

Goodyear Portable Tire Reader User Instructions

Model G3AM

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This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.

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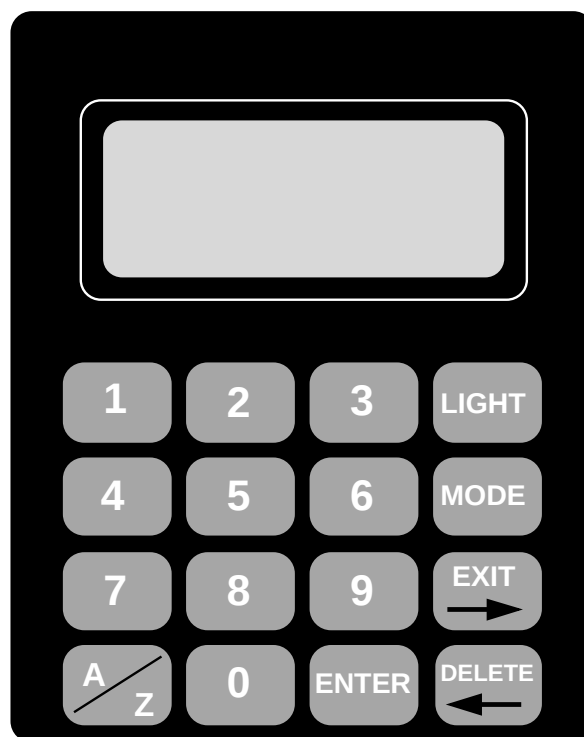
Product Description

Definition: In this manual, the term *tag* is used to refer to the chip that is in the intelligent tire.

Product Description: Model G3AM, portable Radio Frequency Identification Tag Reader. The serial number on the bottom of the Reader begins with "G3", includes a sequence number, and ends with an "AM".

The Reader has the following features:

1. Power Requirements. Reader uses one 12 volt rechargeable battery (Dewalt DW 9071, Extended Run Time).
2. Non-volatile memory. The Reader is equipped with non-volatile memory that maintains user settings and stored data even when the battery pack is removed.
3. Turning the Reader On and Off. Turn the Reader on by pressing the push-button (Trigger) on the bottom of the handle; pushing the trigger again will cause the Reader to attempt to read tags. The Reader automatically shuts itself off two minutes after the last key-press or trigger-press. There is no separate off switch.



4. Keypad and Display. See the picture above: The Reader has a 4-row by 16-character display that is used to display tag data including, tag ID, temperature and pressure. Menus

used for setting Reader options are also shown on the Reader display. The keypad is used to select modes of operation (e.g. set date and time, choose display options, etc.).

5. Read Modes. The Reader has three read modes: 1) READ AND RECORD, 2) READ ONLY, and 3) ADD AIR PRESSURE.
 - READ AND RECORD: In this mode, whenever the Trigger is pressed, the Reader driver field is turned on briefly. The Reader attempts to read any tag in the read field during this time. When a tag is read the ID number, temperature and pressure are displayed. Data including the time, date, tag ID, temperature and pressure are stored in a data file.
 - READ AND RECORD WITH PRESSURE DATA ENTRY: This mode is the same as the READ AND RECORD MODE but includes the option to manually enter an air pressure (e.g. from a tire gauge) that will be stored in the data file with the other information associated with that tag read.
 - READ ONLY mode: This mode is the same as READ AND RECORD mode except no data are stored in Reader memory.
6. Display Light. The keypad contains a key which switches a display light on and off. It is not recommended that tags be read with the light on.
7. Data Storage. When the Reader is in either of the READ AND RECORD modes, the ID number, date, time, temperature, pressure, (and manually entered pressure if that mode is selected) for each valid read are stored in a sequential file in the Reader. The Reader memory can store up to 1000 reads. Subsequent reads will be displayed but will NOT be added to the data file. Stored data must be downloaded or erased by connecting the Reader to a computer via the RS232 (comm) port. The amount of Reader memory available is displayed on the 'Status' screen.
8. Time and Date. The Reader has an internal clock and battery that keep track of the time and date even when the Reader battery is removed. The time and date should be checked periodically and reset if necessary (see procedure below).

