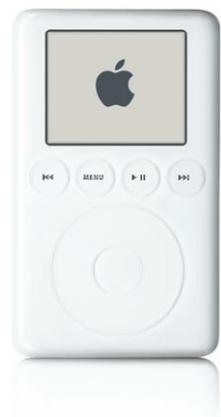




iPod Testing Procedures

iPod (with Dock Connector)

16 May 2005





Testing Procedures

Purpose

These procedures are a tool to help identify an iPod hardware failure point before sending the iPod in for repair. The procedures include a list of tools, computer setup, Restoring procedures, various standard tests and checks, built-in iPod diagnostic tests, and the battery life test.

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).

How To Use These Procedures

These “iPod Testing Procedures” are available for download in PDF format, along with a supporting audio test file at: <http://service.info.apple.com/ipod-tp.html>

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

Refer to the Preparation section, below, to determine other setup needs.

The procedures are written in a beginning-to-end format, but it is not required to complete all the procedures.

You may find that 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, due to the beginning-to-end structure, an earlier procedure may set up the iPod or connections needed for a later procedure.

Warning: These procedures reformat the iPod for the Mac, and erase all data. If all tests complete successfully, the iPod is returned to its original shipping condition, with the most current Mac version of its iPod software installed.

Preparation

Tools needed

- Apple Macintosh computer with the following:
 - Mac OS X 10.3.4 or later
 - iTunes 4.5 or later
 - iPod Updater (latest version, from <http://www.apple.com/ipod/download/>)
 - “ipod_ChannelCheck.mp3” test file (download from <http://service.info.apple.com/ipod-tp.html>)
 - FireWire 400 port
 - USB 2.0 port
 - A minimum of a CDs worth of MP3 or AAC music files in iTunes
 - A 40 MB file (at least) on the hard drive (for USB file transfer testing) (place it somewhere other than the desktop)
- iPod Remote (p/n 922-5860)
- Audio headphones
- iPod FireWire 30-pin to 6-pin cable (p/n 922-5857 or 922-6312)
- iPod USB 30-pin to 6-pin cable (p/n 922-6340)
- iPod 8 watt power adapter (p/n 661-3123)

Computer setup

1. Install the latest iPod Updater onto the Macintosh computer.

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 version 4.5 or later.
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.

Initial Inspection

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

Under warranty

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

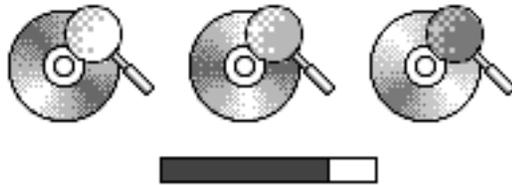
- Note the position of the Hold switch as it was received. Make sure the Hold switch is off (no orange showing) during operation.
- Watch the iPod screen when turning it on, for a low-battery icon (shown below) that may display for approximately three seconds.
If this happens connect the iPod to the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



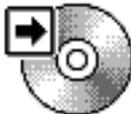
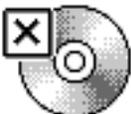
- If a hardware failure is detected, the following icon will be shown. Fail the iPod.



- 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 Select button for approximately three seconds) and will repeat the next time the iPod is turned on.

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

Warning: This procedure erases all data on the iPod, and formats it for Macintosh computers.

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 Play buttons.



2. When the Apple icon appears in on the iPod screen, immediately, and simultaneously, press and hold the Previous and Next buttons,



until you see the Disk Mode screen.



3. 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 FireWire 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. Example shown here:



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

- iPod (10 GB with Dock Connector): 9.2 GB.
- iPod (15 GB with Dock Connector): 13.9 GB
- iPod (20 GB with Dock Connector): 18.5 GB
- iPod (30 GB with Dock Connector): 28 GB
- iPod (40 GB with Dock Connector): 37 GB

6. Click Restore. Click Restore again, when it asks you if you are sure.
7. Enter your name and password in the Authenticate screen.
A progress bar appears.



