FIRMWARE UPDATING FOR THE
JUMA TRX2 & PA100D

The Juma TRX2 transceiver and PA100D linear amplifier are designed in such a way as to permit easy updating of their firmware as modifications, enhancements, and bug fixes become available. This note described the procedures employed.

In order to update the firmware, two software packages are required, the first is the flash writer which is normally present in the upper memory of the transceiver and amplifier's microprocessors, and a loader package which is installed on a suitable desktop or laptop computer which communicates with the flash writer via a RS-232 serial connection between the computer and the transceiver or amplifier.

All kits are supplied with a microprocessor which has already been programmed with a suitable version of the firmware and flash writer, and thus can be easily updated. In the event you have installed a blank microprocessor, or for some reason the flash writer becomes corrupted, then you will need to re-install this package and that will require an entirely different approach. This document only covers updating the firmware using the built-in flash writer.

Since it is vitally important that the serial ports of both the computer and the transceiver or linear amplifier are working correctly, it is essential to verify this prior to attempting to update the firmware.

It is necessary to fabricate a suitable serial cable for the firmware update, and Annex A describes the connection details of these cables. In practice, the same serial cable as used for the Juma TRX2 transceiver can also be used for the PA-100D linear amplifier, provided the serial port jumpers in the amplifier are re-configured from their normal position to the firmware update position. Unfortunately this will require you to remove the cover of the amplifier to accomplish this. If you have a suitable null modem cable, then the normal Juma TRX2 cable can be used without the necessity of reconfiguring the jumpers.

Serial Port Verification
Do not skip this step! If the serial port is not working perfectly there is a serious risk of corrupting the flash writer in the microprocessor which will render the transceiver or amplifier unusable, and will require you to re-load the firmware and boot loader using the ICD header and a programmer. This procedure is not covered in this document.

First make sure that the charge pump is working on the MAX-232 chip. Connect a 3.5mm stereo lead to the transceiver's RS232 port and measure the DC voltage on the tip connection. This is the transmit data line, and in the idle state it should be at about −9V DC. If it is significantly lower than this then it needs to be investigated and corrected. The transmit data line for the linear amplifier with the serial port jumpers in their normal position is the ring connection, if the jumpers are moved to the alternate connection, then the transmit data line is the tip connection.

Having verified that the DC voltage is correct, connect the transceiver's serial port to a PC running a terminal program. Using the User Configuration Menu, step to the RS232 port selection and select the TEST mode.

Set the serial port speed to 115,200 baud, and save the settings. Start the terminal program on the PC, and set its COM port to 115,200 baud, 8 data bits, 1 stop bit, no parity. Enter the letter I on the PC keyboard and verify that you receive the help facility printout. If it looks sensible, enter the letter E and verify that you get an EEPROM dump. Verify that it is also correctly formatted. Repeat these steps several times and ensure that you obtain the same displays each time.

If there are no errors, then this verifies that the serial ports of both the transceiver and the PC are functioning correctly. If you are using a USB RS-232 convertor some models do not work well at 115,200 baud, but might perform satisfactorily at lower speeds. In my case my convertor uses the FTDI chipset, and functions at all speeds.

Software Installation
In order to transfer the firmware from the PC to the transceiver it is necessary to use the Ingenia loader package which must be installed on the PC. If you received this document with the loader package, then the installation and configuration files will already have been extracted from the ZIP file.

Navigate to the folder where you extracted the contents of the ZIP file, and launch the setup program: *ingeniadsPICbootloader.exe*. This will install the package on your computer. At the conclusion of this you will need to replace the configuration file with the new one included with the ZIP file.

Copy the replacement file: *ibldspiclist.xml* to the folder where the Ingenia loader was installed, typically: C:\Program Files\Ingenia\ingeniadsPICbootloader\

This will over-write the file already in this folder. It is essential that this is correctly accomplished, as the replacement file contains the appropriate device ID for the microprocessor used in both the TRX2 and the PA100D.

If you are installing under Windows XP, then this completes the installation.

If you are installing under Windows Vista or Windows 7, then you need to perform the following additional steps.

Locate the Ingenia icon on the desktop, and right-click on it, and select Properties. Click on the Compatibility tab, and check the box marked: Run this program in compatibility mode for: and select Windows XP (Service Pack 3).

Also check the box at the bottom: Privilege Level, Run as Administrator.

Click on Apply and then OK.

