TMS2000

USER'S MANUAL

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CHANGES IN THE DOCUMENT		
Release	**DATE**	**OBJECT of CHANGE**
A0	2016-06-15	From original French release A3(2015-01-07)

	Name- Responsibility-Service-Company	**Date & Signature**
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1. GENERAL DESCRIPTION

This document is dedicated to TMS2000 equipment, a time server using Network Time Protocol to deliver precise time.

1.1. FRONT and REAR FACE

The front face of the equipment shows 4 LED's indicating the current status of the unit.

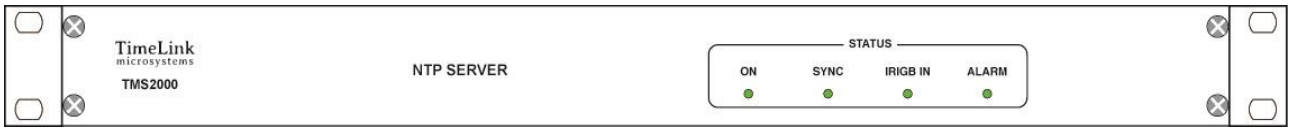

Figure 1 – Front face of the TMS2000

On the front face are located all the connectors.

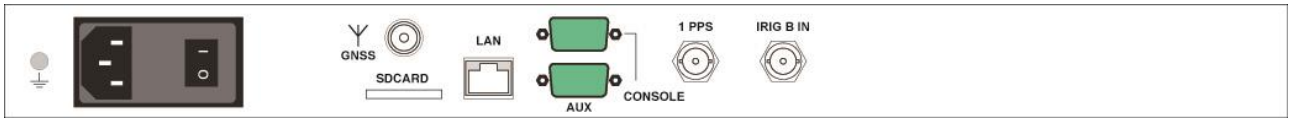

Figure 2 – Rear face of the TMS2000

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1.2. FUNCTIONNAL CARACTERISTICS

Table below shows the main specifications of the unit:

.

Characteristic	Types / Values
1PPS output	level : 0-5V, positive pulse, 50 Ohms
	BNC female socket - Identification "1PPS"
	Duration : 1ms, period 1Hz, reference rising front
IRIGB input	Modulated analog signal 1:1/1:3 level 0,6-6Vcc, charge 600Ω
	BNC female socket - Identification "IRIG B IN"
SD card	"push-push" connector type accessible from the rear face of the unit . Identification "SD-Card"
Power supply input(s)	CEE 2P+T socket with filter and switch On/Off Input 90-264VAC / 47-63Hz
	Consumption : <10W on 230VAC/50 Hz
Network	Ethernet 100 Mbps
	RJ45 socket - Identification "LAN"
NTP	Port UDP 123, operating mode Request/Reply (unicast)
Console	DB-9 connector, speed 115200 bauds, 8bits, 1 bit stop
Service SSH	Port TCP 22
Service HTTP	Port TCP 80
Remote control	UDP frame sent to a list of IP address, PORT number

Tableau 1 – Functional specifications TMS2000

1.3. MECHANICAL CHARACTERISTICS

Table below shows the mechanical characteristics of the unit:

characteristics	Types / Values
Dimensions	Rack 19" (483 mm) height 1U (44 mm), depth 350 mm.
Masse	2.7 Kg (3.0 Kg with power supply cable).

Tableau 2 – Mechanical specifications

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2. BEFORE ANY USE

Before using the equipment, it's necessary to perform the operations described below.

2.1. INSTALLING THE UNIT

The equipment is intended to be integrated in a 19 "cabinet.

It is recommended to connect the equipment to the protective mechanical ground of the bay and grounded via the ground bolt to the left rear of the equipment.

2.2. CONNECTIONS

The equipment must be connected to the mains using the supplied cable.

The equipment must be connected to Ethernet with an RJ45 cable (not supplied).

Important: Power must be set after all connections.

2.3. PARAMETERS

The proper functioning of equipment required to set them with consistent values for the critical parameters. These parameters are located on an inserted SD card on the back of each equipment. The parameters available to the user are in the file "user.ini".

When "setting" the SD card into a PC the file 'user.ini' is located in the "TMS2000" SD-Card. However, if you want to edit this file from the device it is in '/ config'.

The following tables list the parameters according to their location in the configuration space.

The procedure to change the settings is described in an appendix to this document.

Important: Please do not modify files other than those mentioned below under pain of not having functional equipment except if support staff from Timelink Microsystems invites you to do so.

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2.3.1. Parameters of the TMS2000 unit

These parameters are located in the file **'TMS2000/user.ini'** of the card.

