



# iPod Testing Procedures

iPod nano

8 September 2005





# Testing Procedures

The most current version of these procedures are available for download in PDF format, along with any supporting files at: <http://service.info.apple.com/ipod-tp.html>

## Purpose

These procedures contain a beginning-to-end testing process that can supplement standard troubleshooting techniques to identify an iPod hardware failure point.

**Important:** iPods without an identified hardware failure do not qualify to be sent to Apple for repair. If received by Apple, such units will be identified as NTF (No Trouble Found).

## Overview

The iPod nano is shipped from the factory formatted for Windows (FAT32 file system). The first time the iPod is plugged into a computer with iTunes 4.9 or later installed, one of the following actions takes place:

- On a Mac computer, iTunes reformats the iPod to the HFS+ file system to optimize it for the Mac.
- On a Windows PC, iTunes removes the reformat-for-Mac feature, so that the iPod will not be automatically reformatted if it is later plugged into a Mac.

These procedures use a Mac computer to test the iPod. If no trouble is found (NTF) and the iPod will be returned to the customer, a Mac or Windows PC will be used to restore the iPod, depending upon computer availability and the customer's iPod format, if known.

## How To Use These Procedures

These procedures are a beginning-to-end testing process, but it is not required to complete all the procedures. Performing a test out of order may be helpful to quickly identify a likely hardware failure. Keep in mind, each test or procedure may not be self-contained; an earlier procedure may set up the iPod or connections needed for a later procedure.

The procedures cover computer and accessory requirements and setup, restoring procedures, various tests and checks, built-in iPod diagnostics, and battery life test.

Standard troubleshooting is not covered in these procedures. Refer to the iPod Service & Support Page: <http://www.apple.com/support/ipod/>

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## Preparation

### Tools needed

- **Apple Macintosh computer** with the following:
  - Mac OS X 10.3.4 or later
  - iTunes 4.9 or later
  - iPhoto 4.0.3 or later, **Note:** iPhoto 4.0 or later must be installed before updating to 4.0.3 or later. Version 4.0 is available via the iLife '04 install.
  - iPod Updater 2005-09-06 or latest version (for Mac), from <http://www.apple.com/ipod/download/>
  - “ipod\_ChannelCheck.mp3” test file, from <http://service.info.apple.com/ipod-tp.html>
  - FireWire 400 port (for charging only)
  - USB 2.0 port
  - A minimum of about a CDs worth of MP3 or AAC music files in iTunes (clean, non-controversial)
  - Some photos, imported into iPhoto (clean, non-controversial)
- **Windows PC** (If available) with the following:
  - Windows 2000 or XP, with the latest service packs installed
  - iPod Updater 2005-09-06 or latest version (for Windows 2000 or XP), from <http://www.apple.com/ipod/download/>
  - USB 2.0 port
- Audio headphones
- Cable, FireWire, 30-pin to 6-pin (p/n 922-6312)
- Cable, USB to 30-pin (p/n 922-6340) **Important:** When connecting the USB cable, connect to the computer’s USB 2.0 port, not the keyboard or other hub.
- Power Adapter, USB, iPod
- Power Adapter, FireWire, iPod
- “Attention Windows PC Users” letter (p/n 073-0789) from <http://www.apple.com/support/ipod/>

### Resources

Knowledge Base articles:

- 61672, iPod: How to determine your iPod’s hard disk format
- 60971, iPod: System Requirements

iPod Service & Support page: <http://www.apple.com/support/ipod/>

iPod Testing Procedures page: <http://service.info.apple.com/ipod-tp.html>

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## Mac Computer setup

**Note:** Refer to the Tools needed section, above.

1. Install the latest iPod Updater.

**Note:** The system usually stores the iPod Updater in an “iPod Software Updater” folder in the Utilities folder (if desired, you may need to create this if iPod software was not originally installed from a CD).

2. Install or update iTunes and iPhoto to the latest versions.
3. Open **iTunes** and create two playlists. Name them something like the following examples: (**Tip:** Adding a bullet or other symbol can sort the lists near the top)
  - iPod Testing
  - Channel Check
4. From the iTunes Library, drag a CD or more worth of imported songs into the “iPod Testing” playlist.
5. In iTunes, choose File > Add to Library..., then locate the “ipod\_ChannelCheck.mp3” file, downloaded earlier, and Choose it, to load the file into the iTunes Library.
6. Locate “ipod\_ChannelCheck” in the iTunes Library and drag it to the “Channel Check” playlist.
7. Open **iPhoto** and create an album. Name it something like the following example:
  - iPod Slideshow Testing
8. Import the photos to be used for testing into iPhoto, and place them into the iPod Slideshow Testing album.

## Windows PC Computer setup

In these procedures, a Windows PC, if available, is only used to restore an iPod to the Windows PC format, as appropriate.

1. Install the latest iPod Updater for Windows.

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## Initial Inspection

Inspect the shipping box for damage that may have damaged the iPod. Apple will repair damage caused by shipping.

## Under warranty

**Important:** iPods with damage not covered under warranty cannot be returned to Apple, and no further testing is needed.

Damage **NOT covered** under warranty (unless caused by shipping):

- visually broken
- cracked
- deformed
- liquid seeped inside
- iPod shows signs of being opened
- customer acknowledged causing damage

## Out of warranty

Apple will repair, for a fee, iPods that are out of warranty, unless they have “excessive” damage that requires too many internal parts to be replaced.

