Programmable Torque Verifier FM 2.4GHz

Owners Manual

For S/R Part No. 10466

Table of Contents

1 Introduction

The PTV/Switch Wrench System is designed to assist the manufacturer in closing several gaps in the quality system that have hindered their quality improvement efforts. The key capabilities this system enables are:

1. The ability to integrate manual torque wrenches into the automated line control system.

2. The ability to attain control of the actual torque wrench use process, not just the wrench calibration process.

3. The ability to provide rapid and effective training in proper torque wrench use through reinforcement of proper technique with every cycle of the wrench.

1.1 *Control Concepts*

The PTV-FM works with the FM Switch Wrenches to bring systematized control to the use of manual torque wrenches. The control is applied as follows:

1. There are three ways to use a clicker-type torque wrench. When used properly, a steadily increasing force is applied until the wrench clicks and the pressure is immediately released and the tool resets. One improper use technique consists of applying force too quickly ("jerking" the wrench). The other improper technique is to continue to apply force after the click and overtorque the fastener.

2. When the correct technique is used the torque wrench spends a certain amount of time in the "clicked" position. When the wrench is used too quickly it spends less time in the clicked position. When it is rotated past the click it spends more time in the clicked position.

3. The FM Switch Wrench is a preset clicker-type torque wrench. The torque is preset using a torque tester to assure the wrench is accurately set. The torque setting is then locked in.

4. The FM Switch Wrench has a timer that measures the duration of a click (cycle) of the wrench. once the wrench has been accurately adjusted on the tester, variation in technique can be controlled by measuring and controlling the duration of the click.

5. An experiment is conducted to determine the correct use of the torque wrench (duration of time in the clicked position) to obtain the correct torque on the joint. The accurately-preset torque wrench is used to tighten the fastener(s) on the joint and an indicating torque wrench is used to check the torque after the tightening. The experiment determines the minimum and maximum click duration to attain proper torque.

6. The minimum and maximum duration of a proper click is programmed into the PTV-FM. [Time Minimum or TMIN and Time Maximum of TMAX]

7. In use, the FM Switch Wrench tightens a fastener. As soon as the wrench clicks a timer on the wrench starts measuring time.

8. When pressure on the wrench is released and the wrench resets, the timer stops and the duration of the click is transmitted to the PTV-FM. The PTV-FM compares the duration of the click to the TMIN and TMAX specification limits.

9. The PTV-FM immediately communicates to the operator the acceptability of that use of the wrench. Light emitting diodes (LED's) and a buzzer inform the operator whether or not the wrench was used properly and the click accepted.

10. If the wrench was properly used, the PTV-FM advances the count of fasteners tightened in the batch by one. This assists the operator in keeping track of their progress in completing multi-fastener assemblies.

The PTV-FM reduces the probability of missing a fastener in a multi-fastener assembly in two ways:

1. The PTV-FM displays the count of properly-torqued fasteners (or quantity remaining to be torqued) in the batch at all times.

2. The PTV-FM sends a "Batch Accept" signal to the PLC (if connected) and an audible signal to the operator when the correct number of fasteners on the assembly has been properly tightened. The PTV-FM automatically resets to zero (or the number of fasteners to be tightened on the next assembly) upon completion of the batch.

The operator is provided multiple signals (audible and visual) at each step of the process, both for each individual fastener and for the assembly batch.

1.2   *Component Nomenclature*

1   Cabinet
The Cabinet houses all of the electronic components in the unit.

2   Key Lock
The Key Lock permits and denies access to programming the unit. When the Key lock is in the PROG position, programming functions are enabled. When the Key Lock is in the LOCK position, the unit is in the normal operating mode and only those functions are accessible.

