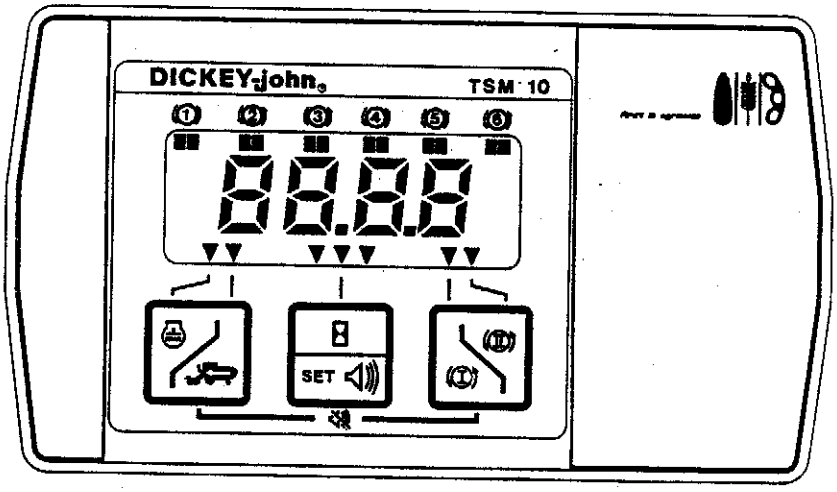
Dj TSM 10 TACH SHAFT MONITOR



INSTALLATION and OPERATING MANUAL

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Table of Contents

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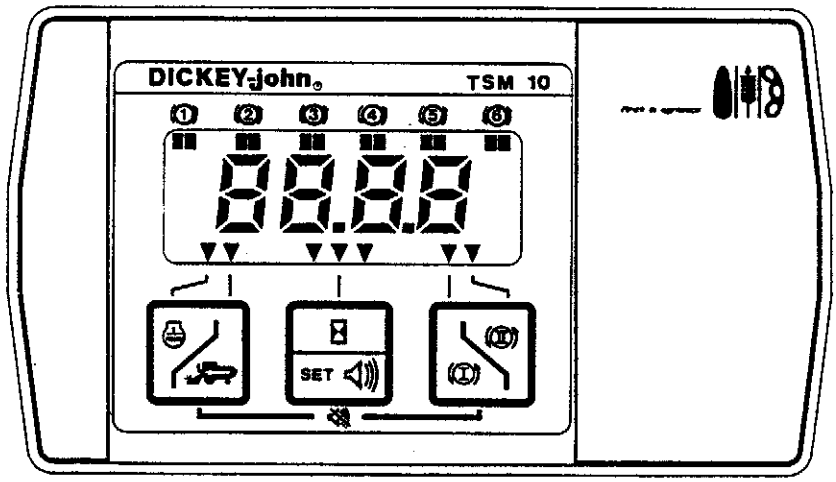
Dj TSM 10 TACH SHAFT MONITOR

INTRODUCTION



A. SYSTEM DESCRIPTION

The DjTSM 10 Tach Shaft Monitor is a microprocessor based unit with readout and alarm functions of a tachometer, shaft monitor, full bin indicator, speedometer and engine hour indicator. The console contains a four digit display with five cursors pointing to functions shown on the decal and six pairs of rectangular indicators which flash indicating shaft sensor location. Three touch switches are used in the operate mode to select the desired function for display and to calibrate each shaft monitor location. These switches are also used in the setup mode to enter constants.

The DjTSM 10 Tach Shaft Monitor System consists of a Console, a +12V Battery Harness, an Implement Harness, Reluctance Sensors and Reed Switch Sensors.

