SCR Preselector-CAT

Tunable 1.8MHz to 50 MHz Software Controlled Radio preselector.

Featuring tracking operation from dedicated radio software.

User manual. Rev 03. May 2017

Features:

The SCR Preselector-CAT is suitable to work with SDR or analogue radios. It is inserted between the antenna and your receiver or transceiver providing filtering of R.F.spectrum to reduce broadband energy and conforming signals before they reach the receiver, rejection of the MW AM broadcast band and VHF FM broadcast band, removing strong emissions radiated back to the antenna from quadrature mixers and attenuating signals in the VHF region that could mix with the sampling frequency of the analog to digital data converter in SDR radios.

IMPORTANT: *If the preselector is connected in line with a transceiver, take precautions to prevent transmitting through it. An Input/Output power RF relay accessory is available to by-pass the preselector in transmision switch-over.*

The SCR Preselector-CAT can be operated in Stand-alone mode, via USB from a personal computer, a software remote control application console is provided for Windows (32 & 64 bits) operate systems, over the Internet or from an external dedicated I2C controller.

Five control modes:

Stand-alone mode: by means of its control knobs.

Remote modes:

- Graphic User Interface (GUI). Remote console on PC.

- CAT serial protocol over Virtual Com Port (VCP), Kenwood TS-2000 protocol.

- Over the Internet or Local Network. (TCP/IP protocol).

- I2C bus from an external dedicated controller.

CAT remote control. Tracking feature

CAT (Computer Aided Transceiver), serial data communication protocol over Virtual Com Port (VCP) enables the SCR preselector-CAT to provide the user with a way to interface with several radios. The SCR Preselector-CAT acts as a passive listener translating valid CAT commands into specific instructions.
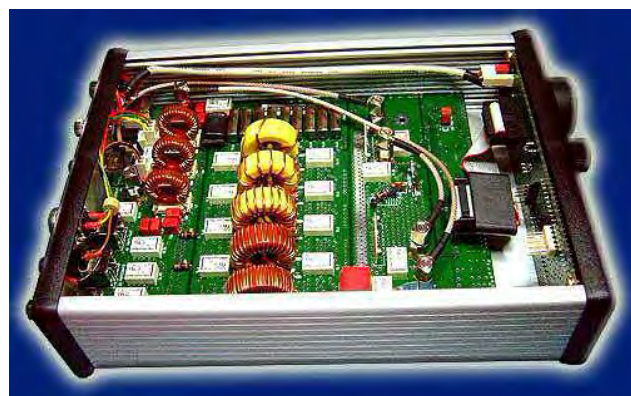
Technical features:

■ Six selectable bands and preselector By-Pass.

■ FiveTuneable Band Pass Filter bank for HF Bands covering 1.8 to 30 MHz plus 50MHz band BPF.

■ All filters are LC passive. No active switching or amplifier devices in the signal path, (LNA Off), therefore it does not contribute to IMD (Intermodulation Distortion).

■ Very high linearity (IP3). Suitable for Software Define Radios and analogue receivers.

■ PTT feature enables connecting in-line with a 100Watts transceiver allowing to by-pass the preselector in transmission. (with external Dual By-Pass relay accessory)

■ Two antenna inputs, one antenna output, let insert a converter, filter, etc between antenna and Preselector.

■ 0dB, 6dB, 12dB, 18dB input attenuator using MiniCircuits PAT series dedicated attenuation cells.

■ Embedded -110dB stop band Broadcast Band Rejection Filter. (AKA BCB filter, Brick Wall filter, MW band killer filter).

■ Six Band Pass Filters: ■ Tuning coils wound on large toroid cores T-106 size, rated for 100Watts RF applications, avoiding saturation in front of large signals.

■ Band Pass Filters have Notch filters centered on the adjacent amateur bands given an exceptional stop-band attenuation. (see graphic below)

■ Digital tuning. Nine bits variable digital capacitor. One pF resolution. (Variable capacitor emulator).

■ Two embedded 7th order, 60MHz, Elliptic Low Pas Filter for FM broadcast band rejection and sampling frequency attenuation.

■ Switchable low noise amplifier (LNA) 25dB Gain, 38dB IP3 , 2.7dB Noise Figure.

■ 12V DC/1Amp DC max. output connector for an external 150 Watts RF rating Input/Output by-pass dual power relay. (PTT or Keying line activated).

■ Power supply: 12Volts DC/ 1 Amp max. 2.5mm plug power connector.

■ Dimension: 220mm x165mm x 52mm (8.661 x 6.496 x 2.047in).
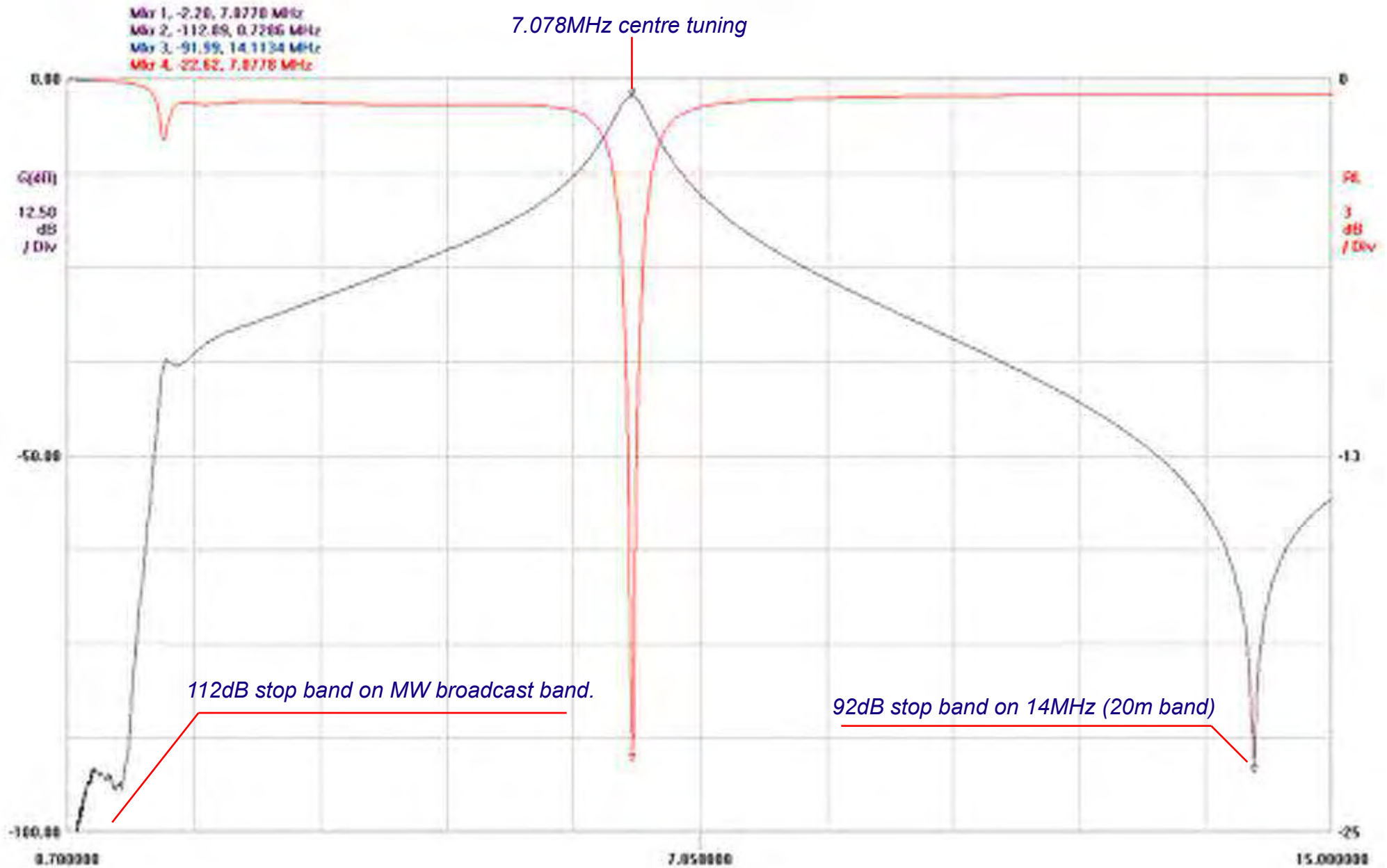
■ Weight: 1.5Kg

USB

■ Full speed USB v2.0 compliant.

■ Plug and Play feature.

■ USB type B connector.

