

ELAD FDM-DUOr Dual Mode SDR Receiver



USER MANUAL

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2 FDM-DUOr Overview

2.1 Notice

Amateur radio regulations vary from country to country. Confirm your local amateur radio regulations and requirements before operating the ELAD FDM-DUOr.

2.2 Firmware versions

The features described in this manual refers the following firmware versions :

RX Demodulator	User Interface	USB Interface	FPGA
Ver: 1.08	Ver: 4.17	Ver: 4.08	Ver: 2.00
Date: 12/19/2014	Date: 12/18/2014	Date: 09/18/2014	Date: 07/30/2014

2.3 Introduction

Thank you for choosing the FDM-DUOr. It is an innovative dual mode SDR receiver covering the frequency range from 9kHz to 54MHz. The FDM-DUOr can be used like a standard receiver in standalone mode or connect to a PC to exploit the full potential of the ELAD FDM-SW2 software.

2.3.1 Main Features

- Frequency range: RX 9kHz to 54MHz direct sampling receiver
- Double antenna connectors (RX input and TX input)
- 11 slot for user selectable filters
- Operating Modes: CW LSB USB AM
- ADC Linear LTC2165,16bit @122.88MHz
- DDC FPGA Spartan 6 XC6SLX25 + Serial Flash for stand-alone mode
- Stand-alone RX demodulator with STM32F4 ARM floating point µController
- LPC1766 Cortex M3 for LCD & Keyboard control
- Clocking source Si5338 driven by 10MHz TCXO or External reference input
- CAT USB interface with FTDI controller

2.3.2 Block Diagram



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FromTransceiver

2.4 **Precautions**

- Connect the receiver only to a power source described in this manual.
- Take care when plugging in cables, avoid applying sideways pressure that might damage the connectors.
- Avoid operating in wet conditions.
- For better performance and safety, connect the receiver to good earth ground using a short, heavy, braided cable.
- Ground all outdoor antennas for this receiver using approved methods. Grounding helps protect against voltage surges caused by lightning. It also reduces the chance of build-up of static charge.

3 Hardware Description

3.1 Front Panel Description



1 - LCD Display

See <u>LCD</u>.

2 - E1 Knob

Audio volume , AGC, noise reduction, noise blanker control. Knobs functions

3 - Main Knob

Main VFO and MEM control. See Knobs functions

4 - Speaker/Headphones Audio Output

The main FDM-DUOr audio output.

5 - Auxiliary Output

Auxiliary audio output.

6 - E2 Knob Filter and pitch control. See <u>Knobs functions</u>

7 - MODE and MENU buttons

Change operating mode and enter the FDM-DUOr setup menu. See Keys functions

8 - VFO and MEM buttons

Basic VFO Memory operations. See Keys functions

3.2 Rear Panel Description



1 - USB Receiver Data Connector

USB 2.0 port to connect with the PC. Please use the supplied cable.

2 - Frequency Reference Input

SMA 50 Ohm 10MHz, 0 dBm frequency reference input.

3 – TX IN Connector

M-type TX Input 50 Ohm antenna connector.

4 - Antenna Connector

M-type RX 50 Ohm antenna connector.

5 - PTT Input Connector

PTT Input to command the internal switch-box.

6 - CAT USB Serial Port

USB serial port for CAT communication.

7 - Power Switch

Turn On/Off the FDM-DUOr.

8 - Power supply

13.8V, 2.5A DC power supply connector.

9 - Expansion Port

DB9 connector for external hardware. This is NOT a standard serial port.



- Pin 1: SPI Latch
- Pin 2: I2C SCL
- Pin 3: SPI Clock
- Pin 4: I2C SDA
- Pin 5: Ground
- Pin 6: TX Duo
- Pin 7: RX Duo
- Pin 8: SPI Data
- Pin 9: +5V

10 – Speaker/Headphones Audio Output

The main FDM-DUOr audio output

11 – Ground Connector

For better performance and safety, connect to an earth ground using a short, heavy cable.

3.3 Internal Hardware Description





FDM-DUOr board with 3 filter modules



S1 ÷ S11Eleven slots for filter modules from 1 to 11.N.B. If FBPY Bypass module is used, it must be placed in Slot No. 11.



3.3.1 ELAD Filter Module Family

Actual SFP-08 available filter modules (*)						
Module Code Module Description		Module Code	Module Description			
FHP05M-1	High Pass 500 kHz	FBP17-1	Band Pass 17 m			
FHP1M7-1	High Pass 1700 kHz	FBP15-1	Band Pass 15 m			
FBP160-1	Band Pass 160 m	FBP12-1	Band Pass 12 m			
FBP80-1	Band Pass 80 m	FBPY	Bypass module (**)			
FBP40-1	Band Pass 40 m	FPCB-B3	Empty module for self-made filters			
FBP30-1	Band Pass 30 m	FPCB-H5	Empty module for self-made filters			
FBP20-1	Band Pass 20 m					

 $^{(^{\ast})}$ Please refer to ELAD website for updated list of filter modules.

(**) Bypass module is included with the FDM-DUOr.

3.3.2 FPCB-B3 Module Schematic





3.3.3 FPCB-H5 Module Schematic





4 LCD



- 1. LP: Low pass input filter active. ATT: input attenuation active.
- 2. Bar meter: in receiver mode displays the signal strength in S-units, in transmission mode displays the forward power transmitted.
- 3. Measurements unit for the main display. The "S" of SWR is also used to indicate the "QuickStep" function.
- 4. PK: blinks if the case of internal ADC overload.
- 5. Secondary display that displays the signal strength.
- 6. Measurement unit for the secondary display.
- 7. LOC: on when the Main Knob is locked.
- 8. CAT: on when a CAT command is received, SERV: Service mode enabled.
- 9. Operating mode.
- 10. External frequency reference present.
- 11. E2 Selected function. PITCH: CW pitch frequency, III :Demodulation filter bandwidth.
- 12. Main display.
- 13. E1 Selected function. VOL: main volume, AGC: automatic gain control settings, NR: noise reduction, NB: noise blanker.
- 14. Display the selected VFO.
- 15. SET: settings menu mode, MEM: memory mode, VFO: VFO mode
- 16. In memory mode, displays the selected memory index, in settings mode display the menu number.
- 17. RX: receive, TX: internal switch box activated.

5 Quick Start

These instructions are intended only for a quick guide, detailed instructions are given later in this manual



- Turn on the FDM-DUOr using the rear panel switch. The receiver start in VFO mode with the VFO-A selected.
- Turn the E1 knob until you hear a suitable level of noise.
- Use the Main knob to tune a frequency.
- Press $\frac{MODE}{E3}$ to select the desired communication mode.
- Use the E2 to set the demodulation filter.

6 User Interface

6.1 VFO Mode

The VFO mode is the default mode of FDM-DUOr. Each VFO memorize the tuning frequency, mode and tuning step

	H WOUT LOC D dBm REM H CAT SERV
S 1 3 5 7 9+10 +20 +40 +60 SM	R LSB USB
E1 VOL SQL MIC AGC NR NB AN E2	PITCH RIT XIT

6.1.1 Tuning

In this mode, use the Main Knob to tune a frequency. A short pressure on the main knob enter the frequency step menu



Use the main knob to modify the tuning step, then with a short pressure return in the VFO menu.

With a long pressure over the main knob, the Digit by Digit Frequency tuning mode is activated



SELECTED DIGIT

In this mode use the main knob to modify the selected digit and E1 or E2 to change witch digit you want to modify. Apply a short pressure on main knob to return in the standard tuning mode.

6.1.2 E1 Receiver Settings

Apply a short pressure on the E1 knob to change the E1 selected parameter, the selected parameter icon is turned on in the LCD. Turn until one click the E1 knob to display the parameter value, then turn again E1 to modify the parameter value.



AGC: if the AGC is turned OFF (manual gain mode), the AGC icon blinks.

NR and NB: if the Noise Reducer or the Noise Blanker is turned on the relative NR or NB icon blinks.

6.1.3 E2 Receiver Settings

Apply a short pressure on the E2 knob to change the E2 selected parameter, turn until one click the E1 knob to display the parameter value, then turn again E1 to modify the parameter value.



6.1.4 Switch VFO

Use the A/B button to switch VFO-A/B.

6.1.5 Store VFO to memory

Use the $\bigvee_{r=1}^{V-M}$ key to store the current VFO settings into a memory



Use E2 knob or main knob to select the destination memory and confirm with a short pressure on E2.

6.1.6 "QuickMem" mode

Keep pressed the \bigvee_{E1}^{V-M} key to enter the "QuickMem" mode.

The memory channels 180 to 199 are reserved for the "QuickMem" selection. Keep pressed the $\frac{1}{10}$ key until the desired frequency appears on the LCD display, then release the key and the current VFO is set to the frequency and mode saved in the memory channel.

You can use the "FDM-DUOr Manager" feature in the ELAD FDM-SW2 software to customize the memory channels.

6.1.7 VFO-A = VFO-B

With long pressure on $\frac{M-V}{F2}$ key you get VFO-A = VFO-B

	60 SWR LSB USB mSW SAMCW± KH7 FMW 10
VFO A B W W W W W W W W W W W W W W W W W W	REFIN PAD KEY PWR PITCH RITXIT

6.1.8 Change Operating Mode

With a short pressure on the $\frac{MODE}{F3}$ button, you can change the receiver mode between the available modes:



6.1.9 "QuickStep"

With a short pressure on the $\begin{bmatrix} S \\ F4 \end{bmatrix}$ key, the "QuickStep" function is activated. This function quickly sets the frequency step preset selected in the "QuickStep" setting menu, press again the $\begin{bmatrix} S \\ F4 \end{bmatrix}$ key to set the previous frequency step.

6.2 MEM Mode

To activate the memory mode, apply a long pressure on

	A/B	
า	M	i

		OC EM ERV
S 1 3 5 7 9+10 +20 +40 +60 MEM A	SWR LSBU MSW SAMC KHz FMW REFIN PAD K	JSB W± IQ
E1 VOL SQL MIC AGC NR NB AN E2	WR PITCH RIT	ХП

6.2.1 Select and edit a memory

Use the main knob to select a memory. Apply a long pressure on the main encoder to enter the edit memory menu. In this menu it is possible to modify the selected memory frequency in digit by digit mode.

	- B B dBm REM	
S 1 3 5 7 9+10 +20 +40 +60 MEM A	SWR LSB USB mSW SAMCW± KHz FMW IQ rffin Pad Key	ŀ
E1 VOL SQL MIC AGC NR NB AN E2	PWR PITCH RIT XIT	

Use the $\frac{A/B}{M}$ button to select the VFO-A/B. This is useful if you want to set the memory settings to a specific VFO.

