyze mode is the normal operating mode and Setup mode is used to program and calibrate the sensor.

TWait

The TWait parameter tells the sensor how long to wait after the activation of the user provided bale switch before taking measurements. This parameter should be set to "0" when using the default automatic trigger. In all other installations, TWait must be set so that the TexMax 2 does not begin its measurement until about 1 foot of the bale has passed the center line of the antenna.

- Press "F1" on the touchscreen to enter Setup mode.
- Press "MENU" until "*Set Paramaters*" is displayed.
- Press "ITEM" until "*TWait*" is displayed.
- Set the "TWait" parameter using the "FIELD" button to move from digit to digit and the "UP" and "DOWN" buttons to increase or decrease each digit.
- Press "MENU" until "*F1 for Analyze*" is displayed.
- Press "F1" to return to Analyze mode.

TAnalysis

The TAnalysis parameter determines how long the sensor stays on when measuring the moisture content of the bale. Proper setting is crucial for accurate and consistent moisture readings. The analysis time should be complete when the tail end of the bale is still fully in front of the antenna and about 1 foot from the center line of the antenna.

To enter this value into the TexMax 2, follow these steps:

- Press “F1” on the touchscreen to enter Setup mode.
- Press “MENU” until “*Set Parameters*” is displayed.
- Press “ITEM” until “*TAnalysis*” is displayed.
- Set the “TAnalysis” parameter using the “FIELD” button to move from digit to digit and the “UP” and “DOWN” buttons to increase or decrease each digit.
- Press “MENU” until “*F1 for Analyze*” is displayed.
- Press “F1” to return to Analyze mode.

TRepeat

The TRepeat parameter determines how often a reading can be taken. It is recommended that this be adjusted so that readings aren’t taken until after any obstructions or personnel are finished working in the vicinity. Default is 30 seconds.

To enter this value into the TexMax 2, follow these steps:

- Press “F1” on the touchscreen to enter Setup mode.
- Press “MENU” until “*Set Parameters*” is displayed.
- Press “ITEM” until “*TRepeat*” is displayed.
- Set the “TRepeat” parameter using the “FIELD” button to move from digit to digit and the “UP” and “DOWN” buttons to increase or decrease each digit.
- Press “MENU” until “*F1 for Analyze*” is displayed.
- Press “F1” to return to Analyze mode.

DBTrigger

The DBTrigger parameter determines how sensitive the automatic trigger function is. If the reading is being triggered before the bale is fully in position, this value can be raised by 0.10 db until the bale is fully in front of the antennas when the scanning indicator shows.

To enter this value into the TexMax 2, follow these steps:

- Press “F1” on the touchscreen to enter Setup mode.
- Press “MENU” until “*Set Parameters*” is displayed.
- Press “ITEM” until “*DBTrigger*” is displayed.
- Set the “DBTrigger” parameter using the “FIELD” button to move from digit to digit and the “UP” and “DOWN” buttons to increase or decrease each digit.

- Press “MENU” until “*F1 for Analyze*” is displayed.
- Press “F1” to return to Analyze mode.

Offset

The Offset parameter allows you to adjust the TexMax 2 to more closely match results from laboratory analysis. If, for example, the TexMax 2 displayed average bale moisture of 6.7% for a particular bale, but laboratory analysis of that bale proved the average bale moisture to be 6.5% an offset of -0.2 can be entered to allow the TexMax 2 to more closely match the laboratory result.

Setting the Offset parameter should only be done after all other programming is complete and an “Air Calibration” has been performed.

To enter this value into the TexMax 2, follow these steps:

- Press “F1” on the touchscreen to enter Setup mode.
- Press “MENU” until “*Set Parameters*” is displayed.
- Press “ITEM” until “*Offset*” is displayed.
- Set the “Offset” parameter using the “FIELD” button to move from digit to digit and the “UP” and “DOWN” buttons to increase or decrease each digit.
- Press “MENU” until “*F1 for Analyze*” is displayed.
- Press “F1” to return to Analyze mode.

Analog Output Scaling

The 4-20mA analog signal from the TexMax 2 can be scaled to accommodate the device receiving the bale moisture information. By default the TexMax 2 reports 0% moisture as 4mA and 30% moisture at 20mA. These values should not normally need to be changed.

