

Yaesu Fusion Firmware Update

How to check your firmware and DSP version and how to update them

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Table of Contents

Table of Contents	1
CAUTION	2
Why do I need to update Firmware?	3
What needs to be updated?	3
Controller Firmware	3
DSP Firmware	3
Display Firmware	4
Checking Versions FT1D	5
Controller Firmware	5
DSP Firmware	5
Checking Versions FT2D	6
Checking Versions FTM-100DR	7
Checking Versions FTM-400(X)DR	8
Checking Versions FT-991	9
DR-1 Repeater Firmware Version check and Update	10
Controller Firmware	10
HRI-200	11
Hardware Notes	11
The Current Firmware Versions	12
Note on WiRES-X 1.1.2 and DR-1X 1.10J	13
A note on DSP versions	13
Where to Get the Current Firmware Versions	14
What if I Don't Have a PC?	14
Special Note Regarding WiRES-X	15
Owners of a WiRES-X Node not connected to a repeater	15
Owners of a repeater who link to a WiRES-X node	15
Owners of a repeater who use a hard-wired HRI-200	15
Owners of a repeater with an Arcom, Scm, ADR, or some other old-fashioned analog repeater controller attached.	15
Clarifications	15

DR-1(x) 1.00m/n	15
DR-1X 1.10D/Q	15
DR-1X 1.00t	16
HRI-200 1.01	16
HRI-200 1.10 WiRES-X Windows software	16
DV4mini	17
SharkRF OpenSpot	17
Revision History	18
Disclaimer	20
Copyright	20

CAUTION

Please keep the following in mind when updating your radio:

1. Use the correct country version. Radios now have different versions for different regions of the world. If you accidentally use the wrong version, your radio may fail to function. If this happens, repeat the procedure using the correct firmware for your region.
2. Follow Yaesu's instructions exactly. Check them off as you accomplish them. Most firmware updates are because the instructions were not followed correctly.
3. If your repeater has 1.10D/J firmware - do not update it unless Yaesu specifically releases firmware for an update to 1.10D/J.
4. There are two different firmware update channels for the repeater. The 1.00b/m/n and 1.00f/t channels are not interchangeable. See firmware update chart for your channel. These two versions will eventually be merged into one.

Why do I need to update Firmware?

Fusion is a new system and is still being developed. So far we have only seen the tip of what Fusion can do. Over the next few years, Yaesu will be releasing updates to the repeater and radios as well as producing new Fusion-capable equipment.

In the past when you bought an HT what you got was what you got - there was no way to update it. That has all changed. Because all of the firmware in your radio can be updated, the radio you bought today is capable of doing new things tomorrow.

The other reason you need to keep firmware up to date is because there are bugs. Early versions of firmware had problems that caused people to be very unhappy with their radios - some even sold them!

So keep your firmware up to date! That will keep your local repeater operator happy and will let you get the most out of Fusion with the people you meet.

What needs to be updated?

There are at least two firmware “packages” in your radio. They are the controller firmware and the DSP firmware.

Controller Firmware

The Controller is responsible for running the LCD, responding to your button presses, telling the transmitter to transmit, and basically controls all of the functions you can control. Until recently most radios only had Controller Firmware - and it couldn't be changed. With some new, modern radios, the Controller Firmware can be updated - but there's a catch.

You need the firmware running to update the firmware. Right? What if something goes wrong with the update? You run the risk of “bricking” the radio - i.e., turning it into a brick since the Controller doesn't have valid firmware anymore and it can't be updated because the firmware isn't running. Ouch!

Fortunately Yaesu has solved this problem. Many microcontrollers (or microprocessors) have a “boot mode”. This is firmware produced by the chip's manufacturer that can never be changed - it comes with the chip. This firmware is used to load the controller's main memory with firmware the customer (Yaesu) has written. Unfortunately the controller needs to know which mode it's in and that can't be done by using firmware (for obvious reasons). That's why Yaesu has a switch that needs to be in Boot Mode to allow the Controller's firmware to be updated.