■ ESD protection on USB lines.
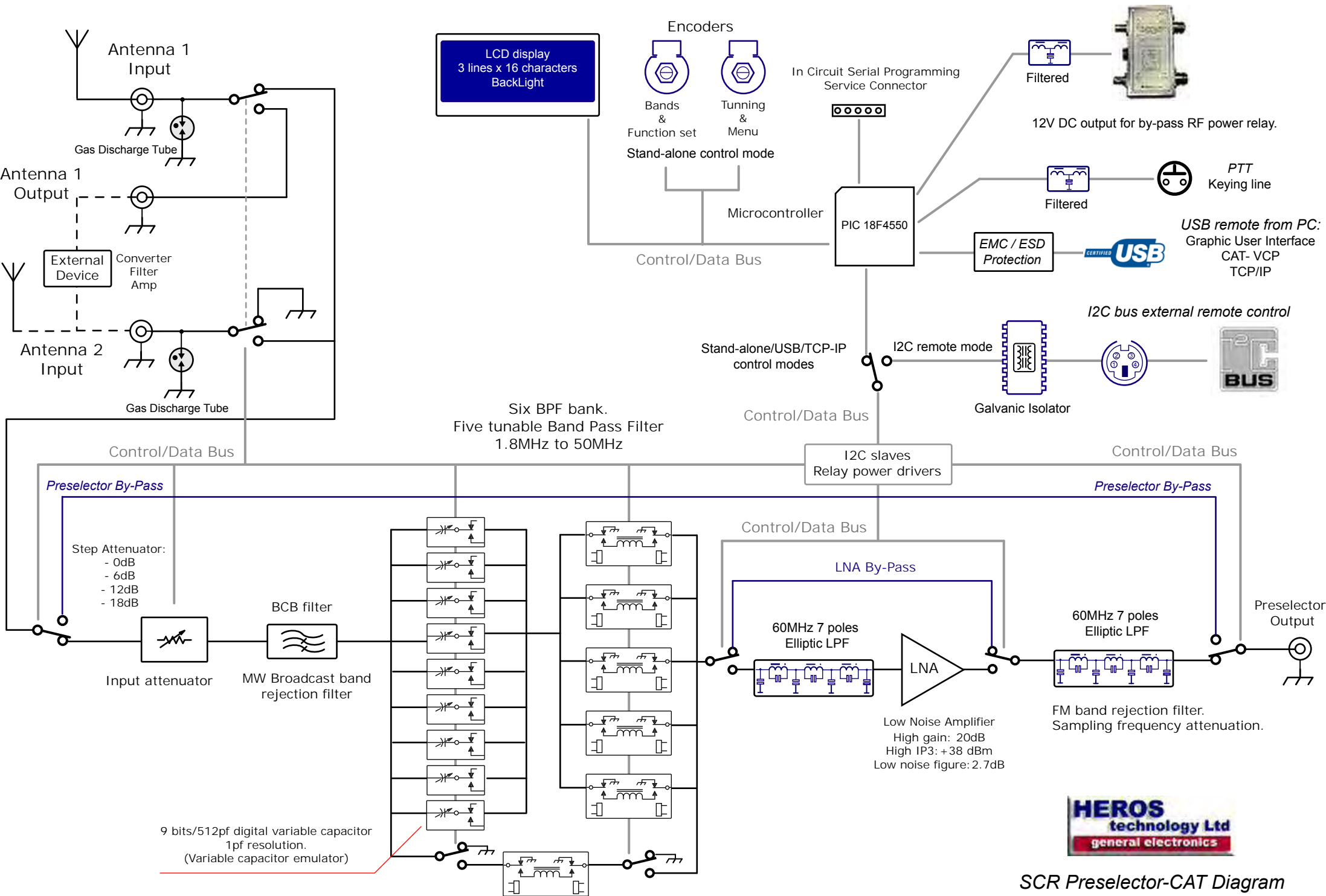
■ Optional USB Galvanic Isolator available.

I2C bus

■ I2C bus external lines Galvanically isolated(ADuM1251).

■ 8 bits standard I2C serial bus interface.

■ Supports 100Kbits/s and 400kbits/s FAST I2C Bus protocol.

■ Mini Din connector for I2C control lines.

■ Compatible with most microcontrollers.

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Response plot.

Mkr 1, -2.20, 7.8770 MHz
Mkr 2, -112.69, 0.7286 MHz
Mkr 3, -91.59, 14.1134 MHz
Mkr 4, -22.62, 7.8778 MHz

7.078MHz centre tuning

112dB stop band on MW broadcast band.

92dB stop band on 14MHz (20m band)

Antenna 1 Input

Gas Discharge Tube

Antenna 1 Output

External Device

Converter Filter Amp

Antenna 2 Input

Gas Discharge Tube

LCD display
3 lines x 16 characters
BackLight

Encoders

Bands & Function set

Tunning & Menu

Stand-alone control mode

In Circuit Serial Programming Service Connector

Filtered

12V DC output for by-pass RF power relay.

Filtered

PTT Keying line

Microcontroller

PIC 18F4550

Control/Data Bus

EMC / ESD Protection

USB

USB remote from PC:
Graphic User Interface
CAT- VCP
TCP/IP

I2C bus external remote control

Stand-alone/USB/TCP-IP control modes

I2C remote mode

Galvanic Isolator

I2C BUS

Control/Data Bus

Six BPF bank.
Five tunable Band Pass Filter
1.8MHz to 50MHz

Control/Data Bus

I2C slaves
Relay power drivers

Control/Data Bus

Preselector By-Pass

Preselector By-Pass

Step Attenuator:
- 0dB
- 6dB
- 12dB
- 18dB

Control/Data Bus

LNA By-Pass

BCB filter

60MHz 7 poles Elliptic LPF

60MHz 7 poles Elliptic LPF

Preselector Output

Input attenuator

MW Broadcast band rejection filter

LNA

FM band rejection filter.
Sampling frequency attenuation.

Low Noise Amplifier
High gain: 20dB
High IP3: +38 dBm
Low noise figure: 2.7dB

9 bits/512pf digital variable capacitor
1pf resolution.
(Variable capacitor emulator)

50MHz band (no tunable BPF)

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SCR Preselector-CAT Diagram
1.8-50MHz tunable Band Pass Filter bank.

1 - Dinamic LCD display.

2 - Function selector.

3 - Tunig/main menu.

1 - I2C bus remote control lines input. 4 ways MiniDin connector.
2 - USB connector. Type B.
3 - Input DC12V/500mA max. Power Jack 2.5mm connector.
4 - Earth post.
5 - RF output 50Ω. BNC connector.
6 - RF antenna 1 output 50Ω. BNC connector.
7 - DC output to external Antenna By-Pass relay, 12V DC/1Amp max.
8 - RF antenna 2 input, 50Ω. BNC connector.
9 - PTT/Keying line switch Input. Jack 3.5mm mono.13mA close to ground.
10 - RF antenna 1 input, 50Ω. BNC connector.

Antenna 1
Input

RF Output

12VDC/500mA max.

+

-

Antenna 2
Input

Receiver
Antenna

Generic radio
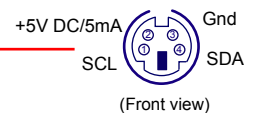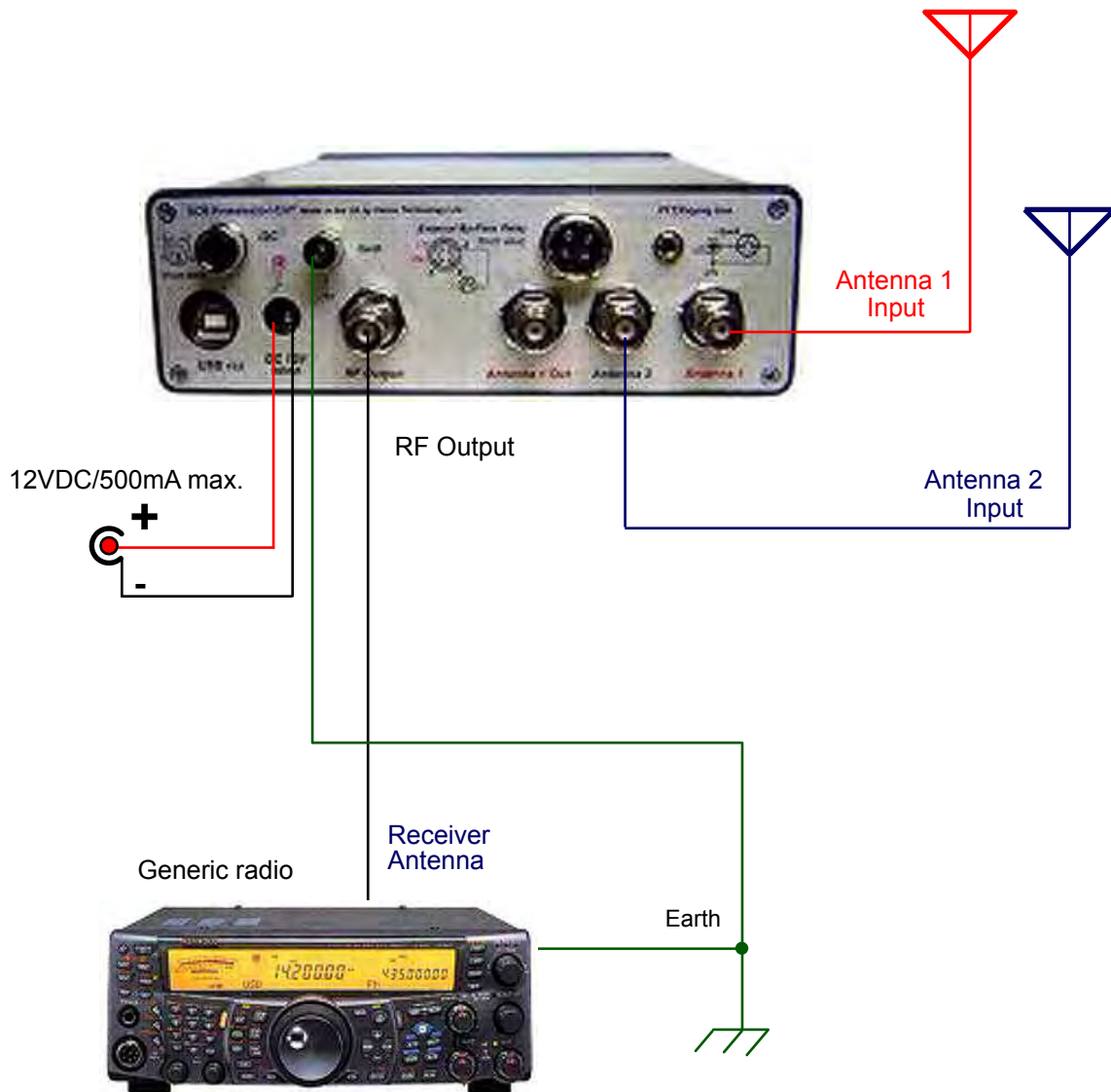
Earth

SCR Preselector-CAT Interconnection. In line with a receiver. Stand-alone mode.