6.2.2 Delete a memory

Apply a long pressure to the

F1 key to enter the delete menu

LP ATT PRE ANT 12 II				UT LOC N REM AT SERV
S 1 3 5 7 9	9+10+20	+40 +6		SB USB
	i na na na		Ø mSW SA	AMCW1
	. <u>@ @</u> @ .	. <u> </u>		AM IQ
E1 VOL SQL MIC AC		E2	PWR PITCH	I RIT XIT

Use the E2 knob to set yes or no and make a short pressure on E2 to confirm.

6.2.3 Set memory to VFO

Use the $\frac{M-V}{F2}$ key to set the selected VFO to the selected memory frequency and mode. When this function is used, the FDM-DUOr automatically switches to the VFO mode.

6.2.4 Change the memory display mode

Apply a short pressure on the $\begin{bmatrix} S \\ F4 \end{bmatrix}$ key to show the memory label in the LCD main display. Press shortly again $\begin{bmatrix} S \\ F4 \end{bmatrix}$ to return to display the memory frequency.

	188 PX H	Nout LOC IBm REM CAT SERV
S 1 3 5 7 9+10 +20 +40 +60 MEM A P K 3 1 3 0 m		LSB USB SAM CW± FMW IQ PAD KEY
E1 VOL SQL MIC AGC NR NB AN E2	WR PIT	CH RT XT

You can use the "FDM-DUOr Manager" feature in the ELAD FDM-SW2 software to customize the memory channels.

6.3 Knobs functions

Menu	Action	Main Knob	E1 Knob	E2 Knob
	Value modified	Change selected VFO frequency	Enter E1 selection parameter	Enter E2 selection parameter
VFO	Short Pressure	Enter STEP menu	Change E1 selected parameter	Change E2 selected parameter
	Long Pressure	Switch to DIGIT by DIGIT tuning mode	(2)	(2)
	Value modified	Change tuning step value		
STEP	Short Pressure	Exit from STEP Menu		
	Long Pressure	Switch to DIGIT by DIGIT tuning mode	(2)	(2)
	Value modified	Select next/previous memory	Enter E1 selection parameter	Enter E2 selection parameter
MEM	Short Pressure		Change E1 selected parameter	Change E2 selected parameter
	Long Pressure	Switch to DIGIT by DIGIT tuning mode	(2)	(2)
51 Coloctions	Value modified	Back to VFO or MEM menu	Modify E1 selected parameter value	Modify E2 selected parameter value
E1 Selection: VOL - AGC-	Short Pressure	Back to VFO or MEM menu	Change E1 selected parameter	Change E2 selected parameter
NR - NB	Long Press	Switch to DIGIT by DIGIT tuning mode	(2)	(2)
	Value modified	Back to VFO or MEM menu	Modify E1 selected parameter value	Modify E2 selected parameter value
E2 Selection: FILTER - PITCH	Short Pressure	Back to VFO or MEM menu	Change E1 selected	Change E2 selected parameter
	Long Pressure	Switch to DIGIT by DIGIT tuning mode	(2)	(2)
	Value modified	Change the destination memory		Change the destination memory
VFO > MEM	Short Press			Save VFO in the selected memory
	Long Pressure		(2)	(2)
	Value modified			Change Yes/No
Delete MEM	Short Pressure			Confirm Yes/No
	Long Pressure			
	Value modified			Change parameter selection
SETUP -	Short Press			Enter parameter setup menu
PARAMETER CHOICE (MENU button)	Long Pressure			

The following table describes the knob functions for some user interface menu :

Menu	Action	Main Knob	E1 Knob	E2 Knob
SETUP -	Value modified	Parameter coarse variation (1)	Parameter coarse variation (1)	Parameter fine variation
PARAMETER	Short Press			Save and exit
MODIFICATION	Long Pressure			
	Value modified	Modify the current digit value	Change digit selection	Change digit selection
DIGIT by DIGIT Tuning	Short Pressure	Switch to standard tuning mode	Switch to standard tuning mode	Switch to standard tuning mode
	Long Pressure		(2)	(2)

- (1) Available only for certain menu.
- (2) Press simultaneously E1 and E2 to lock/unlock all the keys and knobs.

6.4 Keys functions

The following table describes the keys functions :

Mode	Pressure	A/B M	V►M F1	M►V F2	MODE F3	S F4	MENU F5
VFO	Short	Switch VFO	Enter VFO to MEM menu	-	Change selected VFO operating mode	Enable/disable Quickstep function	Enter settings menu
VIO	Long	Switch to MEM mode	Enter "QuickMem" menu	VFO A = B	-	-	Lock/Unlock Main Knob
	Short	Switch VFO	-	Selected memory to VFO	Change selected memory operating mode	Change memory display frequency/label	Enter settings menu
MEM	Long	Switch to VFO mode	Enter delete memory menu	-	-	-	Lock/Unlock Main Knob

6.5 Settings Menu List

The following table describes the FDM-DUOr settings menu list. To enter the settings menu mode, press the M_{F5}^{ENV} key. Use E2 to select the menu, then apply a short pressure on E2 to display the current menu setting, if you want to change the setting use the E2 knob and confirm the setting with a short pressure on E2. In some menu you can also use the main knob to change the setting more quickly. To turn back or exit the menu just press M_{F5}^{ENV} .

Menu	Title	Description	Available Settings	Default
1	RX ATT	Receiver input attenuation	OFF or ON	OFF
3	SNAP	Round to step	OFF or ON	ON
4	AGC TH	AGC Threshold	From 0 to 10	4
6	AUX VOL	Auxiliary output volume	From 0 to 100	50
7	QUICKSTEP	Step selected for the "QuickStep" mode	 1Hz, 5Hz, 10Hz, 25Hz, 50Hz, 100Hz, 250Hz, 500Hz, 1kHz, 2kHz, 3kHz, 4.5kHz, 5kHz, 7.5kHz, 9kHz, 10kHz, 12.5kHz, 25kHz, 50kHz, 100kHz, 125kHz, 250kHz, 500kHz, 1MHz 	1kHz
8	CW MUTE	Set mute status during CW transmission	OFF or ON	OFF
9	xSB MUTE	Set mute status during AM or SSB transmission	OFF or ON	ON
60	FR OFFSET	Enable / Disable the frequency offset for the visualization	OFF or ON	OFF
61	OFS VALUE	Frequency offset value for the visualization	+/- 99.999999999 GHz. See <u>*</u>	OHz
70	CAT BAUD	CAT serial port baud rate	9600, 38400, 57600, 115200	38400
71	HOLD TIME	Hold time to detect a long pressure	From 500 to 2500ms	1000ms
72	REPT TIME	Repetition time when a key is pressed	From 100 to 1500ms	600ms
80	SERVICE	Enable Service mode	ON or OFF	OFF
81	DEFAULT	Restore default parameters	YES or NO	NO
82	UI UPDATE	If Service mode is active, enable the firmware update mode	YES or NO	NO
83	VIEW SN	Display the FDM-DUOr serial number		
84	VIEW FW	Display the FDM-DUOr firmware versions	Firmware	UI
85	CLK ADJ	Sets the internal clock correction value. It is used to have a fine frequency setting. In case of "Ref In" utilization, this parameter is not relevant.	±50000 dots (not Hz)	-

6.5.1 Frequency visualization offset menu

The frequency visualization offset is helpful when using a transverter. The Frequency offset set in digit by digit mode with some improvements to set a signed 10 digit offset in a 9 digit display.

- E2: Select the digit to modify
- Main encoder: modify the selected digit value
- E1: change the visualization
 - o kHz: the 8 most significant digit of the frequency offset are displayed
 - Hz: the 8 least significant digit of the frequency offset are displayed
- E1 or Main encoder short pressure: change the sign of the offset (+/-)
- E2 short pressure: save the setting

EXAMPLES:

Frequency offset value: +10,000,034,120 Hz

o kHz Display mode

	188 WG	
TX S 1 3 5 7 9+10 +20 +40 +60		
^{set} 51 ∤ 10 000 0 <u>3</u> 4	KHz 🛯	AMCW± WWIQ AD KEY
E1 VOL SQL MIC AGC NR NB AN E2		

• Hz Display mode

LP A RX TX	.TT PRE		2 in <i>m</i>				-(88) PKH	LOC REM SERV
SET	1 3 158	88		0 +20 9 - 9	_	-40 81 -	SWR m SW KHz	
				NR NB	AN [

7 CAT Remote Control

7.1 Introduction

The FDM-DUOr receiver uses a full-duplex, asynchronous, USB serial interface for communicating through the USB CAT port. Each data is constructed with 1 start bit, 8 data bits, 1 stop bit, no parity is used (8N1). The baud rate is selectable in the [70] CAT BAUD menu. Available values are 9600, 38400, 57600, 115200 bps.

The FDM-DUO implements proprietary commands and also a subset of the Kenwood TS-480 command set. Some of those commands have a dummy implementation for compatibility issues with Ham Radio Deluxe.

7.2 Computer control commands

A computer control command is composed of an alphabetical command, various parameters, and the terminator that signals the of the command.

For example to set the VFO-A to 14MHz the command is:

FA00014000000;

- "FA": alphabetical command
- "0001400000000": parameter
- ";": terminator

Computer control commands can be classified as shown below:



EXAMPLE

- To set the VFO-A to 14MHz the PC sends: "FA0001400000000;" SET command
- To read the VFO-A frequency the PC sends: "FA;" **READ command**
- When this command has been sent, the following message is returned to the PC: "FA0001400000000;" **ANSWER**

7.3 CAT Commands List

7.3.1 Active commands list

COMMAND	FUNCTION	SET	READ	ANS.
AT/RA	RF ATTENUATOR	YES	YES	YES
DT	DUO TYPE	-	YES	YES
FA	VFO-A FREQUENCY	YES	YES	YES
FB	VFO-B FREQUENCY	YES	YES	YES
FI	INTERNAL FILTER MODULES	YES	YES	YES
FR	VFO/MEM MODE	YES	YES	YES
GC	GAIN CONTROL	YES	YES	YES
GS	GAIN SETTINGS	YES	YES	YES
IF	INFORMATION	-	YES	YES
LB	LCD BACKLIGHT	YES	YES	YES
LP	LOW PASS	YES	YES	YES
MC	MEMORY CHANNEL	YES	YES	YES
MD	MODE	YES	YES	YES
MR	MEMORY READ	-	YES	YES
MT	MUTE IN TRANSMISSION	YES	YES	YES
MW	MEMORY WRITE	YES	-	-
NB	NOISE BLANKER STATUS	-	YES	YES
NC	NOISE REDUCTION	YES	YES	YES
NK	NOISE BLANKER	YES	YES	YES
NR	NOISE REDUCTION STATUS	-	YES	YES
OS	FVO STATE	YES	YES	YES
OV	FVO VALUE	YES	YES	YES
PI	PITCH	YES	YES	YES
RF	RECEPTION FILTERS	YES	YES	YES
SE	SERVICE	YES	YES	YES
SM	S METER	-	YES	YES
SN	SERIAL NUMBER	-	YES	YES
VA	AUX VOLUME	YES	YES	YES
VM	MAIN VOLUME	YES	YES	YES
VS	FIRMWARE VERSION	-	YES	YES