This completes the installation.
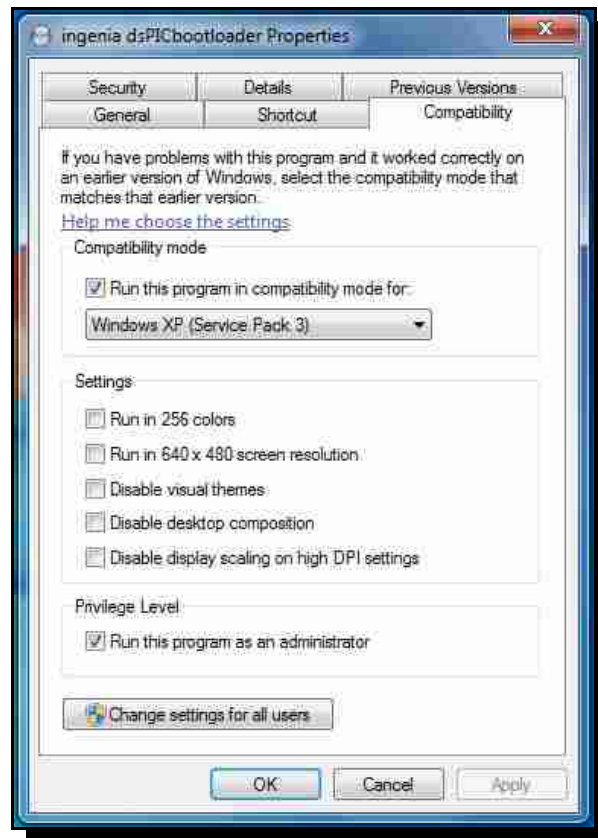
Firmware Update
With the Ingenia loader correctly installed, and the requisite permission levels assigned if using Windows Vista or 7, the firmware of the transceiver can be updated.

1. Connect the transceiver or amplifier to the PC serial port or USB-RS232 convertor using the appropriate serial cable.

2. Ensure the transceiver or amplifier is switched off.

3. Launch the Ingenia loader by clicking on its icon on the desktop. You should receive the following display:

4. Click on the tab: 'OK my platform is shut down', and you should receive the following display:
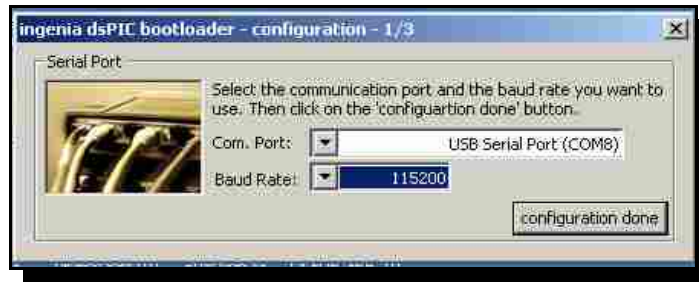
5.   Click on the Com Port tab and select the serial port your intend to use. Normally the program locates the correct port automatically. Then click on the Baud Rate tab and select the speed if you do not wish to use the default of 115,200 baud. Finally click on the 'configuration done' tab, whereupon you should see the following display:


6.   Press and hold the VFO button on the transceiver, and then press the PWR button to turn it on. The transceiver will display a message that the flash writer has started. Wait until you receive the message that the Ingenia loader has recognised your platform. When it has been recognised, you will see the following display:

Click on the OK button, and you should then see the following display:

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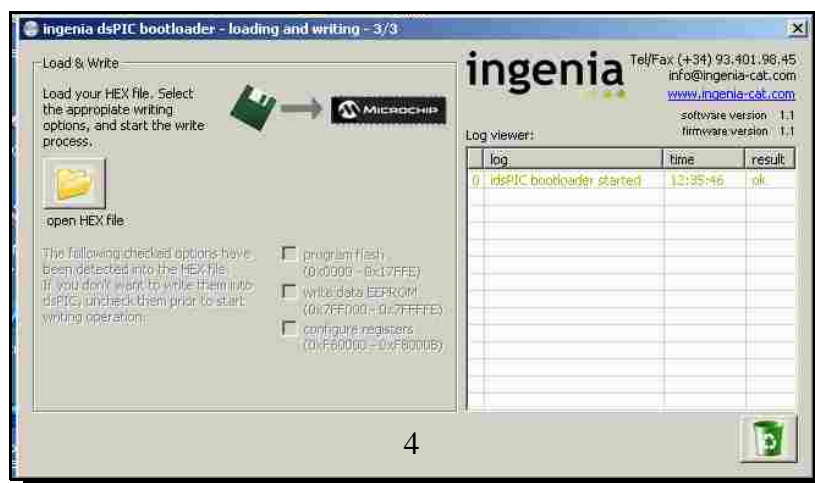
7.	Click on the 'open HEX file' tab, and navigate to the folder where your HEX load file is located, double click it to select and load it, and you should see the following display:
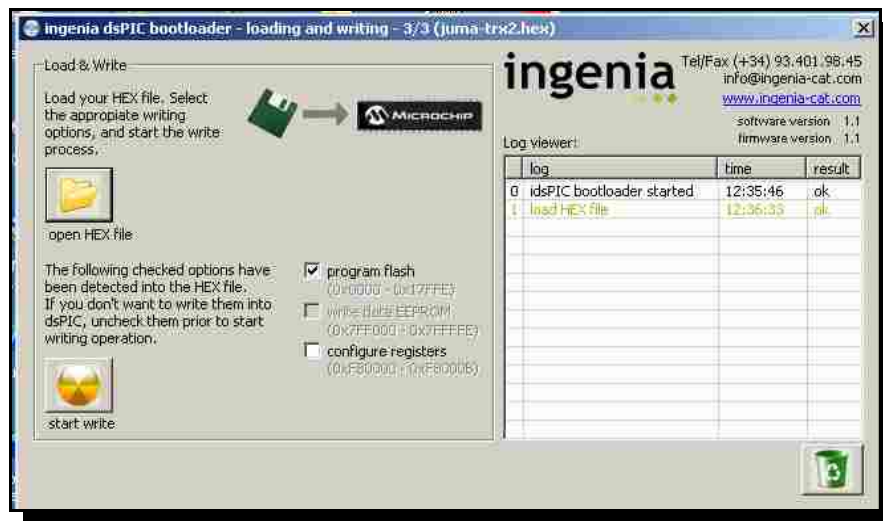
8.	Ensure that the 'program flash' box is checked, this should happen automatically as the HEX load file contains the necessary settings to do this. None of the other check boxes should be selected, nor should there be any error messages. Click on the 'start write' button, and you should see the following display:

