



iPod Testing Procedures

iPod 5th Generation

19 October 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 5th Generation is shipped from the factory formatted for Windows (FAT32 file system). The first time the iPod is plugged into a computer with iTunes 6 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/>

Preparation

Tools needed

Note: iTunes requires QuickTime 7.0.3 or later to play videos purchased from the iTunes Music Store, or to use music purchased from the iTunes Music Store in other applications (such as iPhoto or iMovie), but this functionality is not tested in these procedures.

- **Apple Macintosh computer** with the following:
 - Mac OS X 10.3.9 or later
 - iTunes 6 or later
 - iPhoto 4.0.3 or later recommended
 - QuickTime 7.0.3 or later
 - iPod Updater 2005-10-12 or latest version (for Mac), from <http://www.apple.com/ipod/download/>
 - “ipod_ChannelCheck” test file, from <http://service.info.apple.com/ipod-tp.html>
 - FireWire 400 port
 - USB 2.0 port
 - About 20 MP3 or AAC music files in iTunes (clean, non-controversial)
- **Windows PC** (If available) with the following:
 - Windows 2000 or XP, with the latest service packs installed
 - iPod Updater 2005-10-12 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 922-5857 or 922-6312)
- Cable, USB to 30-pin (p/n 922-6340) (**Important:** Connect the USB cable to the computer’s high-power USB 2.0 port, not the keyboard or other hub.)
- Cable, audio/video, 3.5mm to (3) RCA (p/n 922-6606)
- Power Adapter, USB, iPod (optional)
- Power Adapter, FireWire, iPod (optional)
- Analog color television (NTSC or PAL) with composite (RCA) audio and video input ports (Yellow, White, Red)
- “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
- 61688, Identifying different iPod models

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

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

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 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” 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.

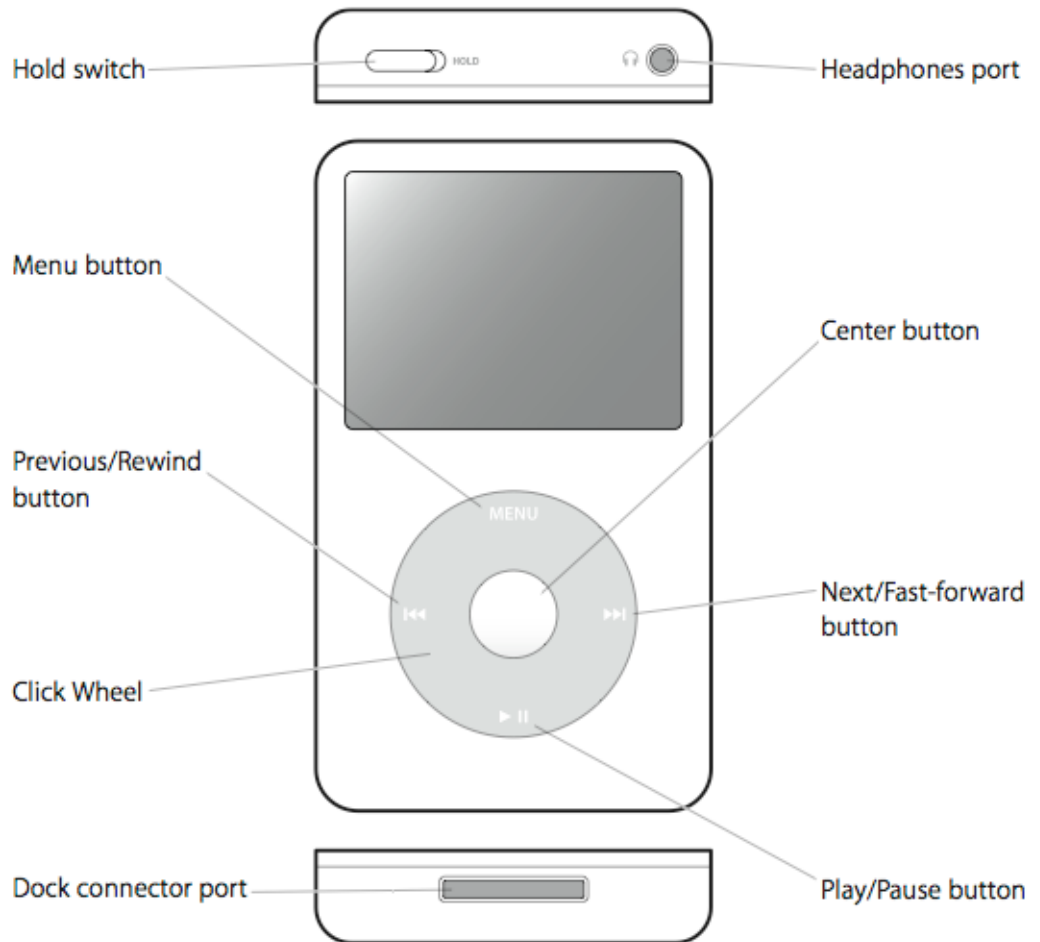
Windows PC Computer setup

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.

iPod External

The iPod controls and ports are referred to throughout these procedures. Use the graphic below to familiarize yourself, and refer back as needed.