7.3.2 Active commands tables

AT	Rea	ds or	sets th	ne inp	Parameters:						
Set	1	2	3	4	5	6	7	8	9	10	P1
	A	т	P1	;							'0': 0dB
Read	1	2	3	4	5	6	7	8	9	10	'1': 10dB
	A	т	;								'2': 20dB
Answer	1	2	3	4	5	6	7	8	9	10	'3': 30dB
	Α	Т	P1	;							

DT	Rea	ds th	e FDM	-DUO	Parameters:						
Set											P1 Always 002
Read	1	2	3	4	5	6	7	8	9	10	
	D	т	;								
Answer	1	2	3	4	5	6	7	8	9	10	
	D	Т	P1	P1	P1	;					

FA			sets tl able dur				Parameters: P1				
Set	1	2	3	4	5	6	7	8	9	10	Frequency in Hz (11 digit)
	F	A	P1	P1	P1	P1	P1	P1	P1	P1	
	11	12	13	14	15	16	17	18	19	20	
	P1	P1	P1	;							
Read	1	2	3	4	5	6	7	8	9	10	
	F	A	;								
Answer	1	2	3	4	5	6	7	8	9	10	
	F	A	P1	P1	P1	P1	P1	P1	P1	P1	
	11	12	13	14	15	16	17	18	19	20	
	P1	P1	P1	;							1

FB			sets th able duri				Parameters: P1				
Set	1	2	3	4	Frequency in Hz (11 digit)						
	F	В	P1	P1	P1	P1	P1	P1	P1	P1	
	11	12	13	14	15	16	17	18	19	20	
	P1	P1	P1	;							
Read	1	2	3	4	5	6	7	8	9	10	
	F	В	;								
Answer	1	2	3	4	5	6	7	8	9	10	
	F	В	P1	P1	P1	P1	P1	P1	P1	P1	
	11	12	13	14	15	16	17	18	19	20	1
	P1	P1	P1	;							

FI	Rea	ds or	sets tl	ne int	ernal	ngs	Parameters: P1 module index, from '0' to '10'				
Set	1	2	3	4	5	6	7	8	9	10	P2 module state;
	F	I	P1	P1	P2	Р3	P3	Р3	Р3	P3	'0' not used
	11	12	13	14	15	16	17	18	19	20	'1' used
	Р3	P3	Р3	P3	Р3	Р3	P4	P4	P4	P4	1 useu
	21	22	23	24	25	26	27	28			P3 module low frequency
	P4	P4	P4	P4	P4	P4	P4	;			PS module low frequency
Read	1	2	3	4	5	6	7	8	9	10	D4 modulo bish faomanan
	F	I	P1	P1	;						P4 module high frequency
Answer	1	2	3	4	5	6	7	8	9	10	
	F	I	P1	P1	P2	P3	P3	P3	Р3	P3	
	11	12	13	14	15	16	17	18	19	20	
	P3	Р3	P3	P3	P3	P3	P4	P4	P4	P4	1
	21	22	23	24	25	26	27	28			
	P4	P4	P4	P4	P4	P4	P4	;			1

FR			sets tl able dur	-	Parameters: P1						
Set	1	2	3	4	5	6	7	8	9	10	0: VFO-A
	F	R	P1	;							1: VFO-B
Read	1	2	3	4	5	6	7	8	9	10	2: M.CH
	F	R	;								
Answer	1	2	3	4	5	6	7	8	9	10]
	F	R	P1	;]				

GC	Rea	ds or	sets th	ne act	tive g	ain co	ontro				Parameters:
Set	1	2	3	4	5	6	7	8	9	10	P1
	G	С	P1	;							0: auto (AGC)
Read	1	2	3	4	5	6	7	8	9	10	1: manual
	G	С	;								
Answer	1	2	3	4	5	6	7	8	9	10	
	G	С	P1	;							

GS	Rea	ds or	sets th	ne co	ntrol	gain	settir	ngs			Parameters:
Set	1	2	3	4	5	6	7	8	9	10	P1
	G	S	P1	P2	P2	P2	;				0: auto (AGC)
Read	1	2	3	4	5	6	7	8	9	10	1: manual
	G	S	P1	;							
Answer	1	2	3	4	5	6	7	8	9	10	P2 for P1='0'
	G	S	P1	P2	P2	P2	;				0 : slow 1 : medium 2 : fast
											P2 for P1='1' 0 : OFF 1 a 10 : active

IF	Retr	ieves	the ti	ransce	eiver s	status					Parameters:
Set											P1: Frequency 11 digit
											P2: 5 spaces
Read	1	2	3	4	5	6	7	8	9	10	P3: Always 0
	I	F	;								P4: Always 0
Answer	1	2	3	4	5	6	7	8	9	10	P5: Always 0
	I	F	P1	P1	P1	P1	P1	P1	P1	P1	P6/P7: Memory ch. Number 0-199
	11	12	13	14	15	16	17	18	19	20	P8: 0:Rx 1:Tx
	P1	P1	P1	P2	P2	P2	P2	P2	P3	P3	P9: Operating Mode (See MD)
	21	22	23	24	25	26	27	28	29	30	P10: See FR
	P3	Р3	P3	P4	P5	P6	P7	P7	P8	Р9	P11: Always 0
	31	32	33	34	35	36	37	38	39	40	P12: Always 0
	P10	P11	P12	P13	P14	P14	P15	;			P13: Always 0
											P14: Always 0
											P15: Space

LB	Sets	s/Rea	ds the	LCD	backl	ight p	baran	neter	S		Parameters: P1 mode
Set	1	2	3	4	5	6	7	8	9	10	0 : temporary set
	L	В	P1	P3	P3	P3	P4	P4	P4	P5	1 : Rx Stand Alone
	11	12	13	14	15	16	17	18	19	20	2 : Rx Remote (PC Controlled)
	P5	P5	;								3 : Tx
Read	1	2	3	4	5	6	7	8	9	10	1
	L	в	P2	;							P2 mode selection
Answer	1	2	3	4	5	6	7	8	9	10	1 : Rx Stand Alone
	L	В	P2	P3	P3	P3	P4	P4	P4	P5	2 : Rx Remote (PC Controlled)
	11	12	13	14	15	16	17	18	19	20	3 : Tx
	P5	P5	;								
											P3 : RED component (0 to 100)
											P4 : GREEN component (0 to 100)
											P5 : BLUE component (0 to 100)

LP	Rea	ds th	e Low-	Pass	Parameters:							
											P1 O: not active	
Read	1	2	3	4	5	6	7	8	9	10	1: active	
	L	Р	;									
Answer	1	2	3	4	5	6	7	8	9	10		
	L P P1 ;											

МС	Reca	alls or	r reads	s the I	Mem	ory c	hann	el			Parameters:			
Set	1	2	3	4	5	6	7	8	9	10	P1: 0 or 1			
	М	С	P1	P2	P2	;					P2: 00 to 99			
Read	1	2	3	4	5	6	7	8	9	10				
	М	С	;											
Answer	1	2	3	4	5	6	7	8	9	10				
	М	С	P1	P2	P2	;								

MD	Reca	alls or	reads	s the o	opera	ting	mode	e stati	JS		Parameters:
Set	1	2	3	4	5	10	P1:				
	М	D	P1	;							1: LSB
Read	Image: Constraint of the state of									2: USB	
	М	D	;								3: CW
Answer	1	2	3	4	5	6	7	8	9	10	5: AM
	Μ	D	P1	;							

MR	Read	ds the	Mem	nory c	hann	el dat	а				Parameters:
Set											P1: 0
											P2/3: 000 to 199 Memory No.
Read	1	2	3	4	5	6	7	8	9	10	P4: Frequency (11 digit)
	М	R	P1	P2	Р3	Р3					P5: Mode (see MD command)
Answer	1	2	3	4	5	6	7	8	9	10	P6: Always 0
	М	R	P1	P2	P3	P3	P4	P4	P4	P4	P7: Always 0
	11	12	13	14	15	16	17	18	19	20	P8: Always 0
	P4	P4	P4	P4	P4	P4	P4	P5	P6	P7	P9: Always 0
	21	22	23	24	25	26	27	28	29	30	P10 to P13: Memory label, last 14
	P8	P8	Р9	Р9	P10	P10	P10	P10	P10	P10	chars
	31	32	33	34	35	36	37	38	39	40	P14: 00
	P10	P10	P10	P10	P10	P10	P10	P10	P11	P12	P15: Memory status
	41	42	43	44	45	46	47	48	49	50	B: used
	P15	P16	P16	P16	P16	P16	P16	P16	P16	;	F: free
											P16: Memory label, first 8 chars

MT			sets tl lable dur	Parameters: P1 CW MUTE							
Set	1	2	3	4	5	6	7	8	9	10	0: not active
	М	Т	P1	1: active							
Read	1	2	3								
	М	Т	;								P2 SSB MUTE
Answer	1	2	3	4	5	6	7	8	9	10	0: not active
	М	т	P1	P2	;						1: active

MW	Stor	e the	data t	to the	Mem	ory c	hanne	el			Parameters:		
Set	1	2	3	4	5	6	7	8	9	10	P1:0		
	М	W	P1	P2	P3	P3	P4	P4	P4	P4	P2/3: 000 to 199 Memory No.		
	11	12	13	14	15	16	17	18	19	20	P4: Frequency (11 digit)		
	P4	P4	P4	P4	P4	P4	P4	P5	P6	P7	P5: Mode (see MD command)		
	21	22	23	24	25	26	27	28	29	30	P6: Always 0		
	P8	P8	Р9	P6	P10	P10	P10	P10	P10	P10	P7: Always 0		
	31	32	33	34	35	36	37	38	39	40	P8: Always 0		
	P10	P10	P10	P10	P10	P10	P10	P10	P11	P12	P9: Always 0		
	41	42	43	44	45	46	47	48	49	50	P10 to P13: Memory label, last		
	P15	P16	P16	P16	P16	P16	P16	P16	P16	;	14 chars		
Read											P14:00		
											P15: Memory status		
Answer											B: used		
											F: free		
											P16: Memory label, first 8 char		

NB	Read	ds the	noise	e blan	ker fu	inctio	n stat	us			Parameters:
Set											P1 0: Noise Blanker OFF
Read	1	2	3	4	5	6	7	8	9	10	1: Noise Blanker ON
	N	В	;								
Answer	1	2	3	4	5	6	7	8	9	10	
	N	В	P1	;							