If you haven't flipped the switch, you haven't updated the Controller Firmware! (You probably updated the DSP.)

DSP Firmware

The Fusion radios contain a custom integrated circuit that contains all of the C4FM signal processing. This chip takes the analog signal from the detector, converts it to digital, then through (mostly) hardware and firmware, decodes the signal into bits. These bits are either used by the Controller for display or other communications or they are used to produce speech. This chip also contains a Vocoder which contains a model of the human vocal tract. Through this model it is able to produce good quality speech at very low bitrates.

While most of the work is done in custom hardware, the chip also contains a general purpose Digital Signal Processor (DSP). The DSP allows the chip to be configured for different purposes (say DMR, MotoTrbo, Fusion, etc.). It also allows Yaesu to introduce new modes and make other improvements.

The DSP firmware is loaded into the DSP every time the radio is turned on. The firmware is stored in a file which can be updated by the controller. Note that even if there is no DSP firmware, the radio can still be operated since the main Controller Firmware is in charge and it's working.

The DSP firmware **MUST** be kept up to date. It is critical that all radios in the system run the current DSP firmware. Different versions will cause incompatibilities between radios. Also the DSP firmware and the Controller Firmware must be compatible. If they are incompatible versions, (i.e., you updated the DSP but not the Controller), there's no telling how badly your radio will behave.

If you updated your firmware and you didn't flip a switch, you updated the DSP only.

Display Firmware

The display also has a microcontroller and associated firmware. Since it is not possible to connect directly from the PC to the display, it's necessary to use the main CPU as a communications bridge. This requires setting the main CPU into a communication bridge mode with the display, setting the display to the boot position and rebooting it (since turning off the power would also reset the main CPU), then transferring the new firmware.

As with the DSP, the display firmware update only updates the display firmware. If main or DSP CPUs need to be updated, they require separate procedures.

Checking Versions FT1D

Controller Firmware

It's necessary to enter the diagnostics mode to check the firmware version. Follow these steps:

1. Turn the radio off.
2. Press and hold the BAND key
3. Turn the radio on
4. When the screen shows a test pattern, release the BAND key
5. Momentarily press the BAND key again
6. The display will show the Controller Firmware version.
7. Turn the radio off

DSP Firmware

The DSP Firmware can be checked using menu commands. Follow these steps:

1. Turn the radio on
2. Select the 'A' side of the radio. This is the only side that can do Fusion digital.
3. Select a digital mode (to enable the DSP).
4. Press and hold "DISP" until the menu mode is entered.
5. Turn the dial until until the "Tx/Rx" menu has been selected.
6. Press ENT.
7. Turn the dial to select "DIGITAL".
8. Press "ENT".
9. Turn the dial to select "DSP Ver".
10. Press "ENT".
11. The display will show the DSP version.
12. Exit the menu mode by pressing "DISP" until you are back at the main operating screen.

Checking Versions FT2D

The Main, Sub, and DSP controller firmware versions can be determined in one operation as follows:

1. Press and hold DISP to bring up the main menu.
2. Press DISPLAY
3. Select item #11, SOFTWARE VERSION

Checking Versions FTM-100DR

The Main, Panel, and DSP controller firmware versions can be determined in one operation as follows:

1. Press and hold DISP to bring up the main menu.
2. Use the Dial to select #13 RST/CLONE
3. Use the Dial to select #8 SOFTWARE VERSION

Checking Versions FTM-400(X)DR¹

To view the FTM-400(X)DR main and panel firmware:

1. Press and hold the DISP button to enter the SETUP MENU.
2. Select RESET/CLONE.
3. Versions are shown in the top right of the screen.

To view the DSP version:

1. Press and hold the DISP button to enter the SETUP MENU.
2. Select TX/RX.
3. Select DIGITAL.
4. Goto item #7 - DSP VERSION.