3   Antenna Housing
The Antenna Housing protects the antenna for the 2.4Ghz band receiver.

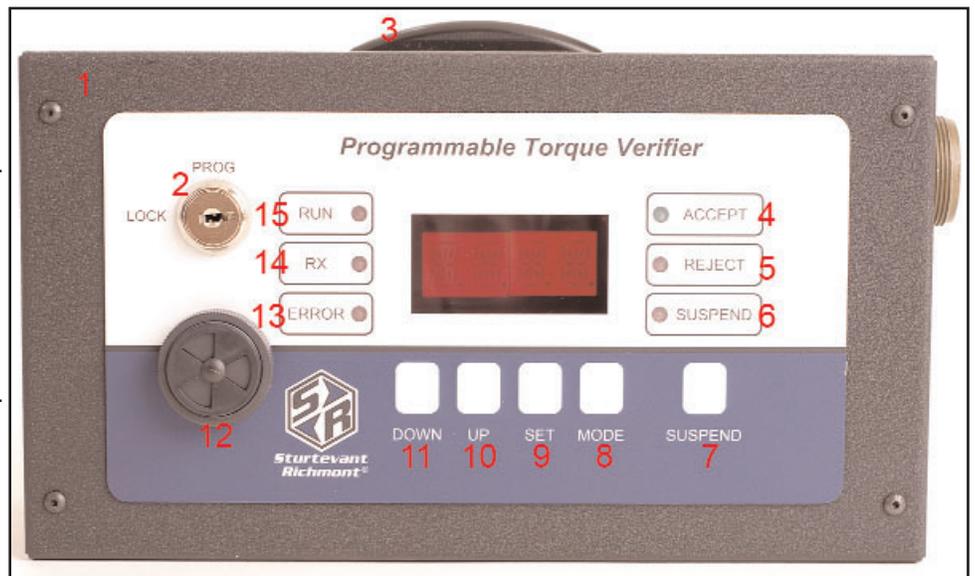4   Accept Light Emitting Diode (LED)
The Accept LED emits a green light to notify the operator when a wrench cycle meets the duration specification.

5   Reject Light Emitting Diode (LED)
The Reject LED emits a red light to notify the operator when a wrench cycle has been rejected.

6 Suspend Light Emitting Diode (LED)
The Suspend LED is lit when the counting of wrench cycles has been suspended, as might be required when the wrench is being tested on a torque tester.

7 Suspend Button
The Suspend button is used to suspend counting during normal operation.

8 Mode Button
The Mode button is used during normal operation to select among available values to display on the four character display.

9 Set Button
The Set button performs different functions in the programming and normal operating modes. See those sections of this manual for details concerning use of the button.

10 Up Button
The Up button is used to navigate among values when the unit is being programmed.

11 Down Button
The Down button is used to navigate among values when the unit is being programmed.

12 Buzzer
The Buzzer is used to communicate the status of each individual cycle of the switch wrench to the operator.

13 Error Light Emitting Diode (LED)
The Error LED activates when a wrench cycle that does not meet one or more specifications.

14 RX Light Emitting Diode (LED)
The RX LED is reserved for factory use.

15 Run Light Emitting Diode (LED)
The Run LED indicates the unit is in normal operating mode.

16 Four Character Display
The Four Character display conveys different information in the programming and operating modes. This display conveys all text information four characters at a time (maximum). Longer messages scroll from right to left across the display.

17 Input/Output (I/O) Port
The I/O Port is a 19-pin connector used to communicate with Programmable Logic Controllers

(PLC's) and other devices used for assembly line automation. This is a 19-pin Amphenol connector. Connecting cables are available from Sturtevant Richmont. Electrical diagram and pin assignment details are provided in section 2.5 of this manual.

18 Voltage Selector and Fuse
This product can be used with either 115 VAC or 230 VAC electric power. The Voltage Selector and Fuse are provided so the selection can be made. For details see the Installation section of this manual.

19 Power Switch
The Power Switch connects and disconnects the electric power from the electronics.

20 Power Cable Connector
The Power Cable Connector is where the supplied Power Cable connects to the unit.

2   Installation

> **Contains FCC ID: OUR-XBEE**
>
> The enclosed device complies with Part 15 of the FCC Rules. operation is subject to the following two conditions: (1) this device may not cause harmful interference and (2) this device must accept any interference received, including interference that may cause undesired operation.

2.1   *Warnings*

This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures: Re-orient or relocate the receiving antenna, Increase the separation between the equipment and the receiver, Connect equipment and receiver to outlets on different circuits, or Consult the dealer or an experienced radio/TV technician for help.

WARNING: To satisfy FCC RF exposure requirements for mobile transmitting devices, a separation distance of 20 cm or more should be maintained between the antenna of this device and persons during device operation. To ensure compliance, operations at closer than this distance is not recommended. The antenna used for this transmitter must not be co-located in conjunction with any other antenna.

2.2   Safe Work Practices

It is mandatory that the national, state, and local safety and wiring standards be followed during installation of this product. These standards would take precedence over any information presented in this section.

To avoid the hazard of electrical shock or burn, the following instructions must be adhered to. Failure to follow these instructions may also cause damage to your unit and void existing warranties.

- Do not energize the unit until all connections have been properly made.

- Equipment must be properly grounded before supplying power. Units energized by cord and plug must be connected to an approved and properly grounded receptacle.

- Ensure the power switch is in the off position before applying power.