NC	Rea	ds or	sets th	ne no	ise re	ducti	ion va	alue			Parameters:					
Set	1	2	3	4	10	P1 always 0										
	N	С	P1	P2	P2	P2	- 7									
Read	1	2	3	4	5	6	7	8	9	10	P2 noise reduction value					
	N	С	P1	;							0: OFF					
Answer	1	2	3	4	5	6	7	8	9	10	01 ~ 10 (active)					
	N	С	P1	P2	P2	P2	;				1					

NK	Rea	ds or	sets th	ne no	ise bl	anke	r valu	ie			Parameters:				
Set	1	2	3	4	10	P1 always 0									
	N	K	P1	P2	P2	P2	;								
Read	1	2	3	4	5	6	7	8	9	10	P2 noise blanker value				
	N	K	P1	;							0: OFF				
Answer	1	2	3	4	5	6	7	8	9	10	01 ~ 10 (active)				
	N	K	P1	P2	P2	P2	;								

NR	Read	ds the	noise	e redu	iction	funct	ion st	atus			Parameters:
Set											P1 0: Noise Reduction OFF
Read	1	2	3	4	5	6	7	8	9	10	1: Noise Reduction ON
	N	R	;								
Answer	1	2	3	4	5	6	7	8	9	10	
	N	R	P1	;							

OS		-	ds the able duri	-	-		offset	: statı	ıs		Parameters: P1
Set	1	2	3	4	0: not active						
	0	S	P1	;							1: active
Read	1	2	3	4	5	6	7	8	9	10	
	0	S	;								
Answer	1	2	3	4	5	6	7	8	9	10	
	0	S	P1	;							

OV	Sets	s/Rea	ds the	Frequ	ency	view	offset	t valu	е		Parameters:
	Set n	ot avail	lable duri	ng trans	missior	า					P1 (1)
Set	1	2	3	4	Always '0'						
	0	v	P1	P2	P2						
	11	12	13	14	15	16	17	18	19	20	Offset sign'+' /'-'
	P3	P3	P3	P3	P3	P3	P3	P3	P3	;	P3
Read	1	2	3	4	5	6	7	8	9	10	Absolute value in Hz
	0	v	P1	;							
Answer	1	2	3	4	5	6	7	8	9	10	
	0	v	P1	P2	Р3	Р3	Р3	P3	Р3	Р3	
	11	12	13	14	15	16	17	18	19	20	1
	P3	P3	P3	Р3	Р3	Р3	Р3	Р3	Р3	;	

PI	Rea	ds or	sets th	ne pit	ch va	lue					Parameters:
Set	1	2	3	4	5	6	7	8	9	10	P1 pitch value in Hz
	Р	I	P1	P1	P1	P1	- 7				0000 ~ 1000 in 10Hz step
Read	1	2	3	4	5	6	7	8	9	10	
	Р	I	;								
Answer	1	2	3	4	5	6	7	8	9	10	
	P	I	P1	P1	P1	P1	;				

RA	Rea	ds or	sets th	ne att	enua	tor fu	unctio	on sta	itus		Parameters:
Set	1	2	3	4	P1						
	R	A	P1	P1	;						00: ATT OFF
Read	1	2	3	4	5	6	7	8	9	10	01: ATT ON (20dB)
	R	A	;								P2: always 00
Answer	1	2	3	4	5	6	7	8	9	10	
	R	Α	P1	P1	P2	P2	;				

RF	Rea	ds oi	r sets t	he re	cepti	on fil	ters v	values	5		Parameters:
Set	1	2	3	4	5	6	7	8	9	10	P1 (like MD command)
	R	F	P1	P2	P2	;					1: LSB
Read	1	2	3	4	5	6	7	8	9	10	2: USB
	R	F	P1	;							3: CW
Answer	1	2	3	4	5	6	7	8	9	10	5: AM
	R	F	P1	P2	P2	;]
											P2: see parameter details section

SE			sets th able duri				status	5			Parameters: P1 always '1'. Force the service
Set	1	2	3	4	10	mode					
	S	E	P1	;							
Read	1	2	3	4	5	6	7	8	9	10	P2 always '0'. If in service mode
	S	E	;								this CAT protocol is not available
Answer	1	2	3	4	5	6	7	8	9	10	
	S	E	P2	;							

SM	Read	ds the	e S-me	eter st	atus						Parameters:
Set	1	2	3	4	5	6	7	8	9	10	P1: Always 0 P2: Meter Read
Read	1 S	2 M	3 P1	4	5	6	7	8	9	10	0000: S0 0002: S1
Answer	1	2	3	4	5	6	7	8	9	10	0003: S2
	S	M	P1	₽2	₽2	P2	₽2	7			0004: S3 0005: S4 0006: S5 0008: S6 0009: S7 0010: S8 0011: S9 0012: S9+10 0014: S9+20 0016: S9+30 0018: S9+40 0020: S9+50 0022: S9+60

SN	Read	ds the	recei	ver se	erial n	umbe	er				Parameters:
Set	1	2	3	4	5	6	7	8	9	10	P1
											Serial number
Read	1	2	3	4	5	6	7	8	9	10	
	S	N	;								
Answer	1	2	3	4	5	6	7	8	9	10	
	S	N	P1	P1	P1	P1	P1	P1	P1	P1	
	11	12	13	14	15	16	17	18	19	20	
	P1	P1	P1	P2	P2	P2	;				

VA	Rea	ds or	sets th	ne au	xiliary	y volu	ume				Parameters:
Set	1	2	3	4	5	10	P1				
	v	A	P1	P1	P1	- 7					000 ~ 100
Read	1	2	3	4	5	6	7	8	9	10	
	v	A	;								
Answer	1	2	3	4	5	6	7	8	9	10	
	V	Α	P1	P1	P1	;					

VM	Rea	ds or	sets th	ne ma	nin vo	lume	:				Parameters:
Set	1	2	3	4	5	10	P1				
	v	М	P1	P1	P1	;					000 ~ 005
Read	1	2	3	4	5	6	7	8	9	10	010 ~ 100 in 5 dots step
	v	М	;								
Answer	1	2	3	4	5	6	7	8	9	10	
	V	М	P1	P1	P1	;					

VS	Rea	ds tl	he FD	M-DU	0 firr	nwa	re ve	rsior	ıs.		Parameters:
Set											P1 firmware version to re I: User Interface
Read	1	2	3	4	.5	6	7	8	9	10	F: FPGA
Redu	v	S	P1	;	0	Ū	,	0	2	10	U: USB audio
Answer	1	2	3	4	5	6	7	8	9	10	R: Rx Demodulator
	v	S	P1	P2	P2	P2	P2	P2	;		
											P2
											firmware version "xx.yy"

7.3.3 Parameters details

7.3.3.1 RF command – P2 parameter

P2		MODE	
	LSB/USB	CW	AM
0	1600Hz	-	2500Hz
1	1700Hz	-	3000Hz
2	1800Hz	-	3500Hz
3	1900Hz	-	4000Hz
4	2000Hz	-	4500Hz
5	2100Hz	-	5000Hz
6	2200Hz	-	5500Hz
7	2300Hz	100Hz & 4	6000Hz
8	2400Hz	100Hz & 3	-
9	2500Hz	100Hz & 2	-
10	2600Hz	100Hz & 1	-
11	2700Hz	100Hz	-
12	2800Hz	300Hz	-
13	2900Hz	500Hz	-
14	3000Hz	1000Hz	-
15	3100Hz	1500Hz	-
16	4000Hz	2600Hz	-
17	5000Hz	-	-
18	6000Hz	-	-

7.3.4 Dummy commands tables

The following commands have a dummy implementation.

AC				ernal an TATION		uner sta	atus				Parameters: P1: Always 00
Set	1	2	3	4	5	6	7	8	9	10	P2: Always 0
Read	1	2	.3	4	5	6	7	8	9	10	-
nead	A	С	;		-	-		-	-		
Answer	1	2	3	4	5	6	7	8	9	10]
	A	С	P1	P1	P2	;					

AG		r reads MY IMP		-	1						Parameters: P1: Always 0
Set	1	2	3	4	5	6	7	8	9	10	P2: Always 000
Read	1	2	3	4	5	6	7	8	9	10	
	A	G	P1	;							
Answer	1	2	3	4	5	6	7	8	9	10	
	A	G	P1	P2	P2	P2;					

AI			the Aut LEMEN			(AI) fund	ction ON	N/ OFF			Parameters: P1: Always 0
Set	1	2	3	4	5	6	7	8	9	10	
					_						
Read	1	2	3	4	5	6	- /	8	9	10	
	A	I	P1	;							
Answer	1	2	3	4	5	6	7	8	9	10	
	A	I	P1	;							

AN			ntenna o PLEMEN			1/ ANT2	-				Parameters: P1: Always 1
Set	1	2	3	4	5	6	7	8	9	10	
Read	1	2	3	4	5	6	7	8	9	10	
	A	N	;								
Answer	1	2	3	4	5	6	7	8	9	10	
	A	N	P1	;							

BC		r reads MY IMP				ction st	atus				Parameters: P1: Always 0
Set	1	2	3	4	5	6	7	8	9	10	
Read	1	2	3	4	5	6	7	8	9	10	
	В	С	;								
Answer	1	2	3	4	5	6	7	8	9	10	
	в	C	P1	;							

ВҮ				l status TATION							Parameters: P1: Always 0
Set	1	2	3	4	5	6	7	8	9	10	P2: Always 0
Read	1	2	3	4	5	6	7	8	9	10	
	В	Y	;								
Answer	1	2	3	4	5	6	7	8	9	10	
	В	Y	P1	P2	;						

CA		nd read MY IMP				eat func	tion sta	tus			Parameters: P1: Always 0
Set	1	2	3	4	5	6	7	8	9	10	
Read	1	2	3	4	5	6	7	8	9	10	-
	С	A	;								
Answer	1	2	3	4	5	6	7	8	9	10	
	С	A	P1	;							

CN				TCSS tor TATION		ber					Parameters: P1: Always 00
Set	1	2	3	4	5	6	7	8	9	10	
Read	1	2	3	4	5	6	7	8	9	10	
	С	N	;								
Answer	1	2	3	4	5	6	7	8	9	10	
	С	A	P1	P1	;						

СТ		nd read MY IMP				tatus					Parameters: P1: Always 0
Set	1	2	3	4	5	6	7	8	9	10	
Read	1	2	3	4	5	6	7	8	9	10	
	С	т	;								
Answer	1	2	3	4	5	6	7	8	9	10	
	С	т	P1	;							

DL		nd read MY IMP		-		iter (DN	IL) funct	tion stat	tus		Parameters: P1: Always 0
Set	1	2	3	4	5	6	7	8	9	10	P2: Always 00
Read	1	2	3	4	5	6	7	8	9	10	-
	D	L	;								
Answer	1	2	3	4	5	6	7	8	9	10	-
	D	L	P1	P2	P2	;]