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 during operation (no orange showing).
- If you see a folder icon with an exclamation point, refer to Knowledge Base article 61003, for troubleshooting procedures.



www.apple.com/support/ipod

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.

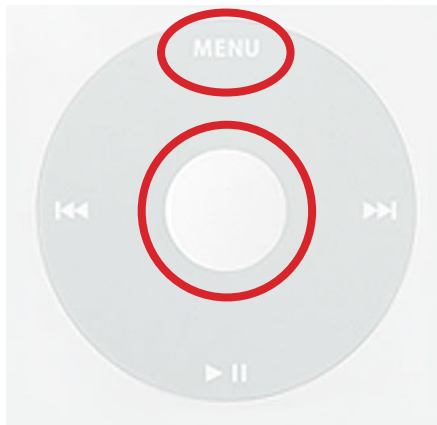
Restore iPod Software

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.

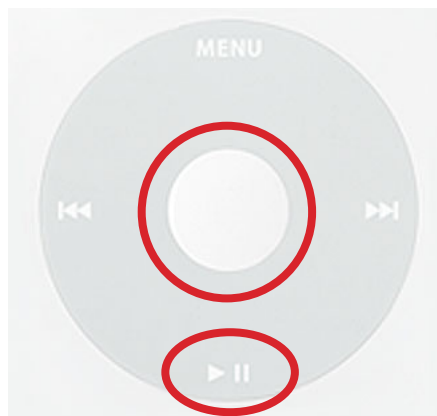
Warning: This procedure reformats the iPod and erases all data.

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.



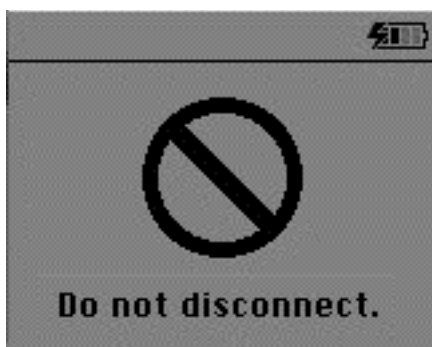
Note: You may need to try several attempts to activate the Disk Mode.

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: Do not connect the cable to 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 5th Generation (30GB): 27.8 GB.
- iPod 5th Generation (60GB): 55.7 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.

iTunes Synchronization Test

1. Open iTunes.

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.

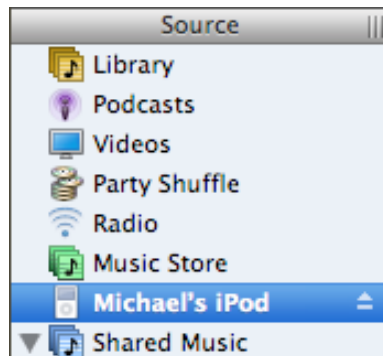


4. In the “Register Your iPod” screen, click Done.



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.