¹ Thanks to VK2PSF

Checking Versions FT-991

Hold A=B and A/B during a power up. For a screen with all 4 values. Note that the screen passes quickly (8-10 sec) through to normal power up. So I keep the following List nearby:

Main: V02-13
DSP: V01-05
TFT: V02-02
C4FM: V04-10

and just scan the last digit.

Updating firmware is much more convoluted and different keys held during a full power plug in. ie not just the power switch but the live power to the back. (I use Andersons and the distribution bar is convenient nearby to pull the plug). I strongly recommend ALWAYS following the accompanying manual carefully step by step.

(Courtesy of Alex VK2PSF)

DR-1 Repeater Firmware Version check and Update

Controller Firmware

Follow these steps to determine the Controller firmware versions.

1. Turn the repeater on.
2. Press "Setup".
3. The firmware version is shown at the top of the screen.

Note: The DSP version cannot be determined except by the DSP update program.

HRI-200

Check the HRI-200 firmware using the WiRES-X Windows software. The firmware version is shown in the “about” window.

Hardware Notes

Starting in late 2015, Yaesu started shipping ferrite clip-on filters to be added to both ends of the USB cable. We're not sure why this change was done, but it's known that both the FTM-100 and 400 do not handle data errors well and are prone to lock into transmit mode when bad data is received. The assumption is that Yaesu is providing these filters to help eliminate any noise problems injected into the USB connection. You may wish to consider upgrading the quality of the USB cable, using a shorter cable, and/or placing ferrites on both ends of the cable.

The Current Firmware Versions

The current firmware versions are listed in the table below.

Transceivers

Radio/Function	Version	Last Update
FT1D Controller was 2.04 (from 22-Oct-2014!!!)	2.07	20-Apr-2016
FT1D DSP was 1.07	4.10	20-Apr-2016
FT1XD Controller was 12.05 (Original)	12.07	20-Apr-2016
FT1XD DSP	4.1	Original
FT1 Programming Software ADMS-6 was 1.0.02.15	1.02.16	1-Apr-2016
FT2D Main was 1.04	1.07	20-Apr-2016
FT2D Sub was 1.01	1.04	20-Apr-2016
FT2D DSP was 4.01 (Original)	4.12	20-Jan-2016
FT2D ADMS-8 Programming Software was 1.0.0.0	1.0.0.2	1-Apr-2016
FTM-100DR Main Controller was 1.2	1.3	3-Aug-2016
FTM-100DR Front Panel was 1.1	1.2	14-Jan-2016
FTM-100DR DSP was 2.1	4.1	14-Jan-2016
FTM-100 ADMS-9 Programming Software was JP	1.0.0.0	26-Feb-2016
FTM-400(X)DR ² Main Controller was 2.1	2.2 ³	12-Feb-2016
FTM-400(X)DR DSP was 2.10	4.10	7-Jan-2016
FTM-400(X)DR Front Panel	1.2	Original
FTM-400 Programming Software ADMS-7 was 1.0.0.1	1.0.0.2	15-Oct-2015
FT-991 Main was 02.18	02.19	16-Jan-2017
FT-991 DSP was 01.05	1.09	6-Dec-2016 ⁴
FT-991 TFT was 02.03	02.04	6-Dec-2016
FT-991 C4FM DSP 4.10	4.15	6-Dec-2016
FT-991A Main	1.07	16-Jan-2017

² The 400DR and 400XDR require different firmware, but version numbers are the same

³ Address WiRES-X node lockup issues

⁴ A prior, damaged, release was made on 2-Dec and was replaced on 6-Dec-2016

Note: There are several update “channels” for the repeater. Make sure that you stay with your correct channel. Follow Yaesu’s instructions and only update the firmware if the update is for your channel.

You can determine your channel from the previous firmware version number as indicated in the table below.