To alter these values in the TexMax 2, follow these steps:

- Press “F1” on the touchscreen to enter Setup mode.
- Press “MENU” until “*Set Parameters*” is displayed.
- Press “ITEM” until “*Moist 4mA*” is displayed.
- Set the “Moist 4mA” parameter using the “FIELD” button to move from digit to digit and the “UP” and “DOWN” buttons to increase or decrease each digit.
- Press “ITEM” until “*Moist 20mA*” is displayed.
- Set the “Moist 20mA” parameter using the “FIELD” button to move from digit to digit and the “UP” and “DOWN” buttons to increase or decrease each digit.
- Press “MENU” until “*F1 for Analyze*” is displayed.

- Press “F1” to return to Analyze mode.

Width

The Width parameter lets the TexMax 2 know whether the bale is a Universal Density (UD 54 inch long) bale or a High Density (HD 41 inch long) bale. This can be shown in inches or meters depending on the “Width Unit” setting. For UD bales enter 30.71 inches or 0.780 meters; for HD bales enter 33.07 inches or 0.840 meters.

To enter this value into the TexMax 2, follow these steps:

- Press “F1” on the touchscreen to enter Setup mode.
- Press “MENU” until “*Set Parameters*” is displayed.
- Press “ITEM” until “*Width*” is displayed.
- Set the “Width” parameter using the “FIELD” button to move from digit to digit and the “UP” and “DOWN” buttons to increase or decrease each digit.
- Press “MENU” until “*F1 for Analyze*” is displayed.
- Press “F1” to return to Analyze mode.

- NOTE -

Most US gins use 54” UD bales and a width setting of 30.71

Equation

The TexMax 2 Equation should normally be set to 1 which is the factory default. Consult the factory before changing this parameter to anything other than 1.

To enter this value into the TexMax 2, follow these steps:

- Press “F1” on the touchscreen to enter Setup mode.
- Press “MENU” until “*Set Parameters*” is displayed.
- Press “ITEM” until “*Equation*” is displayed.
- Set the “Equation” parameter to 1 using the “FIELD” button to move from digit to digit and the “UP” and “DOWN” buttons to increase or decrease each digit.
- Press “MENU” until “*F1 for Analyze*” is displayed.
- Press “F1” to return to Analyze mode.

Programming Example

In this example the user provided bale made switch is located before the TexMax 2 sensor. It takes 1.3 seconds for the head end of the bale to move from the bale made switch to 1 foot beyond the center line of the antenna; the tail end of the bale is 1 foot from the center line of the antenna, but still between the antennas, 3.1 seconds after the bale made switch is triggered. The gin uses a 54" UD press and the 4-20mA analog signal is connected to a Samuel Jackson Moisture Mirror which is setup to receive bale moisture as 4mA = 0% and 20mA = 30%.

The following parameters need to be entered into the TexMax 2.

TWait = 1.3 seconds
TAnalysis = 1.8 seconds (3.1 – 1.3)
Moist 4mA = 00.0
Moist 20mA = 30.0
Width = 0.840
Equation = 1

To enter these values into the TexMax 2, follow these steps:

- Press “F1” on the touchscreen to enter Setup mode.
- Press “MENU” until “*Set Parameters*” is displayed.
- Press “ITEM” until “*TWait*” is displayed.
- Set the “TWait” parameter to 01.3 using the “FIELD” button to move from digit to digit and the “UP” and “DOWN” buttons to increase or decrease each digit.
- Press “ITEM” until “*TAnalysis*” is displayed.
- Set the “TAnalysis” parameter to 01.8 using the “FIELD”, “UP” and “DOWN” buttons.
- Press “ITEM” until “*Moist 4mA*” is displayed.
- Set the “Moist 4mA” parameter to 00.0 using the “FIELD”, “UP” and “DOWN” buttons.
- Press “ITEM” until “*Moist 20mA*” is displayed.
- Set the “Moist 20mA” parameter to 30.0 using the “FIELD”, “UP” and “DOWN” buttons.
- Press “ITEM” until “*Width*” is displayed.
- Set the “Width” parameter to 0.840 using the “FIELD”, “UP” and “DOWN” buttons.
- Press “ITEM” until “*Equation*” is displayed.
- Set the “Equation” parameter to 1 using the “FIELD”, “UP” and “DOWN” buttons.
- Press “MENU” until “*F1 for Analyze*” is displayed.
- Press “F1” to return to Analyze mode.

Air Calibration

Before using the TexMax 2 an “**Air Calibration**” must be performed. This procedure calibrates the sensor to the air between the antennas. Air Calibrations should be done once at installation, again while the gin is running (between bales), and any time there is a change in the sensor position (sensor hit by a bale, moved to work on conveyor, etc.). Follow the steps below to perform an Air Calibration.