First Time Operation of the Reader

The Readers come with the handle section removed. To attach the handle, align the connector in the handle with the mating connector in the base of the Reader. Insert the handle until the handle and the base of the Reader touch. Tighten the two captive screws. A black plug is provided that snaps into the hole in the top of handle to cover the upper captive screw.

Before using a Reader, insert a battery pack into the handle until it snaps into place. Note that the battery should be charged prior to first use.

Battery Usage

The battery pack should provide several hundred tag-reads between charges. When the battery requires recharging, the Reader will emit a **Low Battery Signal** during the read process. This signal is a single tone for approximately one second. Tags can be read after the Low Battery Signal, but the battery pack should be replaced and recharged as soon as possible after it occurs. A fully discharged battery takes about one hour to recharge. The battery pack is only partially discharged when the Low Battery Signal occurs, and recharging should take about one-half hour. The battery charger provides an indication when the battery is fully charged (see battery charger documentation).

Basic Operation

To turn on the Reader, push the **Read push-button** (Trigger) on the handle once. After the Reader is turned on, pushing the **Read push-button** will cause the Reader to interrogate tags. If the battery has been replaced since the Reader was last used, select the proper operating mode from the keypad before reading tags (see Reader Setup section below.)

To read the tire, the antenna section should be placed directly over the “Wingfoot”, and in contact with the tire tread.

Main Menu (SELECT MODE MENU) Options

To turn on the Reader pull the **Trigger** (on the handle) once. If the battery has been removed since the last use the Reader will turn on displaying the Main Menu (if the display is all dark squares, the contrast is incorrectly set, see the section below on adjusting the display contrast).

The title of the main menu is "SELECT MODE". All of the features and modes of the Reader can be reached from the SELECT MODE Menu by pressing the appropriate key and following the displayed instructions. If the battery has not been removed, the Reader turns on with the same display as when the Reader automatically turned off. **The SELECT MODE menu can be reached from any Reader display by pressing the MODE key once or twice as required.** The SELECT MODE appears as:

SELECT MODE
1 = READ & RECORD
2 = READ ONLY
3 = ADD AIR PRESS

The SELECT MODE menu has two screens. The second screen, shown below, is reached by pressing the **MODE** key one time when the Reader is displaying the first SELECT MODE menu.

4 = NOT AVAILABLE
5 = SETUP
6 = STATUS

Note that selection **4** is reserved for future use.

Setting the Time and Date:

To review the time and date setting, reach the SELECT MODE menu and select any Read Mode (i.e. **1**, **2** or **3**). The current time and date will be seen at the bottom of the display (it is recommended that the time and date be checked whenever the Reader has not been used for several days). If the time or date are incorrect and need to be set, perform the following steps:

To set the Time:

1. Press the **Mode** key until the display shows the following:

4 = NOT AVAILABLE
5 = SETUP
6 = STATUS

2. From this display, press **5**, to get this display:

SET UP OPTIONS
1 = TIME 4 = PRESS
2 = DATE 5 = ODOM
3 = TEMP 6 = TREAD

3. From this display, press **1** and follow the instructions on the display to enter the correct time. Note that all 4 digits must be entered for the time followed by a **1** or **2** for AM or PM; the **ENTER** key must be then be pressed to store the entry.

To set the Date:

After the time is entered and the **ENTER** key is pressed, the display will once again become:

SET UP OPTIONS
1 = TIME 4 = PRESS
2 = DATE 5 = ODOM
3 = TEMP 6 = TREAD

Press **2** to set the current **Date**. As before, follow the instructions on the display and press **ENTER** after the last numeric entry.

