Industriefunkuhren

hopf Elektronik GmbH

Technical Manual

Frequency Output Board

Model 7530RC

ENGLISH

Version: 01.00 – 22.02.2012

Valid for Devices 7530RC with FIRMWARE Version: **01.xx**

hopf Elektronik GmbH
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Version number (Firmware / Manual)

THE FIRST TWO DIGITS OF THE VERSION NUMBER OF THE TECHNICAL MANUAL AND THE FIRST TWO DIGITS OF THE FIRMWARE VERSION MUST **COMPLY WITH EACH OTHER**. THEY INDICATE THE FUNCTIONAL CORRELATION BETWEEN DEVICE AND TECHNICAL MANUAL.

THE DIGITS AFTER THE POINT IN THE VERSION NUMBER INDICATE CORRECTIONS IN THE FIRMWARE / MANUAL THAT ARE OF NO SIGNIFICANCE FOR THE FUNCTION.

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Symbols and Characters

Operational Reliability

Disregard may cause damages to persons or material.

Functionality

Disregard may impact function of system/device.

Information

Notes and Information.

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Safety regulations

The safety regulations and observance of the technical data serve to ensure trouble-free operation of the device and protection of persons and material. It is therefore of utmost importance to observe and compliance with these regulations.

If these are not complied with, then no claims may be made under the terms of the warranty and no liability will be assumed for any ensuing damage.

Safety of the device

This device has been manufactured in accordance with the latest technological standards and approved safety regulations

The device should only be put into operation by trained and qualified staff. Care must be taken that all cable connections are laid and fixed in position correctly. The device should only be operated with the voltage supply indicated on the identification label.

The device should only be operated by qualified staff or employees who have received specific instruction.

If a device must be opened for repair, this should only be carried out by employees with appropriate qualifications or by ***hopf*** Elektronik GmbH.

Before a device is opened or a fuse is changed all power supplies must be disconnected.

If there are reasons to believe that the operational safety can no longer be guaranteed the device must be taken out of service and labelled accordingly.

The safety may be impaired when the device does not operate properly or if it is obviously damaged.

CE-Conformity

CE

This device fulfils the requirements of the EU directive 89/336/EWG "Electromagnetic compatibility" and 73/23/EWG "Low voltage equipment".

Therefore the device bears the CE identification marking (CE=Communauté Européenne)

CE = Communautes Europeénnes = European communities

The CE indicates to the controlling bodies that the product complies with the requirements of the EU directive - especially with regard to protection of health and safety for the operator and the user - and may be released for sale within the common markets.

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1 General Description of Functions

The frequency output board 7530RC is used to produce sinewaves between 1 Hz and 10 MHz in steps of 1 Hz. It is designed for the ***hopf*** **7001RC** central clock systems in European format with a 3U/4HP front panel.

The accuracy of the frequency is controlled by the PPS pulse of the GPS receiver in the system 7001RC. The sinus frequency is given out via the BNC connector on the front panel. The amplitude can be adjusted slightly with a potentiometer.

For the generation of the base frequency from which the output frequency is slipping, a furnace stabilized quartz generator is responsible for its accuracy with the GPS second mark is within $\pm 5 * 10^{-10}$.

Up to 3 of these boards 7530RC can be implemented independently from each other in the Base System 7001RC on a modular basis (depending on the system configuration).

Due to its **hot-plug capability**, the board 7530RC can be removed from and re-connected to the running 7001RC system at any time and at any point, without affecting the function of other system boards.

The board 7530RC is configured via the keyboard of the ***hopf*** system 7001RC, or using remote software.

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2 Hardware

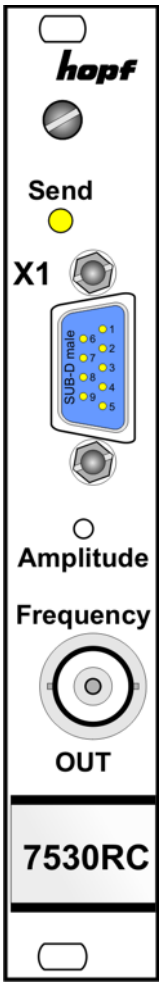
2.1 Front Panel 3U/4HP

SEND
Status LED

X1
SUB-D male connector (9-pole)

Amplitude
Potentiometer

Frequency OUT
BNC connector



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2.1.1 Status LED of the Board 7530RC

Board 7530RC has a SEND-LED on the front panel.