8. When the progress bar completes, the message "Your iPod has been restored..., and is restarting." appears.



9. Quit the iPod Updater, and disconnect the iPod (**Note:** This is correct to do, even though the Updater says otherwise). The iPod screen will say it's OK to disconnect.
10. Reset the iPod by simultaneously pressing and holding the Menu and Play buttons.
11. Reconnect the iPod to the computer with the FireWire cable.
12. The iPod screen will display the Apple and, in a moment, a progress bar will begin.



13. When the update completes, iTunes, and the iPod Setup Assistant should open.

iTunes Synchronization Test

1. Open iTunes if it didn't launch automatically.
2. The iPod Setup Assistant window will be displayed.
3. Uncheck the "Automatically update my iPod" box, then click Done.



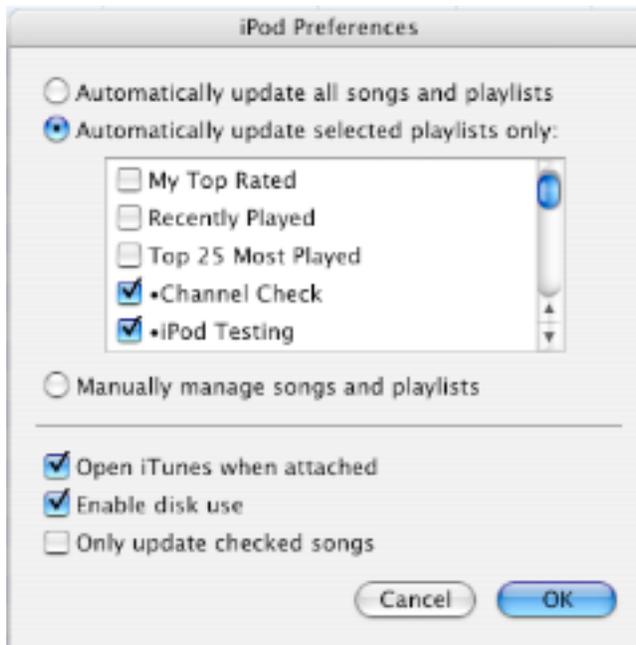
4. In the iTunes playlist Source panel, select the iPod icon.



5. Select the "Display iPod options" button at the bottom right corner of the iTunes window to open the iPod Preferences.



6. Make the selections shown below, and click OK, and OK the "Are you sure..." window.



7. The iPod will download the music in the test playlists selected above.

FireWire Disk Mode Test

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



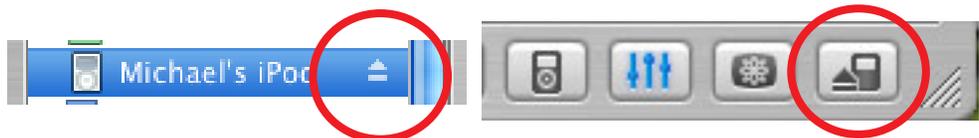
2. If not, select the iPod icon in the iTunes Source panel, then select the "Display iPod options" button to open iPod Preferences (see above instructions), and make sure the "Enable disk use" check box is checked.

Battery Charging Check

1. Make sure that the animated battery charging symbol appears at the top right corner of the iPod screen.



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.

iPod Screen Check

1. In the Language screen, English should be highlighted. Click the Select button to select it. The iPod screen appears.
2. Make sure the screen displays properly with no pixels missing.
3. 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, reject the iPod.
4. If the screen is too dark or too light, adjust the Contrast from the Settings menu to get a normal contrast.

Note: If the adjusted contrast is less than 25% (less than a quarter of the contrast bar) or more than 75% (more than 3 quarters of the contrast bar) then reject the unit for “Contrast excessive adjustment.”

Control Buttons & Audio Test

1. Use the touchwheel to scroll up and down the menu. Make sure that you hear the clicker sound when rotating the touchwheel.
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 Select.
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 touchwheel 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 button to stop the playback.
11. Slide the Hold button on (to reveal the orange color). Scroll the touchwheel 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.