Damage NOT repairable (unless caused by shipping):

- severely damaged, crushed
- iPod arrives in pieces

## Important Notes

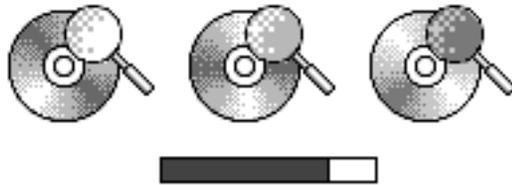
- Note the position of the Hold switch as it was received. Make sure the Hold switch is off (no orange showing) during operation.
- Watch the iPod screen when turning it on, for a low-battery icon (shown below) that may display for approximately three seconds.  
If this happens connect the iPod to the power adapter for at least 5-15 minutes before operating it from the battery.



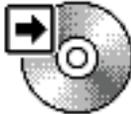
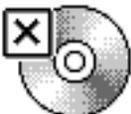
- If a hardware failure is detected, the following icon will be shown. Fail the iPod.



- If the iPod detects a hard drive error during startup, it will launch a diagnostic hard drive scan and attempt to repair any problems. You will see the icons and progress bar, shown below. This can take up to 15 to 20 minutes, so plug the iPod to a power adapter.



When the scan has finished, one of four possible icons will be displayed:

Icon	Description
	Scan failed and will be repeated the next time the iPod is turned on.
	Scan found no problems.
	Some problems found, but was able to correct some or all of them.
	Scan was canceled by user (by holding down the Center button for approximately three seconds) and will repeat the next time the iPod is turned on.

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## Verify Problem Reported by Customer

- Attempt to duplicate and document the problem reported by the customer.
- Use standard troubleshooting procedures to diagnosis and fix the problem, if possible.
- If a problem is documented and cannot be resolved, there is no need to continue. The iPod and the documented problem information can be sent to Apple for repair.

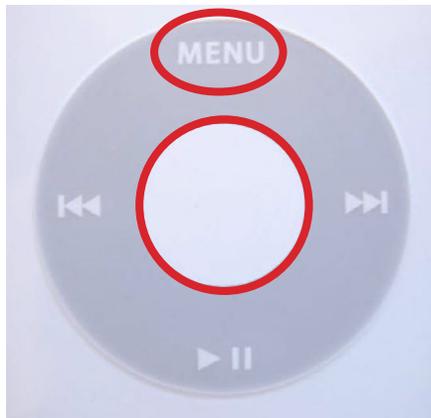
## Restore iPod Software

**Important:** Note the format of the iPod or ask the customer. If later returning the iPod to the customer, it should be restored to the format as received, if possible.

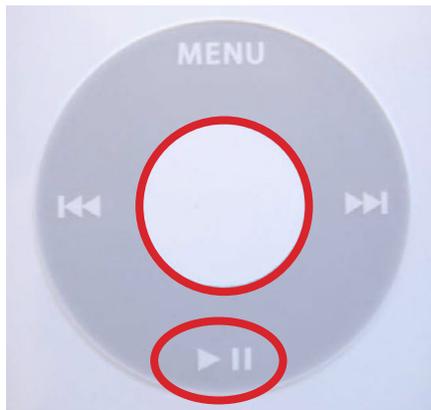
**Warning:** This procedure reformats the iPod and erases all data.

**Note:** The battery must have enough charge to operate the iPod on battery power at times during these procedures. Charge the iPod about 5 to 15 minutes if needed.

1. With the iPod NOT connected to the computer. Reset it by simultaneously pressing and holding the Menu and Center buttons.



2. When the Apple icon appears, attempt to put the iPod into Disk Mode by immediately and simultaneously pressing and holding the Play and Center buttons,



until you see the Disk Mode screen.



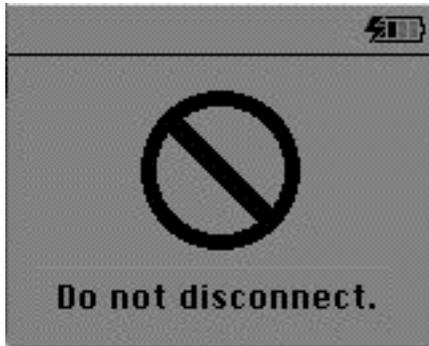
**Note:** You may need to try several attempts to activate the Disk Mode, but do not fail the iPod if you are unable to get it into Disk Mode at this time.

3. On a Mac computer, launch the latest release of iPod Updater on the computer. Wait until you see the message "Plug in an iPod to update it."



4. Quit iTunes if it is open.
5. Connect the iPod to the computer with the USB cable. The iPod screen changes to a "Do not disconnect" screen,"

**Important:** Connect the USB cable to the computer, not the keyboard or other hub.



and the iPod Updater window displays the iPod name, serial number, software version, capacity, and the Restore button is available. Example shown here:



**Note:** The approximate Capacity for the following iPods should be:

- iPod nano (2GB): 1.8 GB.
  - iPod nano (4GB): 3.8 GB.
6. Click Restore. Click Restore again, when it asks you if you are sure.
  7. Enter your Admin name and password in the Authenticate screen. A progress bar appears.