2.3   Mounting

This unit may be wall mounted, table mounted, beam mounted, suspended overhead, pedestal mounted, or used without mounting. Mounting tabs are located on flanges on the rear of the cabinet.

The mounting location should be in a stable, secure area so as to avoid damage to the unit and avoid injury to the operator due to an inconvenient mounting. Locate the unit so that ambient air can circulate freely around the cabinet.

This unit should be located to allow access to the front panel and connectors. The location should allow for unrestricted and comfortable viewing of the front panel. The unit may be remotely mounted, but should still be accessible.

2.4   Source Power

CAUTION! This unit is capable of being powered by 115 VAC or 230 VAC (both 50 and 60Hz). **Before powering up the unit for the first time, make sure the voltage selection on the power entry module matches the type of power being applied.**

1. The voltage setting for the unit is always displayed in a window above the power switch, shown as #1 in the image to the right. Always check the voltage for compatibility before supplying electric power to the unit. For this example the voltage will be changed from 115VAC to 230VAC.
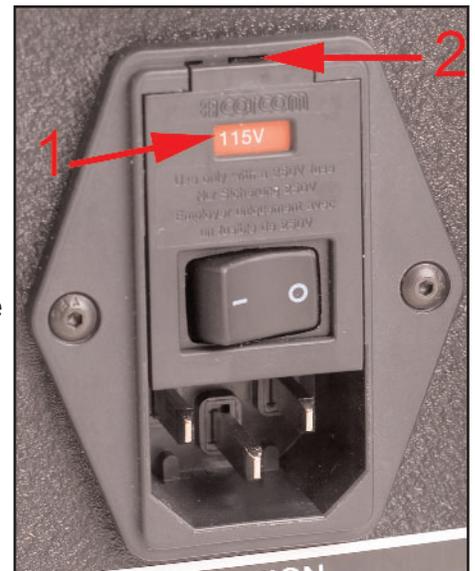
2. If the setting needs to be changed because it does not match the power to be supplied, open the access door marked as #2 in the prior image by prying outward gently with a fingernail or small screwdriver. Slide the red voltage selector/fuse holder out of the module.

3. Turn the red voltage selector/fuse holder over so the voltage matching that of the power to be supplied has the top of the printed voltage facing upwards.
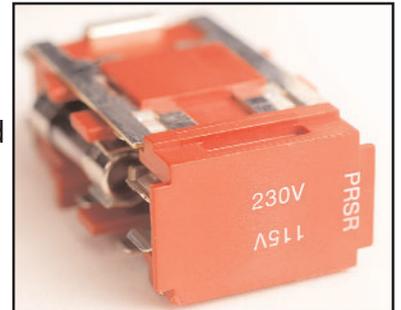
6. Reinsert the red voltage selector/fuse holder into the module. The face of the voltage selector/fuse holder will be slightly recessed in the module when it has been properly reinserted.
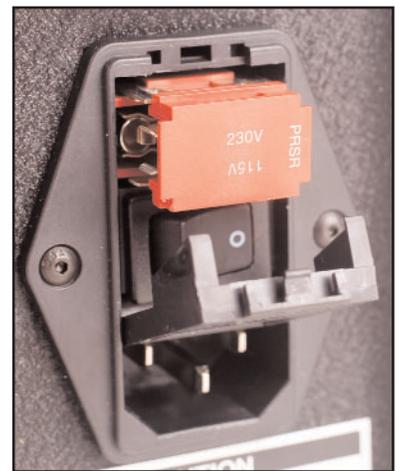
7. Close the door over the voltage selector/fuse holder. The correct voltage, that which matches the voltage of the power to be supplied to the unit, should now show through the window.

The PTV-FM is fused at 1 Amp for 115VAC. The PTV-FM is fused at 1 Amp for 230 VAC. The fuses are located on the sides of the voltage selector/fuse holder, as shown in the accompanying photograph.