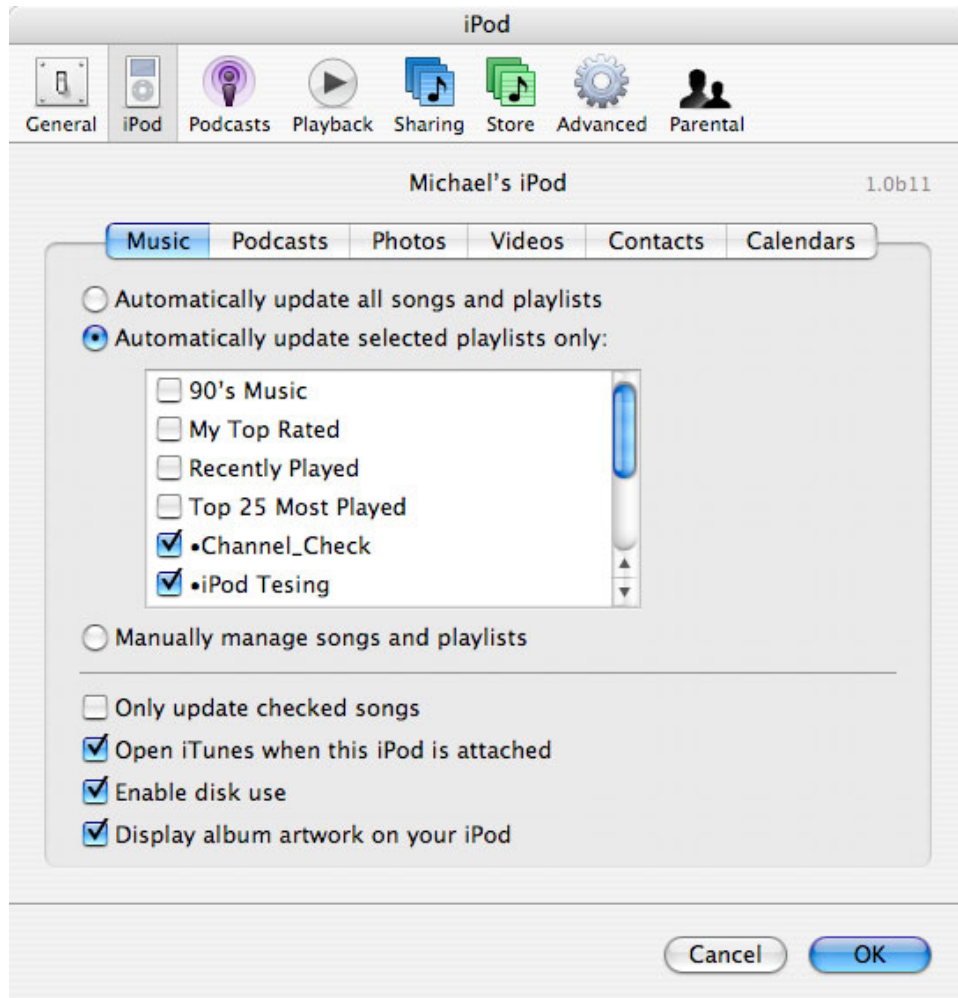
5. In the iTunes playlist Source panel, select the iPod icon.



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



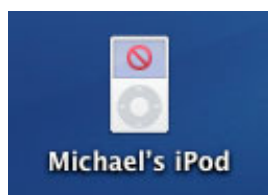
7. Select the Music tab, and make the selections shown below. Ok the popup dialog box asking if you are sure.



8. Click OK. iTunes will begin copying the music to the iPod.

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. When the iPod is connected to a power source, the battery icon shows that the battery is charging or fully charged.



	Battery charging
	Battery fully charged

Note: When the iPod is NOT connected to a power source, the battery icon shows approximately how much charge is left.

	Battery is less than 20% charged
	Battery about halfway charged
	Battery fully charged

2. When the download is complete, eject the iPod by selecting its icon in the Source panel of iTunes, then either click the eject symbol in the Source panel or the iPod eject button at the bottom right corner of the iTunes window.

This ejects the iPod from the Source panel and the desktop.



3. The Language screen appears on the iPod.
4. Disconnect the iPod from the computer.

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” 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.
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/Pause button to pause 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.

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.

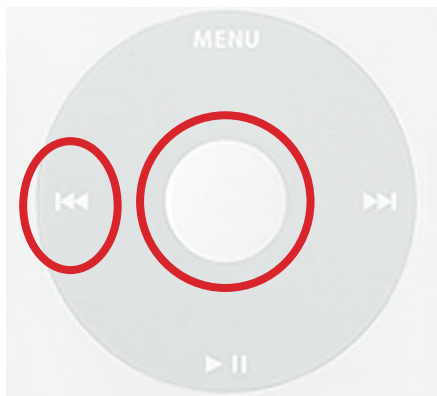
1. Make sure the iPod is NOT connected to the computer.
2. Reset the iPod by simultaneously pressing and holding the Menu and Center buttons.



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.



4. 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.

Navigation Notes:

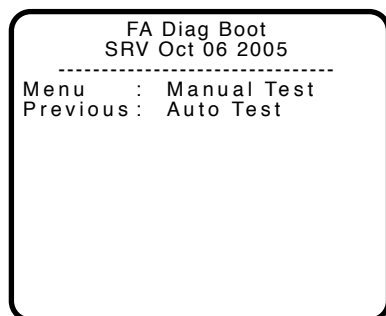
- Navigate through the lists of tests by using the Click Wheel or the Next and Previous buttons to move the selection pointer “>” up and down the list.
- Start a test by pressing the Center button (sometimes referred to as ACTION key).
- Press the Menu button to continue, or return to previous diagnostics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

Auto Tests

The first screen is a “jump” screen to choose either manual or auto testing. **Note:** You cannot get back to this menu without resetting the iPod and re-entering the internal diagnostics.