Repeater and WiRES-X

“1.00b” Firmware Update Channel (Mostly US)		
DR-1X Repeater Field Update was 1.00m	1.00n ⁵	14-Mar-2016
DR-1X Repeater DSP was 3.00 ⁶	4.11	14-Mar-2015
“1.00f” Firmware Update Channel (Mostly EU)		
DR-1X Repeater (narrow) Main was 1.00f	1.00t	20-Jan-2016
DR-1X Repeater (narrow) DSP	4.12 (see note 6)	20-Jan-2016
“1.10D” Firmware Update Channel		
DR-1X Repeater (WiRES-X control) was 1.10J	1.10Q	23-Sep-2016
DR-1X Repeater (DSP software) was 4.11	4.13	23-Sep-2016
HRI-200		
HRI-200 Firmware was 1.00	1.01 ⁷	22-Jan 2015
HRI-200 (Wires-X software) was 1.1.1	1.1.2	12-Mar-2016
HRI-200 / DR-1X Manual	1.10Q	8-Jan-2017

Note on WiRES-X 1.1.2 and DR-1X 1.10J

It appears that WiRES-X 1.1.2, DR-1X 1.10J, and DR-1X 1.10n were released to address transmitter lock-up issues. It is unknown if the WiRES-X 1.1.2 and DR-1X 1.10J address issues with directly connecting the HRI-200 to the DR-1X. Our current recommendation is to link using a node radio.

A note on DSP versions

DSP version 4 (any radio) is a performance update. It provides improvements to how well Fusion handles drop-outs and noise, thus improving performance and range. All radios should update to DSP 4.xx to benefit from these performance improvements.

⁵ Yaesu’s bizarre way of numbering DR-1 releases goes through the upper case alphabet then the lower case. So “1.00b” comes after “1.00Z”. Go figure!

⁶ The DSP version can only be determined by the update software. It is not visible from the repeater’s screen.

⁷ Not on the U.S. website as of 28-Dec-2015 (access via node owner’s login/page on the WiRES-X website)

Where to Get the Current Firmware Versions

The only source for the current versions of the firmware is Yaesu. You can obtain firmware for your radio at the following URL's:

Visit <http://www.yaesu.com> , select the appropriate radio, then select the Files tab

The Japanese-only software is available on the Yaesu Japanese web site.

http://www.yaesu.com/jp/amateur_index/index.html

Note that the Yaesu-provided radio programming software is not produced by RT Systems. It is incompatible with RT Systems, perhaps not quite as fancy, but it's free and less likely to cause problems with the radio due to radio interface errors.

For the firmware and software, there will be a document generally describing the firmware version(s) and a compressed zip file. Note that the zip file may contain both the Controller Firmware and the DSP Firmware. In addition, it contains the specific instructions for installing the appropriate version. Print out these instructions and follow them step-by-step. Do not improvise!

Note the following:

1. Backup your radio before performing the update. Assume the update will wipe everything from your radio. Backup to SDcard is nice for doing this.
2. When an update is complete, reset the radio to factory defaults. It may seem like it's working. It may even give you the correct firmware version numbers, but there's a good chance some bits in memory are in the wrong place and they'll come back to haunt you at the wrong time!
3. Verify that the Controller and DSP have the correct version information.
4. Restore your radio from the backup you created earlier.

What if I Don't Have a PC?

Congratulations if you're running a Mac or Linux! Way to go! Unfortunately you'll need to engage the services of a PC-equipped friend or find an old, rusty copy of Windows and run that in a Virtual Machine. VirtualBox is a free Virtual Machine manager that works well and supports Windows, Mac, and Linux. The Yaesu software operates fine on a Windows XP virtual machine.

VirtualBox is available here: www.virtualbox.org

(And if you haven't used a VM, you'll want to. They're fun!)

Special Note Regarding WiRES-X

It had gotten a little bit complicated regarding the software and firmware updates for repeaters, nodes, and WiRES-X. I'll try to explain. This information was valid as of 28-Dec-2015

Owners of a WiRES-X Node not connected to a repeater

- Your WiRES-X HRI-200 should be at firmware level 1.01. You can check the firmware from the About box on the WiRES-X Windows software.
- Use WiRES-X software 1.1.1 or later.