EX			the Ext	Parameters: P1: 000 - 060: Menu No.							
Set	1	2	3	4	5	6	7	8	9	10	P2: Always 00
											P3: Always 0
Read	1	2	3	4	5	6	7	8	9	10	P4: Always 0
	E	х	P1	P1	P1	P2	P2	Р3	P4	;	P5: Always 0
Answer	1	2	3	4	5	6	7	8	9	10] '
	E	Х	P1	P1	P1	P2	P2	P3	P4	P5]
	11	12	13	14	15	16	17	18	19	20]
	P5	;									1

FS			ids the F PLEMEN			Parameters: P1 Always 0					
Set	1	2	3	4	5	6	7	8	9	10	
Read	1	2	3	4	5	6	7	8	9	10	
	F	S	;								
Answer	1	2	3	4	5	6	7	8	9	10	
	F	S	P1	;							

FW		ts or rea MY IMP			Parameters: P1 Always 0000						
Set	1	2	3	4	5	6	7	8	9	10	, ,
Read	1	2	3	4	5	6	7	8	9	10	
	F	W	;]
Answer	1	2	3	4	5	6	7	8	9	10]
	F	W	P1	P1	P1	P1	;				

GT		ts or rea MY IMP				Parameters: P1 Always 000					
Set	1	2	3	4	5	6	7	8	9	10	
Read	1	2	3	4	5	6	7	8	9	10	
	G	т	;								
Answer	1	2	3	4	5	6	7	8	9	10	
	G	т	P1	P1	P1	7					

ID		s the tra MY IMP				Parameters: P1: 020					
Set	1	2	3	4	5	6	7	8	9	10	
Read	1	2	3	4	5	6	7	8	9	10	
	I	D	;								
Answer	1	2	3	4	5	6	7	8	9	10	
	I	D	P1	P1	P1	;					

IS			ls the IF LEMEN		Parameters: P1: "+"						
Set	1	2	3	4	5	6	7	8	9	10	P2: Always 0000
Read	1	2	3	4	5	6	7	8	9	10	
	I	S	;								
Answer	1	2	3	4	5	6	7	8	9	10	
	I	S	P1	P2	P2	P2	P2	;			1

KS		and read MY IMP				Parameters: P1: 010					
Set	1	2	3	4	5	6	7	8	9	10	
Read	1	2	3	4	5	6	7	8	9	10	
	K	S	;								
Answer	1	2	3	4	5	6	7	8	9	10	
	K	S	P1	P1	P1	;					

MF			Menu A PLEMEN			Parameters: P1: Always 0					
Set	1	2	3	4	5	6	7	8	9	10	
D	7	2	2	Λ	5	C	7	0	0	10	
Read	 M	∠ F	3	4	5	6	/	8	9	10	
Answer	1	2	3	4	5	6	7	8	9	10	
	M	F	P1	;							
MG		or reads MY IMP		•	-	atus					Parameters: P1: Always 000
--------	---	---------------------------	----	----	----	------	---	---	---	----	-------------------------------
Set	1	2	3	4	5	6	7	8	9	10	
Read	1	2	3	4	5	6	7	8	9	10	-
	М	G	;								
Answer	1	2	3	4	5	6	7	8	9	10	
	М	G	P1	P1	P1	;					

NL		reads t MY IMP	•		,	level					Parameters: P1: Always 000
Set	1	2	3	4	10						
Read	1	2	3	4	5	6	7	8	9	10	
	N	L	;								
Answer	1	2	3	4	5	6	7	8	9	10	
	N	L	P1	P1	P1	7					

ΡΑ				-amplifie TATION		on statu	S				Parameters: P1: Always 0
Set	1	2	3	4	5	6	7	8	9	10	P2: Always 0
Read	1	2	3	4	5	6	7	8	9	10	
	Р	A	;								
Answer	1	2	3	4	5	6	7	8	9	10]
	Р	A	P1	P2	;						

PC		or reads MY IMP									Parameters: P1: Always 005
Set	1	2	3	4	5	6	7	8	9	10	,
Read	1	2	3	4	5	6	7	8	9	10	
	Р	С	;								
Answer	1	2	3	4	5	6	7	8	9	10	
	Р	С	P1	P1	P1	;					

PR			the Spe LEMEN			functior	ON/ OI	FF			Parameters: P1: Always 0
Set	1	2	3	4	10						
Read	7	2	3	4	5	6	7	8	9	10	
neau	P	R	;	1	0	0	,	0		10	
Answer	1	2	3	4	5	6	7	8	9	10	
	Р	R	P1	;							

PS			the Pov LEMEN			atus					Parameters: P1: Always 1
Set	1	2	3	4	5	6	7	8	9	10	,
Read	1	2	3	4	5	6	7	8	9	10	
	Р	S	;								
Answer	1	2	3	4	5	6	7	8	9	10	
	Р	S	P1	;							

QR		or reads MY IMP				nnel dat	ta				Parameters: P1: Always 0
Set	1	2	3	4	5	6	7	8	9	10	P2: Always 0
Read	1	2	3	4	5	6	7	8	9	10	
	Q	R	;]
Answer	1	2	3	4	5	6	7	8	9	10	
	Q	R	P1	P2	;						

RA		or reads MY IMP				status					Parameters: P1: Always 00
Set	1	2	3	4	10	P2: Always 00					
Read	1	2	3	4	5	6	7	8	9	10	
	R	A	;								
Answer	1	2	3	4	5	6	7	8	9	10	
	R	A	P1	P1	P2	P2	;				

RG		or read t MY IMP									Parameters: P1: Always 000
Set	1	2	3	4	5	6	7	8	9	10	
Read	1	2	3	4	5	6	7	8	9	10	
	R	G	;								
Answer	1	2	3	4	5	6	7	8	9	10	
	R	G	P1	P1	P1	;					

RL				se Redu TATION		vel					Parameters: P1: Always 00
Set	1	2	3	4	5	6	7	8	9	10	,
Read	1	2	3	4	5	6	7	8	9	10	
	R	L	;								
Answer	1	2	3	4	5	6	7	8	9	10	
	R	L	P1	P1	;						

RM		or reads MY IMP									Parameters: P1: Always 1
Set	1	2	3	4	5	6	7	8	9	10	P2: Always 0001
Read	1	2	3	4	5	6	7	8	9	10	
	R	М	;								
Answer	1	2	3	4	5	6	7	8	9	10	
	R	М	P1	P2	P2	P2	P2	;			

SD		or reads MY IMP				delay					Parameters: P1: Always 0000
Set	1	2	3	4	10	,					
Read	1	2	3	4	5	6	7	8	9	10	
	ន	D	;								
Answer	1	2	3	4	5	6	7	8	9	10	
	S	D	P1	P1	P1						

SH		or reads MY IMP			-						Parameters: P1: Always 00
Set	1	2	3	4	5	6	7	8	9	10	
Read	1	2	3	4	.5	6	7	8	9	10	
neau	S	H	;	1	0	0	,	0		10	
Answer	1	2	3	4	5	6	7	8	9	10	
	S	H	P1	P1	;						

SL				P filter s TATION	-						Parameters: P1: Always 00
Set	1	2	3	4	5	6	7	8	9	10	
Read	1	2	3	4	5	6	7	8	9	10	
	S	H	;								
Answer	1	2	3	4	5	6	7	8	9	10	
	S	H	P1	P1	;						

SQ		and read MY IMP									Parameters: P1: Always 0
Set	1	2	3	4	5	6	7	8	9	10	P2: Always 000
Read	1	2	3	4	5	6	7	8	9	10	
	S	Q	P1	;							
Answer	1	2	3	4	5	6	7	8	9	10	
	S	Q	P1	P2	P2	P2	;				

TN				ne freque TATION	•	mber					Parameters: P1: Always 00
Set	1	2	3	4	5	6	7	8	9	10	,
Read	1	2	3	4	5	6	7	8	9	10	
	т	N	;								
Answer	1	2	3	4	5	6	7	8	9	10	
	т	N	P1	P1	;						

то			the Tor LEMEN			OFF					Parameters: P1: Always 0
Set	1	2	3	4	5	6	7	8	9	10	, ,
Read	1	2	3	4	5	6	7	8	9	10	
	т	0	;								
Answer	1	2	3	4	5	6	7	8	9	10	
	Т	0	P1	;							

TS		or reads MY IMP				Parameters: P1: Always 0					
Set	1	2	3	4	5	6	7	8	9	10	,
Read	1	2	3	4	5	6	7	8	9	10	
	т	S	;								
Answer	1	2	3	4	10						
	т	S	P1	;							

VD		or reads MY IMP									Parameters: P1: Always 0000
Set	1	2	3	4	5	6	7	8	9	10	
Read	1	2	3	4	5	6	7	8	9	10	
	v	D	;								
Answer	1	2	3	4	5	6	7	8	9	10	
	v	D	P1	P1	P1	P1	;				

VG		or reads MY IMP		-							Parameters: P1: Always 000
Set	1	2	3	4	5	6	7	8	9	10	
Read	1	2	3	4	5	6	7	8	9	10	
	v	G	;								
Answer	1	2	3	4	5	6	7	8	9	10	
	v	G	P1	P1	P1	7					

VX				X functio TATION		S					Parameters: P1: Always 0
Set	1	2	3	4	5	6	7	8	9	10	, ,
Read	1	2	3	4	5	6	7	8	9	10	
	v	х	;								
Answer	1	2	3	4	5	6	7	8	9	10	
	v	x	P1	;							

8 Software & Driver Installation

8.1 Software installation

8.1.1 First-time install in Windows 8 and Windows 7

Double-click the file "setup.exe" in the CD .

l ⊋ 🚺 = 1	Application Tools	ELAD.	FDM_SW2_V1_00Beta30			\rightarrow
File Home Shar	e View Manage					~
🖻 🤿 🔹 🕇 📕 🕢 _	PRG_8 > ELAD_PR11-0009_FDM_S1 > SW	PC > BetaTest > ELAD_FDM_SW	2_V1_00Beta30	٧Ċ	Search ELAD_FDM_SW2_V1_0	_ ,A
🔆 Favorites	Name	Date modified Typ	e Size			
E Desktop	DotNetFX40	1/23/2014 5:46 PM File	folder			
🗼 Downloads	vcredist_x86	1/23/2014 5:46 PM File	folder			
💝 Dropbox	WindowsInstaller3_1	1/23/2014 5:46 PM File	folder			
Recent places	ELAD_FDMSW2Setup	1/23/2014 5:44 PM Wit	dows installer 30,902 KB			
	🔂 setup	1/23/2014 5:44 PM Ap	lication 424 KB)		
Calibraries						
Documents						
👌 Music						
Pictures						
Videos						
ntegroup						
Computer						
Local Disk (C:)						
progetti (\\192.168.	2					
🗣 Network						
items 1 item selected	423 KB					800

The windows installer first installs the prerequisites:

- Microsoft VC++ 2010 Runtime libraries
- Microsoft .NET Framework 4.0 (Only for Windows 7) and then the FDM-SW2 software.
- Click on "Accept" (Only for Windows 7)

ELAD FDM-SW1 Setup	X
For the following components:	
Microsoft .NET Framework 4 (x86 and x64)	
Please read the following license agreement. Press the page down key to see of the agreement.	the rest
	-
MICDOSOFT SOFTWARE	
MICROSOFT SOFTWARE SUPPLEMENTAL LICENSE TERMS	
MICROSOFT SOFTWARE SUPPLEMENTAL LICENSE TERMS	
)FT
SUPPLEMENTAL LICENSE TERMS MICROSOFT .NET FRAMEWORK 4 FOR MICROSO)FT
SUPPLEMENTAL LICENSE TERMS MICROSOFT .NET FRAMEWORK 4 FOR MICROSO WINDOWS OPERATING SYSTEM)FT
SUPPLEMENTAL LICENSE TERMS MICROSOFT .NET FRAMEWORK 4 FOR MICROSO WINDOWS OPERATING SYSTEM)FT

Click on "Install"



Click on "Yes"



Click on Install



Microsoft Visual C++ 2010 x86 Redistributable installation is complete, click on "Finish"



Click on "Yes" to start the installation of the .Net Framework 4.0 (Only for Windows 7)



Click to "Next" to start the FDM-SW2 software installation



Chose the installation folder, then click on "Next"

17	ELAD FDM-SW2 -	□ ×
Select II	nstallation Folder	
The installer v	ill install ELAD FDM-SW2 to the following folder.	
To install in th	s folder, click "Next". To install to a different folder, enter it below or click "E	Browse''.
<u>F</u> older: C:\Program	n Files\ELAD\ELAD FDM-SW2\ Brows	se
	Disk C	iost
Install ELAI ● Everyo ○ Just m		
	Cancel < Back	Next >

Click on "Next"

過	ELAD FDM-SW2	- 🗆 🗙
Confirm Installati	on	
The installer is ready to instal	IELAD FDM-SW2 on your computer.	
Click "Next" to start the insta	Illation.	
	Cancel < Back	Next >

Click on "Yes"

3		User Account Control		
Û	Do you want to allow the following program from an unknown publisher to make changes to this computer?			
Program name: P:_PRG_8\ELAD_PR11-00\ELAD_FDMSW2Setup.m Publisher: Unknown				
Show details		Yes No		
	Change when these notifications appear			

8.1.2 First-time install in Windows XP

Double-click the file "setup.exe" in the installation folder.



Click on "Accept"



Click on "Install"



Click on "Install"



Click on Next to install the FDM-SW2 software



Select the installation folder, then click on "Next"



Click on "Next"

🛃 ELAD FDM-SW2	
Confirm Installation	
The installer is ready to install ELAD FDM-SW2 on your computer.	
Click "Next" to start the installation.	
Cancel < Back	Next

The FDM-SW2 Software installation is completed



8.1.3 Update an existing software version

Double click on file ELAD_FDM_SW2_V_x.xx.msi included in the update and follow the instructions.

8.2 USB driver

8.2.1 USB driver installation in Windows 8 and Windows 7

8.2.1.1 First driver installation

To install ELAD FDM-DUOr driver, connect the FDM-DUOr USB RX port to a USB 2.0 socket on PC end power on the device. When Windows detects the new hardware, follow the steps listed below to install driver correctly:

Open **Control Panel** from **Start** menu, select "System" and "Device Manager". Expand "Other Devices" node: FDM-DUO.



Select FDM-DUO, right click on it and execute "Update driver software".

File Action View Help Image: State of the selected device.	4	Device Manager	-	
▲ UT93-LAPTOP ↓ ▲ Audio inputs and outputs ▶ Batteries ● Batteries ● Batteries ● Batteries ● Batteries ● Digital Media Devices ● Display adapters ● Display adapters ● Display adapters ● Display dapters ● Wince and other pointing devices ● Monitors ● Monitors ● Print queues ● Print queues ● Printers ● Printers ● Scan for hardware changes ● Sound, video ar Properties Sustem devices	File Action View Help			
Image: Second State Sta	(= =) 📰 🛅 🚺 🕷	8 🕅 🙀 🕫		
Image: Second state is a second sta				^
> Image: Solution of the solut		uts		
Image: Second State Sta				
Pigital Media Devices Disk drives Display adapters Display dapters Disole				
Disk drives Disk drives Display adapters Diplay adapters Monitors Monitors Network adapters Diplay drives Print queues Diplay drives				
Imaging dapters Imaging devices				
Imaging devices				
 Dig Human Interface Devices □ IDE ATA/ATAPI controllers □ Imaging devices □ Regional other pointing devices □ Monitors □ Monitors □ Monitors □ Other devices □ Other devices □ Processors □ Software device □ Software devices □ Software device □ Software devices □ Software device □ Sof				
IDE ATA/ATAPI controllers Imaging devices Imagi		-ec		
> Imaging devices > Keyboards > Wice and other pointing devices > Mice and other pointing devices > Wonitors > Wonitors > Print queues > Software devices Uninstall > Software devices > Software devices > Storage controlt > Sustem devices				
> Keyboards > Mice and other pointing devices > Monitors > Network adapters > Pointers > Print queues > Print queues > Processors > Software device > Sund, video ar > Sundar idue ar > Sutem devices				
> Monitors > Network adapters > Other devices > Print queues > Print queues > Processors > Software device > Software device > Software device > Software device > Storage controlt > Suptam devices				
> Network adapters > > > >		ng devices		
Bother devices FONDUO USR FW v.d 7 FONDUO USR FW v.d 7 Update Driver Software Printers Processors Uninstall Software device Scan for hardware changes Software control Software device Scan for hardware changes Software device Scan for hardware water changes Software device Statem device Sustem device	Monitors	-		
Image: First print queues Update Driver Software Image: First print queues Update Driver Software Image: First print queues Disable Image: First print queues Disable Image: First print queues Disable Image: First print queues Uninstall Image: First print queues Scan for hardware changes Image: First print queues Properties Image: First print queues Properties	Network adapters			
Image: Print queues Update Driver Software Image: Printers Disable Image: Printers Disable Image: Processors Uninstall Image: Processors Scan for hardware changes Image: Properties Properties				
> ⊕ Printers Disable □ Processors Uninstall > ⊡ Software device Scan for hardware changes > ↓ Sound, video ar Properties > ♦ Storage control Properties				
> □ Processors > □ Software device > □ Software device > □ Software changes Properties	A dan a series of			
> Imit Stating > Imit		Disable		
Software device Scan for hardware changes w Sound, video ar b Storage control Topperties		Uninstall		
Vertice are control Vertice	,			
		scan for naroware changes		
N 💶 Sustem devices 🗸 🗸 🗸 🗸 V		Properties		
				~
		are Wizard for the selected device.		

When Windows starts the installation procedure, select the option "Browse my computer for driver software" (the second option).

4		Device Manager	-	×
File	Action	View Help		
()				
	UT93- ▷ ■ AL ▷ 200 Ba ▷ 200 BI		×	^
	 Image: Comparison of Comparison	How do you want to search for driver software?		
	▷ 🤐 D\ ▷ 🖏 Hi ▷ 😭 ID ▷ 🗃 Im ▷ 💭 Ke	Search automatically for updated driver software Windows will search your computer and the Internet for the latest driver software for your device, unless you've disabled this feature in your device installation settings.		
	▷ 🖉 M ▷ 🖳 M ▷ 🚰 N ■ 🔂 Of	Browse my computer for driver software Locate and install driver software manually.		
	 ▷ □ Pr ▷ □ Pr ▷ □ Pr ▷ □ Sc ▷ □ Sc 			ł
	⊳ kaji su ⊳ C⊕ St ∧ n∎ Su		Cancel	¥

In the next dialog-box, insert the driver folder location using "Browse" button and check the option "Include subfolders". In this way manual driver search is enabled

For 32 bit system select the folder: C:\Program Files\ELAD\ELAD FDM-SW2\ELAD_FDM_Driver For 64 bit system select the folder: C:\Program Files (x86)\ ELAD\ELAD FDM-SW2\ELAD_FDM_Driver Then click "Next".



Click Install.

Let the hardware installation automatically completes and, at the procedure ending, click on "Close"; then disconnect and connect FDM-DUOr device on the same USB socket.



Now ELAD FDM-DUOr USB driver is installed on your PC.

8.2.2 USB driver installation in Windows XP

8.2.2.1 First driver installation

To install ELAD FDM-DUOr driver, connect the FDM-DUOr USB RX port to a USB 2.0 socket on PC and power on the device. Windows XP detects the new hardware and starts the hardware installation wizard. Then, next steps to install FDM-DUOr driver are listed below:

At the first dialog box, select the last option "No, not this time" and "Next".

Found New Hardware Wizard			
	Welcome to the Found New Hardware Wizard		
	Windows will search for current and updated software by looking on your computer, on the hardware installation CD, or on the Windows Update Web site (with your permission). <u>Read our privacy policy</u>		
	Can Windows connect to Windows Update to search for software?		
Yes, this time only			
Yes, now and every time I connect a device			
	💿 No, not this time		
	Click Next to continue.		
	< Back Next > Cancel		

Select "Install from a list or specific location (Advanced)" and "Next".

In the next dialog-box, check the options "Search for the best driver in these location" and "Include this location in the search" to enable manual driver search. Clicking on "Browse", select the path where the driver folder is located: Local Drive (C:) \Programs\ELAD\ELAD FDM-SW2\ELAD_FDM_Driver. Then click "Next".

ound New Hardware Wizard
Please choose your search and installation options.
Search for the best driver in these locations.
Use the check boxes below to limit or expand the default search, which includes local paths and removable media. The best driver found will be installed.
Search removable media (floppy, CD-ROM)
Include this location in the search: The search: The searc
O Don't search. I will choose the driver to install.
Choose this option to select the device driver from a list. Windows does not guarantee that the driver you choose will be the best match for your hardware.
< Back Next > Cancel

Let the hardware installation automatically completes and click on "Finish"; then disconnect and connect FDM- DUOr device on the same USB socket.

Found New Hardware Wizard				
	Completing the Found New Hardware Wizard The wizard has finished installing the software for: ELAD FDM-DUO			
	Click Finish to close the wizard.			
	K Back Finish Cancel			

Now ELAD FDM- DUOr driver is installed on your PC.

8.2.2.1 Driver installation verify in Windows 8 and Windows 7

To verify FDM-DUOr driver current version, connect the device to USB socket (where the device driver is already installed) and power on the device. Then open **Control Panel** from **Start** menu. Click on "System" and select "Device Manager".

Expanding "ELAD Samplers" node, right click on "ELAD FDM-DUO" and select "Properties".