Important: If an auto test cannot be performed or the test was not run correctly, manually run the test from the manual test menus at the end, after the auto testing has completed.

These testing procedures will first perform the Auto Test, and then selected tests from the Manual Test menus.

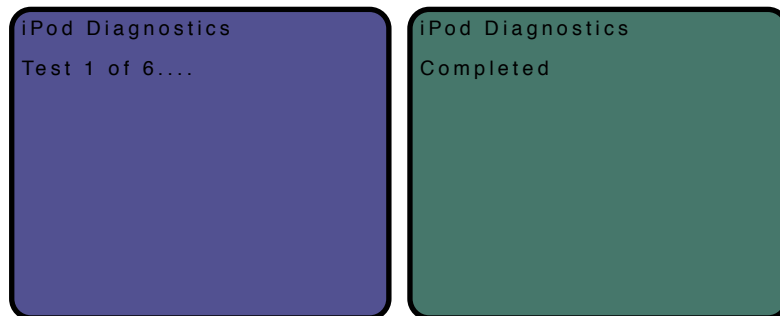


Note: You will need to keep the Dock connector-type FireWire and USB cables handy during these procedures.

1. Press the Previous button on the Click Wheel to start the Auto Test. The Auto Test runs a variety of tests, each activated after the next by pressing the MENU button.

Graphic Self Test

1. The first test is a Graphic Self Test. Six internal tests will be performed and the following screens will display.

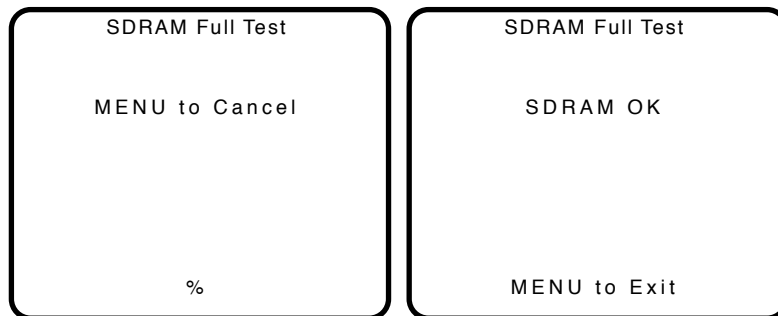


2. **Pass Conditions:**
 - The test starts with a blue screen and ends with a green screen, and says Completed.
3. Press MENU to continue.