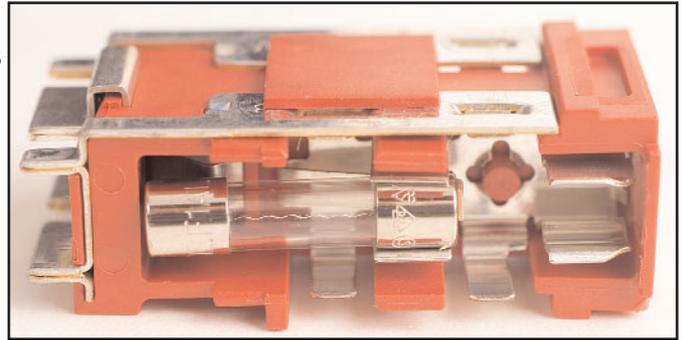## 2.5 *Connecting Peripheral Devices*

The PTV-FM has relay outputs, npn outputs and optically isolated outputs. All can be accessed through the 19-pin connector labeled "I/O" on the side of the box.
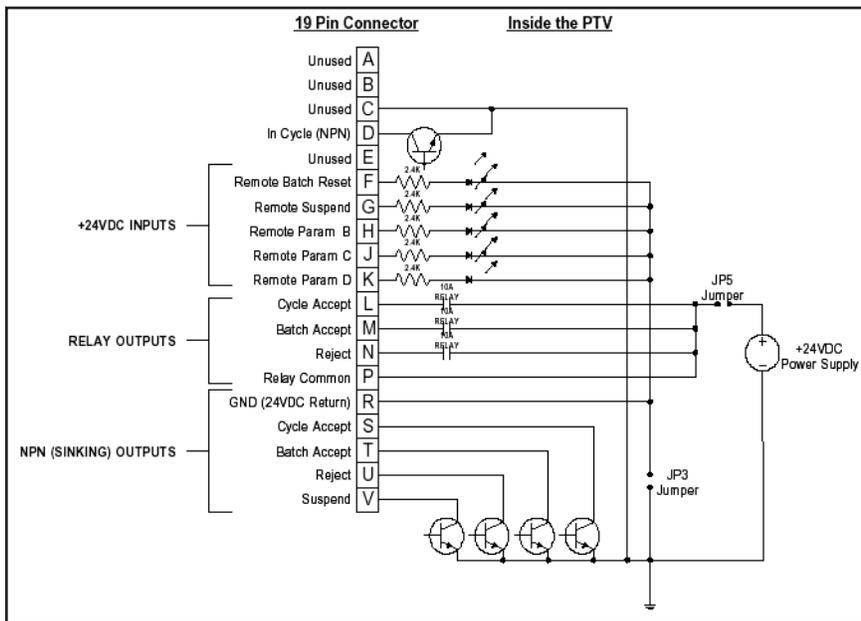
3. Programming

3.1 *Programming Overview and Menu*

The PTV-FM can be programmed for up to four different torque applications. The variables for each application are saved as four individual parameter sets designated by the letters A, B, C and D.

The Program menu provides access to all the setting, features and qualification parameters of the PTV. It's important to remember that while editing items in the program menu you are only changing the settings for the active parameter set.

The four character display is used to communicate with the programmer during the programming process. During the programming process there are a number of messages that are longer than four characters that must be conveyed to the programmer. When the message, is longer than four characters, the message will scroll from right to left across the screen.

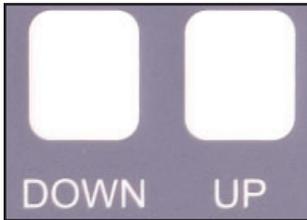The programming menu first requires that you select the parameter set (A,B,C,D) to be programmed, then takes you to the menu options. The basic menu structure is shown below.

ABCD   MENU OPTIONS   ADD WRENCH
                                        ↕
                                    BATCH LIMIT
                                        ↕
                                    CLEAR TOTAL
                                        ↕
                                    RELAY MODE
                                        ↕
Use the UP and DOWN buttons to   ACCEPT RELAY TIME
move through the menu selections.   ↕
                                    REJECT RELAY TIME
                                        ↕
                                    BEEP
                                        ↕
                                    TMIN
                                        ↕
                                    TMAX
                                        ↕
                                    TBC
                                        ↕
Use the SET button to select a   TBB
parameter, menu item or option.   ↕
                                    COUNT DIRECTION
                                        ↕
                                    SEQUENCING
                                        ↕
                                    LOW-BATTERY ALARM
                                        ↕
                                    CHANNEL SELECT
                                        ↕
                                    ERASE WRENCHES

1. To enter the Programming menu move the power switch to the On position. Allow the unit to go completely through its' normal startup routine. (See section 4.) Use the key to turn the key lock from the LOCK position to the PROG position.

2. The four parameter sets ABCD will appear on the display. The three currently inactive parameter sets will display steadily and the currently active parameter will be flashing. Use the UP and DOWN buttons to navigate to the parameter set to be selected.

3. When the parameter set to be programmed is flashing, press the SET button. The message MENU OPTIONS will scroll across the screen and then the first parameter for the selected set will appear.

3.2   *Adding A Wrench*

Before a wrench can be used with the PTV-FM, it must first be identified by the unit and associated with one or more of the parameter sets. A single wrench may be used with either a single or multiple parameter sets. The four parameter set limit means the maximum number of wrenches that can be used with a single unit is four.