SEND LED (yellow)	Description
Flashing / flickering	**Normal case** – indicates access to the system bus. Board 7530RC is correctly integrated into System 7001RC.
Off	Board 7530RC is not ready for operation.
On	Fault on Board 7530RC.

2.1.2 SUB-D male connector (X1)

The SUB-D connector X1 has currently no function.

2.1.3 Potentiometer for Calibrating the Signal Amplitude

The signal amplitude can be recalibrated slightly at the hidden potentiometer above the BNC-connector.

2.1.4 BNC Connector (Frequency OUT)

The sinus frequency is put out at the BNC connector in the front panel.

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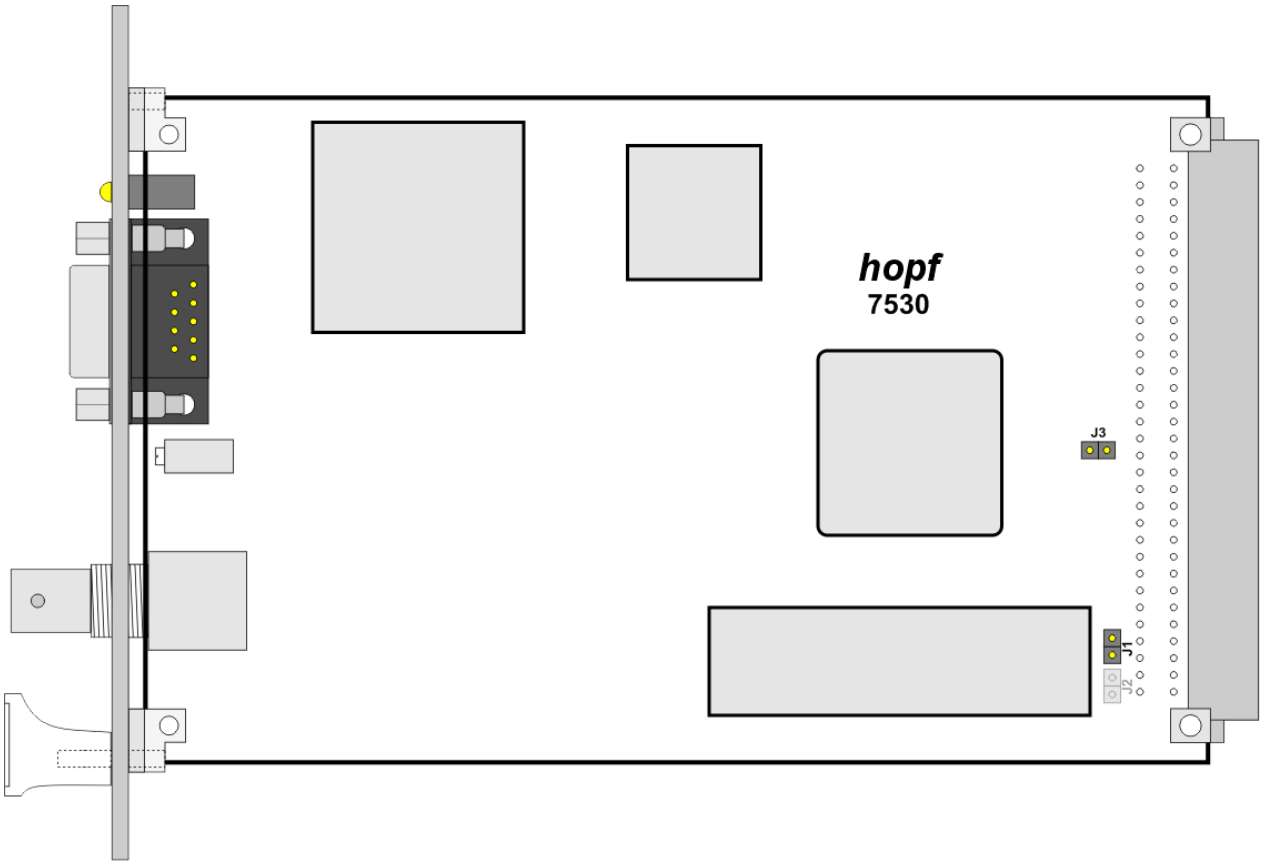
2.2 Board Configuration of Board 7530RC



Jumper J1	Jumper J3	Board Number in System 7001RC

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3 Embedding the Board 7530RC in the System 7001RC

This chapter describes the implementing of an additional RC-Function Board into the System 7001RC. In a new delivered System 7001RC all System Boards are already implemented and pre-configured with the ***hopf*** default settings as a rule.