SDRAM Full Test

1. The following screens will display. The test will show its percentage progress at the bottom of the first screen.

Pass Conditions: SDRAM OK

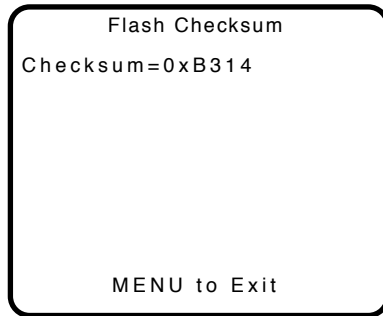


2. Press MENU to continue.

Flash Checksum

1. A Flash checksum test.

Pass Conditions: Checksum=0xB314

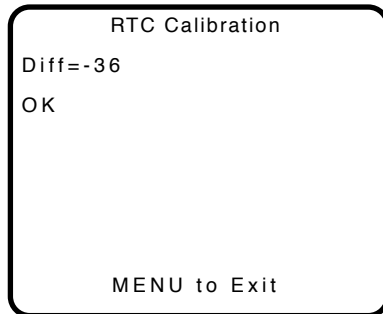


2. Press MENU to continue.

RTC

1. An RTC calibration test.

Pass Conditions: Reading must be between -100 and 100

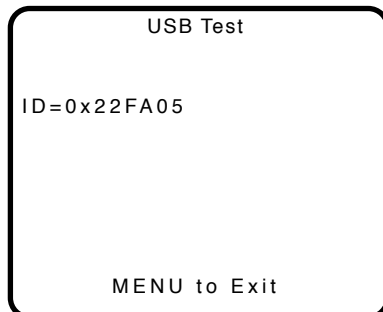


2. Connect the iPod to the computer with a USB cable.
3. Press MENU to continue.

USB Test

1. A USB ID and detect test.

Pass Conditions: ID=0x22FA05

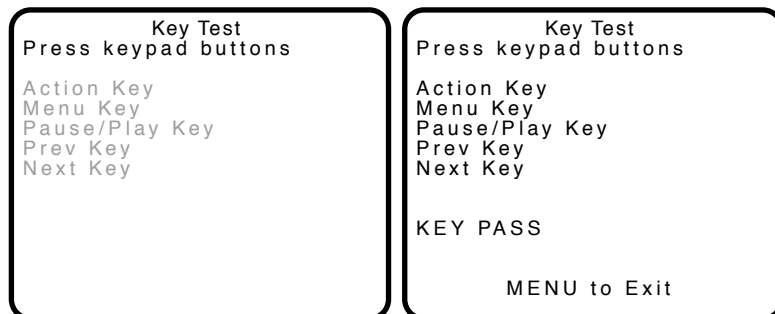


2. Disconnect the USB cable from the iPod.
3. Press MENU to continue.

Key Test

1. Tests the function of the Click Wheel buttons. The keys titles are grayed out until pressed.

Pass Conditions: KEY PASS



2. Press MENU to continue.

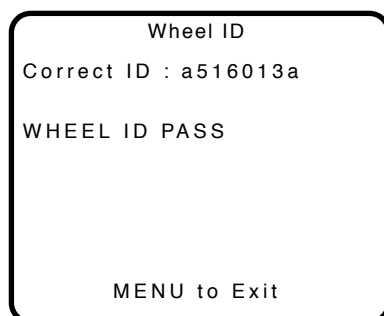
Wheel ID Tests

The Wheel ID has two tests:

Wheel ID: Checks the Wheel ID informations

Pass Conditions:

- Correct ID: a516013a
- WHEEL ID PASS

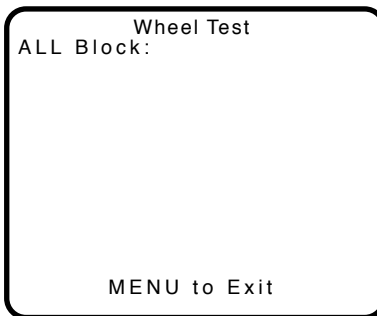
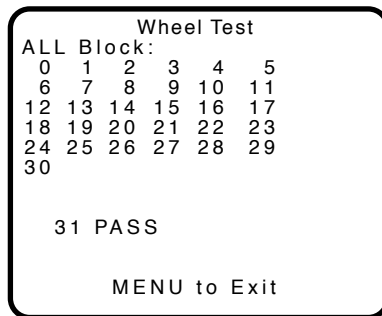


1. Press MENU to continue.

Wheel Test: Tests the 32 sectors on the Click Wheel

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

Pass Conditions: All sectors (numbers in the matrix) must disappear



2. Press MENU to continue.

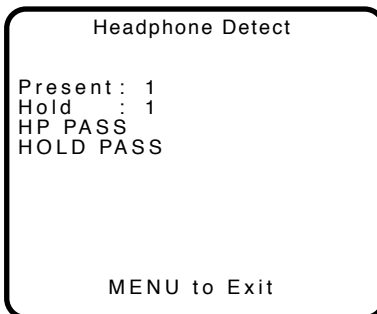
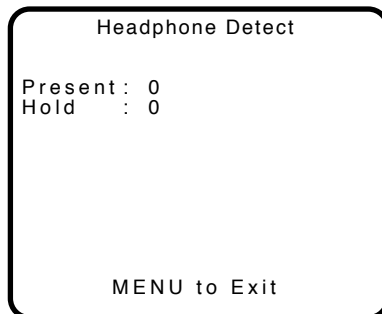
Headphone Detect

Tests status of the headphone port and Hold switch:

1. Plug in headphones into the headphone port.
2. Slide the Hold switch to the hold position (orange shows).

Pass Conditions:

- HP PASS
- HOLD PASS



3. Slide the Hold switch to off.
4. Remove the headphones.
5. Press MENU to continue.

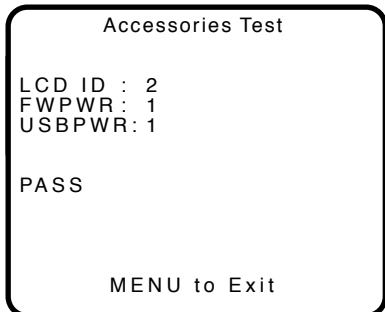
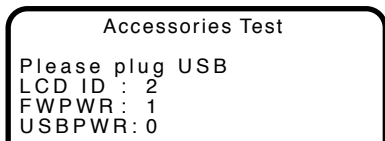
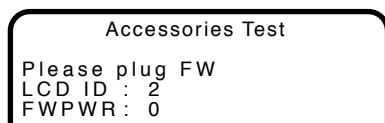
Accessories Test

This test uses both a FireWire and USB cable connected to the computer.

1. Connect the iPod to the computer with the FireWire cable.
2. Disconnect it from the iPod.
3. Connect the iPod to the computer with the USB cable.
4. Disconnect it from the iPod.