Dj TSM 10 TACH SHAFT MONITOR

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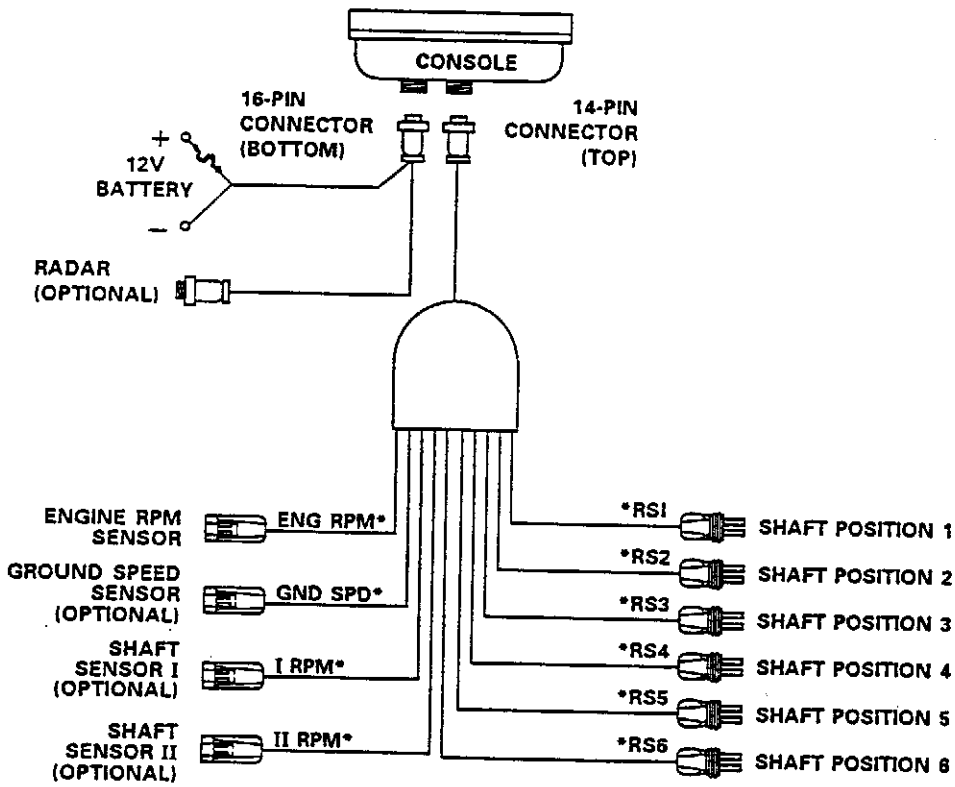
Refer to the following harnessing diagram showing the connection relationship of the Tach Shaft Monitor System components.



* HOT STAMPED ON HARNESS CABLE

TSM 10 HARNESSING DIAGRAM

B. PREPARING TO INSTALL THE TACH SHAFT MONITOR

Step 1. Unpack and visually inspect the Monitor System components for damage that may have occurred during shipping. If damage is found, file a claim with the carrier and notify your DICKEY-john Dealer.

Check against your purchase invoice to make certain you have received all the monitor system components you purchased.

C. INSTALLING THE DjTSM10 MONITORING SYSTEM

Refer to the Installation Instructions supplied with the DjTSM 10 console and each component for detailed installation procedures.

Dj TSM 10 TACH SHAFT MONITOR

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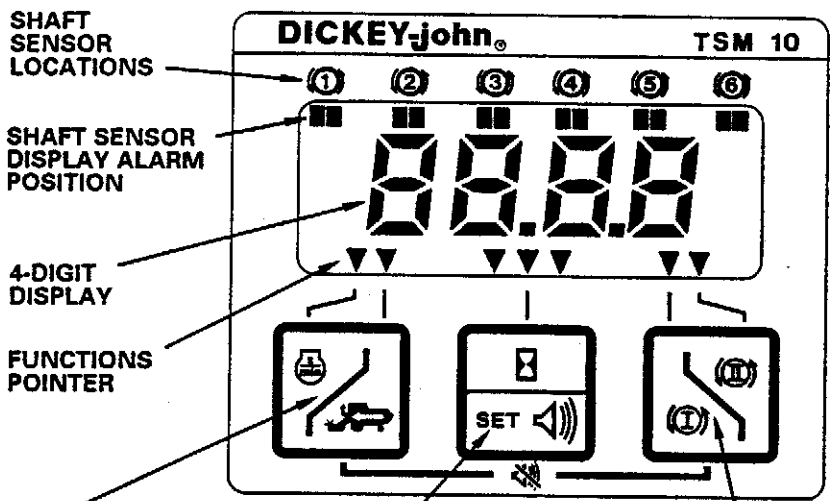
LEARNING TO USE THE CONSOLE

After the Console, Sensors and Harness have been installed, the Monitoring System can be powered up.

A. MONITORING SYSTEM DISPLAY AND SWITCH DESCRIPTIONS



OPERATE MODE

- SELECTS ENGINE RPM OR GROUND SPEED TO DISPLAY.
- HOLD DEPRESSED AND TURN POWER ON TO ENTER SETUP MODE 1.

SETUP MODE 1

- SELECT DIGIT

SETUP MODE 2

- SELECT DIGIT

SETUP MODE 3

- SELECT DIGIT

OPERATE MODE

- SELECTS ENGINE HOUR DISPLAY.
- HOLD DEPRESSED TO CALIBRATE SHAFT SENSORS TO CURRENT RPM.
- HOLD DEPRESSED AND TURN POWER ON TO ENTER SETUP MODE 3.

SETUP MODE 1

- NO FUNCTION

SETUP MODE 2

- SELECT CONSTANT LOCATION

SETUP MODE 3

- HOLD DEPRESSED FOR 3 SECONDS TO BEGIN MODIFICATION.