Each wrench also stores the identification number of the PTV-FM to which it is assigned. In order to assign a wrench to a PTV-FM, any stored identification number must be cleared from the wrench. To do this, click the wrench and hold it in the clicked position until the light emitting diode (LED) on the wrench flashes. This will take about five seconds. The flashing of the light emitting diode indicates the wrench has been reset. The wrench is now set to perform an inquiry for available PTV-FM units.

Immediately after a battery is installed on the switch wrench the light emitting diode (LED) will flash alternating red and green colors several times very quickly. This indicates a reset condition. This reset indication will be followed by a red pulse if the wrench has no stored PTV-FM unit identification number and is ready to be added to one of the PTV-FM parameter sets. If the reset indication is followed by a green pulse, the wrench has already been assigned to a PTV-FM and is ready to perform torque operations.

To add a wrench to the parameter set make sure the wrench is immediately available and has a battery installed.

1. When the message ADD WRENCH scrolls across the screen, press the SET button once to make this parameter active.

2. The message CLICK WRENCH will scroll across the screen.

3. Press the SET button one time.

4. The message CLICK WRENCH will scroll across the screen.

5. Cycle (click) the wrench to be used for that parameter set one time.

6. If the operation was successful, the last four digits of the identification number for the transmitter of the wrench will be displayed. This will be followed by the wrench software version and OK.

If the operation was not successful, the message ADD WRENCH will continue to scroll. To correct this:
1. Check the wrench battery to assure that there is a functioning battery installed.

2. Clear any PTV-FM identification number already on the tool by clicking the tool and holding it in the clicked position for five or more seconds.

3. Retry the ADD WRENCH procedure.

3.3 *Setting the Batch Limit*

The batch limit setting is the number of fasteners that must be completed before the PTV-FM issues a Batch Accept and increments the total number of batches completed. The Batch Limit can be as large as 255 fasteners and can be set from the BATCH LIMIT parameter prompt in the program menu.

To set the batch limit:

1. Press the UP or DOWN button until BATCH LIMIT scrolls across the display.

2. Press the SET button one time.

3. A slash followed by the current number of fasteners in the batch will be shown on the display, appearing as /001. The number in the hundreds column will be flashing to indicate that this is the active digit in the number. The other two digits will be displayed continuously.

4. Use the UP or DOWN buttons to increment or decrement to the new number for the hundreds value in the display. The options are 0 to 2.

5. When the correct value is displayed in the hundreds column, press the SET button one time.

6. The value in the hundreds column will change from a flashing display to a steady display. The value in the tens column will start flashing to indicate that this is the active value.

7. Use the UP or DOWN buttons to increment or decrement to the desired value for the tens column. When the desired value is displayed as a flashing number, press the SET button one time.

8. The value in the tens column will change from a flashing display to a steady display. The value in the ones column will start flashing to indicate that this is the active value.

9. Use the UP or DOWN buttons to increment or decrement to the desired value for the ones column. When the desired value is displayed as a flashing number, press the SET button one time.

10. The batch limit is set and the display will return to showing BATCH LIMIT on the screen. Use the UP and DOWN buttons to go to the next parameter to be set.

3.4   *Clear Total*

This total counts the number of completed batches in a parameter set. It does not count the number of completed cycles. Each parameter set has a separate total. The total can be reset to zero using this parameter option.

To clear the total for the parameter set:

1. Press the UP or DOWN button until CLEAR TOTAL scrolls across the display.

2. Press the SET button one time.

3. The instruction PRESS SET will scroll across the screen.

    A. To clear the total press the SET button one time.

    B   To abandon the operation without clearing the total, press the MODE button one time.

3.5   *Relays*

The PTV-FM has relay outputs to indicate three status conditions: (Cycle) Accept, Batch Accept, and Reject. The relays can be set to latch until the next wrench cycle or to provide a momentary output after each cycle.

If the relays are set to Momentary, the duration of the signal can be adjusted. As an example, if the Accept Relay Time is 0.15 the Accept relay will close for 0.15 seconds then it will open. The Batch Accept relay will also use the (Cycle) Accept relay settings. The Reject relay can be adjusted in the same manner. If Momentary is used we recommend the time be 0.2 second or less.

To set the Relay operation:

1. Use the UP or Down button until RELAY MODE scrolls across the display.

2. Press the SET button one time.

3. The current relay mode - MOMENTARY or LATCHING - will scroll across the screen. Use the UP or DOWN button to change the mode if change is needed.