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Remote control console on PC

USB cable

Optional USB Galvanic isolator

Earth

150 Watts RF rating Input/Output
by-pass dual power relay.
(model: Default By-Pass)

Antenna 1
Input

Antenna

Relay control

RF Output

12VDC/1 Amp

Earth

PTT/Keying line
13mA close to ground

Generic Transceiver

Transceiver
Antenna

SCR Preselector-CAT interconnection. In line with a 100W Transceiver.

Remote control console on PC

Optional USB Galvanic isolator

USB cable

Antenna 1
Input

RF Output

Antenna 2
Input

12VDC/1 Amp.

Receiver
Antenna

Generic radio

Earth

SCR Preselector-CAT PC interconnection. In line with a receiver.

Remote control console on PC

USB cable

Optional USB Galvanic isolator

Antenna 1
Input

Antenna 1
Output

Antenna 2
Input

External device: Converter

Converter Input

12VDC/1 Amp.

+

-
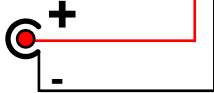
Converter Output

RF Output

Receiver
Antenna

*Antenna menu:
Antenna 1 selected, converter by-passed.
Antenna 2 selected, converter in line.

Generic radio

Earth

SCR Preselector-CAT Interconnection. External device

PowerSDR on PC

CAT remote control (tracking)
Virtual COM port over USB

FireWire cable

Optional USB Galvanic isolator

NOTE:
No CAT utilities or COM port splitter software is needed.

RF Output

USB cable

Antenna ports

Antenna 1
Input

RX1 IN
(loop config)

12VDC/1Amp

+

-

Earth

RX1 OUT
(loop config)
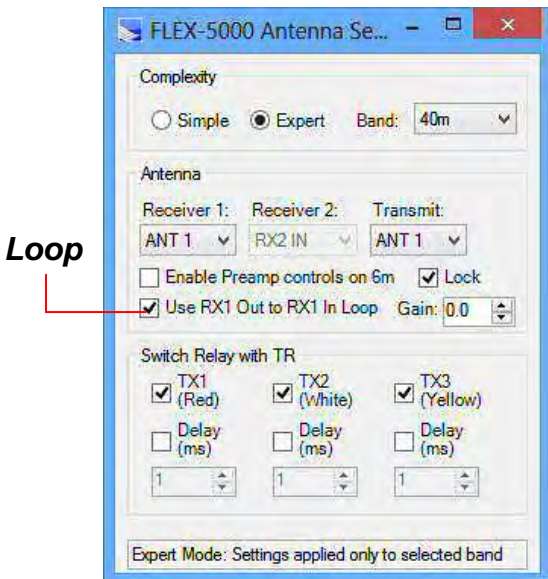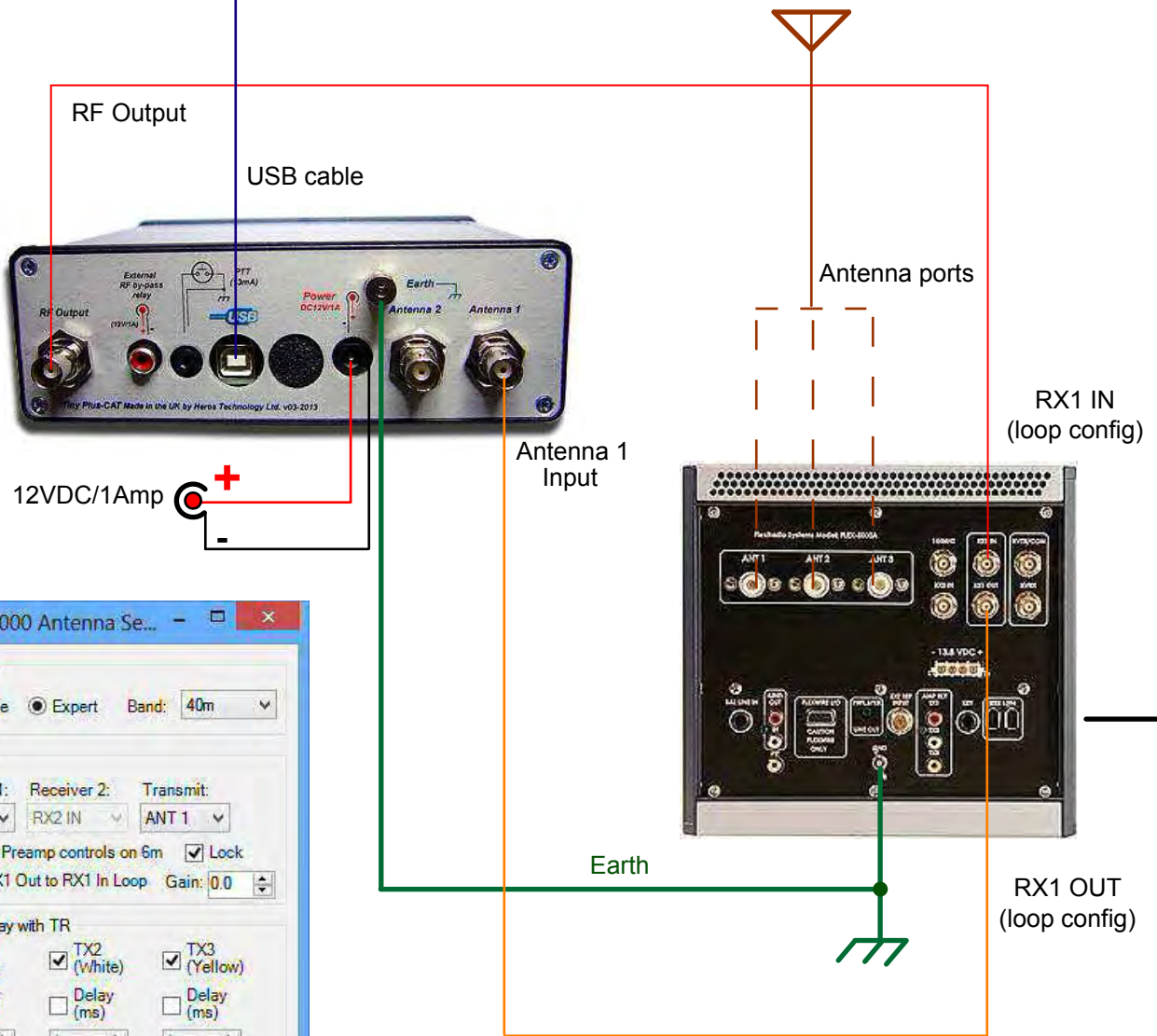
Loop

SCR Preselector-CAT interconnection. FlexRadio.

*(see Primary antenna ports configuration
on FLEX-5000_Owners_Manual)*

IEE 1394 cable

USB cable

CAT remote control tracking from PowerSDR application

Optional USB Galvanic isolator

USB cable

General Purpose Dual By-Pass relay
100 Watts RF power rating
(model: Default By-Pass)

Antenna 1 Input

Antenna

12VDC/1 Amp max

+

-

Relay control line

Earth

Preselector Output

Earth

PTT line

Flex 3000 Antenna port

B0609-0001

IEE 1394 cable

Earth

Options

☑ Spur Reduction
☐ Disable PTT

☐ Enable TX1 Delay
TX1 Delay: 50

☑ All Mode Mic PTT
☐ Disable Split on Band Change

Options Sub-Tab
Enable PTT Delay 100mS
(See Owners manual)

**SCR Preselector-CAT in line with Flex 3000 transceiver. Connection diagram**

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CAT remote control tracking from PowerSDR application

Optional USB Galvanic isolator

USB cable

General Purpose Dual By-Pass relay
100 Watts RF power rating
(model: Default By-Pass)

Antenna 1
Input

Antenna

12VDC/1 Amp

Relay control line

Earth

Earth

Preselector Output

Flex 1500 Antenna port

FlexWire connector
Pin 3 PTT Out (13mA)
Pins 1-5 Ground
(See Owners manual)

FLEX-1500 Antenna Selection

Mode
◉ Simple   ○ Expert

Antenna
Receive: PA
Transmit: PA
☑ Lock

FlexWire PTT Out
☑ Enable   ☐ Delay [ms] 100

Simple Mode: Settings are applied to all bands

Earth

Antenna Form
Enable PTT Delay 100mS
(See Owners manual)

SCR Preselector-CAT in line with Flex 1500 transceiver. Connection diagram

MiniDin 4 ways plug
solder side

Ferrite core

+5VDC/5mA   Gnd

SCL   SDA

Shield

from an external dedicated I2C controller.