All RC function boards are individually parameterized from the system 7001RC.

Every RC function board is uniquely identified via the board type and an assigned board number

The following steps are necessary for implementation:

- Identification of the board numbers available
- Setting up of the board number with Jumper J1 and J3 on the board 7530RC
- Installation of the board 7530RC in the system 7001RC
- Parameterization of the board 7530RC
- Activation of the board 7530RC via the system 7001RC

3.1 Identification of the Board Numbers available

The board numbers allocated so far can be displayed via the **SHOW ALL ADDED SYSTEM-BOARDS** menu. The board numbers that are not listed for this board type are available for the new board.

Boards that are available in terms of hardware, but which have not yet been activated via the system menu, are **not** listed in the **SHOW ALL ADDED SYSTEM-BOARDS** menu. (The "SEND" LED of these boards does not flash when in operation.)

In order to identify the set board number, these boards must be made available externally, in order to identify the set board number from the DIP switch setting.

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3.2 Set the Board Number

In order to clearly identify the board in the system 7001RC, the board number must be defined via the both jumper J1 and J3. The board number is set as Hex code. Jumper J1 is the lowest value bit and Jumper 3 the highest value bit. The position of jumper J1 and J3 are printed on the board 7530RC. Board numbers from 1 to 3 can be setup, board numbers outside this range are not recognized by the system 7001RC.

Under no circumstances may two boards of the same type with the same board number be embedded in one system 7001RC. This leads to undefined errors on both boards.

Jumper J3	Jumper J1	Board number in System 7001RC
Free	Free	Not active
Free	Closed	Board number 1
Closed	Free	Board number 2
Closed	Closed	Board number 3

3.3 Installation of a new Board 7530RC in the System 7001RC

In order to install a new board 7530RC, a free extension slot (slot with board connectors and VG strip installed in the system bus) must be available. This information can be obtained from the associated specific system drawing.

If no free extension slot is available, this can usually be retrofitted. Please contact ***hopf*** Elektronik GmbH.

3.4 Parameterize / Activating the Board 7530RC in the System 7001RC

The following steps are required to activate the board:

To avoid undesirable output behaviour of the board it is first parameterized and then activated by switching it into the monitoring system.

- In **BOARD-SETUP** menu, sub-heading **ADD SYSTEM-BOARDS**, log on the newly installed board.
- In **BOARD-SETUP** menu, sub-heading **SET SYSTEM BOARDS PARAMETER** parameterize the board.
- In **BOARD-SETUP** menu, sub-heading **SET SYSTEM BOARDS TO MONITORING-MODE OR IDLE-MODE** integrate the newly installed board into the monitoring system.

The menus:
- **ADD SYSTEM-BOARDS** and
- **SET SYSTEM BOARDS TO MONITORING-MODE OR IDLE-MODE**

can be consulted in the technical specification of the system 7001RC.

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4 Administration of the Board 7530RC

The technical manual of the System 7001RC is the basis for the configuration. Successional only the input of values are described which are located in the menu **BOARD-SETUP**.

All parameters can be activated also in the system 7001RC with the associated ***hopf*** 7001RC Remotesoftware (see technical description ***hopf*** 7001RC Remotesoftware).

The menu **SET SYSTEM-BOARDS PARAMETER** has to be completely finished by pressing the ENT key so that the System 7001RC accepts the newly configured parameters.