A. If the current mode is LATCHING and you wish to keep this the mode, press the SET button to retain this mode and exit this parameter setting.

B. If the current mode is LATCHING and you wish to change to MOMENTARY, press the UP or DOWN button one time.

C. When the mode is set to MOMENTARY, press the DOWN button one time to go to the ACCEPT RELAY TIME parameter.

D. Press the SET button one time to access the time setting.

E. The current setting will be displayed in the format N.NN. The number in the whole seconds position will be flashing and the numbers in the 1/10 second and 1/100 second column will be steadily lit.

F. Use the UP and DOWN buttons to change the number in the whole seconds position to the desired number, then press the SET button.

G. Use the UP and DOWN buttons to change the number in the 1/10 seconds position to the desired number, then press the SET button.

H. Use the UP and DOWN buttons to change the number in the 1/100 seconds position to the desired number, then press the SET button.

I. The menu will return to the ACCEPT RELAY TIME parameter. Press the DOWN button one time to go to the REJECT RELAY TIME parameter.

J. Repeat steps E through H above to set the REJECT RELAY TIME parameter.

3.6 *Beep*

The PTV-FM has an audible alarm or "beeper". There are several options that can be selected for the audible alarm. The audible alarm may be set to beep only when there is a cycle reject. The audible alarm may be set to beep when there is a completed batch and when there is a reject. The audible alarm may be set to beep after every accepted cycle and every reject. The audible alarm can also be turned off entirely.

To set the beeper options:

1. Press the UP or DOWN button until BEEP appears on the display.

2. Press the SET button one time.

3. The current option will scroll across the display. Use the DOWN button to scroll through the options until the desired option appears on or scrolls across the display. The options appear as:

OFF
REJECT ONLY
BATCH AND REJECT
CYCLE AND REJECT

4. When the desired option is displayed, press the SET button one time to make that setting active and exit the option selection.

3.7 *TMIN (Minimum Time)*

This is the minimum amount of time for the duration of an acceptable cycle (click) of the wrench. The range of the TMIN specification is 0.00 to 2.55 seconds. The minimum time must be set to less than the maximum time for acceptable click duration.

To set the TMIN:

1. Use the UP or DOWN button to scroll to the TMIN parameter.

2. Press the SET button one time.

3. The current setting will be displayed in the format N.NN. The whole seconds position number will be flashing and the numbers in the 1/10 second and 1/100 second positions will be steadily displayed.

4. Use the UP or DOWN button to scroll to the desired value for this position. Press the SET button 1 time to set the value and move to the next position.

5. The 1/10 second value will change from a steady display to a flashing display. Use the UP or DOWN button to scroll to the desired value. Press the SET button 1 time to set the value and move to the next position.

6. The 1/100 second value will change from a steady display to a flashing display. Use the UP or DOWN button to scroll to the desired value. Press the SET button 1 time to set the value and exit the setting of this parameter.

3.8 *TMAX (Maximum Time)*

This is the maximum amount of time for the duration of an acceptable cycle (click) of the wrench. The range of the TMAX specification is 0.00 to 2.55 seconds. The maximum time must be set to more than the minimum time for acceptable click duration.

To set the TMAX:

1. Use the UP or DOWN button to scroll to the TMAX parameter.

2. Press the SET button one time.

3. The current setting will be displayed in the format N.NN. The whole seconds position number will be flashing and the numbers in the 1/10 second and 1/100 second positions will be steadily displayed.

4. Use the UP or DOWN button to scroll to the desired value for this position. Press the SET button 1 time to set the value and move to the next position.

5. The 1/10 second value will change from a steady display to a flashing display. Use the UP or DOWN button to scroll to the desired value. Press the SET button 1 time to set the value and move to the next position.

6. The 1/100 second value will change from a steady display to a flashing display. Use the UP or DOWN button to scroll to the desired value. Press the SET button 1 time to set the value and exit the setting of this parameter.

3.9   *TBC (Time Between Cycles or Clicks)*

This is the minimum time duration between cycles (clicks) of the torque wrench. The timer starts at the completion of each torque wrench cycle. If the wrench is cycled (clicked) again before this amount of time elapses, a reject is generated for the cycle and the violated parameter is shown briefly on the display. The TBC may be set from 0 to 9999 seconds.

To set the Time Between Cycles:

1. Press the UP or DOWN button to scroll to TBC.

2. Press the SET button one time.

3. The current setting will be displayed as NNNN. The number in the thousands position will be flashing to indicate it is the active value and the other numbers will be displayed steadily.