12VDC/1 Amp.

RF Output

Earth

Generic radio

Antenna 1
Input

Antenna 2
Input

Receiver
Antenna
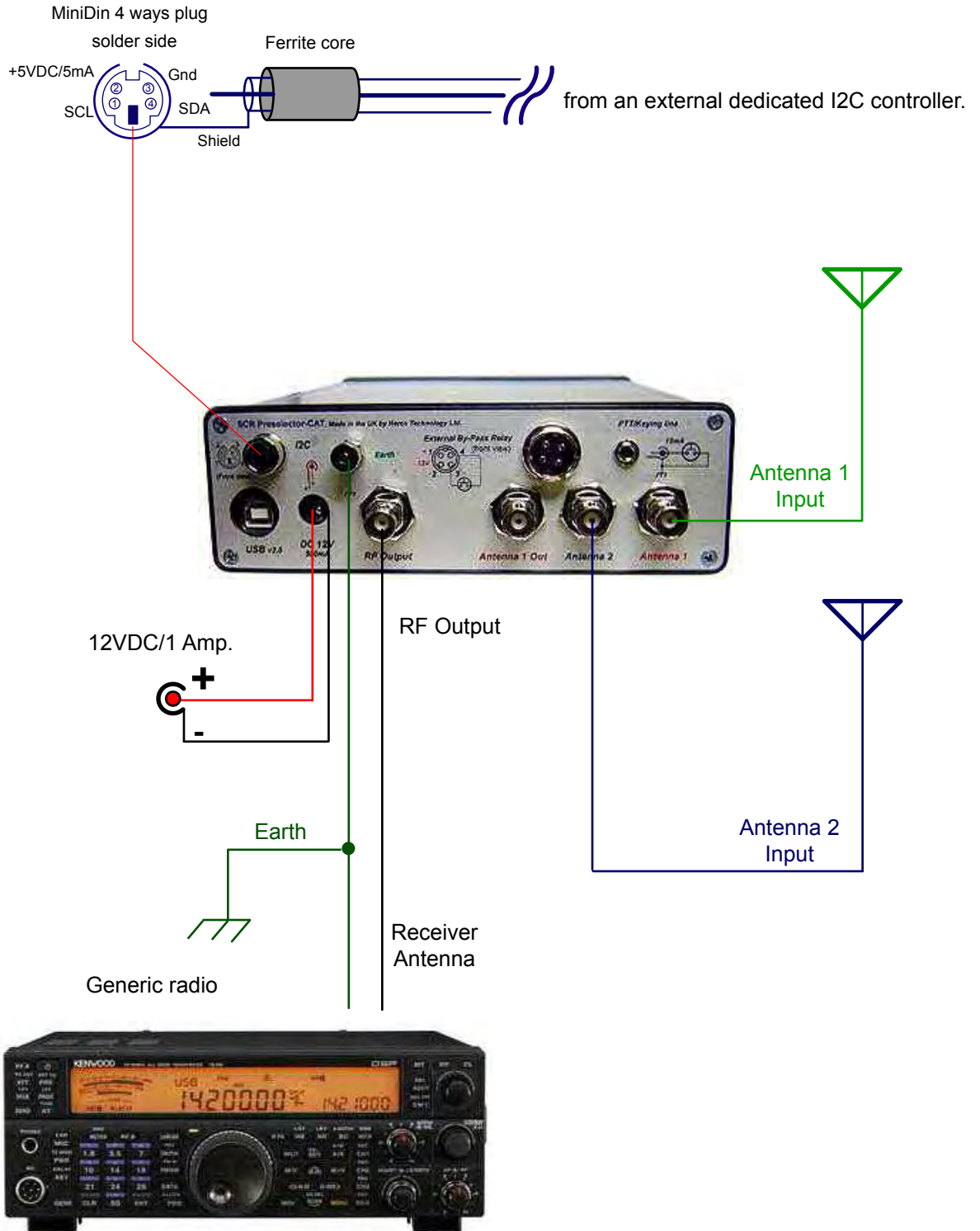
SCR Preselector-CAT interconnection. I2C bus mode.

USB signed driver installation. Windows 32-64 bits Operate Systems.
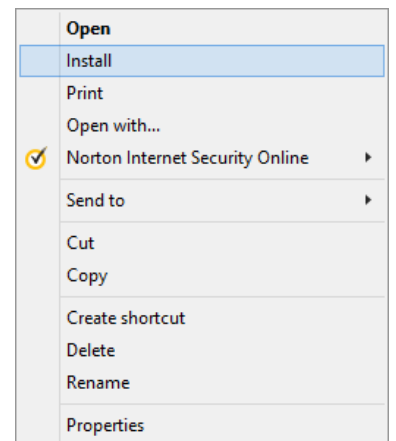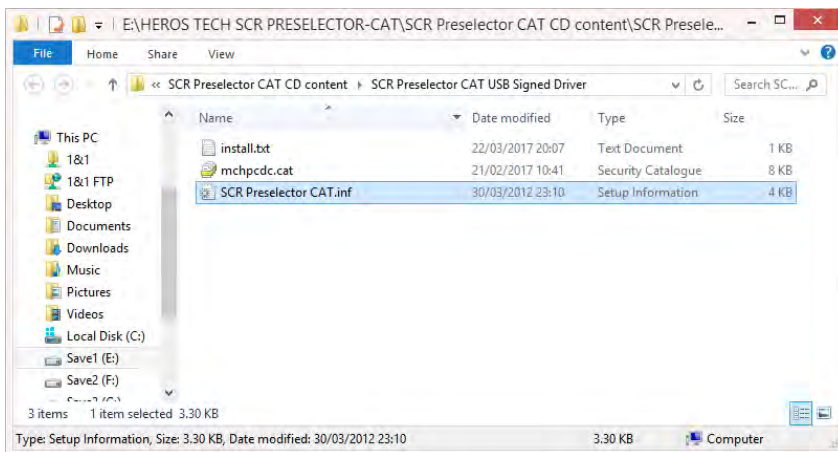
- Do not install and/or execute any application from the CDR.

- Create a new folder in your PC in the location of your choice.

- Copy the content of the CD ROM in it.

- Open the folder "SCR Preselector CAT USB Signed Driver"

- Place the mouse cursor on "SCR Preselector.inf file.

- Right click mouse button on it.

- A context menu will open.

- Click on "Install" option.
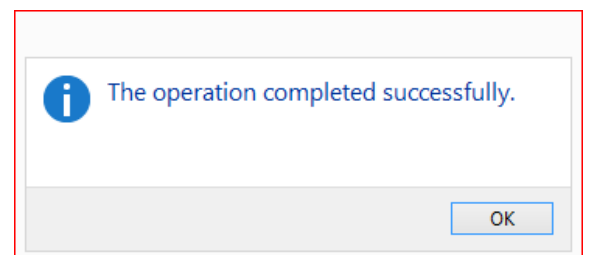
Windows will inform once the installation has been completed successfully.

In order to check it power ON the SCR Preselector-CAT and go to *"Control Panel" / "Device Manager" / "Ports (COM&LPT)"* section.

"SCR Preselector-CAT (COM x)" is shown indicating that the driver has been installed and a Virtual Com Port has been created over the USB port
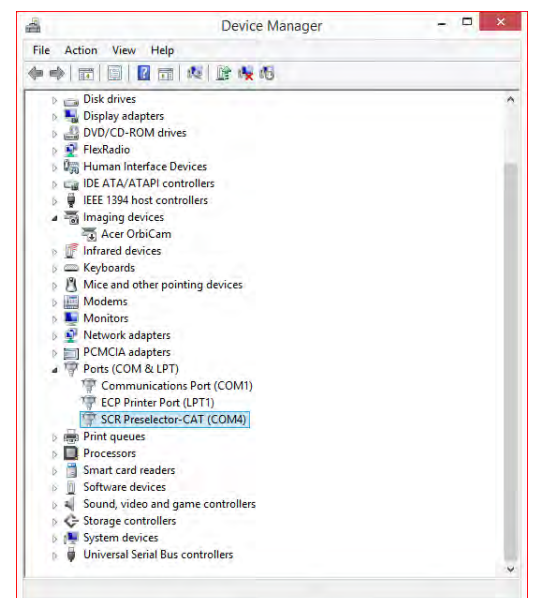
Getting started

Select among the above connection diagrams to set-up the SCR Preselector-CAT according with your radio system.