🚔 Device Manager			
<u>File Action View H</u> elp			
🦛 🧼 🗖 📄 📄 📝 🖬 🕴	9 📴 🙀 🚯		
HUT96-PC Acronis Devices Acronis Devices Acronis Devices Acronis Devices Bevices Bevices ELAD Samplers ELAD Samplers ELAD Samplers ELAD Samplers Bevices Monitors Monitors Monitors Monitors Ports (COM & LPT) Processors Sound, video and gam System devices WSD Print Provider			

When dialog box opens, select "Driver" label: you must read provider name, current driver release date and current driver version. The figure shows an old FDM- DUOr driver version.

1	ELAD FDM-DUO Properties
	General Driver Details
	ELAD FDM-DUO
	Driver Provider: ELAD srl Italy
1	Driver Date: 1/22/2014
	Driver Version: 3.0.0.0
	Digital Signer: ELAD Srl
	Driver Details To view details about the driver files.
ì	Update Driver To update the driver software for this device.
	Roll Back Driver If the device fails after updating the driver, roll back to the previously installed driver.
I	Disable Disables the selected device.
	Uninstall To uninstall the driver (Advanced).
	OK Cancel

8.2.2.2 Manual driver update

To update FDM-DUOr driver, connect the device to USB RX socket (where the device driver is already installed) and power on the device. Then open **Control Panel** from **Start** menu. Click on "System" and select "Device Manager".

Under "ELAD samplers" list select "ELAD FDM-DUO", right click on it and execute "Update driver".

a	Device Manager	- 🗆 🗙
File Action View Help		
🗢 🔿 🖬 🖺 📔 🖬 👰 🎼 🍕		
🔺 🚔 UT93-LAPTOP		^
Audio inputs and outputs		
Batteries		
Bluetooth		
Image:		
Digital Media Devices		
Disk drives		
Display adapters		
DVD/CD-ROM drives		
ELAD Samplers		
ELAD FDM-DUO		
7 -00		
G IDE ATA/ATAP Disable G Imaging device Uninetal		
Constall Constall		
▷ ▲ Keyboards ▷ ▲ Mice and other Scan for hardware changes		
Monitors		
Network adapt		
Print queues		
Printers		
Processors		
Description Sensors		
Software devices		
Sound, video and game controllers		
Storage controllers		
N 🔊 System devices		Ŷ
Launches the Update Driver Software Wizard for the selected	device.	

~

When Windows starts the installation procedure, select the last option "Browse my computer for driver software".

4		Device Manager	-	
File	Action Vie	w Help		
¢= 0	• 🖬 🔄			
	BZ UT93- At At BZ BZ BZ BZ BZ	Update Driver Software - FDMDU0 USB FW v4.7	×	^
	▷ 1 및 Cc ▷ 🚅 Di ▷ 급 Di ▷ 🔩 Di	How do you want to search for driver software?		
	> D\ > ↓ ↓ Hu > ↓ ↓ ↓ ↓ ↓ ↓ ↓ ↓ ↓ ↓ ↓ ↓ ↓ ↓ ↓ ↓ ↓ ↓ ↓	Search automatically for updated driver software Windows will search your computer and the Internet for the latest driver software for your device, unless you've disabled this feature in your device installation settings.		
	 ▷ ▷ □ M ○ ○	Browse my computer for driver software Locate and install driver software manually.		
	⊳ 🖶 Pr ⊳ 🛄 Pr ⊳ 🚾 Se ⊳ 🚊 Sc			
	⊳ ∎ Sc ⊳ � St		Cancel	¥

In the next dialog-box, disable the option "Include subfolders" and choose "Let me pick from a list of device drivers on my computer". Don't click "Next".

Browse for driver software on your computer		
Search for driver software in this location: C:\Program Files (x86)\ELAD\ELAD FDM-SW2\ELAD_FDM_Driver v Browse Include subfolders		
Let me pick from a list of device drivers on my computer This list will show installed driver software compatible with the device, and all driver software in the same category as the device.		
Next Cancel		

Verify that "Show compatible hardware" option is checked and ELAD FDM-DUO is selected: then click on "Have a Disk". In this way the manual driver update is enabled. Don't click "Next".

4	×	
File Action		
(= =) 🗖	Update Driver Software - ELAD FDM-DUO	
🔺 🛁 UT93-		^
⇒ 4 Aι		
⊳ 🍃 Ba	Select the mar	
⊳ 🚷 BI ⊳ 📜 Co	🥑 disk that cont 🔲 Insert the manufacturer's installation disk, and then 🛛 🗸	
þ 📮 Di	make sure that the correct drive is selected below.	
🛛 🗠 👝 Di	Cancel	
Di 🛼 🛼 Di	Show compatible ha	
⊳ 🚑 D\ ⊿ 🏺 EL	Model	
ļ	RELAD FDM-DUO	
⊳ 🕼 Hi	Copy manufacturer's files from:	
⊳ ⊂a ID ⊳ ≂a In	A:\ Browse	
→		
⊳ <u>₿</u> M	This driver has an Authenticode(tm) signature.	
⊳ 🖳 M ⊳ 👰 Ni		
⊳ 💇 Ni ⊳ 🚔 Pr		
⊳ 🖶 Pr		
> 🛄 Pr		
⊳ 🗹 Se	ftware devices	
	invare devices und, video and game controllers	
	orage controllers	
N 18 Str	stem devices	*

Click on "Browse" and search for FDM-DUOr driver update folder location; then open winusb fdmsampler.inf file. Click "OK" and then "Next".

Let the hardware installation automatically completes and, at the procedure ending, click on "Close"; then disconnect and connect FDM-DUOr device on the same USB socket.

	Device Manager -	• 🗆 🗡
File Action Vi	w Help	
	×	
	Update Driver Software - ELAD FDM-DUO	^
⊳ 🚯 BI ⊳ 🛒 C	Windows has successfully updated your driver software	
> 👝 D	Windows has finished installing the driver software for this device:	
⊳ ■ D ⊳	ELAD FDM-DUO	
⊳©an H ⊳⊂an D		
⊳ 🗃 In ⊳ 🧰 Ki ⊳ 🖉 M		
⊳ I M ⊳ I N ⊳ III PI		
⊳ 🖨 Pi ⊳ 🔲 Pi		
⊳ 📶 Se ⊳ <u>∏</u> Sc ⊳ 🖏 Sc	Close	
Svstem		,
S SUSTEM I	INVERS.	

To verify that a correct update is done, enter "Device Manager" in Control Panel; under "ELAD samplers" label select ELAD FDM-DUO driver (see sub-chapter <u>Driver installation verify in Windows 8 and Windows</u> <u>7</u>): right click on it and choose "Properties": select "Driver" label to visualize the last driver version (an example is depicted in figure below).

1	ELAD FDM-DUO Properties
	General Driver Details
	ELAD FDM-DUO
	Driver Provider: ELAD srl Italy
1	Driver Date: 1/22/2014
	Driver Version: 3.0.0.0
	Digital Signer: ELAD Srl
	Driver Details To view details about the driver files.
	Update Driver To update the driver software for this device.
	Roll Back Driver If the device fails after updating the driver, roll back to the previously installed driver.
l	Disable Disables the selected device.
	Uninstall To uninstall the driver (Advanced).
	OK Cancel

8.2.2.3 Driver installation verify in Windows Xp

To verify FDM-DUOr driver current version, connect the device to USB socket (where the device driver is already installed) and open **Control Panel** from **Start** menu. Click on "System" and select "Device Manager" under "Hardware" label.

Expanding "ELAD Samplers" node, right click on "ELAD FDM-DUO" and select "Properties".

🖳 Device Manager	
File Action View Help	
← → 🗉 🖆 😫 💷 🕺 ≈ 🗙 🔕	
⊡	~
🗄 💘 Batteries	
🗄 😼 Computer	
🗄 🧼 Disk drives	
🗄 🕎 Display adapters	
E S DVD/CD-ROM drives	
ELAD Samplers	
ELAD FDM-DLID	
Hoppy disk conc	
E J Floppy disk drive Disable ⊡ 🛱 Human Interface Uninstall	
Can for hardware changes Scan for hardware changes	
□- 🚱 Other devices	
E 🖉 Ports (COM & LPT)	
🗄 🕷 Processors	_
🕀 🏀 SCSI and RAID controllers	
🕀 🚳 Sound, video and game controllers	~
Opens property sheet for the current selection.	

When dialog box opens, select "Driver" label: you must read provider name, current driver release date and current driver version. The old ELAD FDM-DUOr driver version is shown in figure below as example.

ELAD FDM-DUO Properties		
General Drive	er Details	
eca ela	D FDM-DUO	
Driv	er Provider: ELAD srl Italy	
Driv	er Nate: 1/22/2014	
Driv	er Version: 3.0.0.0	
Digi	tal Signer: Not digitally signed	
Driver Det	ails To view details about the	driver files.
Update Dr	iver To update the driver for th	is device.
Roll Back	Driver If the device fails after upo back to the previously inst	
Uninsta	all To uninstall the driver (Adv	vanced).
		JK Cancel

8.2.2.4 Manual driver update in Windows Xp

To update FDM-DUOr driver, connect the device to USB socket (where the device driver is already installed) and power on the device. Then open **Control Panel** from **Start** menu. Click on "System" and select "Device Manager" under "Hardware" label.

Select "ELAD FDM-DUO" from "ELAD Samplers" list, right click on it and execute "Update driver "



Now Windows XP launches the hardware update wizard: select the last option "No, not this time" and "Next".

Hardware Update Wizard		
	Welcome to the Handware Update Wizard	
	Windows will search for current and updated software by looking on your computer, on the hardware installation CD, or on the Windows Update Web site (with your permission). <u>Read our privacy policy</u>	
	Can Windows connect to Windows Update to search for software?	
	Yes, this time only	
	Yes, now and every time I connect a device	
	💿 No, not this time	
	Click Next to continue.	
	< Back Next > Cancel	

At next step select "Install from a list or specific location (Advanced)" and "Next".

Then, disable all check-boxes that the system automatically sets and choose the last option for manual driver update, as depicted in figure. Select "Next".

Hardware Update Wizard		
Please choose your search and installation options.		
Search for the best driver in these locations.		
Use the check boxes below to limit or expand the default search, which includes local paths and removable media. The best driver found will be installed.		
Search removable media (floppy, CD-ROM)		
Include this location in the search:		
C:\Program Files\ELAD\ELAD FDM-SW2\ELAD_FD 👽 🛛 Browse		
Don't search. I will choose the driver to install. Choose this option to select the device driver from a list. Windows does not guarantee that the driver you choose will be the best match for your hardware.		
< Back Next > Cancel		

Verify that "Show compatible hardware" option is checked and ELAD FDM-DUO is selected: then click on "Have a Disk". Don't click "Next".