8. When the progress bar completes, in a few moments the message “Your iPod has been restored..., and is restarting.” appears on the computer.



9. The iPod screen will display the Apple and, in a moment, a progress bar will begin.



10. Wait until the iPod Updater window displays the iPod name and serial number screen.
11. Quit the iPod Updater. The iPod has been Restored.

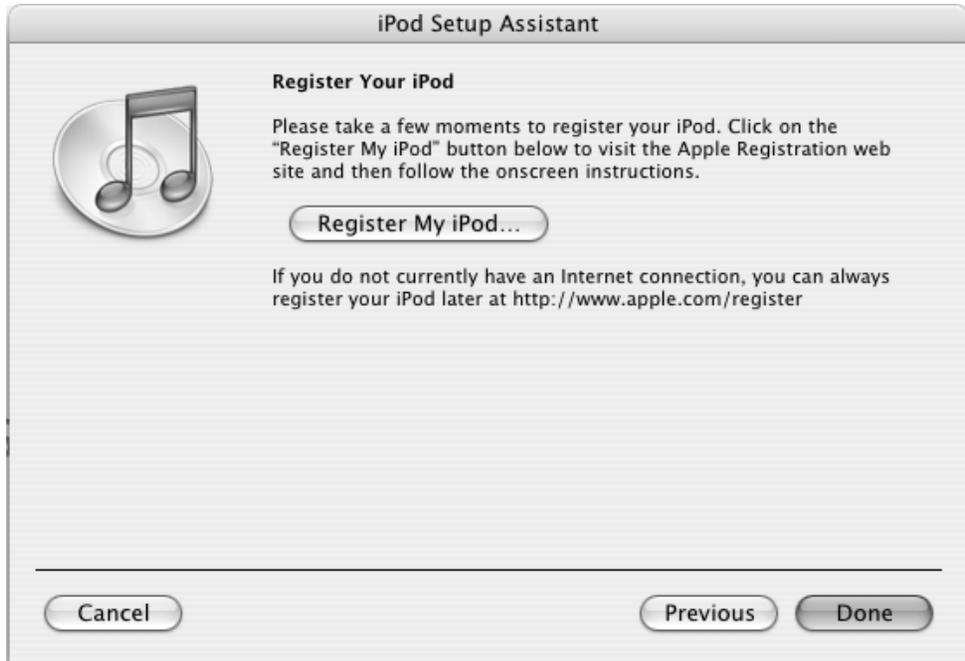
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## iTunes Synchronization Test

1. Open iTunes if it didn't launch automatically.  
**Note:** If iTunes was already open, quit and relaunch it.
2. The iPod Setup Assistant window will be displayed.
3. Deselect both check boxes for "Automatically update songs on my iPod" and "Automatically copy photos to my iPod." Click Next.

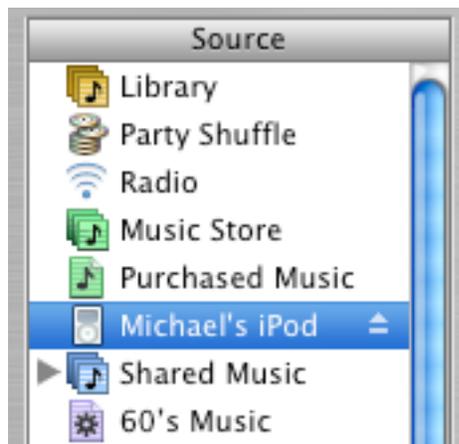


4. In the “Register Your iPod” screen, click Done.



**Note:** iTunes may attempt to connect to the Apple Music Store. If it is unsuccessful, due to no internet connection for example, you will receive a message window.

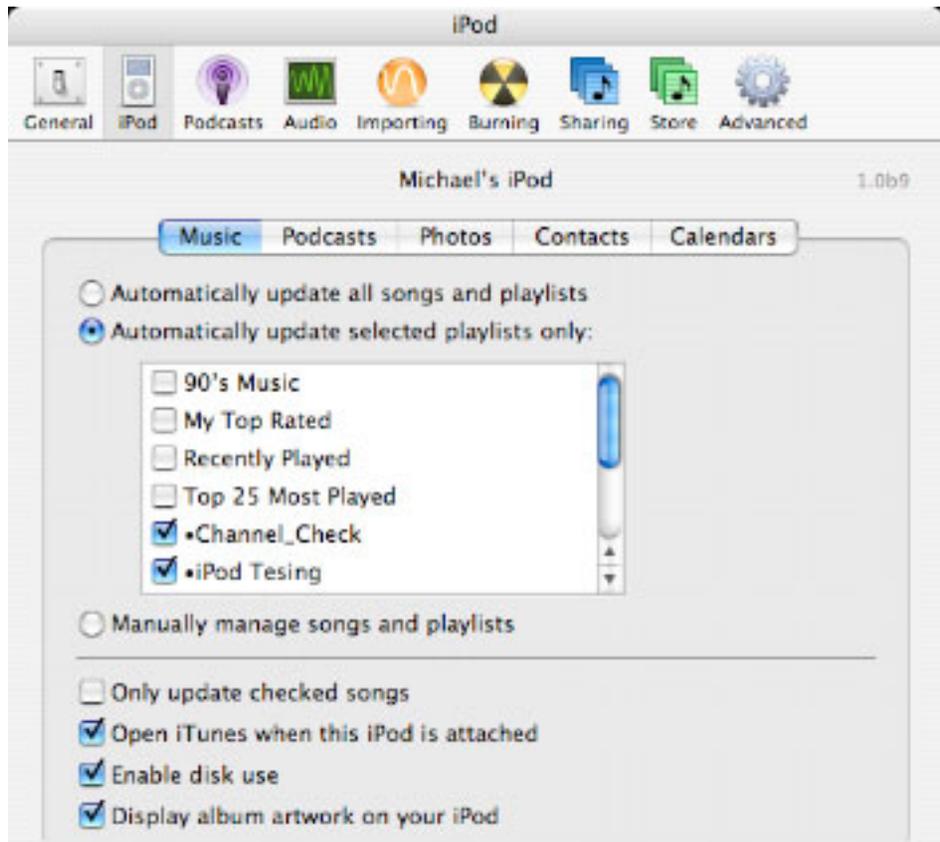
5. In the iTunes playlist Source panel, select the iPod icon.