4. Use the UP or DOWN button to scroll to the desired value. Press the Set button one time.

5. The value for the hundreds position will begin flashing to show that it is the active value.

6. Use the UP or DOWN button to scroll to the desired value. Press the Set button one time.

7. The value for the tens position will begin flashing to show that it is the active value.

8. Use the UP or DOWN button to scroll to the desired value. Press the Set button one time.

9. The value for the tens position will begin flashing to show that it is the active value.

10. Use the UP or DOWN button to scroll to the desired value. Press the Set button one time to set the value and exit the setting of this parameter.

3.10 *TBB (Time Between Batches)*

This is the minimum time duration between fastener batches. The timer starts at the completion of each batch accept. If the wrench is cycled (clicked) again before this amount of time elapses, a reject is generated for the cycle and the violated parameter is shown briefly on the display. The TBB may be set from 0 to 9999 seconds.

To set the TBB:

1. Press the UP or DOWN button to scroll to TBB.

2. Press the SET button one time.

3. The current setting will be displayed as NNNN. The number in the thousands position will be flashing to indicate it is the active value and the other numbers will be displayed steadily.

4. Use the UP or DOWN button to scroll to the desired value. Press the SET button one time.

5. The value for the hundreds position will begin flashing to show that it is the active value.

6. Use the UP or DOWN button to scroll to the desired value. Press the SET button one time.

7. The value for the tens position will begin flashing to show that it is the active value.

8. Use the UP or DOWN button to scroll to the desired value. Press the SET button one time.

9. The value for the tens position will begin flashing to show that it is the active value.

10. Use the UP or DOWN button to scroll to the desired value. Press the SET button one time to set the value and exit the setting of this parameter.

3.11 *Count Direction*

When cycles are being counted towards the batch limit the PTV-FM can count up or down according to the operators preference. The selection is made in the COUNT DIRECTION menu.

To set the COUNT DIRECTION:

1. Press the UP or DOWN button to scroll to COUNT DIRECTION.

2. Press the SET button one time.

3. The current selection will be displayed.

4. Use the UP or DOWN button to scroll to the desired direction.

5. Press the SET button to set the value and exit this parameter.

3.12 *Sequencing*

Sequencing can be used for operations that require multiple wrenches be used in a fixed sequence. If sequencing is enabled, the PTV-FM will switch from one parameter set in the sequence to the next parameter set when the batch limit is met in the first parameter set. When the batch limits are met for all parameter sets in the sequence, the PTV-FM will issue a batch accept and return to parameter set A.

Example: Sequencing is set for parameter sets "A-B". Parameter set A has a batch limit of 3 and uses wrench number 1. Parameter set B has a batch limit of 7 and uses wrench number 2. After three fasteners are correctly completed with wrench number one, the PTV-FM will automatically change to parameter set B. After wrench number two completes seven fasteners correctly the PTV-FM will issue a batch accept and return to parameter set A.

To set the Sequencing:

1. Press the UP or DOWN button to scroll to SEQUENCING.

2. Press the SET button one time.

3. One of the following will be displayed as the current setting:

   OFF
   A – B
   A – C
   A – D

4. Use the UP or DOWN button to scroll to the desired setting.

5. Press the SET button one time to activate that setting and exit this parameter.

3.13 *Low Battery Alarm*

The low battery alarm signals the operator when the battery charge on the wrench falls below a certain threshold. The limit is displayed as a percentage from 0% to 99% and can be adjusted in this menu item.

To set this parameter:

1. Press the UP or DOWN button to scroll to `LOW-BATTERY ALARM`.

2. Press the SET button one time.

3. The current setting will be displayed in the format `NN`. The number in the tens position will be flashing to indicate that it is the active value and the number in the ones position will be displayed steadily.

4. Use the UP or DOWN button to scroll to the desired value, then press the SET button.

5. The value in the ones position will begin flashing.

6. Use the UP or DOWN button to scroll to the desired value, then press the SET button to set the value and exit this parameter.

3.14 *Channel Select*

The PTV-FM and switch wrench system can operate on any of thirteen channels. The channels are selected in this parameter. Each parameter set (A - D) can be set to operate on the same channel or different channels. A wrench must be added to the parameter set before the channel can be changed.

This process changes the channel on the wrench as well as the PTV-FM.

To set this parameter:

1. Press the UP or DOWN button to scroll to `CHANNEL SELECT`.

2. Press the SET button one time.

3. The current setting will be displayed in the format `CH NN`.

4. Use the UP or DOWN button to scroll to the desired channel.

5. Press the SET button one time.

6. The prompt `CLICK WRENCH` will scroll across the display. Cycle (click) the wrench one time.

7. If the operation is successful the last four digits of the wrench will be displayed briefly, followed by `OK`, and the program menu step will reappear.