Hardware Update Wizard		
Select the device driver you want to install for this hardware.		
Select the manufacturer and model of your hardware device and then click Next. If you have a disk that contains the driver you want to install, click Have Disk.		
Model		
ELAD FDM-DUO	R	
This driver is not digitally signed! <u>Tell me why driver signing is important</u>	Have Disk	
	< Back Next > Cancel	

Click on "Browse" and search for the FDM-DUO driver update folder location; then open winusb fdmsampler.inf file, as depicted in figure. Click "OK" and then "Next".

Install From Disk		
I	Insert the manufacturer's installation disk, and then make sure that the correct drive is selected below.	OK Cancel
	Copy manufacturer's files from:	Browse

Now driver update starts: at next dialog box select "Continue Anyway" and ignore the warning.

Let the hardware update automatically completes and, at the procedure ending, click on "Finish"; then disconnect e connect FDM-DUOr device on the same USB socket.

Hardware Update Wizard	
	Completing the Hardware Update Wizard The wizard has finished installing the software for: ELAD FDM-DUO
	Click Finish to close the wizard.
	< Back Finish Cancel

To verify that a correct update is done, enter "Device Manager" from **Control Panel**; under "ELAD Samplers" list, select ELAD FDM-DUO driver (see chapter <u>Driver installation verify in Windows Xp</u>) right click on it and choose "Properties". Select "Driver" label to visualize the last driver version (an example is depicted in figure below).

ELAD FDM-DUO Properties 🛛 🛛 🔀		
General Driver Details		
ELAD FDM-DU	0	
Driver Provider:	ELAD sri Italy	
Driver Cate:	1/22/2014	
Driver Version:	3.0.0.0	
Digital Signer:	Not digitally signed	
Driver Details	To view details about the driver files.	
Update Driver	To update the driver for this device.	
Roll Back Driver	If the device fails after updating the driver, roll back to the previously installed driver.	
Uninstall	To uninstall the driver (Advanced).	
	OK Cancel	

8.2.3 USB CAT Serial port

Connect the CAT USB port of FDM-DUOr to a USB 2.0 port of the PC . Windows download and install automatically the FTDI FT232R serial port driver.



When the installation process ends, open the windows device manager and check the FDM-DUOr USB serial port in the node Ports (COM & LPT).

Bevice Manager	- 🗆 🗙
File Action View Help	
🔺 🚔 UT93-LAPTOP	^
Audio inputs and outputs	
🛛 🔊 Batteries	
Bluetooth	
> 👰 Computer	
Digital Media Devices	
Disk drives	
b Signal Display adapters	
DVD/CD-ROM drives	
⊳ 🕼 Human Interface Devices	
IDE ATA/ATAPI controllers	
▷ 3 Imaging devices	
> — Keyboards	
Mice and other pointing devices	
Monitors	
Network adapters	
A 🐺 Ports (COM & LPT)	
USB Serial Port (COM5)	
V tear Print queues	
> 🖶 Printers	
Processors	
> 🚾 Sensors	
Software devices	
Sound, video and game controllers	
Storage controllers	
N 📲 Suctem devices	*

9 Firmware update

The following section describes how to update the firmware of the various components of the FDM-DUOr. The latest versions for the User interface, Rx demodulator, USB interface and FPGA are available here: <u>http://sdr.eladit.com/FDM-DUO/Firmware Releases/</u>.

To ensure that the receiver still working properly, please download the full update compressed archive named ELAD_FDM_DUO_Update_YYYY_MM_DD.zip (where YYYY_MM_DD are year, month and day of the release date). In this archive you can find the latest version of each firmware and also the latest version of the ELAD FDM-SW2 software.

TO AVOID UPDATE ERRORS, PLEASE UPDATE THE "USER INTERFACE" FIRMWARE AFTER THE OTHERS FIRMWARE UPDATES

9.1 User interface firmware update

Download the latest version of the UI firmware DISABLE ANY ANTIVIRUS PROGRAM BEFORE START THE FIRMWARE UPDATE

In order to update the user interface (UI) firmware, you need to install the Flash Magic software. This program is available here: <u>http://www.flashmagictool.com/</u>

Turn on the ELAD FDM-DUOr and connect the CAT USB serial port to a USB 2.0 port of your PC. Enable the FDM-DUOr to perform a UI firmware update:

- Press the MENU key and select the menu "80 SERVICE".
- Press E2 to enter the setting, turn E2 to select ON then press E2 to store the setting.
- Go to menu "82 UI Update".
- Press E2 to enter the setting, turn E2 to select YES then press E2 to store the setting.

You need to identify the CAT USB COM port. Open the windows "Device Manager" and expand the COM port node. The CAT USB port is listed as "USB Serial Port".



In this case the CAT USB port is the COM19

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Step 2 - Era

Erase block 0 (0x000000-0x000FFF Erase block 1 (0x001000-0x001FFF Erase block 2 (0x002000-0x002FFF Erase block 3 (0x003000-0x003FFF Erase block 4 (0x004000-0x004FFF

Erase all Elash+Code Bd Prot.

Step 5 - Start

0

- - - X

Browse.

more inf

Start

Â

🌧 Flash Magic - NON PRODUCTION USE ONLY

🖻 🖬 | 🔍 🗿 🐗 🖌 🌉 🔈 | 😻 | 🚳 🚱 😂

Hex File: C:\Users\UT96\Desktop\FDMDUO_UI.hex

On-Line training classes for microcontrollers and embedded networking and

Modified: Unknown

Verify after programming

Gen block checksums Execute Activate Flash Bank

ww.esacademy.com/faq/classes

Fill unused Flash

Internetworking

File ISP Options Tools Help

Select... LPC1766

COM Port: COM 19 Baud Rate: 230400

Interface: None (ISP)

Oscillator (MHz):

Run Flash Magic software.

In the "Step 1 – Communication" section:

- Select LPC1766.
- COM Port: the CAT USB com port
- Baud Rate: 230400
- Interface: None (ISP)

In the "Step 2 – Erase" section:

• Check "Erase all Flash+Code Rd Prot"

In the "Step 3 – Hex File" section:

• Click on Browse and select the update ".hex" file

In the "Step 4 – Options" section:

• Check "Verify after programming

Check the communication with the FDM-DUOr. Click on ISP and click on "Read Device Signatures". If the communication with the FDM-DUOr is ok, a new windows with some device information is opened.

🧑 FI	ash Magic - NON PRODUCTION USE ON		sh B=		Erase block 1 (UXUU1000-0X001FFF)
File	ISP Options Tools Help			Device Signature	
6	Blank Check	1 😨 😂		Manufacturer ID: 0x	
Step	Read Security	Step 2 - Erase	nte	Device ID 1: 0x	
Sel	Read Device Signature	Erase block 0 (0x000000-0x000FFF)	scill	Device ID 2: 0x	
Flash	Boot Vector and Status Byte	Erase block 1 (0x001000-0x001FFF) Erase block 2 (0x002000-0x002FFF)		Device ID: 0x	26013F33
СО	🔍 Display Memory	Erase block 3 (0x003000-0x003FFF)	₽P -	Bootloader Ver:	4.2
Bau		Erase block 4 (0x004000-0x004FFF) Erase block 5 (0x005000-0x005FFF)	ex F		ie.
	Rh Marita	Erase all Flash+Code Rd Prot	20.4	Serial Number:	185335324 1397565140 1323834993 4110417920
ln -	Execute	Erase blocks used by Hex File	/eri		Close
Osc	Reset		Fill 🦶	ock checksums	
	> Go		aenb	OCK CHECKSUMS	
Step	💖 Start Bootloader				
He	Read Clocks	I.hex Browse			
	Device Configuration Cyclic Redundancy Check	more info			
Step		Step 5 - Start!			
	Carial Number				
E Fi		Start			
G					
E:					
	EEPKOIVI	J			
fect	nical on-line articles about 8051 and XA prog	gramming			
<u>www</u>	.esacademy.com/fag/docs	▶			

If the communication is Ok, click on close and in the Flash Magic main window, click on Start to begin the programming. Wait until the end of the process, then turn off and restart the FDM-DUOr.

9.2 RX demodulator firmware update

To update the RX demodulator firmware, you must remove the FDM-DUOr top cover. Remove the four screws in the FDM-DUOr chassis bottom as shown in the figure below.



Then remove the top cover of the FDM-DUOr

Download the latest version of the RX demodulator firmware.

Replace the file *fdmduorx.bin* in the USB pen provided with the FDM-DUOr **The file fdmduorx.bin must be in the root of the USB pen**

Connect the provided USB pen to the FDM-DUOr RX Micro-USB programming port using the provided micro-USB adapter.

Connect the power supply, keep pressed the Rx program mode button and power up the FDM-DUOr.



- Keep pressed the Rx program mode button until the red led turns on.
- Release the Rx program mode button .
- Wait until the red led turns off.
- Turn off the FDM-DUOr, disconnect the USB pen and restart the FDM-DUOr.

If during the firmware update the green leds are blinking quickly, it means that the programming process is failed. In this case contact the technical assistance.

9.3 USB interface firmware update

Download the latest version of the USB interface

Turn on the FDM-DUOr and connect the USB Receiver data connector port to a USB 2.0 port of your PC. **Disable any antivirus program before start the firmware update**

Run the downloaded file and wait until the end of the update process **without disconnecting the USB cable or power off the FDM-DUOr**, then turn off and restart the FDM-DUOr.

9.4 FPGA DDC update

Download the latest version of the FPGA DDC.

Turn on the FDM-DUOr and connect the USB Receiver data connector port to a USB 2.0 port of your PC. **Disable any antivirus program before start the firmware update**

Run the downloaded file and wait until the end of the update process **without disconnecting the USB cable or power off the FDM-DUOr**, then turn off and restart the FDM-DUOr.

Declaration of Conformity (EC)

The product marked as

FDM-DUOr

manufactured by

Manufacturer: ELAD S.r.l.

Address:

Via Col De Rust, 11 - Sarone 33070 CANEVA (PN)

is produced in conformity to the requirements contained in the following EC directives:

- ▶ R&TTE Directive 1999/5/CE
- EMC Directive 2004/108/CE
- Low Voltage Directive 2006/95/CE
- ▶ RoHS Directive 2011/65/CE

The product conforms to the following Product Specifications:

Emissions & Immunity:

ETSI EN 301 489-1 V1.9.2 ETSI EN 301 489-15 V1.2.1 ETSI EN 301 783-2 V1.2.1

Safety:

EN 60950-1:2006 + A11:2009 + A1:2010 + A12:2011 + A2:2013

And further amendments.

This declaration is under responsibility of the manufacturer:

ELAD S.r.l. Via Col De Rust, 11 - Sarone 33070 CANEVA (PN)

Issued by:

Name: Franco Milan Function: President of ELAD

> Caneva Place

July, 30th 2014 Date

Signature