OPERATE MODE

- SELECTS I RPM OR II RPM TO DISPLAY.
- HOLD DEPRESSED AND TURN POWER ON TO ENTER SETUP MODE 2.

SETUP MODE 1

- SET DIGIT VALUE

SETUP MODE 2

- SET DIGIT VALUE

SETUP MODE 3

- SET DIGIT VALUE

B. INITIAL POWER UP OF MONITORING SYSTEM

The TSM10 Tach Shaft Monitor System has two active modes. One is the "OPERATE" mode which is used during normal operation and the second is the "SETUP" mode which is used to enter constants which describe the system to be monitored. **NOTE:** When power is turned on, the monitoring system will always come up in the "OPERATE" mode. The following procedures in the Operate Mode and Setup Mode are intended to familiarize you with the uses of the console switches and setup mode constant locations.

1. OPERATE MODE

Step 1. When power is turned on, the console will sound the alarm and show all display segments for approximately 2 seconds, then enter the Operate Mode.

If engine RPM is 500 RPMs or above the 4-digit display will show ENGINE RPM. If engine RPMs is below 500, then the 4-digit display will show engine hours.

Step 2. In the Operate Mode, the triangle shaped pointer, shown at the bottom of the display, points to the monitored functions graphic on the decal. The functions current value is displayed in the 4-digit display.

Step 3. Press and release the left touch switch, note that each time the touch switch is pressed the pointer alternates between Engine RPM and Vehicle Ground Speed. The display shows the current value of each function.

Step 4. Press the center touch switch, the 4-digit display will show total accumulated hours that the monitor has been on with the engine RPM input at or above 500 rpms. The display will show the accumulated hours for approximately three seconds then return to the last displayed function (Engine RPM above 500).

Step 5. Press and release the right touch switch, the 4-digit display will display one of the two RPM inputs. Each time the right touch switch is pressed, the pointer and display will alternate between I RPM and II RPM inputs.

Step 6. The numbers shown above the top of the display designates the rotational shaft sensor's position. An alarm condition for a shaft sensor is shown by a pair of rectangular segments flashing on and off under the position number. The audible alarm will sound initially for a short duration (approximately 3 seconds).

Each sensor position can be programmed for the alarm to sound in one of three different formats: 1) FIXED FREQUENCY MODE - the alarm RPM values are programmed, 2) FRONT PANEL SET FREQUENCY MODE - The alarm RPM value is a programmed percentage below normal operating RPM, 3) FRONT PANEL SET VARIABLE FREQUENCY MODE - The alarm RPM value is a programmed percentage below normal operating RPM, however, the alarm failure point is ratioed to Engine RPM (**NOTE:** If Engine RPM halves, so does the alarm point).

2. SETUP MODE

The TSM 10 has three setup modes which can be entered by pressing and holding different combinations of the touch switches while switching the console power to ON.

a. SETUP MODE 1 (DISTANCE CONSTANT)

Setup Mode 1 allows access to only the Distance Calibration Constant and is entered by pressing and holding the left touch switch while switching the console power to ON.

b. SETUP MODE 2 (ALL CONSTANTS EXCEPT HOUR METER PRESET)

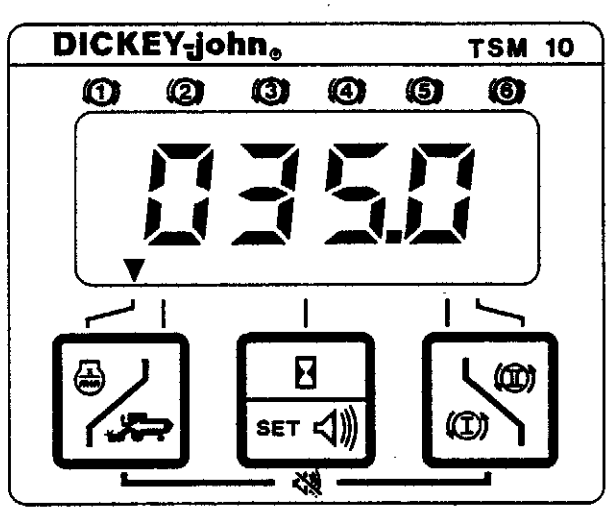
Setup Mode 2 allows access to all constants (including the distance constant) and is entered by pressing and holding the right touch switch while switching the console power to ON.

c. SETUP MODE 3 (HOUR METER PRESET)

Setup Mode 3 allows access to the Hour Meter display value. This mode is entered by pressing and holding the center touch switch while switching the console power to ON.

In each of the above setup modes the triangle shaped pointers are displayed to identify the constant locations for Engine RPM, Ground Speed, I RPM and II RPM. The Shaft Monitor locations (SETUP MODE 2) are identified by a combination of the rectangular cursors (flashing or solid) shown across the top of the display.