Owners of a repeater who link to a WiRES-X node

- Your WiRES-X HRI-200 should be at firmware level 1.01.
- Your repeater may be at 1.00b, 1.00f, 1.00m, 1.10D, or 1.10J - any will work.
- Your WiRES-X Windows software must be at least 1.1.1⁸.
- Update the node radio (FTM-100 or FTM-400 to the current firmware version).
- Under the node's transmitter settings, select DN only and enter the repeater settings

Owners of a repeater who use a hard-wired HRI-200

Direct connection behavior is improving. There will most likely be releases beyond those listed below. These should be considered the minimum versions.

- Your WiRES-X HRI-200 should be at firmware level 1.01.
- Your repeater must be at 1.10J or latter
- Your WiRES-X Windows software must be at 1.1.2 or later.
- Not all features are there and bugs exist, so some of the above will require updating before this is all over.

Owners of a repeater with an Arcom, Scm, ADR, or some other old-fashioned analog repeater controller attached.

- You're on your own.

Clarifications

DR-1(x) 1.00m/n

This is a firmware and DSP update for the DR-1X repeater. It adds some new features, mostly involving the squelch, ID, hang time, and it fixes the standby beep on FT2s and makes it more reliable on all other radios. **It does not add any new WiRES-X capability.**

It does not allow you to use a node radio to connect to the repeater using DN (that was enabled by WiRES-X Windows software 1.10.) 1.00m was not withdrawn from the Yaesu USA website. You do not need a special cable to install it. You already have the cable, it came with the repeater

1.00m adds the version 4 DSP to the repeater. (Old version was 3.00.) This is a significant update to the DSPs used by all the Fusion radios! It provides improvements to how well Fusion handles drop-outs and noise, thus improving performance and range. All repeaters should update to this version so that users can benefit when their radios receive the version update.

DR-1X 1.10D/Q

New repeaters with 1.10 started being shipped in December 2015. Older 1.00 repeaters need to be returned to Yaesu for update - user update is not available. Think of this as a hardware change. It does add WiRES-X capability. **If you have**

⁸ Versions prior to this could exacerbate a radio lock-up issue.

1.10D DO NOT DOWNGRADE TO 1.00n!!!!!! This update is useful if you want to attach an HRI-200 to the back of the repeater. If you don't want to do that, then don't worry about it.

(This is my analysis - not information I have received from Yaesu) 1.10D is different in that it updates a FLASH ROM WHICH DOES NOT HAVE ANY EXTERNAL PROGRAMMING INTERFACE. The only way to update this ROM is to use a special cable such as that used by software developers. This is not a simple USB to serial cable you can get for \$20. Don't expect repeaters to ship with this cable or to be freely given away.

DR-1X 1.00t

Only apply this update if the repeater is already running 1.00f. This update adds narrow-band capability and is of no benefit unless you intend to run the repeater in narrow band. (Generally not a good idea as you will lose performance and capability.)

HRI-200 1.01

The current firmware version of the HRI-200. This firmware is now available on the U.S. site. Previously it was only available on the JP site.

HRI-200 1.10 WiRES-X Windows software

This was made available on the US website on 12/26 for several hours. It was withdrawn and is now back again - exactly the same. CRCs show no difference in the software. This software allows a WiRES-X/HRI-200 node radio set to the input/output frequencies of a repeater to make that repeater behave as a node. No change to the repeater firmware is needed, 1.00b works.

This version of software was a bit buggy with memory leaks and sound driver problems. Users should update all components to the most current versions.

This is the really cool software that really opens up digital linking of repeaters - and you don't need Internet and a Windows computer (argh!) at the repeater site. This software also partially implements some capability with repeaters that have 1.10D/Q, essentially using the HRI-200 as a repeater controller. It doesn't work completely yet. So the only reason you should even think about "upgrading" to 1.10 is because you want to use it as an RF node to add WiRES-X linking to a repeater (which you should do!).