Pass Conditions:

- LCD ID: any number
- PASS



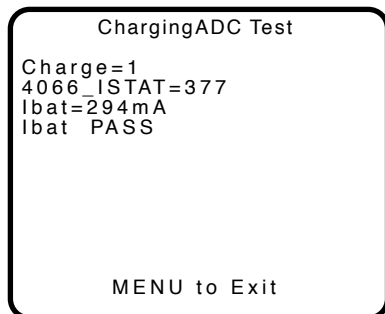
5. Connect the iPod to the computer with the FireWire cable.
6. Press MENU to continue.

Charging ADC Test

The battery should not be fully charged for this test.

Pass Conditions:

- For 30GB iPod: Ibat = less than 333mA
- For 60GB iPod: Ibat = less than 490mA



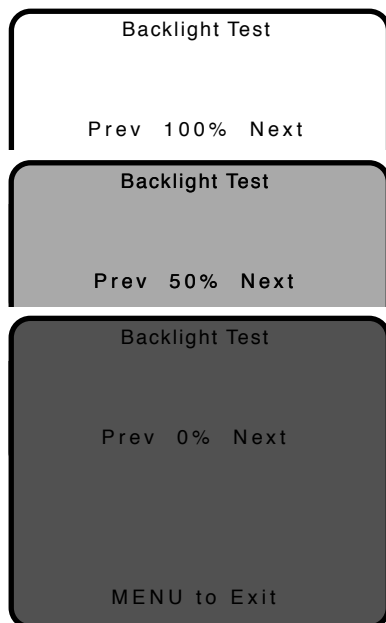
1. Press MENU to continue.

Backlight Test

Tests backlight control by using the Previous and Next buttons.

1. Press the Previous button to reduce the backlight brightness by 50%, then again to reduce to 0%.
2. Press the Next button to advance the backlight brightness to 100%.

Pass Conditions: Works as expected.



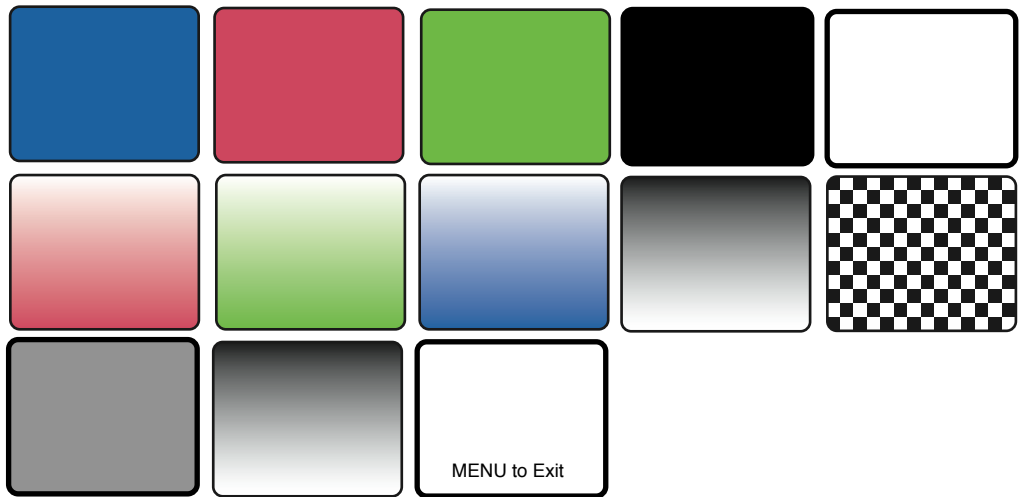
3. Press MENU to continue.

Color Test

Tests the LCD screen display with colors and patterns.

1. Press the Center button to advance through the screens.

Pass Conditions: The screen representations shown below are displayed.



2. This is the end of the Auto Test.
3. Press MENU to continue to the manual test menu screens.

Manual Diagnostic Testing Menus

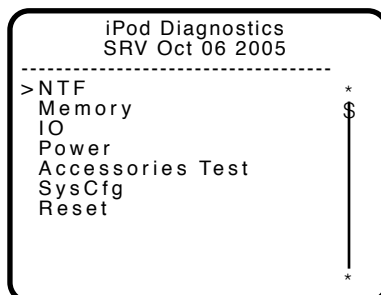
The following menu screens provide manual tests that can be run individually.

For these testing procedures, only certain tests will be performed here.

Notes:

- You cannot get back to the beginning Auto/Manual jump menu or the Auto Tests without resetting the iPod and re-entering the internal diagnostics.
- If you missed a test in the Auto Test procedures, most of them (except the full SDRAM test) can be found and run individually under the NTF menu heading, instead of going back through the entire Auto Test.
- The SDRAM Full Test can be found under the Memory heading.
- Press the Previous or Next buttons or scroll the Click Wheel to move the selection pointer.