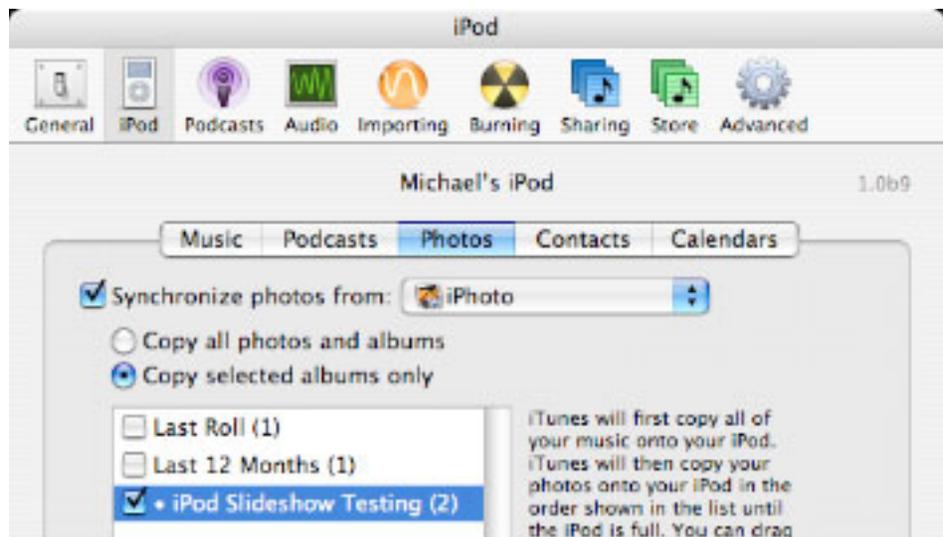
6. Select the “Display iPod options” button at the bottom right corner of the iTunes window to open the iPod Preferences.



7. Select the Music tab, and make the selections shown below. Ok the popup dialog box asking if you are sure.



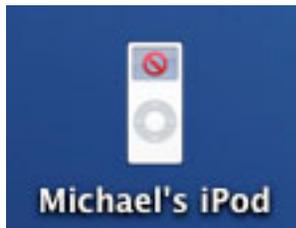
8. Select the Photos tab, and make the selections shown below.



9. Click OK. iTunes will begin copying the music and photos as selected in the iPod preferences. **Note:** iTunes copies music first, then photos, until completed or until the iPod is full.

## USB Disk Mode Test

1. Make sure that the iPod icon is on the desktop.



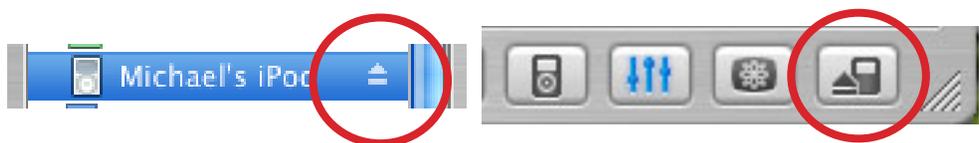
2. If not, select the iPod icon in the iTunes Source panel, then select the "Display iPod options" button to open iPod Preferences (see above instructions), and make sure the "Enable disk use" check box is checked.

## Battery Charging Check

1. Make sure that the battery charging symbol appears at the top right corner of the iPod screen. If fully charged, the icon will be static with a symbol of a plug.



2. Select the iPod icon in the Source panel of iTunes, then either click the iPod Eject button at the bottom right corner of the iTunes window, or the eject symbol in the Source panel. This ejects the iPod from the Source panel and the desktop.



3. The "Do not disconnect." screen will disappear, and the Language screen appears.
4. Disconnect the iPod from the computer.

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## **iPod Screen Check**

1. In the Language screen, English should be highlighted. Select the language that you prefer and press the Center button to select it. The iPod menu screen appears.
2. Use the Click Wheel and buttons to navigate through some screens.
3. Make sure that the backlight is on when navigating the menus
4. Make sure the screen displays properly with no pixels missing.
5. Check for “rainbow effect” by looking straight at the iPod display screen, without tilting. If a rainbow effect (Newton Ring effect) appears and is larger than 1 square cm, fail the iPod.

## **Sleep/Wake up Test**

1. Press and hold the Play button a few seconds to put the iPod into sleep mode. The iPod screen goes blank.
2. Press any button to wake up the iPod.