To familiarize yourself with the constant locations, enter SETUP MODE 2 and repeatedly press the center touch switch to increment through all constant locations.



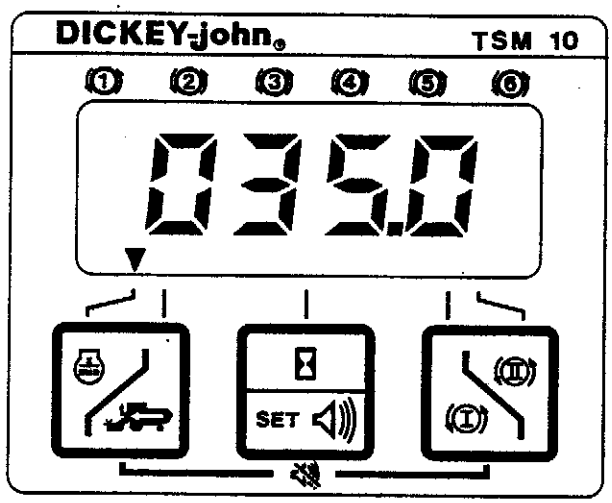
When SETUP MODE 2 is entered, the display is as shown above. The four digits display the current value of the constant and the triangle shaped pointer identifies the constant as Eng RPM. Note that the most significant digit of the constant value is flashing.

Press the left touch switch and note that the digit to the right of the most significant digit begins to flash. Repeatedly press and release the left touch switch and note that the flashing digit moves from left to right across the display. The flashing digit indicates to the operator the digit that will change when the right touch switch is pressed. Press the right touch switch and note that the flashing digit increases value by one count. Repeatedly press and release the right touch switch and note that the flashing digit sequences through digits 0 (zero) through 9 (nine). The value of the digit is as shown on the display.

The above procedure explains how to select and set the individual digits so that a desired value of the 4-digit constant is shown in the display. Make certain the digits are positioned so that the decimal point is in the correct location. **NOTE:** Decimal point is not adjustable.

ENTERING CONSTANTS

Enter SETUP MODE 2 by pressing and holding the right touch switch while turning the console power to ON. Hold touch switch depressed until display segment test is completed (approximately 3 seconds). The display will show the current value of the Engine RPM Constant. Note that the pointer is pointing to the Engine RPM symbol on the console decal.

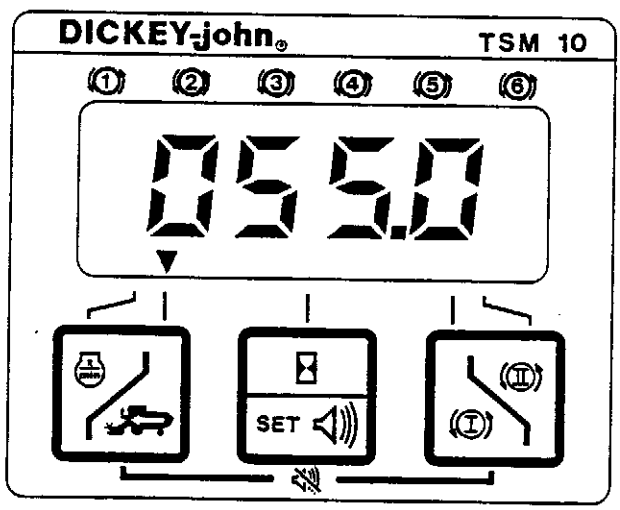


1. ENGINE RPM - Pulses per engine revolution.

Determine the number of points (gear teeth, etc.) sensed by the Engine RPM sensor (reluctance) per engine revolution. Enter this number as the Engine RPM Constant using the left touch switch (Digit Select) and the right touch switch (Digit Set). **NOTE:** The decimal point is not adjustable, make certain the digits of the constant are positioned to read the correct value.

Press the center touch switch and note that the pointer moves to the vehicle ground speed location.

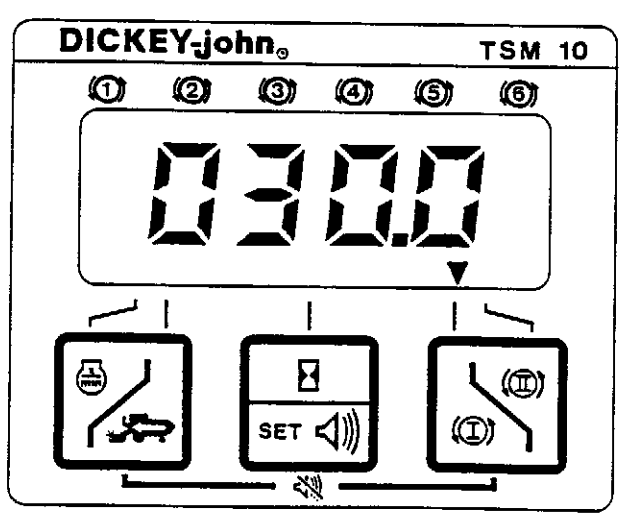
2. **GROUND SPEED** - Pulses per foot.