Section [NETWORK]

Name	Description	Presence	Default value	Authorized values
IP	Show the IP v4 address of the unit	mandatory	192.168.10.190	Any valid IP address
MASK	The sub network mask on which the equipment is located	mandatory	255.255.255.0	Tout masque de sous-réseau valide
MAC	Show the MAC address of the equipment	mandatory	Predefined in factory according to serial number of the unit	Any valid MAC address Nota: except in special cases, should not be changed.
GW	The IP v4 router address of the sub network on which the equipment is located	Optional but recommended to reach other subnets	192.168.10.254	Any valid IP address
BROADCAST	indicates the IPv4 broadcast address for the equipment on its subnet	optional	192.168.10.255	Any valid broadcast address
NAMESERVER	Indicates the IP v4 address of the server of names used to resolve the machine's names.	Optional but essential if the machine names are used in other settings (eg, names of NTP servers to reach)	8.8.8.8	Any valid IP address

Section [NTP_SERVER]

Name	Description	Presence	Default value	Authorized values
ENABLE	Enable or disable the NTP server of the equipment	mandatory	Y	Do not change this value under penalty of no longer having NTP service in the equipment
VERSION	Sets the version contained in the response to NTP requests	mandatory	AUTO	**V3**: for a response with a release 3 packet.**V4**: for a response with a release 4 packet. **AUTO**: to adapt the response to the request

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Name	Description	Presence	Default value	Authorized values
NOTIME	Define the behavior in case of impossibility to deliver a right time	mandatory	NO_ANSWER	**NO_ANSWER**: no response to the NTP request if the time could not be provided **LEAP**: the NTP packet will contain the flag 'LEAP' indicating that the server doesn't provide a right time.

Section [IRIGB_IN]

Name	Description	Presence	Default value	Authorized values
ENABLE	Enable or disable the acquisition of the IRIG-B signal	mandatory	Y	Don't change this value otherwise the acquisition of the IRIG-B signal will stop. equipment
CODE	Define the contents of the IRIG-B signal	mandatory	2	Don't change this value
YEAR	Define the year of the IRIG-B signal	mandatory	2014	Don't change this value

Section [GPS]

Nom	Description	Presence	Default values	Authorized value
UTC_OFFSET	Offset between the GPS hour and the UTC hour	mandatory	16	

Section [RM]

Nom	Description	Presence	Default values	Authorized value
PUSH_TO	Give the list of the 'IP:Port' to which send information to remote management. Couples IP: Port 'are separated by ', '.	mandatory	192.168.10.191:9000	All 'IP:Port' couple valid on the network where the server is connected.

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Note: There are other parameters in the file 'user.ini' but these should not be changed without the agreement of TimeLink microsystems. These settings are located under the following banner:

```
#-------------------------------------------------------------------------#

#>>>>  DO NOT MODIFY PARAMETERS UNDER THIS LINE  <<<<

#-------------------------------------------------------------------------#
```

3. USE

3.1. Power On

Equipment starts from power by switching the button On / Off on the '1' position.

Notes:

1. During the startup of the operating system, the front face indicator LEDs remain off for about fifteen seconds after power On.
2. Equipment having very low consumption, it is necessary to wait 30 seconds between a power off and a new power on to allow a full stop. An OFF / ON cycle too short can lead to a bad start equipment.

3.2. Lights

On the front face the group of LEDs gives the status of the equipment. These LEDs and their meaning are described in the following sections.

3.2.1. Voyants pendant le démarrage de l'équipement

Pendant le démarrage de l'équipement les LEDs de la face avant indiquent une progression ou un code d'erreur.

Le tableau suivant récapitule les combinaisons de LEDs durant cette étape.

ON	SYNC	IRIGB	ALARM	Description
Yellow	Off	Off	Off	Mounting the SD-Card
Red	Red	Red	Red	SD car missing or not detected
Green	Green	Yellow	Off	Start up the configuration
Red	Off	Off	Red	IP address is missing
Off	Red	Off	Red	Network mask is missing
Off	Off	Red	Red	MAC address is missing
Green	Green	Green	Yellow	Start up of the application proper to the equipment
Green	Green	Green	Green	Application has start up
Blue	Blue	Blue	Red	Application stopped in error
Yellow	Yellow	Yellow	Red	Application doesn't start up

Tableau 3 – LEDs status during start up

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LEDs during operation of the TMS 2000 equipment

LEDs	Color	meaning
ON	White	The system booted
SYNC	Red	The system is not synchronized to the GNSS signal
	Yellow	GNSS source is not the selected source
	Green	The system is synchronized to the GNSS signal
	Off	GPS source has been disabled
IRIGB	Red	The system is not synchronized to the IRIG-B signal
	Yellow	IRIG-B source is not the selected source
	Green	The system is synchronized to the IRIG-B signal
	Off	IRIG-B source has been disabled
ALARM	Green	No alarm is present or at least one alarm "information" type is present
	Yellow	At least one alarm "warning" type was generated
	Red	At least one alarm "error" type was generated

3.3. Interfaces of the equipment

The equipment provides the following interfaces :

- One connector providing 1 PPS signal
- One connector for IRIG-B input signal
- One connector for Ethernet 100Mbits
- a slot for an SD card
- a 4 LEDs display

On the Ethernet interface the following functionalities are available:

- NTP service in IP v4
- SSH access by IP v4
- HTTP access
- Access to a UDP frame v4

3.3.1. NTP Service

This service offers the ability to synchronize this equipment with an NTP client. The times generated are those of the internal time itself synchronized to one of the source connected to the equipment.