## **Screen Backlight Test**

1. The backlight should turn on while operating the iPod.
2. If the Center button is not pushed and the Click Wheel not touched, the backlight should turn off in about 10 seconds or so (depending on the Backlight Timer setting).
3. Scroll the Click Wheel or press the Center button to turn on the backlight.
4. Press and hold the Menu button a few seconds to turn off the backlight.

## **Control Buttons & Audio Test**

1. Use the Click Wheel to scroll up and down the menu. Make sure that you hear the clicker sound through the iPod speaker when rotating the Click Wheel.
2. Connect headphones to the iPod, and orient the left and right sides correctly.
3. Navigate to the “Channel Check” playlist (this contains the downloaded “ipod\_ChannelCheck.mp3” file), and press the Center button.
4. Make sure the ipod\_ChannelCheck audio file is selected, then press the Play button.
5. Listen for any distortion. Make sure the left and right channel messages are heard on the appropriate side.
6. Navigate to the “iPod Testing” playlist, and start playing the songs.
7. Use the Click Wheel to vary the volume to ensure it works properly.
8. Press the Next button to play the next song, and play it for about 5 seconds.

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9. Press the Previous button twice to go back to the first song (the first press goes back to the beginning of the song). Play it for about 5 seconds.
  10. Press the Play button to stop the playback.
  11. Slide the Hold button on (to reveal the orange color). Scroll the Click Wheel and press all five buttons to make sure they are deactivated and nothing happens.
  12. Slide the Hold button off (to cover the orange color) (all buttons will be active).
  13. Press the Menu button several times to go back to the iPod menu screen.
  14. Remove the headphones.

## **Slideshow Test**

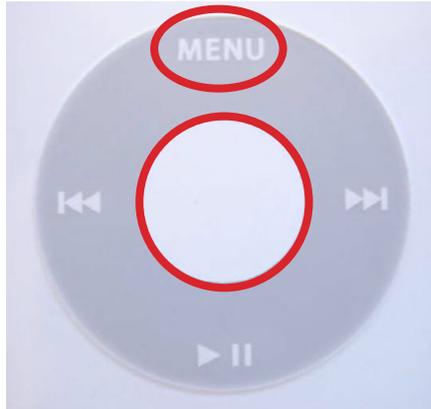
1. Connect headphones to the iPod.
2. Press the Center button to select Photos > Slideshow Settings > Music, then select the "iPod Testing" playlist. The display should return to the Settings menu.
3. Press Menu to return to the Photos screen, and select the iPod Slideshow Testing playlist, to display its photo thumbnails.
4. Press the Center button to display the first photo in full screen.
5. Press Center button again to start the slideshow, and verify pictures change properly.
6. Make sure music is playing.
7. Press the Menu button to stop the slideshow.

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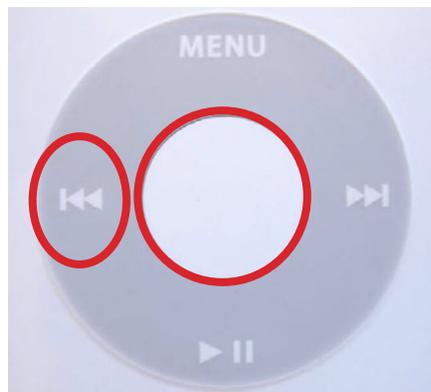
## Built-in Diagnostic Tests

**Pass/Fail:** If the iPod does not behave as indicated during any of the following built-in diagnostic tests, fail the iPod.

1. Make sure the iPod is NOT connected to the computer.
2. Reset the iPod by simultaneously pressing and holding the Menu and Center buttons.



3. When the Apple icon appears on the iPod screen, immediately, and simultaneously, press and hold the Previous and Center buttons.



Release the buttons when the Apple icon disappears from the screen.

**Note:** You may need to try several attempts to activate the Diagnostics.

### Navigation Notes:

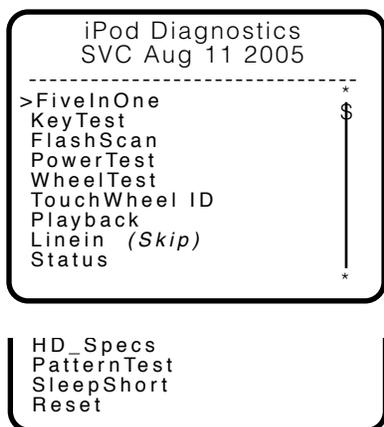
- Navigate through the lists of tests by using the Next and Previous buttons to move the selection pointer ">" up and down the list.
- Start a test by pressing the Center button (sometimes referred to as ACTION key).
- Press the Menu button to continue, or return to previous diagnostics menu screens.
- The example diagnostic screens in these procedures are approximations, and *italics* text in parenthesis is used for information, only.
- To leave the diagnostics, Reset the iPod.

## iPod Diagnostics Menu

Two faint beeps will be heard through the iPod speaker as it goes into the iPod Diagnostics mode.