9.	The progress bar above the message 'flash programming started' should smoothly increment, and the programming operation will takes about 10 – 15 seconds at 115,200 baud. At the successful conclusion of the flash writing, you should see the following display:

10.   Terminate the Ingenia loader program by clicking on the cross button in the top right-hand corner. Turn the transceiver off by switching its power supply off. Note that you cannot turn it of with its PWR button, as this is inoperative during flash programming, the only way is to turn the power supply off or disconnect it.

After shutting down the power supply, turn the transceiver back on with the PWR button. If this new firmware uses a different EEPROM map than before, then you will receive a checksum error message the first time, and the default values will have been loaded. Perform the re-calibration and user setup actions to configure the transceiver to your preferences.

Linear Amplifier Firmware Update
The procedure is essentially the same, except that to invoke the linear amplifier's flash writer, in step 6 press and hold the OPER button, and then turn the amplifier on with the PWR button.

Notes

1.   It is important not to disturb the writing process in any way. To ensure nothing interferes with the process, shut down all non-essential processes including Internet access, anti-virus/anti-spyware applications, and other background tasks not intrinsically concerned with the operation. This can most easily be accomplished by right-clicking the icons on the task bar and selecting the exit or end process option.

2.   If an error message is provoked when opening the HEX file in step 7, this may indicate that either the HEX file has been corrupted, or that the installation of the Ingenia loader was incorrect. Download the HEX file again, and compare its 32-bit CRC with the original. Re-install the Ingenia loader and make sure that the configuration XML file is replaced.

3.   Errors occurring during the flash writing process are usually caused by faulty serial port communications. Investigate the cable connections, as well as the operation of the serial port itself. Some USB-RS232 convertors are incapable of sustained operation at 115,200 baud, and may have to be set to a lower speed for successful operation. Those

using the FTDI chipset have been found to be quite reliable. Some dual-port convertors do not perform at all well in this application. A particularly good convertor can be obtained from suppliers of the Parallax BASIC Stamp micro-controller, this convertor uses the FTDI chipset, and with the latest drivers, works correctly under both Windows XP as well as Windows Vista and Windows 7. The Parallax reference number is: 28030, and it is currently priced at $14.99. The Parallax website also has suitable FTDI drivers for download.

4.   Errors during loading, inability to recognise the microprocessor, etc, are all indicative of a serial port problem. Plug a stereo 3.5mm patch lead into your transceiver and measure the DC voltage on the tip. It should be −9V. Anything less needs to be investigated. Problems that have occurred have been, C49/C50/C51/C52 of IC10 mounted at 90 degrees to their correct orientation; early version chips for IC10 requiring 1uF capacitors for C49/C50/C51/C52 rather than the 0.1uF supplied; incorrect resistor for R22, it should be 10 ohm, if you have mounted IC10 backwards and then removed it and replaced it after powering up you may have damaged R22 or IC10. The DC open-circuit voltage from pin 14 of IC10 must be −9V.

Annex A

Juma TRX-2 & PA-100D Serial Interface Cables

JUMA TRX-2

Signal	DB-9 Pin	Data Direction	3.5mm Stereo Plug	Signal
Rx Data	2	←	Tip	Tx data
Tx Data	3	→	Ring	Rx Data
Ground	5	2	Sleeve	Ground

JUMA PA-100D

Signal	DB-9 Pin	Data Direction	3.5mm Stereo Plug	Signal
Rx Data	2	←	Ring	Tx data
Tx Data	3	→	Tip	Rx Data
Ground	5	2	Sleeve	Ground

Note-1: The Juma TRX-2 data cable can be used for the Juma PA-100D if the amplifier's internal jumpers are set to the PROGRAM position, alternatively they can remain in the normal position and a null-modem connector used.