DV4mini

DV4mini Software and Firmware

DV4mini Firmware		
Radio/Function	Version	Last Update
DV4mini Firmware was 1.73	1.75	21-Feb-2017
DV4mini Windows Control Panel ⁹ was 27-Dec-2016	21-Feb-2017	21-Feb-2017

SharkRF OpenSpot

SharkRF OpenSpot Software and Firmware

Openspot Firmware		
Radio/Function	Version	Last Update
OpenSpot 1.1 "Stable firmware" was	1.1-0072	14-Nov-2016
OpenSpot 1.1 "Stable firmware"	1.1-0101	19-Feb-2017

⁹ A version number is not provided. The release date is used.

Revision History

Rev	Date	Change
36	27-Feb-2017	Openspot firmware update to 101 DV4mini firmware 1.75 DV4mini Control Panel 21-Feb-2017
35	13-Feb-2017	Added DV4 and OpenSpot FT-991A Main HRI-200/DR-1X manual
34	22-Jan-2017	Updated repeater firmware information Updates to FT-991 firmware
33	28-Sep-2016	FT-991 Main to 2.16 DR-1X 1.10J Main and 4.13 DSP
32	24-Aug-2016	FT-991 Main and TFT firmware
31	7-Aug-2016	FTM-100 main firmware
30	13-Jul-2016	FT-991 Added features
29	20-Apr-2016	Updated firmware for all the HTs: FT1DR, FT1XDR, FT2DR
28	4-Apr-2016	Updated Windows programming software for FT1(X)DR and FT2D
27		- Added FTM-400 instructions
26	20-Mar-2016	Updated firmware identification instructions for the FTM-100 and FT2DR
25	14-Mar-2016	- WiRES-X software to 1.1.2 - DR-1X to 1.10J, and 1.00n
24	29-Feb-2016	- FD2-DR ADMS-8 programming software - FTM-100DR ADMS-9 programming software
23	13-Feb-2016	- FTM-100 Main to 1.20 - FTM-400 Main to 2.20 - both changes to address WiRES-X lockup
22	8-Feb-2016	FT-991 C4FM DSP to 4.11 Main to 2.10
21	5-Feb-2016	WiRES-X software update Notes on HRI-200 hardware changes
20	20-Jan-2016	- FT-2DR Main, sub, and DSP - DR-1X Main and DSP for narrow band
19	14-Jan-2016	- FTM-100 firmware, panel, and DSP
18	7-Jan-2016	- HRI-200 Windows software is back (again) - FTM-400 firmware to 2.1 and DSP to 4.1 - Additional explanation about all the different versions added to the end of the document.
17	28-Dec-2015	This is complicated!

		<ul style="list-style-type: none"> - DR-1X to 1.00m (squelch and ID functions) - DR-1X to /1.10D (WiRES-X ROM update) - HRI-200 1.01 firmware and software - ADMS-8 (FT2-DR) - ADMS-9 (FT-100DR)
16	19-Dec-2015	FT-991 DSP, ADMS-6
15	09-Nov-2015	FT-991 Main firmware update, Windows programmer for FTM-400
14	28-Oct-2015	FT-991 Main firmware update
13	16-Oct-2015	Updated FT2DR data (no change to firmware)
12	21-Sep-2015	Corrections to the firmware status table
11	03-Sep-2015	All FT-991 firmware updates removed from site
10	27-Aug-2015	FT-991 Main
9	21-Aug-2015	FTM-100 Display
8	20-Aug-2015	FT-991 Main, ADMS-7
7	24-Jul-2015	FT-991 Main, TFT, and DSP
6	15-Jul-2015	FT-1DR programming software update
5	14-Jul-2015	FTM-400 main controller, ADMS-7 release
4	27-Jan-2015	DR-1 update (1.00Z)required for stable operation)
3	25-Dec-2015	HRI-200 (Wires-X)
2	22-Oct-2014	FT1DR update
1	21-Oct-2014	FTM-400 update

Disclaimer

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