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. Press and hold the Menu button a few seconds to turn on the screen backlight, as well as the backlight on the four buttons.
2. Press and hold the Menu button again to turn off the screen backlight.

Built-in Diagnostic Tests

Note: 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 Play buttons.



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



4. When the Apple icon disappears, release the buttons.

-
5. A beep will be heard, and the first of two menu screens of tests will be displayed (both screens, in order, shown here).

A . 5 IN 1
B . RESET
C . KEY
D . AUDIO
E . REMOTE
F . FW ID
G . SLEEP
H . A2D

I . OTPO CNT
J . LCM
K . CHG STUS
L . USB DISK
M . CHK SUM
N . CONTRAST
O . HDD SCAN
P . RUN IN

Navigation Notes:

- Navigate through the list of tests by using the Next and Previous buttons to move up and down the list.
- Start a test by pressing the Select button (sometimes referred to as ACTION button).
- Press the Play button to continue, or return to the diagnostics menu list.
- Reset the iPod to leave the diagnostics.

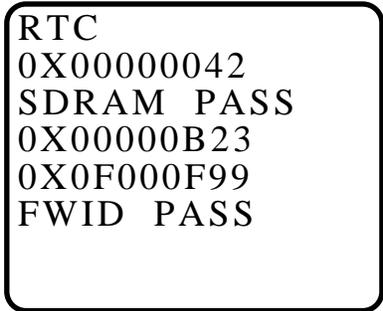
A . 5 IN 1

This includes tests for: LCM, RTC, SDRAM, FLASH CHKSUM, FW ID, and BUZZER.

LCM:

1. The iPod screen will be blank.
2. Press the Select button, the screen will go black.
3. Press Select, four different shade grayscale bars will appear.

4. Press Select, a dark cross appears, and the backlight is turned on. Make sure there are no missing lines and the backlight is on.
5. For the next tests, six lines of text will appear automatically:



```
RTC
0X00000042
SDRAM PASS
0X00000B23
0X0F000F99
FWID PASS
```

RTC (lines 1 and 2):

- Pass = RTC must be between 0x00000000 and 0x00000050

SDRAM (line 3):

- PASS or FAIL indicated

FLASH CHECKSUM (line 4):

- N/A (Ignore for now)

FW ID (lines 5 and 6):

- Pass = FW ID shows PASS

6. Individually press the Previous, Menu, Next, and Select buttons, to hear four different buzzer sounds.

B . RESET

1. Skip this test.

C . KEY

1. Start the test and press all 5 buttons, in any sequence, within 5 seconds (or will show KEY FAIL).

D . AUDIO

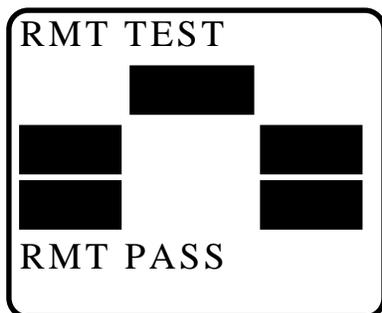
1. Plug headphones into the iPod.

Caution: Loud rapid drumbeats will be played that can be startling, if you're not expecting them.

2. Start the test. You will hear a rapid drum beat sound from the headphones.
3. Pass condition = iPod behaves as indicated.

E . REMOTE

1. Plug in the remote control.
2. Start the test and press all 5 buttons on the remote control (Play/Pause, Next, Previous, Volume up, Volume down), in any order, within 5 seconds (or will show RMT FAIL).
3. A pass condition shows (approximately) the following screen, with RMT PASS:



F . FW ID

1. Pass condition = FW PASS.

G . SLEEP

1. Skip this test.

H . A2D (This test must be run before running the CHG STUS (K) test)

1. Ignore the test display screen. There is no fail condition. This test is required to be run before the CHG STUS test (K).