Determine the number of pulses received from the Ground Speed Sensor per foot of vehicle travel. Enter this number as the Ground Speed Constant using the left touch switch (Digit Select) and the right touch switch (Digit Set). **NOTE:** The decimal point is not adjustable, make certain the digits of the constant are positioned to read the correct value.

Press the center touch switch and note that the pointer moves to the I RPM location.

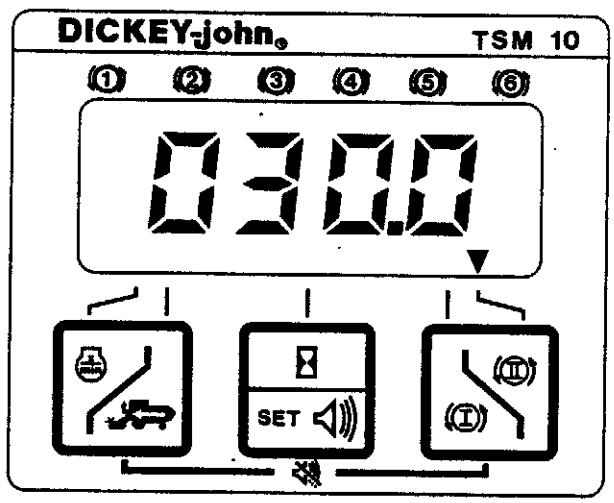
3. **I RPM** - Pulses per shaft revolution.



Determine the number of points (gear teeth, etc.) sensed by the I RPM Shaft Sensor (reluctance) per shaft revolution. Enter this number as the I RPM Constant using the left touch switch (Digit Select) and the right touch switch (Digit Set). **NOTE:** The decimal point is not adjustable, make certain the digits of the constant are positioned to read the correct value.

Press the center touch switch and note that the pointer moves to the II RPM location.

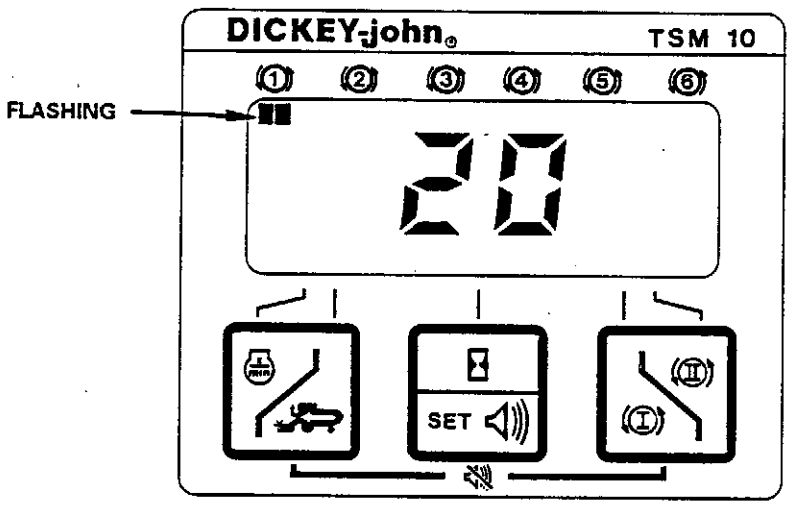
4. **II RPM - Pulses per shaft revolution.**



Determine the number of points (gear teeth, etc.) sensed by the II RPM Shaft Sensor (reluctance) per shaft revolution. Enter this number as the II RPM constant using the left touch switch (Digit Select) and right touch switch (Digit Set). **NOTE:** The decimal point is not adjustable, make certain the digits of the constant are positioned to read the correct value.

Press the center touch switch and note that the two rectangular cursors below the number 1 shaft monitor location begins to flash.

5. thru 10. **ALARM PERCENT** - The ALARM PERCENT constant for all six shaft monitor positions are entered using the same procedure. Each constant location is identified by the two flashing rectangular cursors below the shaft number.



The Alarm Percent Constant is the percent slow down from a normal shaft operating rpm that will trigger an alarm. Enter the percent values using the left touch switch (Digit Select) and right touch switch (Digit Set). **NOTE:** For this function to be active the input must be configured as SET FREQUENCY or SET FREQUENCY VARIABLE input as described in the MODE SELECTION Constant entry.

Press the center touch switch and note that the two rectangular cursors are now flashing below shaft location 2. Enter the percent value for shaft 2. Repeat the above procedure for the remaining shaft locations.