- Make sure the air path between the receiver and transmitter is clear and the transmitter and receiver are aligned.
- Make sure the TexMax 2 has been powered up for at least 10 minutes to allow the electronics to properly warm up.
- Using the touchscreen on the Transmitter, press “F1” to select Setup mode.
- Press “ITEM” until “*ENT for Air Cal*” is displayed.
- Press “ENT” to perform the Air Calibration.
- If there are no error messages on the TexMax 2 display, the message “*Air Cal OK*” will be displayed which means that the air calibration has been completed successfully.
- Press “ENT”
- Press “ITEM”
- Press “F1” to return to Analyze mode.

If after an “Air Calibration” laboratory analysis of several bales shows the TexMax 2 to be in error by more than 0.2% adjustment to the “Offset” parameter described in the *Programming* section of this manual may be indicated.

Default Parameter Values

Item	Explanation	Range	Default Setting
Twait	Time delay between detecting a bale and commencing measurements	00.0 to 60.0 s	0 (Should be changed per installation)
TAnalysis	Duration of moisture analysis	00.1 to 30.0 s	2 (Should be changed per installation)
Trepeat	Minimum time between readings	00.00 to 60.00	30.00
DBTrigger	The amount of blockage required to trigger an automatic reading	00.00 to 99.99	5.00
IP1/Dual Input	Selects between requiring one or both inputs to be on before taking a reading	Dual / Input 1	Input 1
Sensor Mode	Determines the logic for triggering the inputs	Low / High / Off	High
Smoothing TC	Smoothing time constant	0 to 1000 seconds	10
Offset	Adds any required bias to the moisture readings	-99.99 to 99.99	00.00
Moisture 4 mA	Moisture at 4mA on the output current loop	00.0 to 99.9 %	00.0 %
Moisture 20mA	Moisture at 20mA on the output current loop	00.0 to 99.9 %	30.00%
Width Units	Sets the units to be used in the width setting	in / m	m
Width	Width of the Material Under Test (bale width in meters) UD = 0.840, HD = 0.780	MMX.10 to 99.99 inches MMX.10 to 10.000 Meters	0.840 (Should be changed per installation)
Equation	Selects the calibration equation to be used.	1 to 4	1
Pl. 1 Op	Selects the data that corresponds to output 1	Inst / Smoothed	Inst
Lp 2 Op	Selects the data that corresponds to output 2	Smoothed / Std Dev	Smoothed
Solenoid	Selects the function of the out alarm terminals. Result = Bale Made output. Error = Error/Fault output.	Error / Result	Error (Should be changed per installation)
IP Address	IP Address of this Bale TexMax	TM1 – 10.52.18.130 TM2 – 10.52.18.131	TM1 – 10.52.18.130
IP Mask	IP Mask of this Bale TexMax	255.255.252.0	255.255.252.0
IP Gateway	IP Gateway of this Bale TexMax	10.52.18.254	10.52.18.254
Modbus IP	Where the TexMax should send data	MMX-10.52.18.30 Spectrum-10.52.19.0	MMX – 10.52.18.30

Item	Explanation	Range	Default Setting
Modbus MST	Modbus Address for Bale Moisture	MMX Bale 1 – 1984 MMX Bale 2 – 2008 Spectrum Bale 1 – 0016 Spectrum Bale 2 – 0018	MMX Bale 1 – 1984 (Should be changed per installation)
Modbus Bale	Modbus Address for Bale Made signal	MMX Bale 1 – 1988 MMX Bale 2 – 2009 Spectrum Bale 1 – 0048 Spectrum Bale 2 – 0049	MMX Bale 1 – 1988 (Should be changed per installation)

Error Codes and Troubleshooting

- E1 The temperature of the electronics is out of range (Temp Low, Temp High).
- E2 Unreasonably low Phase reading.
- E3 Looks like you are trying to analyze an air path; no bale between antennas.
- E4 Microwave attenuation too high; error in reading the microwave signal.
- E5 Unable to calculate moisture e.g. would cause division by 0; wrong calibration equation.
- E6 Moisture out of limits; out of "Min moisture", "Max moisture" range.
- E8 Mass / Density / or Width out of limits; no bale between antennas.
- E9 VMX850 reply time out condition; faulty serial connection between boards.
- EA Tying to do an air calibration with bale between antennas or antenna alignment error.

Most errors will clear themselves when the next bale is scanned.