To set the Temperature Units:

The Reader can be set to display temperature in either Fahrenheit or Centigrade. The default setting is degrees Centigrade. Temperature units can be set by pressing the **Mode** key until **Setup** can be selected. Press **Setup (5)** and **Temp (3)** and select the desired temperature units by pressing the appropriate number key. Note that this setting only affects the temperature units *displayed*. Data are always stored in degrees Centigrade.

Calibration Type:

The Calibration type will default to the Standard setting. This setting should NOT be changed except for use under specific circumstances.

The Reader was designed to allow Goodyear to evaluate different calibration methods. The calibration for the “G3 – A” reader is **Type T3**.

If somehow the calibration setting gets changed, or the reader is giving bad data for every tire, you can check the calibration type to make sure it is **Type T3**

To review or change the Reader **Tag Type** setting:

1. Push the **MODE** key twice to display the following menu:

4 = NOT AVAILABLE
5 = SETUP
6 = STATUS

2. From this display, press **5**, then press **ENTER** to display the SET UP OPTIONS:

SET UP OPTIONS
7 = DISP 0 = IDONLY
8 = CAL
9 = AMBIENT

3. Press **8** to set the calibration type:

SET CAL TYPE
CAL TYPE IS T3 *(This line shows the current Reader setting)*
1 = I 2 = D 3 = T 4 =
125 5 = 200 6 = 300

4. Press **3** to set the calibration type to **T**.

Display Type – Normal vs. Counts

The Display Type default is 'Normal' (i.e. pressure and temperature). Do NOT adjust the Display Type unless required to do so for a specific application.

For normal use, the "Normal" setting will display all the data that is needed:

```
TIRE ID 00C10865
PRESSURE =100PSI
SWITCH = 1
TEMP. 73 F      T
```

For test purposes, or to "debug" the reader, it is useful to know the raw pressure and temperature data transmitted by the tag prior to the Reader converting this data into pressure or temperature units. This raw data is called "counts". If necessary, the Reader can be setup so that it displays counts as well as the converted pressure and temperature values.

To set the Display Type to Counts:

1. Push the **MODE** key twice to get the following display:

```
4 = NOT AVAILABLE
5 = SETUP
6 = STATUS
```

2. From this display, press **5**, then press **ENTER** to show the following display:

```
SET UP OPTIONS
7 = DISP      0 = IDONLY
8 = CAL
9 = AMBIENT
```

3. Press **7** to show the following display:

```
SET DISP TYPE
DISP IS NORMAL (This line shows the current Reader setting)
1 = NORMAL
2 = COUNTS
```

Pressing **2** will set the Reader to display count information. An example of a display after reading a tag in this mode is:

```
TIRE ID 00C10865
25 C 2350 2350
98 PSI 450 450
CAL TYPE IS T3
```

In the above example, 2350 is the temperature count and 450 is the pressure count. The tag transmits all of its data twice, yielding the two values. The Reader does not store the count values in memory. Therefore, any record of the tag counts must be manually logged.

To set the Display Type to Normal:

Follow the steps above except in step 3, press **1** to select the normal display mode. An example of a display after reading tags in the Normal mode is shown below:

TIRE ID 00C10865
PRESSURE <=100PSI
SWITCH = 1
TEMP. 73 F T

Setting Ambient Pressure and Temperature Calibration

You SHOULD NOT have to adjust the ambient pressure and temperature settings (except after new software has been programmed into the Reader).

The Reader contains an internal barometric pressure sensor and a temperature sensor. The barometric sensor enables the Reader to subtract the ambient air pressure from the tag reading, which is an absolute pressure reading. This enables the Reader to display the gauge pressure of the tire for any altitude or ambient air pressure, which is typical for tire air pressure gauges. The temperature sensor serves the purpose of adjusting the contrast of the Reader display, which changes with temperature. The ambient barometric pressure and temperature are set at Phase IV and will only need to be reentered if the software in the Reader is changed. If entry of this information is necessary, perform the following steps:

If a barometer is available it may be used to determine the correct atmospheric pressure. The unit of measurement for most barometers is inches of mercury. For entry into the Reader, these units must be converted to PSI by the following formula: $\text{PSI} = \text{inches of Hg} \times .4912$. If a barometer is not available, 14.5 PSI may be entered (at sea level). The temperature entry is not critical; entry of 25° C (approximate room temperature) is adequate for most purposes.