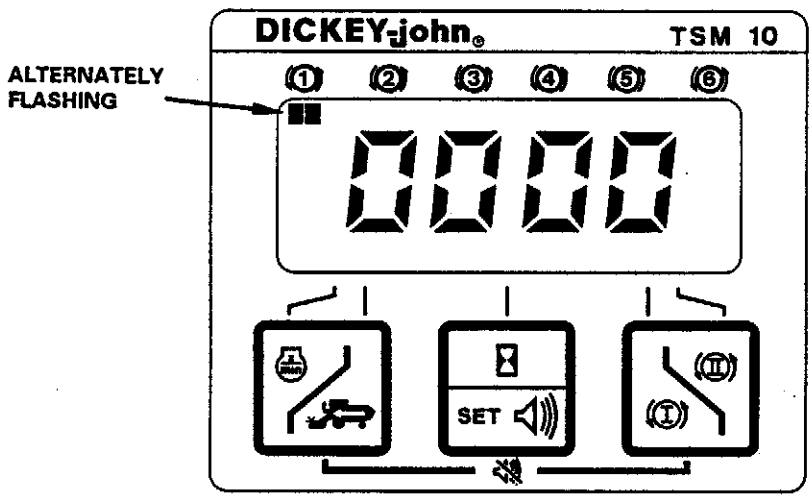
After the percent value for shaft location six is entered pressing the center touch switch the two rectangular cursors under shaft position 1 come on and stay on.

11. thru 16. RATIO - The RATIO positions are identified by the two rectangular cursors below the shaft monitor position number being turned on (not flashing). The values shown are calculated values stored during the shaft monitor calibra tion for shaft positions that are in the SET FREQUENCY VARIABLE mode. The value is the result of the following calculation: Shaft RPM times 1000 divided by Engine RPM. **NOTE:** You DO NOT have to enter this value. The console will compute this value and automatically enter during calibration.

After displaying the Ratio for shaft position 6, pressing the center touch switch again will cause the display to show Mode Selection for Shaft 1. This position is identified by the two rectangular cursors alternately flashing on and off.

17. thru 22. MODE SELECTION- Each of the six shaft inputs can be independently configured as an ON/OFF, FIXED FREQUENCY, SET FREQUENCY or SET

FREQUENCY VARIABLE input. These Mode Selections are made by entering certain values in locations 17 thru 22.



ON/OFF MODE (000.0 or 000.1) - Entering 000.0 configures the input as an ON/OFF input with the alarm activated by a low going signal. Entering 000.1 also configures the input as an ON/OFF input with the alarm activated by a high going signal.

FIXED FREQUENCY MODE (000.2 to 090.0) - Entering a value greater than 000.1 and less than or equal to 090.0 configures the input as FIXED FREQUENCY. The number value is the frequency at which the alarm is triggered.

$$\text{FIXED FREQUENCY} = \frac{\text{DESIRED RPM}}{60} \times \text{Number of sensed points per revolution}$$

Where:

FIXED FREQUENCY - is the value to be entered for the respective input

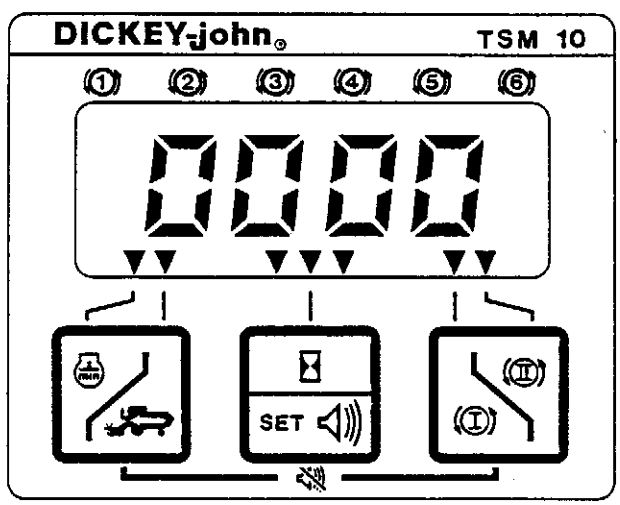
DESIRED RPM - is the monitored Shaft RPM point at which an alarm is desired

SET FREQUENCY MODE (090.1 to 100.0) - Entering a value greater than 090.0 and less than or equal to 100.0 configures the input as SET FREQUENCY. Selecting this mode will allow the operator, in the Operate Mode, to set a normal operating rpm by pressing and holding the center touch switch for 3 seconds, equipment must be running at operating rpm. The alarm point will be calculated by using the normal operating rpm and subtracting the specified ALARM PERCENT.