**Pass/Fail:** Fail the iPod if two beeps are not heard.

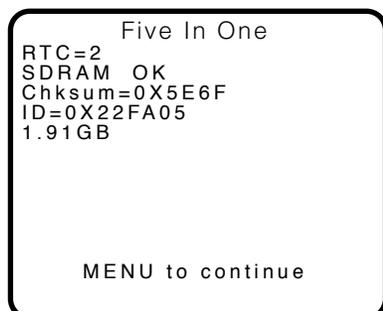
The following screen is displayed. Pressing the Previous or Next buttons successively will scroll the menu screen to reveal more menu items (shown below), as needed.



## Five In One

This test includes test for: RTC, SDRAM, CHKSUM, USB, Flash memory, and Backlight.

1. Press the Center button to start the test. In a moment the following screen will display.
2. **Pass Conditions:**
  - Backlight on during test
  - RTC = between 0–150
  - SDRAM OK
  - Chksum=0X5E6F
  - ID=0X22FA05, (USB ID test)
  - Flash memory capacity (approximate)

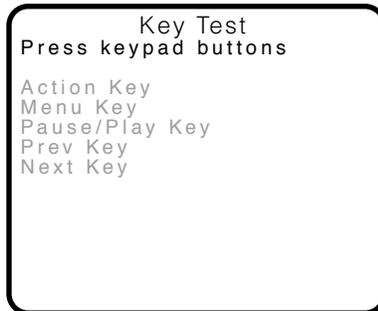


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## KeyTest

Checks function of the 5-button Click Wheel.

1. Press the Center (Action) button to start test. The following screen will display with the button names grayed out.

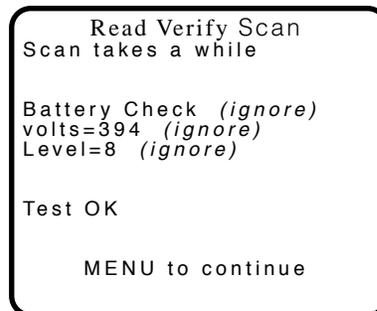
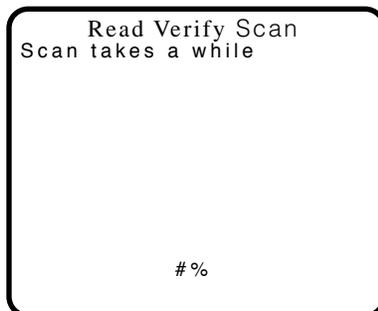


2. Press each Click Wheel button (key):  
As each button is pressed its name will turn black.  
**Pass:** All key names turn black, and screen dims.
3. Press Menu to continue.

## FlashScan

Checks Flash memory. **Note:** This scan takes a while.

1. Press the Center button to start. The following (left) screen will display.  
The scan progress will display as a percentage at the bottom of the screen.
2. **Pass Conditions:**
  - "Test OK" displayed (right)



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## PowerTest

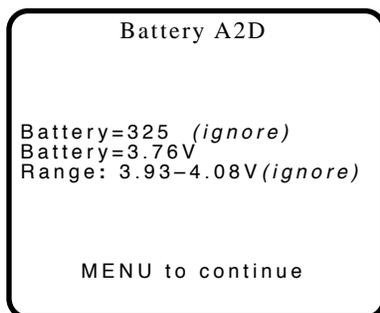
Four power checks will be performed.

- Battery A2D
- VCC Main
- ACC A2D (*ignore this test*)
- Charge Current Test (*ignore this test*)

Press the Menu button to advance to each test.

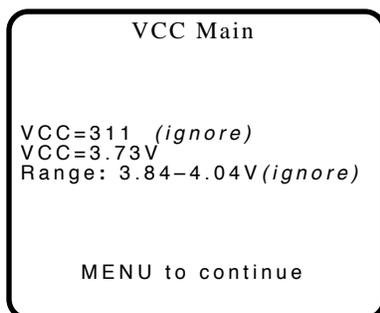
### Battery A2D Test

**Pass:** Battery = between 3.2–4.08V

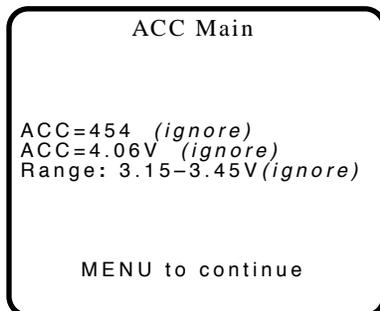


### VCC Main Test

**Pass:** VCC = between 3.2–4.08V

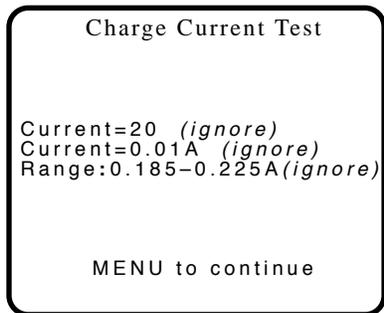


### ACC A2D Test (*ignore this test*)



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## Charge Current Test *(ignore this test)*



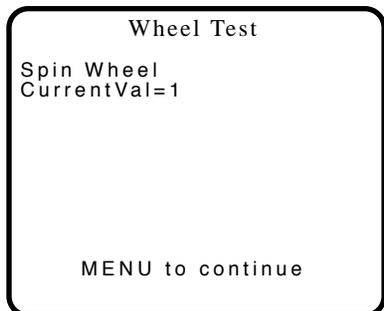
## WheelTest

Click Wheel scroll test.