Here are the menu screens under the NTF heading, for your reference.




```
NTF
SRV Oct 06 2005
-----
>AutoTest *
$
*
```

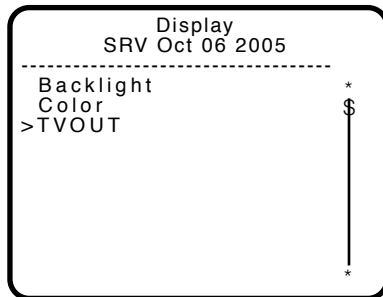
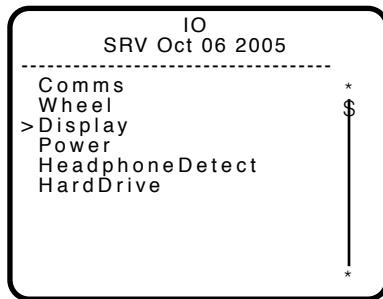
```
Auto test
SRV Oct 06 2005
-----
>Graphic Self Test *
SDRAMQuickTest $
Checksum
RTC
USBTest
KeyTest
WheelTest
HeadphoneDetect
Accessory Test
ChargeADC
Backlight
Color *
```

IO Test

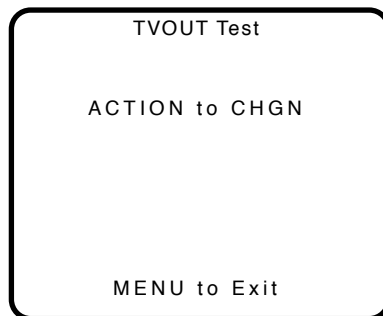
This test connects the iPod to an analog television with the Apple audio/video cable to test for an NTSC or PAL signal.

1. Connect the Apple audio/video cable's RCA (Red, White, Yellow) connectors to the audio and video input ports that will be used on the television set.
2. Set the television to display from these input ports (see the television's manual)
3. Follow the menu selection path below and select TV OUT.

```
iPod Diagnostics
SRV Oct 06 2005
-----
NTF *
Memory $
>IO
Power
Accessories Test
SysCig
Reset *
```



4. Press the Center button to change the display.



Pass Conditions: The television displays the NTSC/PAL test signal (8 vertical bars: white, yellow, light blue, green, maroon, red, blue, black).

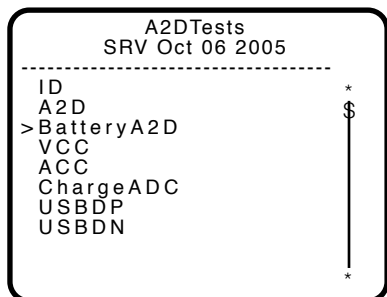
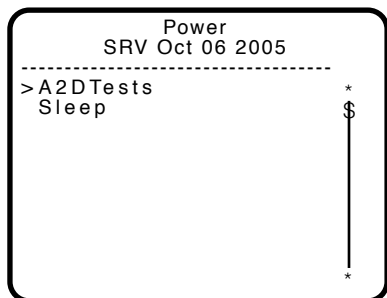
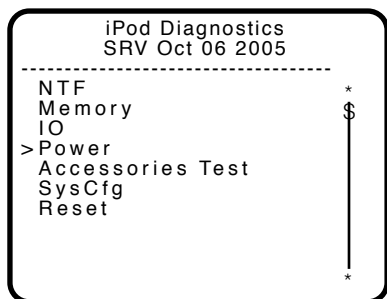
5. Press MENU to exit.

Power A2D Tests

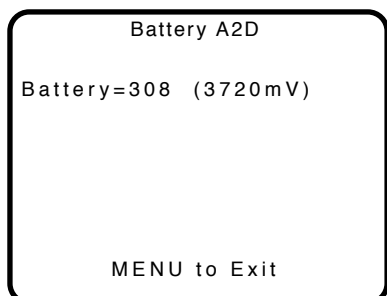
For these tests, verify the iPod is disconnected from the computer. The second test uses both a FireWire and a USB cable.

Battery A2D:

1. Follow the path below and select Battery A2D.



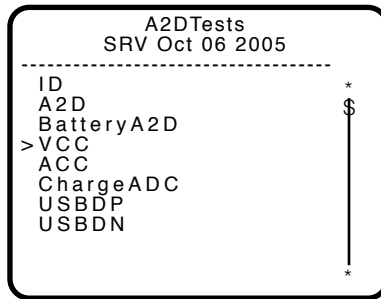
Pass Conditions: Battery = must be between 3300mV and 4700mV.