To set the Ambient Pressure and Temperature:

1. Turn the Reader on by pushing the Read-Trigger on the handle.
2. Push the **MODE** key twice to get the following display:

4 = NOT AVAILABLE
5 = SETUP
6 = STATUS

3. From this display, press **5** then press **ENTER** to get the following display:

SET UP OPTIONS
7 = DISP
8 = CAL
9 = AMBIENT

4. From this display, press 9, to get the following:

AMBIENT
PRESS = 12.1 PSI
TEMP = 25.8 C
P = . T = .

5. To enter the correct barometric pressure in PSI; enter three digits (two digits plus one decimal). Note that the Reader will automatically enter the decimal point. After the barometric

pressure is entered the Reader will automatically move the prompt to the temperature field. Enter the current ambient temperature in degrees Centigrade (including one decimal). Press **Enter** to store the ambient pressure and temperature data. Press **Exit** to abort data entry and to leave the current settings unchanged.

Reading Tags

Before reading tags one of the three reading modes must be selected. This is done from the first screen of the SELECT MODE menu shown below.

SELECT MODE
1 = READ & RECORD
2 = READ ONLY
3 = ADD AIR PRESS

From the above menu select the desired reading mode by pressing the associated number key. When a Read Mode is selected, the mode title, time and date are displayed. The Reader stays in a selected mode (even after automatic shut down) until a different mode is selected or until the battery is changed.

Once the mode is selected, every press of the Trigger causes the Reader to activate the driver field for 0.2 seconds. The Reader attempts to read any tag in the field during this time. The Reader emits a single beep when the Trigger is pressed immediately followed by a double beep if a valid read is achieved. The Reader displays the ID number if a valid read occurs, otherwise it displays "NO VALID READ". The display stays on for two minutes after any read is attempted at which time the Reader automatically turns itself off. After any automatic shut down the Reader can be turned on by pressing the Trigger once at which time the Reader will turn on in the mode it was in when it shut down. If this is the desired mode, tag reading can be reactivated by pressing the Trigger a second time.

Status Display

To view the STATUS information, press the **MODE** key as required to display the second screen of the SELECT MODE menu:

4 = NOT AVAILABLE
5 = SETUP
6 = STATUS

At this menu, press key **6**. When selected, the STATUS feature displays the electronic serial number of the Reader, the Software Revision, the number of files stored and the percent of the Reader memory which has been filled by the stored files.

Adjusting the Display Contrast

The display contrast can be adjusted using the **DELETE (←)** and the **EXIT (→)** keys.

Reader Driver and Receiver Test Procedure

The Reader Drive and Receiver circuitry can be tested using the included poker chip tag and by following the test procedure below. Note that the poker chip tag supplied is a working unit that was rejected for failing one of the calibration criteria. While the pressure displayed by the Reader may be incorrect, the test procedure uses relative temperature values and will be unaffected by the actual values. The procedure listed below assumes the Reader is set to a mode that will display temperature in Fahrenheit. See the procedures below:

To Test Reader Performance:

1. Turn On the Reader and select the **Read Only** mode.
2. Place the poker chip tag in the center of the antenna paddle area.
3. Trigger the Reader 10 times and note the temperature displayed. The Reader should read at least eight times out of ten.
4. Hold or support the poker chip tag 2" above the center of the antenna paddle area (do not use metal objects to support the tag).
5. Trigger the Reader 10 times and note the temperature displayed. The Reader should read at least eight times out of ten and the displayed temperature should be within 3° F of the temperature displayed in step 3.