1. Use your finger to slowly scroll (2-inches per second) around the Click Wheel.

### **Pass Conditions:**

- No dead spots
- CurrentVal scrolls from 1 to 95



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## TouchWheelID

Click Wheel ID test.

**Pass:** Item list 1 = A616013A

```
Touchwheel Register:  
0:8104003a (ignore)  
1:A60C013a  
2:8001023a (ignore)  
3:805B033a (ignore)  
4:8000043a (ignore)  
5:8001053a (ignore)  
  
MENU to continue
```

## Playback

Check Headphones port audio output. A rapid pulsing tone will be heard.

**Warning:** The audio tone may be very loud and piercing, use caution when listening with headphones, or plugging in speakers.

1. Plug in headphones and speakers in turn to listen for the audio tone.

**Pass:** Audio heard

```
PlaybackEmlutorTest  
  
Playing Now...  
MENU to continue
```

## Linein *(skip this test)*

## Status

Hardware information and port status.

1. Plug in and unplug headphones and check correct port status.
2. Plug in FireWire and USB cables (plugged into a power adapter) to check correct port and charging status.

### Pass Conditions:

- LCD: any #
- Serial number displayed (SrNm)
- Model number displayed (Mod#): MA005
- HP (Headphone port status): 0=unplugged, 1 = plugged in
- FW\_PWR\_GOOD (FireWire power detect status): 0=plugged in, 1=unplugged
- USBPWR\_DET (USB power detect status): 0=unplugged, 1=plugged in
- CHRNG (Battery charging status) (**Note:** To detect charging, the battery should NOT be fully charged. Plug into a charging source): 0=charging, 1=not charging

```

      Status
LCD      : 01
SrNm:XXXXXXXXXXXX
MOD#:MA005
HP       : 0
FW_PWR_GOOD : 0
USBPWR_DET : 0
CHRNG    : 0

      MENU to continue
```

## HD\_Specs (not a test)

Capture mass storage specs.

1. Record the information:
  - Model Number
  - Firmware rev (FirmwareRev)
  - Total LBA
  - Total Size: 3.7 to 4.0GB
  - Partition information

```

      HD Info
Model Number:
WE-M-C45K-19D05LT5SS
FirmwareRev:
WE-M-C45K-19D05LT5SS8H

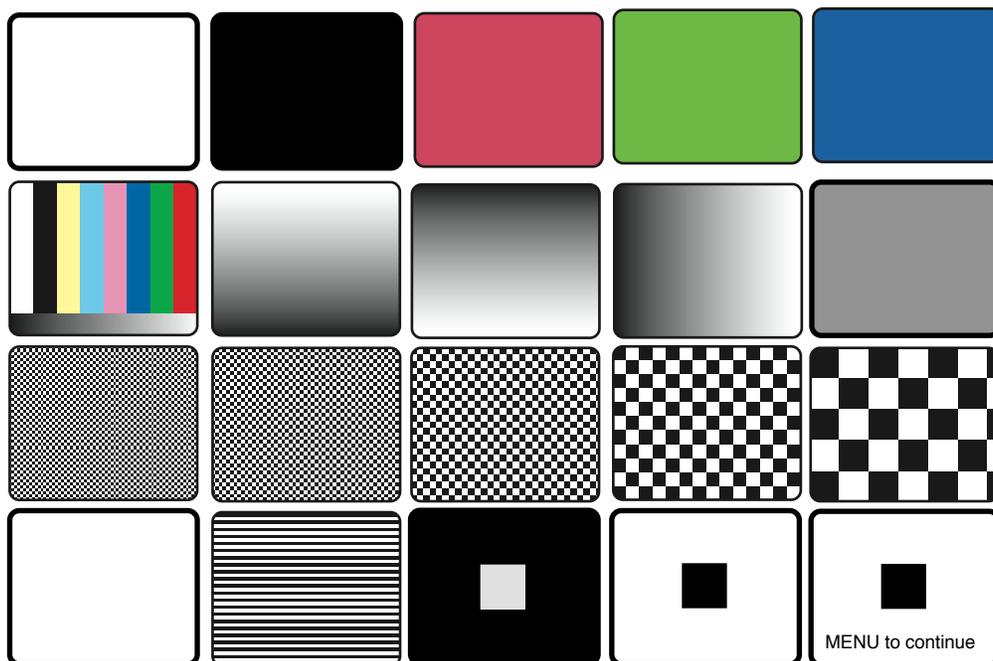
Total LBA: 3999744
Total Size: 3.7GB
Partition:HFS

      MENU to continue
```

## PatternTest

Check LCD with screen patterns and turn backlight on and off.

1. To test the backlight, press the Center button to start. The first screen will be white.
2. Press the Previous button to turn off the backlight. Press the Next button to turn on the backlight. **Pass:** backlight works as expected.
3. Press the Center button to advance through the screen tests.
4. Colors, gradients, and patterns will be displayed (full screen), as shown in left to right order, below. **Note:** These illustrations are rough approximations only, and may vary.



### Pass Conditions:

Screen shows:

- White, Black, Red, Green and Blue
- 8 vertical color bars and 1 horizontal gradient from dark to light
- 3 dark to light gradients
- Gray
- 5 checkerboards, from small to large
- White
- Thin horizontal white and black lines
- Black with white square
- White with black square

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## Sleepshort

Test the Sleep Mode function.