IMPORTANT: *If the preselector is connected in line with a transceiver, take precautions to prevent transmitting through it. An Input/Output power RF relay accessory is available to by-pass the preselector in transmision switch-over.*

Copy the contents of the provided CD-ROM into your computer, do not execute software applications from CD-ROM.

Keep safe a back-up of the original calibration tables folder on your computer.

Power Up.

Assure to use a reliable external power supply providing 12 Volts/ 1 Amp DC.

Avoid using a power supply of 20-40Amp generally utilised to feed transceivers. They are designed to manage strong loads no low current ancillary equipment.

Power first the power supply feeding the SCR Preselector-CAT, next switch on the power toggle switch located on rear panel, no on the contrary.

Wait for Power ON delay of 5 seconds.

After switching off wait for several seconds before switch on again.

Avoid switch off suddenly the Preselector if it is connected to a computer via USB port. A data transaction may be is occurring, if so the microcontroller on board, computer software or USB port could be damage. Close or stop first the application running on the computer.

For the same reason avoid unplug suddenly the USB cable.

Switching on the preselector, a welcome message is displayed. (Image 1)

Rotating the Function selector knob(2) the LCD display changes to main menu.(Image 2)

By default Stand-alone mode if the USB cable from PC is detached. To change among modes rotate and press Function selector knob(2)

They are five preselector control modes to choose:

- Stand-alone mode.

Through USB from PC:

- from Graphic User Interface application (GUI).

- CAT from a dedicated radio software.

- TCP/IP from the Internet or Local Network.

- I2C mode from an external dedicated controller.

Stand-alone mode of operation

To navigate through the main menu rotate the Function selection knob(2) and press on the desired option. Available options are: (Image 2-3)

Stand-alone mode.

USB-CAT-TCP/IP mode.

I2C mode.

By-Pass.

Band A to F.

Each band has its own menu, rotate Function selector knob(2) to position the cursor on any function press and release the knob to change options. (Image 4)

Band F, 50MHz band, is a non tunable BPF so no tune value is shown. (Image 5)

They are five memories available for each band. Each memory keeps all parameters shown on display. (Image 6)

To change to main menu press Tunig-main menu knob(3).

Attaching the USB cable from PC changes display accordly. Rotating the Function selection knob(2) the LCD display changes to main menu.(7)
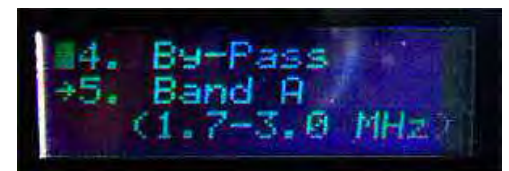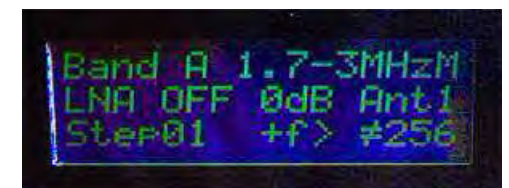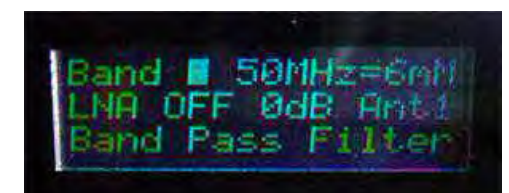

Image 1

Image 2

Image 3

Image 4

Image 5

Image 6

Image 7

Graphic User Interface (GUI) on PC. Remote control console.

The SCR Preselector-CAT is commanded by the user by means of the GUI console on PC as it would in stand-alone mode.
The GUI context menu provides additional options and utilities.
The application console runs under Windows (32 & 64 bits) operate systems.

Open the SCR Preselector-CAT application; a pop-up window will emerge indicating the USB connection status. By default the preselector application starts in by-pass state on power-on. In this state all controls are disabled except antenna selection and context menu.

Available controls, options and utilities are itemised below.

1- Band selection.
Click over band push-button to change band or live By-pass state.

2- Input attenuator.
0dB, 6dB, 12dB, 18dB of attenuation available.

3- Low Noise Amplifier. LNA ON/OFF.

4- By-Pass.
By-passes the preselector. Default on power-on. In this state all controls are disabled except antenna selection and contextual menu.

5- Antenna selection. Two antenna input available. Active in by-pass state.

6- Tuning step. x1, x2, x5, x10. Position x1 performs scan clicking on the dial.

7- Tuning knob.
Performs tuning rolling the mouse wheel. Also by pressing left or right arrows on the keyboard. Adjust to maximum signal or background noise.

8- Tune Reference Dial. Displays the actual tuned frequency and the corresponding capacitor value. Notice the attenuation of the pass band filters increases with less capacity due to the response of series tuned circuits.

9- Mnemonic text box. A brief caption can be written in the text boxes. Five memories for each band can be stored, twenty-five in total. On band change memories and captions are updated.

10- Memory management.

11- Frequency scale. Frequency references on the scale are updated in accordance with the calibration tables.

12- Context menu.
Right mouse button click on dial or function key F2 opens the context menu.
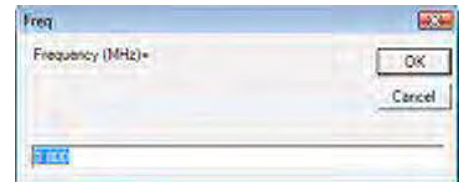
13- PTT pushed on.

Context menu

Right mouse button click on dial window or function key F2 opens the Context menu.
A set of program options are available to the user as follows:

Set Frequency...	F3
I2C Slaves' Addresses...	F4
Write tables...	F5
Logfile...	F6
Firmware update...	F7
Remote Client...	F8
Remote Server...	F9
Send CAT command...	F10

Set Frequency. Function key F3

Enter any valid frequency expressed in MHz.

I2C slave's address. Function key F4

Internal I2C slaves address can be changed.
Useful when the preselector is working in I2C remote control mode.
Notice that the Third address, bit A0, is always the complementary value of Second address one. Address is obtained automatically by software.

You may only modify values for first and second slave, with second slave third is obtained automatically.
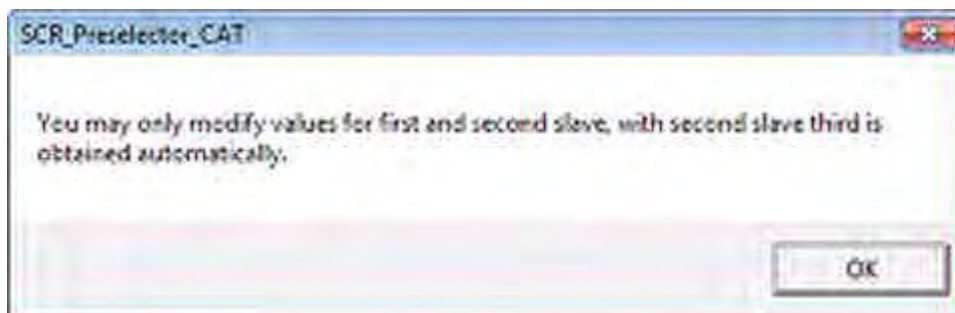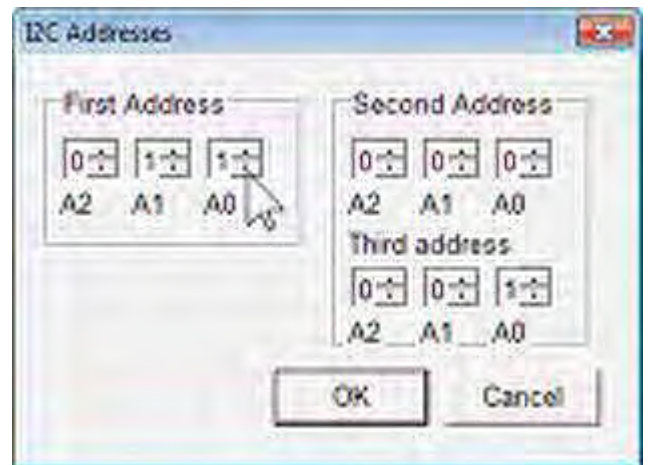
Calibration table

Write calibration tables. Function key F5

IMPORTANT: Keep safe a back-up of the calibration tables on your computer

Calibration tables are needed by the microcontroller on board to translate frequency CAT commands into tune capacity values.

SCR Preselector-CAT comes calibrated from factory. Whenever the user can do recalibration with the aid of the calibration tables for each band.

The SCR Preselector-CAT program folder contains five documents so-called

table_BAND_A.txt

table_BAND_B.txt

table_BAND_C.txt

table_BAND_D.txt

table_BAND_E.txt

table_BAND_F.txt   *(Table_Band_F do not need be changed due it is a non tunable BPF)*

The tables link the operating frequency with the tuning capacity value, comprised between 0 and 511 maximum. That value can be read on Tune Reference Dial (8)

The column on the left is the capacity value, on the right the frequency related in MHz.