Operation Tips



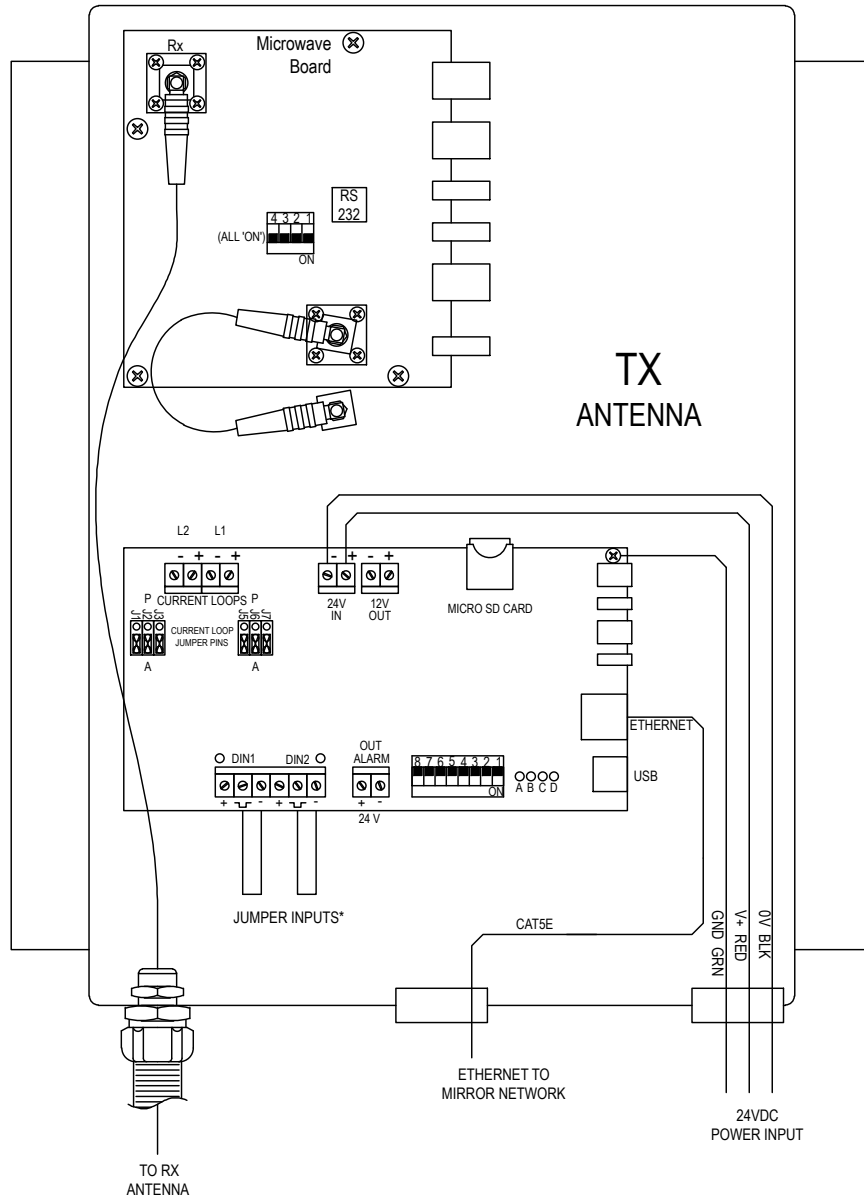
- *An “Air Calibration” must be completed after installation and before checking the output of the sensor.*
- *For the most accurate readings, “Air Calibration” should be done again when the gin is operating (i.e. all motors on).*
- *If an error is displayed on the TexMax 2 the 4-20mA analog signal is designed to indicate moisture in excess of 20%. For this reason, it is recommended that the analog scaling be left at the factory default. (0% = 4mA | 30% = 20mA)*
- *Any sign of excessive bale moisture should be investigated immediately regardless of the TexMax 2 reading.*
- *A dot shows up to the right of the display when the TexMax 2 is actively taking a reading. This can be especially useful when troubleshooting a triggering issue or setting up timers.*
- *A hash sign (#) shows up on the right side of the screen during the debounce time. During this time, no readings will be taken and the input signal will be ignored.*

A TexMax 2 cannot protect you against problems from bales that have been subjected to water spray systems. Because water spray systems apply moisture unevenly, extreme wet spots can and do exist within a bale that has an average moisture of less than 7.5%. Problems from these wet spots can arise before the moisture can equilibrate throughout the bale.