3.15 *Erase Wrench*

The Erase Wrench option can be used to erase wrench transmitter identification numbers from the selected parameter set. This will make the parameter set unusable until a wrench is added using the Add Wrench operation.

To erase wrenches from this parameter:

1. Press the UP or DOWN button to scroll to ERASE WRENCHES.

2. Press the SET button one time.

3. The message SELECT APPLICATION will scroll across the screen.

4. Press the SET button one time.

5. The four parameter sets will appear as ABCD. The active parameter set will be flashing and the other parameter sets will be steadily displayed.

6. Use the UP or DOWN button to scroll to the desired parameter set.

7. Press the SET button to perform the function. When the wrench identification numbers for the selected parameter set(s) have been erased the unit will return to the main program menu.

4 Operation

4.1 *Starting Operation*

When the power switch is moved to the On position, the PTV-FM will display a series of identifiers then proceed to the "COUNT" window for parameter set A.

Starting Sequence:

PTV	Product Identification
VN.NN	Firmware version number
NNNX	The last four characters of the identification number for the unit
COUNT	Scrolls across to inform user that the unit is in operating mode
A.NNN	Parameter set A and the current number of fasteners completed in the current batch.

4.2 *Normal Operation*

The information in this section is the information available to the operator while the PTV-FM is in the normal operating mode. The functions in this section are those available to the operator in the normal operating mode.

The displayed information is changed by pressing the MODE button. Other operations are accessible only through the programming function.

During normal operation the current parameter set and the number of fasteners to be completed (or remaining to be completed) in the batch are displayed. Example: A   2

As the operator tightens fasteners correctly, the fastener count increments (or decrements) to inform the operator of the current status of the work. When the end of a batch is attained, the unit either moves to the next parameter set or restarts the batch, depending upon the options chosen during programming.

As the operator tightens the fasteners, the light emitting diodes (LED's) on the front panel inform the operator of the successful completion of each or inform the operator of an error. The green ACCEPT light emitting diode illuminates every time a fastener is tightened correctly. If so programmed, the PTV-FM also activates the audible alarm.

The operator has a function that can be performed with the SET button. The operator can reset the batch by pressing and holding in the pressed position for three seconds the SET button. This resets the batch count to zero and clears any status on the relays and NPN outputs.

The operator can also suspend receipt of transmissions from the wrench(es) by pressing the SUSPEND button. The SUSPEND light emitting diode (LED) will illuminate when receipt of transmissions is suspended. A suspended PTV-FM will not count any wrench transmissions or issue any commands. The suspended status is removed by pressing the SUSPEND button again.

The operator can access the information below by pressing the MODE button. Doing so causes the unit to enter a display loop that the operator moves through by use of the MODE button. The description of each value scrolls across the display before the value is displayed. The MODE button must be pressed one time to advance the displayed information in the loop.

COUNT XNNN
This is the current parameter set and the number of completed fasteners towards the batch count.

BATCH TOTAL – A NNNNN
This is the parameter set and the number of completed batches for the parameter set. If the number of completed batches is fewer than 1,000 the entire number is displayed. If the number is 1,000 or greater, the number scrolls across the display.

BATTERY CHARGE NN
This is the current charge percentage on the battery in the active switch wrench for this parameter.

WRENCH ID XNXN
This is the last four characters in the identification number for the transmitter for the active wrench on this parameter set.

SIGNAL STRENGTH NN

This is the signal strength of the active wrench during the last transmission. The value is relative, not absolute.

CLICK TIME N.NN

This is the time duration of the last cycle (click) of the active wrench.

4.3 *Error Codes*

When a wrench cycle occurs that does not meet all the programmed parameters for the parameter set, a reject occurs. The red REJECT light emitting diode (LED) illuminates and the reason for the reject is displayed. The reject status and error message can be cleared by issuing a batch reset command on the 19 pin connector or by pressing and holding the SET button. There is also a LOW BATTERY message to alert the operator that the battery in the wrench should be removed and replaced with a fresh battery.

TMIN

This will be displayed if the switch wrench was operated too quickly.

TMAX

This will be displayed if the switch wrench was held in the clicked position too long.

TBC

This is displayed if the wrench was cycled before the required time between clicks elapsed.

TBB

This is displayed if the wrench was cycled before the required time between batches elapsed.

LOW BATTERY

If the charge on the wrench battery drops below the programmed limit, this message is displayed.

For additional information contact your Sturtevant Richmont
distributor or go to the S/R website.