With the aid of a reference frequency or receiver, values in the calibration tables can be modified. ***Up to 64 reference points*** can be added to the list. Intermediate values in the table are computed by the microcontroller on board.
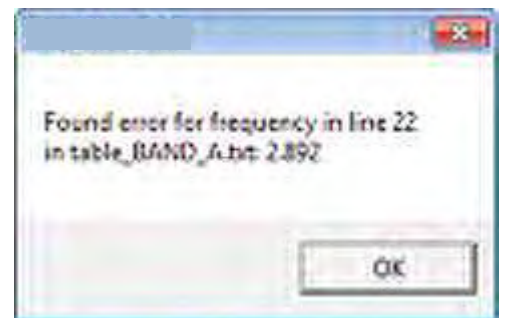
To calibrate, tune the preselector at maximum reference frequency or background noise on your receiver; enter in the table the capacity value shown in the Tune Reference Dial (8) and the reference frequency from your RF generator or receiver dial. Frequency must be expressed in MHz.

Next, calibration tables must be updated into the microcontroller; function key "F5" opens the message box.


Updating calibration tables.

After update close the program and open again. The microcontroller on board resets, starts again and reads the new calibration tables.
If writing tables a syntax error occurs a warning message is show when the program is open again.

Logfile. Function key F6

A Logfile is generated each time that the SCR Preselector-CAT application is opened . It is helpful to diagnosis purposes.

Function key "F6" opens the Logfile.

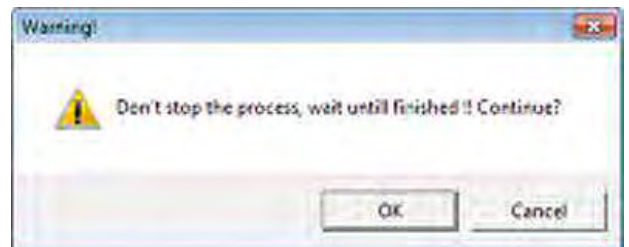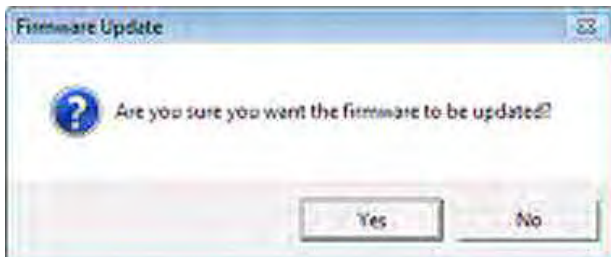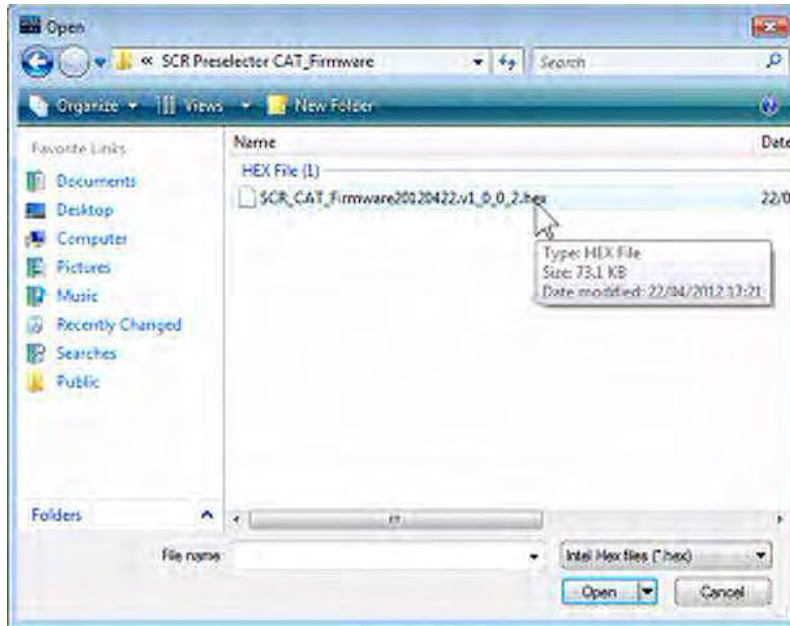Also the file can be found in the program folder as Log.txt.
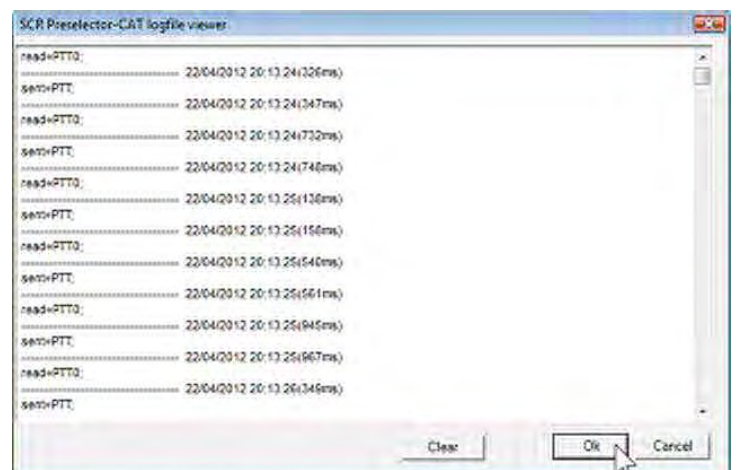
Firmware update. Function key F7

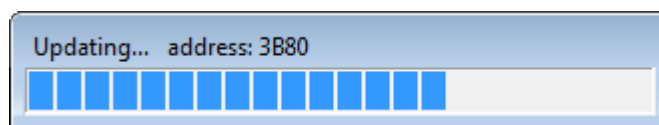To update the on board microcontroller firmware, Function key "F7" pops-up the dialog window.

Select SCR_CAT_Firmware20120422.v1_0_0_2.hex file, located in the program folder.

WARNING! Do not stop the process, wait until finished.

IMPORTANT: After update write calibration tables.

Updating the Firmware

Remember write calibration tables

Internet/Local network remote control

The SCR Preselector-CAT supports connections via the Internet and Local network.To make use of this feature execute the application on your computer and on a remote one.The protocol only uses TCP/IP; UDP which by definition is unreliable is not used.

Remember that you are accepting incoming TCP/IP connections so you must configure your firewall on your PC and on external hardware firewall. See details below.

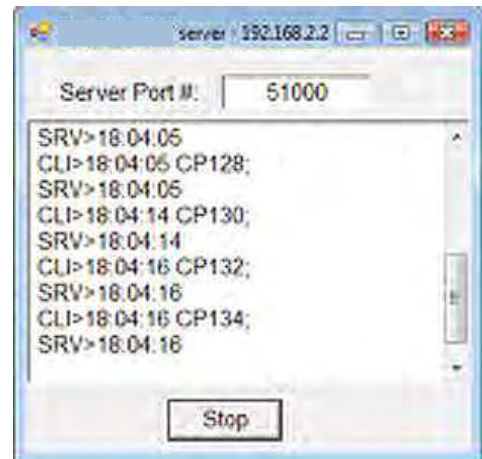**Remote server (preselector side) Function key F9**
To start the communication open first the Remote Server, Function key "F9".
The connection console is displayed showing the address in dotted format of the computer where the server is running and the port number, default port 51000.
Click on Start button. If the connection is successful you will start to receive commands from the client computer, current commands are traced on the console. The SCR Preselector-CAT will respond in accordace with valid CAT commands.
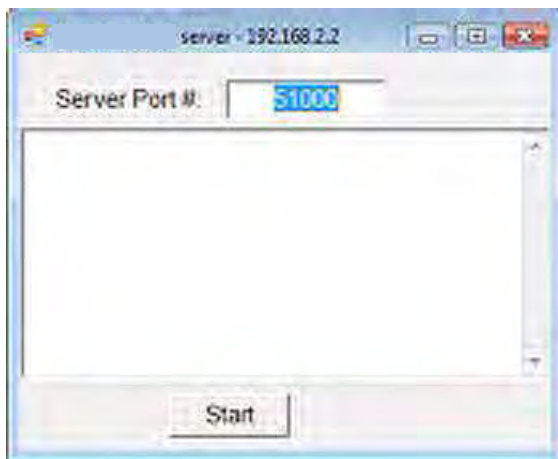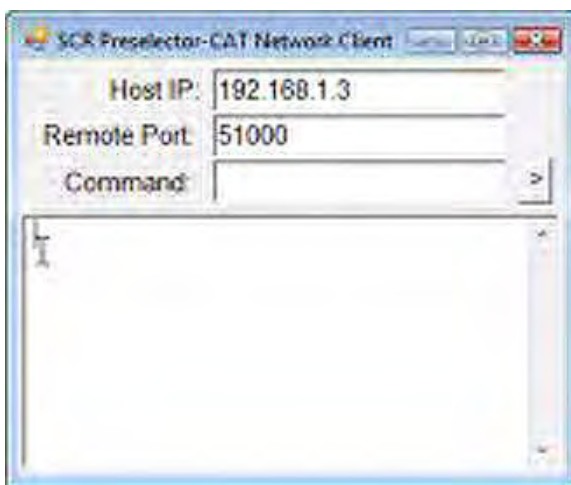

Remote Server console

*Receiving data from the Remote Client*

Remote Client (remote control side) Function key F8

To connect to the server make sure the server is started and is listening. Open the Remote Client, Function key "F8".