SET FREQUENCY VARIABLE MODE (above 100.0) - Entering a value greater than 100.0 configures the input as SET FREQUENCY VARIABLE MODE. Selecting this mode, the alarm point is ratioed to Engine RPM. In the Operate Mode with shaft speed at normal operating rpm, press and hold the center touch switch (approximately 3 seconds). This procedure sets the Ratio of the shaft speed to engine rpm and the Alarm Point is calculated based upon the Alarm Percent entered for this location. This Alarm Point will track the Engine RPM and the alarm will sound only when the ratio between the two decreases by the Alarm Percentage.

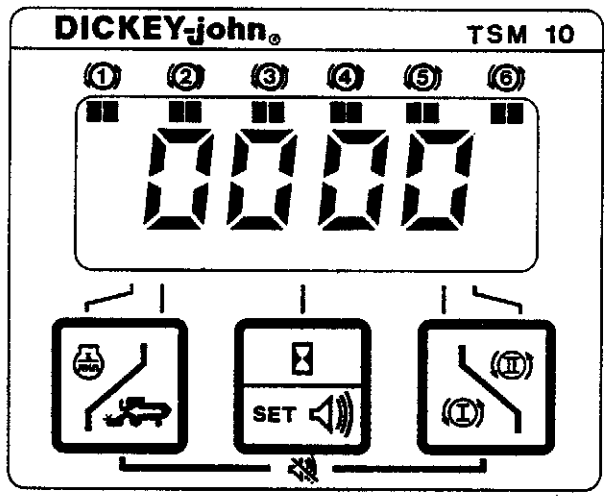
23. **ENGINE RPM DISCRIMINATOR** - The Engine RPM Discriminator constant provides an option to eliminate all visual and audible alarms if the engine rpm drops to 500 or below. Entering 0000 activates the discriminator and eliminates the alarm indications when engine rpms drop below 500. Entering a non-zero (any number in any digit position) will deactivate the discriminator and alarm indications are always present.

    Location identified by all pointers on.



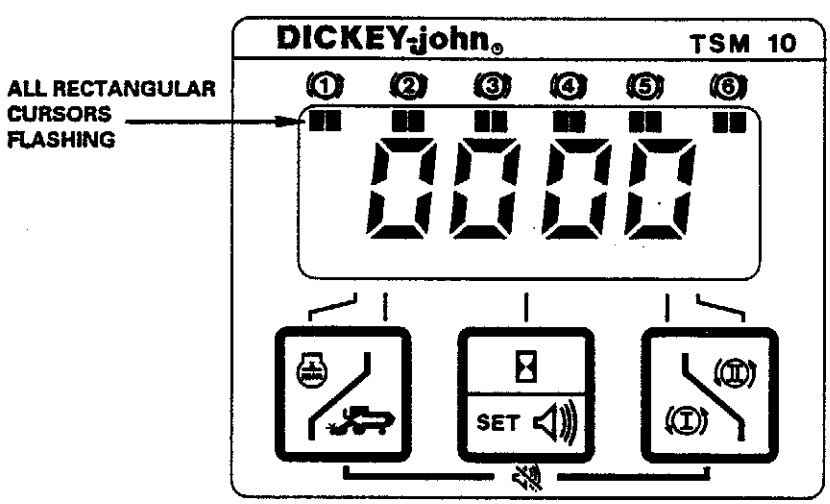
24. **ALL POSITIONS FAILED DISCRIMINATOR** - The All Positions Failed Discriminator constant provides an option to eliminate all visual and audible alarms if all shaft positions fail. Entering 0000 activates the discriminator and eliminates the alarm indications when all positions show failed. Entering a non-zero (any number in any digit position) will deactivate the discriminator and alarm indications are always present.

    Location identified by all six pairs of rectangular cursors turned on.



25. AUDIBLE ALARM OPTION - The Audible Alarm Option allows the selection of a continuous audible alarm for each failure or a 5 second alarm for each new failure. Entering 0000 selects the 5 second alarm and entering a non-zero (any number in any digit position) the continuous alarm mode.

Location identified by all six pairs of rectangular cursors flashing on and off.

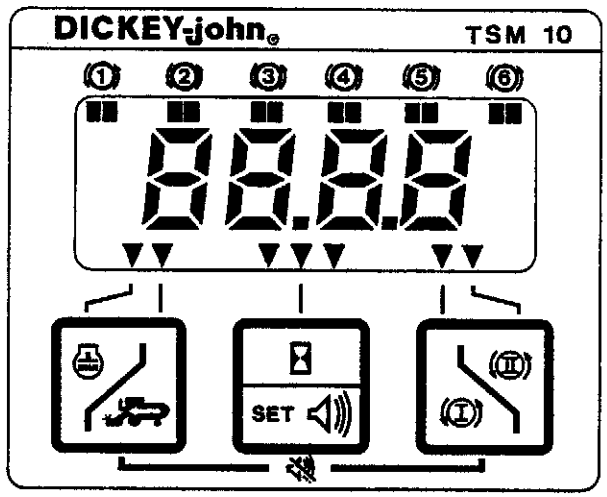


Pressing the center touch switch returns to the first constant location (ENGINE RPM).