1. Press the Center button to put the unit to sleep.
2. Press the Center button to wake it up.

**Pass:** Functions as expected

## Reset

Test the Reset function.

1. Press the Center button to Reset the unit.

**Pass:** Unit resets and returns to the iPod main menu.



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## Battery Life Test (off line test)

### Notes:

- This test is only required for iPods which are reported having short battery life (less than 12 hours playing time).

**Important:** The start time of this test should be planned carefully to ensure that the iPod will be checked at the times needed. The iPod is initially checked after 15 minutes, and then it must be checked again in 12 hours.

1. Connect the iPod to a computer or power adapter and allow the iPod to charge for at least 4 hours or until the battery is fully charged.
2. From the Settings menu, select Repeat▷All (to play the playlist continuously). All other settings are left unchanged (default settings).
3. Select and play the “iPod Testing” playlist. Record the start time on a piece of paper.
4. Set the Hold button to On, to prevent accidental button activation.
5. Let the iPod play for 15 minutes, then check the status of the iPod:
  - If the iPod is still playing music, then recheck the iPod 12 hours.
6. If the iPod is still playing music when checked again at the specified time, the battery is OK, and passes the test.
7. If the iPod stops playing because the battery depleted, then reject the iPod for short battery life.

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## Restore to Customer's Format

If no trouble was found with the iPod, and it will be returned to the customer, it should be restored to the customer's format, as received (or desired by customer).

- For Windows (if a Windows PC is available)—restore the iPod using a Windows PC.
- If the format is unknown or no PC is available—restore the iPod on a Mac and provide the customer with the “Attention Windows PC Users” letter (p/n 073-0789-E).
- For Mac—restore on the Mac.

### Windows PC restoring

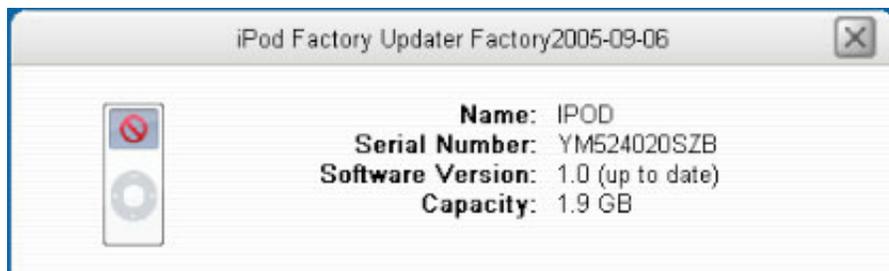
This step removes all the music and data on the iPod and restores it for a Windows PC.

Refer to the Restore iPod Software procedures described earlier, to perform the following:

1. On a Windows XP or 2000 PC, launch the latest release of iPod Updater. An information window displays the iPod model and corresponding software version. Click OK. Wait until you see the message “Plug in an iPod to update it.”

**Note:** You do not need to Reset or put the iPod into Disk Mode.

2. Quit iTunes if it is open.
3. Connect the iPod to the USB 2.0 port on the computer. The iPod screen changes to a “Do not disconnect” screen,” and the iPod Updater window displays the iPod name, serial number, software version, capacity, and the Restore button is available.
4. Click Restore. Click Restore again, when it asks you if you are sure.
5. A progress bar appears. When the progress bar completes, the message “Your iPod has been restored..., and is restarting.” appears.
6. The iPod screen will display the Apple and, in a moment, a progress bar will begin.
7. Wait until the iPod Updater window displays the iPod name and serial number screen, then quit the iPod Updater. The iPod has been Restored.



8. Eject the iPod icon in My Computer.
9. Disconnect the iPod.

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## Mac restoring

This step removes all the music and data on the iPod and restores it, optimized for Mac.

Refer to the Restore iPod Software procedures described earlier, to perform the following:

1. Launch the latest release of iPod Updater on the computer. Wait until you see the message “Plug in an iPod to update it.”

**Note:** You do not need to Reset or put the iPod into Disk Mode.

2. Quit iTunes if it is open.
3. Connect the iPod to the computer with the USB cable. The iPod screen changes to a “Do not disconnect” screen,” and the iPod Updater window displays the iPod name, serial number, software version, capacity, and the Restore button is available.
4. Click Restore. Click Restore again, when it asks you if you are sure.
5. Enter your name and password in the Authenticate screen. A progress bar appears.
6. When the progress bar completes, the message “Your iPod has been restored..., and is restarting.” appears.
7. The iPod screen will display the Apple and, in a moment, a progress bar will begin.
8. Wait until the iPod Updater window displays the iPod name and serial number screen, then quit the iPod Updater. The iPod has been Restored.



9. Eject the iPod icon from the desktop.
10. Disconnect the iPod.

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## **Charge the Battery (unattended operation)**

Before returning an iPod to a customer, charge the battery.

1. If the tested iPod has passed all the tests so far, connect an iPod power adapter to the iPod and charge it for at least 1.5 hours.
2. Ensure that the battery has a good charge. After the charge, the battery symbol should indicate that the charge level is close to 100%. Fail the iPod if the battery is not charged.

## **Clean the iPod**

Before returning an iPod to a customer, use a soft non-abrasive cloth or paper towel dampened with Windex (or equivalent non-streaking cleaning solution).