The connection console is displayed showing the default address in dotted format of the host computer and the port number, default port 51000. Enter the Host IP address in the text window and start operating the SCR Preselector-CAT application. Executed commands on the GUI are traced on the console. Also valid CAT commands can be send from the text box.
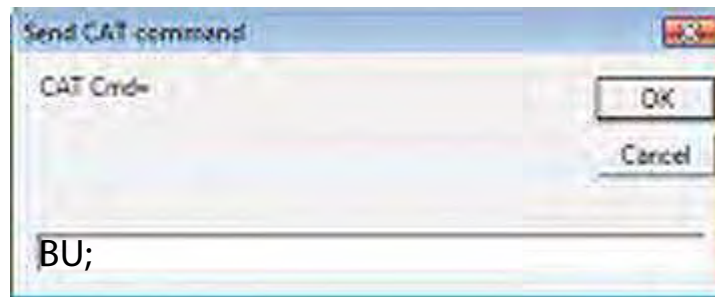

Remote Client console
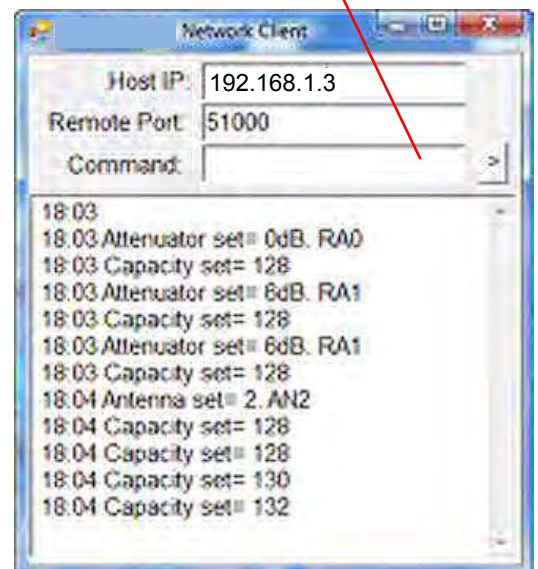
Sending data to the Remote Server

Send CAT command. Function key F10

Let send valid CAT commands for testing purposes.

Network Configuration

Public IP Address.

To make your SCR Preselector-CAT Remote server visible to the outside world you must have a public IP address; this is an address that is reachable on the global Internet. Some ISP's assign public addresses which may change from time-to-time; this is known as a dynamic IP address.
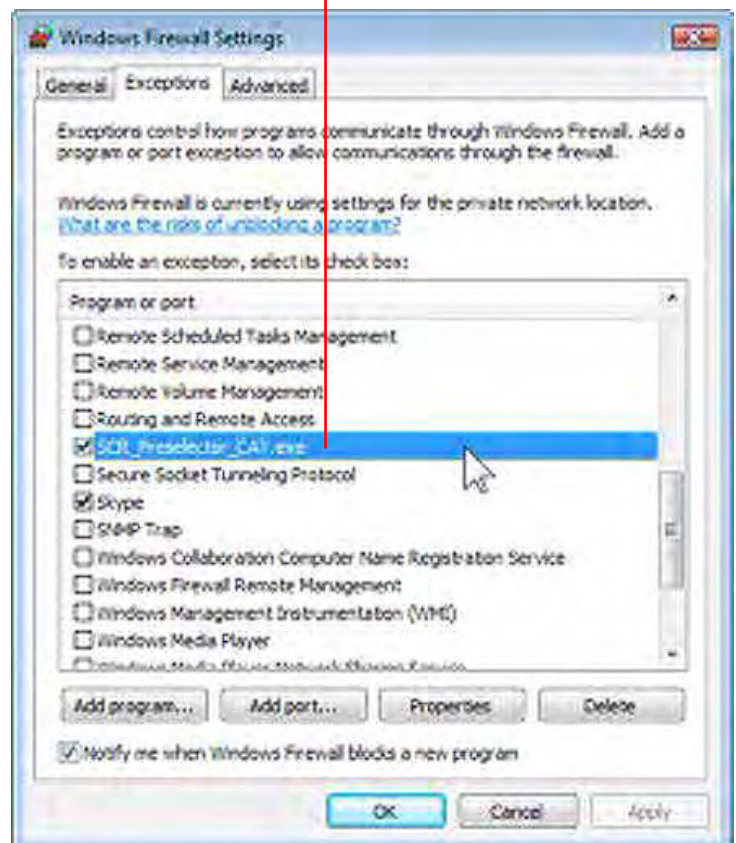
Firewall configuration

You must allow incoming TCP/IP connections on the port number selected in the Remote server's Console, by default this port number is 51000.

You may have more than one firewall activated on your router and Windows Firewall. If the Windows firewall is enabled then when you start the
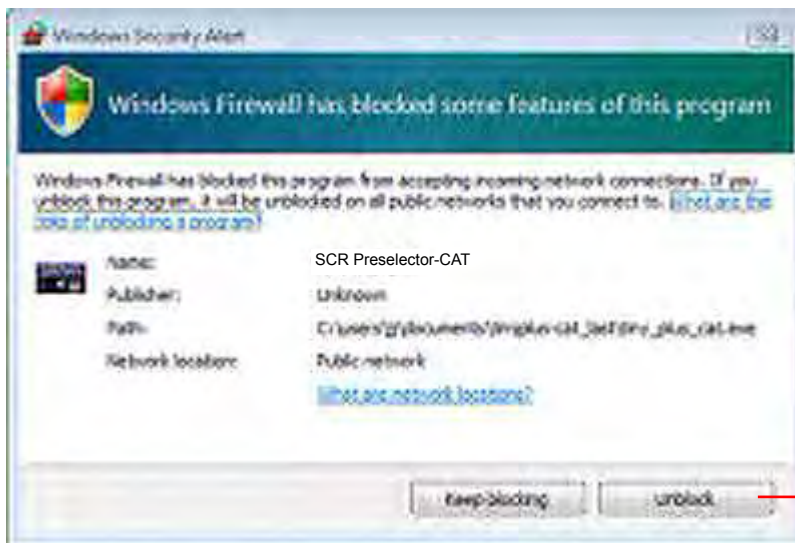
Unblock

Windows Firewall

Anti-virus.

Make sure you do not have anti-virus software inspecting and/or blocking TCP/IP traffic on the server port.

Port Forwarding

As well as allowing incoming TCP/IP connections on port 51000 you must route connections on this port to the computer where the server is running, this is known as Port Forwarding.

Depending on your router configuration software this may be referred to as Firewall> Virtual Servers, Port Forwarding, Forwarding - Virtual Servers,etc.

The screenshot below is from a Belkin router.

CAT remote control. Kenwood TS-2000 compatible.

CAT (Computer Aided Transceiver), serial data communication protocol over Virtual Com Port (VCP) enables SCR Preselector-CAT to provide the user with a way to interface with several radios. The user can track the SCR Preselector-CAT from remote control software applications.

Refer to your specific radio software application manual regarding CAT operation.

The SCR Preselector-CAT acts as a passive listener translating valid CAT commands into specific instructions.The microcontroller on board performs valid Kenwood TS-2000 compatible CAT commands.

Starting in CAT remote control mode.

The preselector GUI application must be closed before interface with any remote control software.

Power-On the preselector and plug the USB cable, a new virtual COM port is open; start and configure your application to control remotely the preselector.

Warning:

If you are working with Windows 7 and specially Windows 7 /64 bits O.S. it is highly recommended to upgrade to Windows 8.

COM ports are a limited resource and must be managed properly or the whole radio system could be severely compromised. Any unnecessary activity should be avoided in favor of avoid saturate the ports.

Experimental and/or beta Radio Control Programs should be avoided.
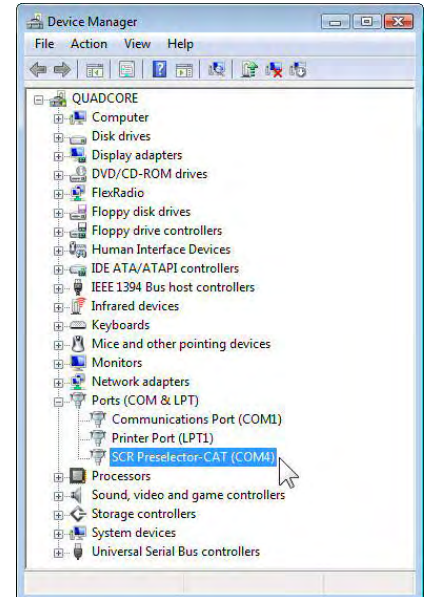
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CAT configuration console on PowerSDR

CAT control commands list *(Kenwood 2000 compatible)*

CAT CONTROL COMMANDS. General information.

A CAT control command is composed of an alphabetical command, parameter, and the terminator that signals the end of the control command.