4.1 Input Functions for the Board 7530RC in the System 7001RC

The input and display functions of the board parameters are polled in the menu heading **BOARD-SETUP:4**

with ENT key ⇨ Main menu
with 4 key ⇨ Board setup
with N key ⇨ Scroll to menu heading:

```
 SET SYSTEM-BOARDS PARAMETER  Y/N
```

Select with key Y

Search for board to be parameterized with key N and select with key Y

Example:

```
 PARAMETER BOARD 03 OF 25  7530 NO.:01
STATUS:I/E  BOARDNAME:"FREQ 01 " SET>Y/N
```

PARAMETER BOARD 03 OF 25 ⇨ Board 03 of a total of 25 implemented boards

7530 NR.: 01 ⇨ board type **7530RC** with board number **01**

STATUS: M (I)**/-** (E) ⇨ **M** = monitoring / **–** = without error operating

I/E **I** = no monitoring / **E** = board error

BOARDNAME: " FREQ _ 01 _" ⇨ Board name freely selectable by customer

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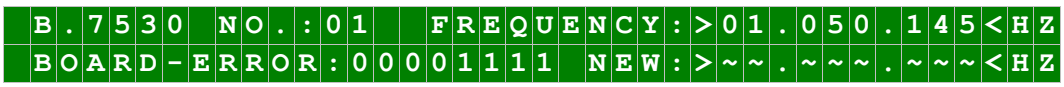
4.1.1 Parameterizing the Output Frequency - Overview Board-Errobyte

Output Frequency

In this menu, the output frequency is displayed and configured. Entering a new output frequency is always 8 digits. It can be set to a frequency of 1 Hz (00.000.001 Hz) to 10 MHz (10.000.000 Hz) in 1 Hz steps.

The input frequency is entered with the **"ENT"** button and is stored in fail safe.



Board Error Byte

In addition, the current error status of the board 7530RC will be shown.

Eight bits are shown in this window. Two bits are used at present. In case of a logical ‘0’ there is no error. A logical ‘1’ indicates an error.

Bit 0	Memory defect detected
0	No Error
1	This bit indicates an error in the EEPROM

Bit 1	Control out of range
0	No Error
1	This bit is set when the control of the oven controlled crystal is out of range

Bit 2-7	without function in present
0	No Error

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4.1.2 Delayed Output Frequency dependent on the Status

The frequency is usually put out unless the complete system works radio synchronously (R). The switch-on time can be delayed to give the system time to control the frequency. **'ON'** is used to set the period between first radio synchronicity and the start of the frequency output. Once the voltage is supplied the oven stabilised crystal on the board 7530RC needs some minutes to warm up. During this time the accuracy of the frequency does not meet the stated standard. The switch-on delay should therefore never be less than 10 minutes.

For testing purposes, with "ON = 000 minutes," the output frequency is always permitted independent of the system status.

When the system is no longer running radio synchronously the frequency continues on the last controlled level of accuracy for some time. The **"OFF"** function sets the time which may pass between the loss of synchronisation and the switching off of the frequency. The time cannot exceed 254 minutes. The setting of 255 minutes delay time is the only exception. In this case the output of the frequency stays switched on all the time.

Both times are set in one operation.

```
B.7530 NO.:01     ON/OFF:>002/055< MIN
FREQUENCY-OUT AFTER SYNC.:>~~~/~~~< MIN
```

Timer	Input Value
ON	0 .. 255min.
OFF	2 .. 255min.

4.1.3 Parameter Byte Input - Parameter Byte 01

Various board parameters are set using the parameter byte menu. A function is allocated to each bit. These functions are explained in the following tables. A function is activated with **1** and deactivated with **0**.

```
B.7530 NO.:01   OLD: BYTE 01 >00001111<
BYTE = BIT 7..0 NEW: BYTE 01 >01100000<
```

The current parameter byte is shown in the upper line with its number (01) and the preset values. The bits of the parameter byte are numbered in descending order:

```
BYTE 01 >76543210<
```

Bit 7-0	Currently without a function
0	For compatibility reasons these bits must always be set to **"0"**.

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5 Technical Data

Board dimensions	Euro board 100mm x 160mm, 3U / 4HP
Power supply	5V DC ± 5% (via system bus)
Charging rate	approx. 1 A
Temperature range	0 ... + 50 °C
Humidity	95 %, not condensing
MTBF	> 622,000 hrs.

Frequency Output	
Via BNC connector	Signal level: 2 V_{pp} Sinus at 50 Ω

Internal Operating Accuracy (absolutely to the system internal PPS)	
Warm-up time OCXO	5 Min. at 25°C
Turn-on accuracy	< ± 100ns
Operating accuracy after 15 min	< ± 5ns / 100s
Operating accuracy after 45 min	< ± 5ns / 100s
Operating accuracy after 240 min	< ± 0,5ns / 100s
Long-term accuracy when constantly controlled by satellite	< ± 0,01ns / day

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