Wiring Diagrams

ETHERNET ELECTRICAL CONNECTIONS 81710A Texmax Microwave Moisture Sensor

CA13947
11-17

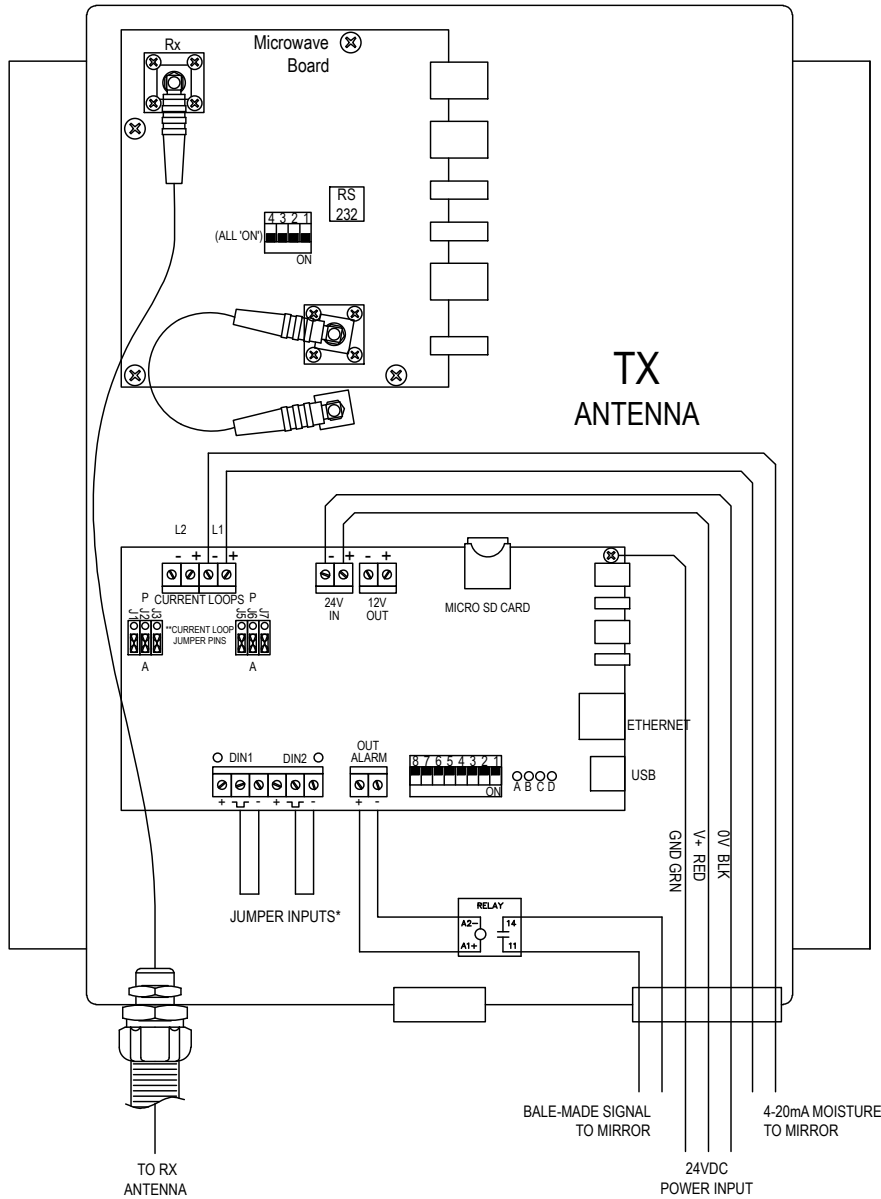


NOTES:
*INPUT 1 (DIN1) MAY BE USED WHERE THERE IS NO SEPARATION BETWEEN BALES AT TEXMAX

ANALOG ELECTRICAL CONNECTIONS

81710A Texmax Microwave Moisture Sensor

CA13948A
7-18



NOTES:
 *INPUT 1 (DIN1) MAY BE USED AS TRIGGER WHERE
 THERE IS NO SEPARATION BETWEEN BALES AT TEXMAX
 **CURRENT LOOP JUMPERS SHOULD BE SET TO ACTIVE

IMPORTANT!

The following notice affects your warranty.

Electrical Controls and Your Safety

Your new Sam Jackson product may be equipped with electrical controls or is designed to interact with controls on a related Sam Jackson product.

In the event that local, state, federal or other specified safety compliance is required, we will consider modifications to meet the particular requirements. Implementation of alternative safety devices may incur additional charges. No warranty of compliance with a particular standard is made in the absence of specific reference to it in our quotation.

If you modify, or permit others to modify, these controls without specific written permission from Sam Jackson, Inc. the warranty on your product will be void and there is a possibility of serious damage to machinery, damage to product, serious injury to personnel, or death. The modifier of the controls assumes all liability for these consequences.

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