2. Press MENU to exit.

VCC:

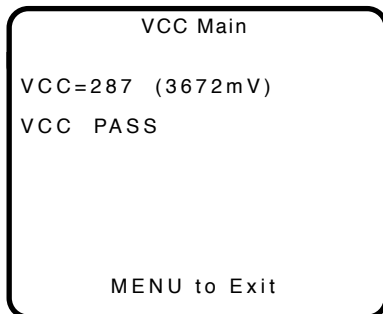
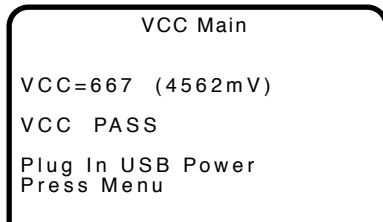
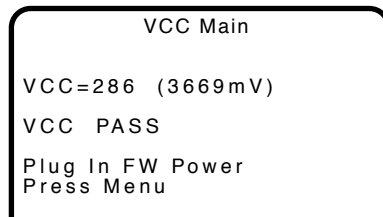
1. Select VCC.



2. Connect the iPod to the computer with the FireWire cable.
3. Disconnect it from the iPod.
4. Connect the iPod to the computer with the USB cable.
5. Disconnect it from the iPod.

Pass Conditions:

- VCC = must be between 3300mV and 4700mV.
- VCC PASS



6. Press MENU to return to the Sleep menu item under Power.

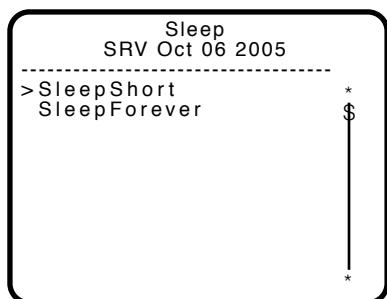
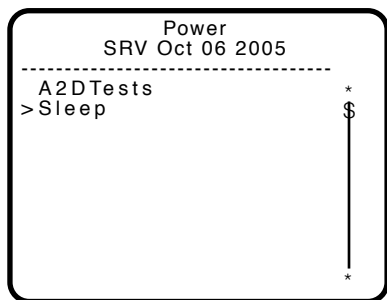
Power Sleep Tests

Two sleep tests will be performed. The second test resets the iPod and returns it to the main iPod menu screen.

SleepShort:

1. Follow the path below and select SleepShort. The iPod will go to sleep.
2. After 10 seconds, press the Center button to wake the iPod.

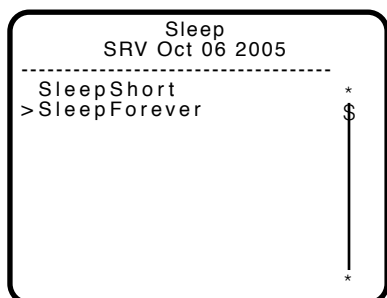
Pass Conditions: iPod wakes.



SleepForever:

3. Select SleepForever. The iPod will go to sleep.
4. After 10 seconds, press the Center button to wake the iPod. The iPod will reset.

Pass Conditions: iPod resets and returns to the main iPod menu screen.

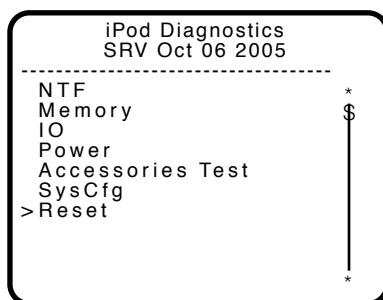
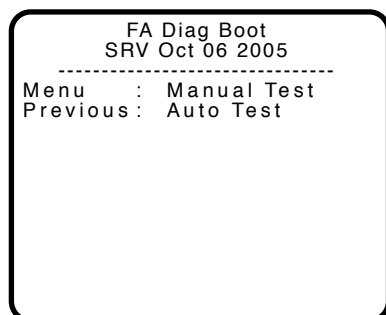


Reset

This test uses the iPod internal diagnostics to test the reset function.

1. Re-enter the iPod internal diagnostics.
2. Press MENU to select the Manual Tests.
3. Select Reset in the menu selections, and the iPod will reset.

Pass Conditions: iPod resets and returns to the main iPod menu screen.



Battery Life Test (off line test)

Note: This test is only required for iPods which are reported having short battery life:

- 30GB model — less than 12 hours audio playing time
- 60GB model — less than 18 hours audio 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 or 18 hours (depending upon the model).

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 in 12 or 18 hours (depending upon the model).
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.

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.

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.

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%.

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).