I . OTPO CNT

1. A similar screen to the following, with the third line of numbers being displayed when using your finger on the touchwheel.
2. Pass condition = number counts up when rotating clockwise, and counts down when rotating counterclockwise.

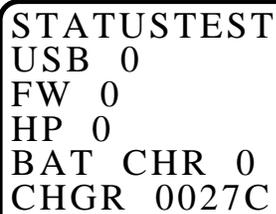


J . LCM

1. Skip this test.

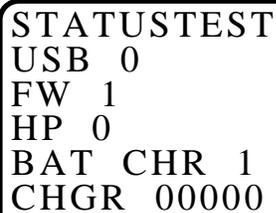
K . CHG STUS (A2D (H) must be run before running this test)

1. Connect the iPod to the computer with the FireWire cable, if not already connected.
2. Start the test.
3. The screen should show a screen similar to the following:



```
STATUSTEST
USB 0
FW 0
HP 0
BAT CHR 0
CHGR 0027C
```

4. Pass conditions:
FW = 0
BAT CHR = 0
CHGR XXXXX (XXXXX is not 00000)
5. Disconnect the FireWire cable.
6. Start the test. The screen should show a screen similar to the following:



```
STATUSTEST
USB 0
FW 1
HP 0
BAT CHR 1
CHGR 00000
```

7. Pass conditions:
FW = 1
BAT CHR = 1
CHGR = 00000

L . USB DISK

1. Start the test.
2. Connect the iPod to the computer with the USB cable. In a few seconds the iPod icon will appear on the desktop. If not, Fail the iPod.
3. Drag the iPod icon to the trash to unmount it.

M . CHK SUM

1. Skip this test.

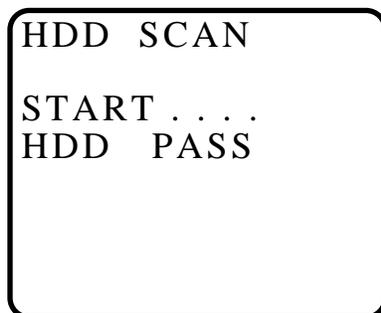
N . CONTRAST

1. Four text lines will appear on the screen. The last line is similar to the following:
0X0000006x
2. Use your finger to scroll the touchwheel clockwise. The last digit will increase, and the display will become darker.
3. Scroll counterclockwise. The digit will decrease, and the display will become lighter.
4. Return the display to a normal contrast.
5. Pass condition = iPod behaves as expected.

M . HDD SCAN

Important: The hard drive scan can take approximately 20 minutes. You may want to save this test (and the battery test) for when the time can be allotted. If postponing, remember to complete this test later, if needed.

1. Plug the iPod into an iPod power adapter, or to the computer with the FireWire cable.
2. When the test is complete, the following screen should be displayed:



3. Pass condition = HDD PASS.
4. Press the Play button to go back to the diagnostics.
5. Press and hold the Menu and Play buttons simultaneously until the Apple icon appears, to Reset the iPod.

N . RUN IN

1. Skip this test.

Battery Life Test (off line test)

Notes:

- This test is only required for iPods which are reported having short battery life (less than 6.5 hours playing time).
- For iPods returned during the 2nd year under APP (Apple Protection Plan), the testing time is 4 hours.

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 either 4 or 6.5 hours, depending on the required test.

1. Connect the iPod to the computer with the 6-pin FireWire cable and allow the iPod to charge for 4 hours to fully charge the battery.
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 again at 4 or 6.5 hours, depending on the required test.
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 Shipping Configuration

This step removes all the music and data on the iPod and restores it to the manufacturing configuration.

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 FireWire 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. Open iTunes if it didn’t launch automatically.

Note: If iTunes was already open, quit and re-launch it.

10. The iPod Setup Assistant window will be displayed.
11. This time, click Cancel.



12. Drag the iPod icon on the desktop to the Trash to unmount it.
13. Disconnect the iPod.

Charge the Battery (unattended operation)

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.

Note: It may take about five minutes after disconnecting the iPod from power for the battery charge symbol to indicate its full charge.