If the Reader read eight out of ten times in both positions, the receiver is working properly. If the temperature varied less than 3° F between the two positions, the driver is working properly.

If You Have a Problem With the Reader:

Contact Goodyear for advice:

Gary Belski, 330-796-4860
Bill Dunn 330-796-7195
Brian Logan 330-796-3007

If they cannot help you, or if they cannot be reached, contact Phase IV Engineering, the firm that designed the reader:

Phase IV Engineering

Phase IV Engineering can be reached at 303-443-6611, M-F, 9a-5p mountain time.

Goodyear Portable Tire Reader Programming Instructions

The following procedure describes the steps needed to *program* the Reader with a *new software version*.

1. Connect the cable between the Reader and the computer (serial port).
2. Insert the Programming floppy disc into the computer.
3. Open the floppy disc 'file folder' by double clicking on the 'My Computer' icon on the 'desktop' and then double clicking on the '3.5" Floppy (A:)' icon. Start Procomm by double clicking on the 'Pcplus' program filename (it will have an MSDOS icon). After Procomm has finished loading, press 'enter' to clear the Procomm startup screen.
4. Turn on the Reader. The Reader will display "**TERMINAL MODE**" on its display screen and the Procomm display will show:

Terminal mode-Software version DX.XX->

5. If the 'Terminal mode' message is not displayed by Procomm, the serial port setting may be incorrect. To change the serial port setting, Press the 'Alt' key and then press the 'p' key. The 'Current Settings' screen is displayed.
6. At the top right of the display, the 'COM' port number is displayed. Press the function key (e.g. F2 for COM2) to change to the correct serial port number. Press the 'Alt' and 's' key to save the new port number. If the correct port number is not known, try each port number until communication is established.
7. Press 'enter' to determine if the correct serial port has been selected. If the Reader is communicating with the computer, the Reader will respond with:

**? Unknown command.
->**

8. Type 'load' and press 'enter'. The Reader will respond with:

**Upload programming softwareThe file is prgm.hex and
the format is raw ASCIIWaiting for line #1**

9. Press the 'page up' key. Procomm will open the 'Upload Protocols' box.
10. Press 'r' (to select Raw ASCII). Procomm will open the 'Raw ASCII Upload' box. The filename 'prgm.hex' should already be displayed.
11. Press 'enter' to accept 'prgm.hex' as the file to be uploaded.
12. Each line of the program will be sent to the Reader and the Reader will respond to each line with:

Waiting for line #XX

13. After approximately 553 lines, programming will be complete and Procomm will show the message (sent by the Reader):

Software successfully loaded->

14. Type 'program' and press 'enter'. The Reader will respond with:

**Flash programming software version 1.03.
Upload reader source file tag.hex
Waiting for line #1**

15. Note that the filename shown above (tag.hex) is NOT the correct filename and only represents the *type* of file to be uploaded.
16. Press the 'page up' key. Procomm will open the 'Upload Protocols' box.
17. Press 'r' (to select Raw ASCII). Procomm will open the 'Raw ASCII Upload' box. The filename 'tag.hex' will be displayed.
18. Type the *correct filename* (e.g. g3b90.hex) in the Upload box (it will replace 'tag.hex'). Press 'enter'. Each line of the program will be sent to the Reader and the Reader will respond to each line with:

Waiting for line #XX

19. After approximately 4000 lines, programming will be complete and Procomm will show the message (sent by the Reader):

**Flash programming was successfulHit any key to
restart reader**

20. Press 'enter' to restart the Reader. The Reader will respond with:

Terminal mode-Software version DX.XX ->

21. The programming procedure is complete. Disconnect the cable from the Reader and remove the battery.
22. Exit Procomm by pressing the 'ALT' key and then pressing the 'x' key. Press the 'y' key.
23. After programming, the following settings must be reentered *before* the Reader is used for the first time (follow the procedures outlined in the Reader User Instructions) :

- Ambient Temperature and Pressure
- Time and Date
- Read Mode
- Temperature and Pressure display mode