EXAMPLE: Command to set tune frequency to 14.250 MHz
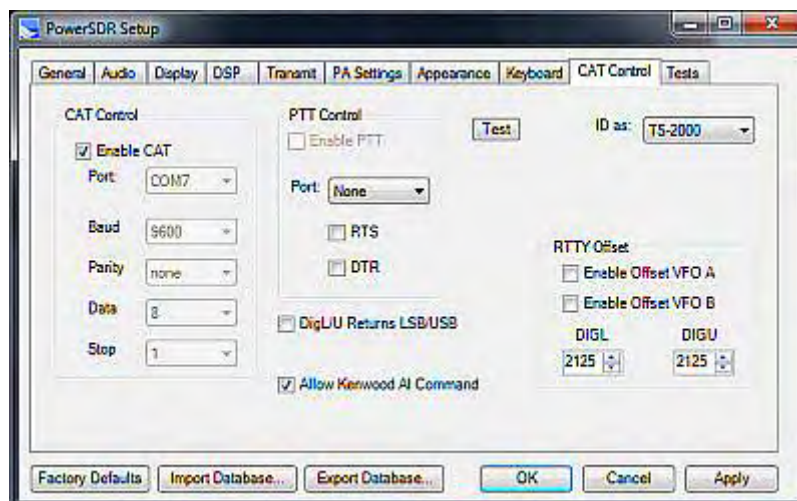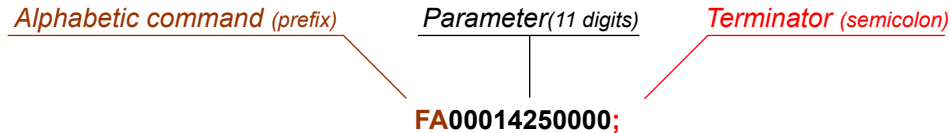
Alphabetic command (prefix)   *Parameter(11 digits)*   *Terminator (semicolon)*

FA00014250000**;**

There are three command categories: Set (write) command that change preselector status, Get (read) command that request status information from the preselector and Answer (response) command that return information requested in a Get command.

A correctly executed Set command does not return an Answer command.

The terminator for all CAT commands is the semicolon (;). CAT commands are not case sensitive. Get and Set commands must contain the correct number of parameter characters as shown below. Get commands are simply the prefix followed by a termination.

SCR Preselector-CAT. Available CAT commands.

Band commands: *prefix BNx (x band number, 1 digit ;). SET commands*

BN0;	*By-Pass*
BN1;	*Band A*
BN2;	*Band B*
BN3;	*Band C*
BN4;	*Band D*
BN5;	*Band E*
BN6;	*Band F*
BU;	Band-up
ZZBU	(PowerSDR)
BD;	Band-down
ZZBD;	(PowerSDR)
BN;	*(answer: BNx; where x is the band number) request information about Band status. GET command.*

Frequency commands: prefix *FA (band number, 11 digit ;). frequency in Hz. SET commands.*

FA000xxxxxxxx;	*(e.g. 3.8MHz FA00003800000, e.g. 21.315MHz FA00021315000*
ZZFA;	*(PowerSDR)*
FA;	*(answer FA000xxxxxxxx;) request information about frequency status. GET command.*

Antenna commands: *prefix ANx (x antenna number, 1 digit ;). SET commands.*

AN1;	antenna 1.
AN2;	antenna 2
AN;	*(answer ANx; where x is the antenna number) request information about antenna status. GET command.*

Attenuator commands: *prefix RAxx (xx attenuator number, 2 digit ;). SET commands.*

RA00;	*attenuator 0dB*
RA06; or RA01;	*attenuator 6dB*
RA12; or RA02;	*attenuator 12dB*
RA18; or RA03;	*attenuator 18dB*
RA;	*(answer RAxx; where xx is the attenuator value) request information about attenuator status. GET command.*

Preamplifier commands (LNA): *prefix PAx (x antenna number, 1 digit ;). SET commands.*

PA0;	Preamplifier OFF
PA1;	Preamplifier ON
ZZPA;	(PowerSDR)

Tune capacity commands: *(non standard Kenwood) prefix CPxxx (xxx capacity value (pF.), 3 digit ;). SET commands.*

CPxxx;	*(e.g. CP210; sey capacity to 210pF, e.g. CP009; set capacity to 9pF).*
CP;	*(answer CPxxx; where xxx is the capacity value in pF.) request information about tune capacity status. GET command.*

I2C bus remote control mode.

SCR Preselector-CAT features remote control mode from a dedicated external control system supporting I2C bus data communications. It operates totally independent of other remote control modes.

External I2C bus master controller must implement the control software detailed in the table below.

I2C lines are Galvanically isolated by means of ADuM1251 a hot swappable digital isolator specialised device from Analog Devices Inc.

I2C signal lines SDA, SCL, +12V and Ground from the I2C controller are connected to a 4 ways miniDin socket on rear panel. Pinout cabling is shown below.

External I2C Bus lines

4 ways mini-Din socket connector pin-out

+5V DC/5mA   Gnd (isolated)
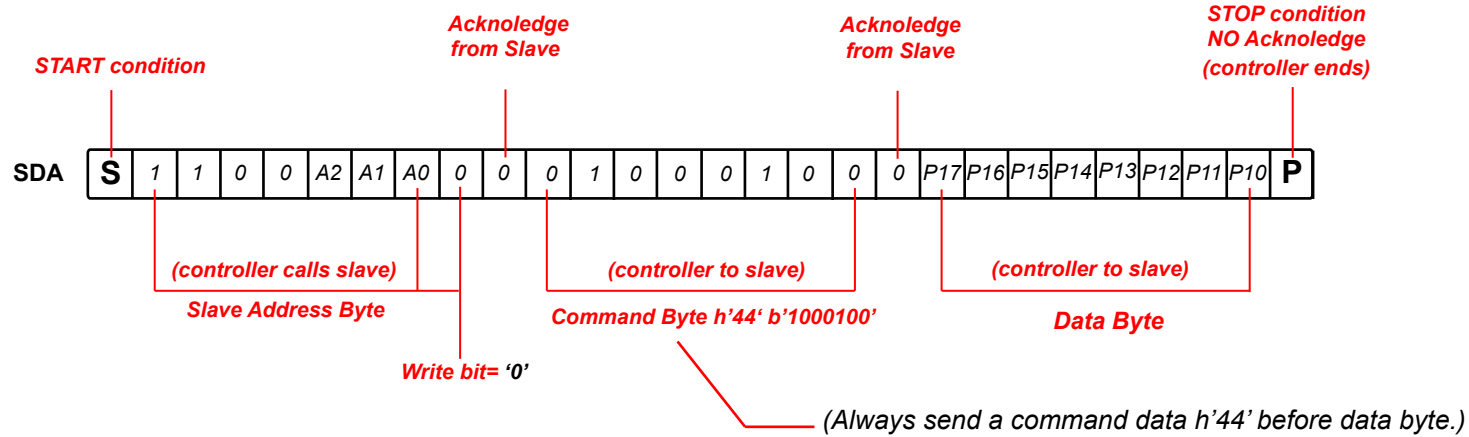
SCL   ② ③
        ① ④   SDA
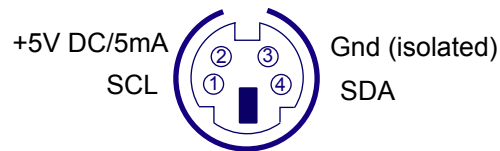
(Front view)

In order to switch to I2C remote control mode first program the I2C addresses on GUI, Context menu, I2C slave's address (Function key F4).

Go to LCD main menu, Functions selection knob (2), and pick "3. I2C Mode". The preselector remains on that remote control mode until other control mode is selected.

I2C Bus remote control implementation

Writing sequence to slaves.

	Acknoledge from Slave	Acknoledge from Slave	STOP condition NO Acknoledge (controller ends)
START condition			

SDA | S | 1 | 1 | 0 | 0 | A2 | A1 | A0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | P17 | P16 | P15 | P14 | P13 | P12 | P11 | P10 | P |

(controller calls slave)

Slave Address Byte

Write bit= '0'

(controller to slave)

Command Byte h'44' b'1000100'

(controller to slave)

Data Byte

(Always send a command data h'44' before data byte.)

1st slave: I2C address: 1100 A2 A1 A0			2nd slave: I2C address: 1100 A2 A1 A0			3rd slave: I2C address: 1100 A2 A1 A0		
bit	**Relay**	**Action**	**bit**	**Relay**	**Action**	**bit**	**Relay**	**Action**
0	RL13	Tune Cap 1pF	P10 - RL21		Tune Cap 256pF	P00	RL25	Attenuator 6dB
1	RL14	Tune Cap 2pF	P11 - RL11, RL12		Band F	P01	RL26	Attenuator 12dB
2	RL15	Tune Cap 4pF	P12 - RL9, RL10		Band E	P02	RL27	LNA signal
3	RL16	Tune Cap 8pF	P13 - RL7, RL8		Band D	P03	RL29	+12V LNA
4	RL17	Tune Cap 16pF	P14 - RL5, RL6		Band C	P04	RL22	Antenna 1, 2
5	RL18	Tune Cap 32pF	P15 - RL3, RL4		Band B	P05	NC	
6	RL19	Tune Cap 64pF	P16 - RL1, RL2		Band A	P06	NC	
7	RL20	Tune Cap 128pF	P17- RL23,24,30		By-Pass	P07	NC	

NOTES:

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