To exit the Setup Mode and return to the Operate Mode, turn console power off and then on.

NOTES

OPERATION



The TSM 10 Tach Shaft Monitor Console contains three touch switches and a four digit display. The left touch switch is used to display Engine RPM and Ground Speed. Repeatedly pressing and releasing the touch switch will cause the display to alternately show current Engine RPM and Ground Speed values. The center touch switch selects the Engine Hours display. The right touch switch is used to display "I" RPM and "II" RPM. Repeatedly pressing and releasing the touch switch will cause the display to alternately show current "I" RPM and "II" RPM values.

The six shaft monitor positions located across the top of the display are alarm active only. When a failure occurs the audible alarm will sound (5 seconds or continuous) and the two rectangular cursors, below the shaft position number, will alternately flash.

DISPLAY FUNCTIONS

ENGINE RPM - Display shows vehicle engine RPM.

GROUND SPEED - Display shows vehicle ground speed in MPH (kph).

ENGINE HOURS - Display shows accumulated engine running time in hours. **NOTE:** Engine Hour display is automatically shown when engine rpm drops below 500 (display returns to selected function when engine rpm increases above 500). Engine Hours can also be displayed with Engine rpm greater than 500 by momentarily pressing the center touch switch, This display will remain for 3 seconds and then return to the previously selected function.

Engine Hours accumulate only when Engine RPM is above 500.

I RPM - Display shows RPM of monitored shaft.

II RPM - Displays shows RPM of monitored shaft.

SHAFT MONITOR CALIBRATION (SET FREQUENCY and SET FREQUENCY VARIABLE MODES)

The six shaft monitor positions are alarm only but requires calibration to the programmed values. This calibration is accomplished as follows:

Step 1. The monitored shafts must be rotating at their normal operating rpm.

Step 2. Press and hold the center touch switch for approximately 3 seconds. The Engine Hour cursor will initially be displayed. When the alarm sounds (1/8 second) and a cursor appears on both sides of the Engine Hour cursor, the calibration is complete.

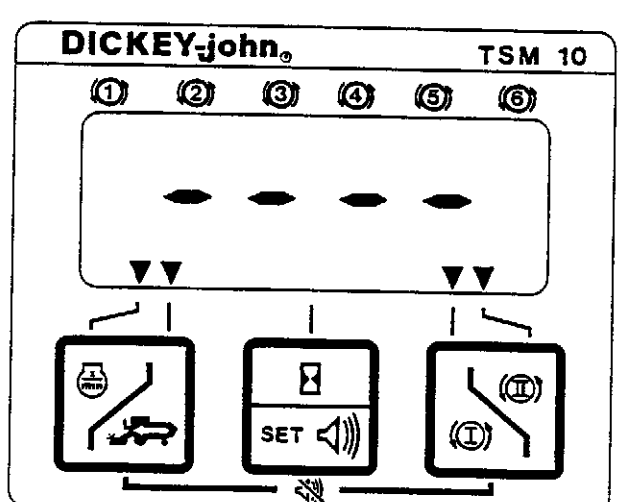
ALARM CANCEL PROCEDURE

An unused shaft monitor position may show an alarm condition, after the calibration procedure is performed. This alarm condition can be eliminated by conducting an Alarm Cancel procedure as follows:

IMPORTANT: At least one position must be passing and Engine RPM greater than 500 before a valid procedure will be allowed.

Step 1. Press and hold the left and right touch switches simultaneously for 3 seconds. The display will show "——". When the procedure is successfully completed, the two left and two right function pointers will be displayed.

The positions eliminated from being monitored will remain eliminated until a Shaft Monitor Calibration Procedure is again successfully completed.



DICKEY-john WARRANTY

DICKEY-john warrants to the original purchaser for use that, if any part of the product proves to be defective in material or workmanship within one year from date of original installation, and is returned to DICKEY-john within 30 days after such defect is discovered, DICKEY-john will (at our option) either replace or repair said part. This warranty does not apply to damage resulting from misuse, neglect, accident or improper installation or maintenance. Said part will not be considered defective if it substantially fulfills the performance specifications. THE FOREGOING WARRANTY IS EXCLUSIVE AND IN LIEU OF ALL OTHER WARRANTIES OF MERCHANTABILITY, FITNESS FOR PURPOSE AND OF ANY OTHER TYPE, WHETHER EXPRESS OR IMPLIED. DICKEY-john neither assumes nor authorizes anyone to assume for it any other obligation or liability in connection with said part and will not be liable for consequential damages. Purchaser accepts these terms and warranty limitations unless the product is returned within fifteen days for full refund of purchase price.

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