The service is able to respond in NTPV3 or NTPV4 depending on its configuration. In case of unavailability of the internal time it can, depending on its configuration, respond with the flag LEAP positioned or else doesn't respond.

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3.3.2. SSH access

This service provides access to the device from another computer in safe mode.

Only the user « maintenance" has authorization to connect to the equipment. After connecting a shell is opened on the machine. So it should be paid to actions from this moment on pain of no longer serve the primary functions of the equipment.

Possible actions from the shell are:

- to update the system software
- change a user's password
- restart or shut down equipment
- log in as 'root'

The default password is « tms2000 ».

3.3.2.1. Updations the system

The system update is done using the tool **'update'** provided.

Refer to the section Maintenance to see how.

3.3.2.2. Changing password

To change the password of a user you must use the command **'passwd [<user>]**'. You will be requested the new password and it will be written in the SD card file.

Note: When the user "**maintenance**" changes his password, it must respect the following rules:

- length of 8 characters at least
- at least three of four criteria: a tiny (a-z), a capital letter (A-Z), a number (0-9), a special character ($, @, ...)
- The password must be sufficiently different from the current password
- The password cannot be the host name (including permutation of characters, different case).

Failure to comply with these rules results in the rejection of the password.

For the **root** user, the non compliance is indicated but the password is nonetheless forced.

3.3.2.3. Restart or shutdown the equipment

These functions allow to restart or to stop safely the equipment. You first need to be **root** to enable these features (see below).

To restart type **'reboot'** and stop type **'poweroff'**. After a 'poweroff' you can turn off the equipment.

3.3.2.4. Become 'root'

This function allows the user to change his identity in that of **root**.

For this type '/ tools / su' and enter the password for the root user (default: tms2000 ").

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3.3.3. Access from the console

The system can be accessed from the console port by connecting a terminal emulator. Use the following settings:

- speed 115200
- 8 bits, 1 stop bit, no parity

You can access the command shell as when using the access via SSH after you 'logged' on the system.

Once the command shell you can perform the same actions as described above.

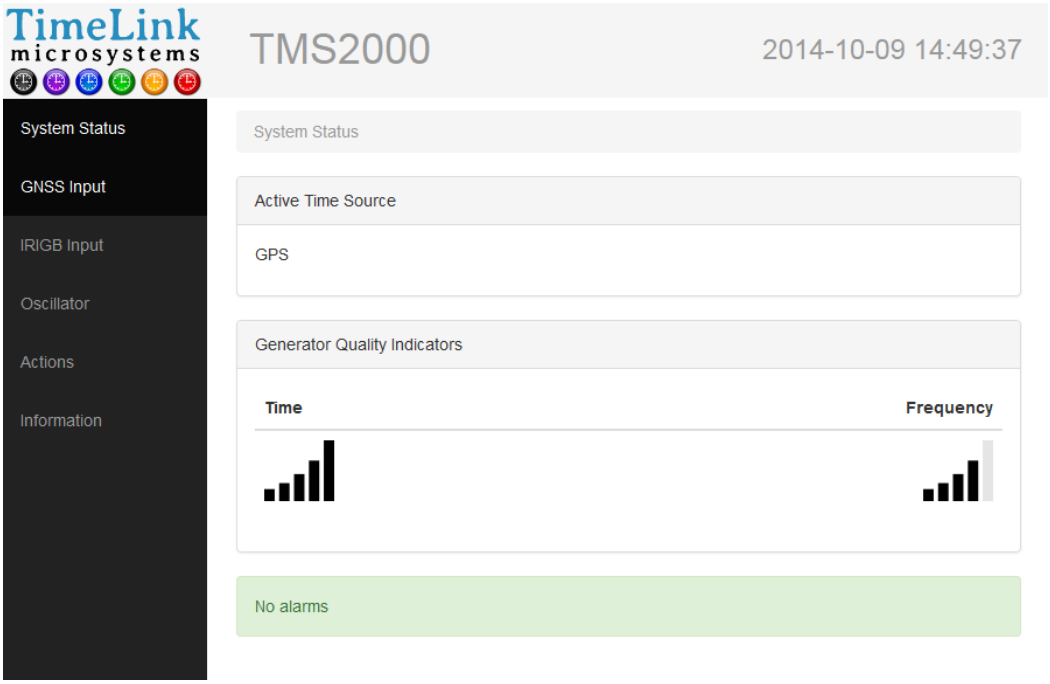
4. SURVEILLANCE

Equipment monitoring can be done via the integrated web server or by receiving a UDP frame containing information on the equipment.

4.1. http server

The HTTP server is accessible on port 80 to the equipment.

The screenshots below show the outline of the pages as they are displayed in a browser.



Homepage

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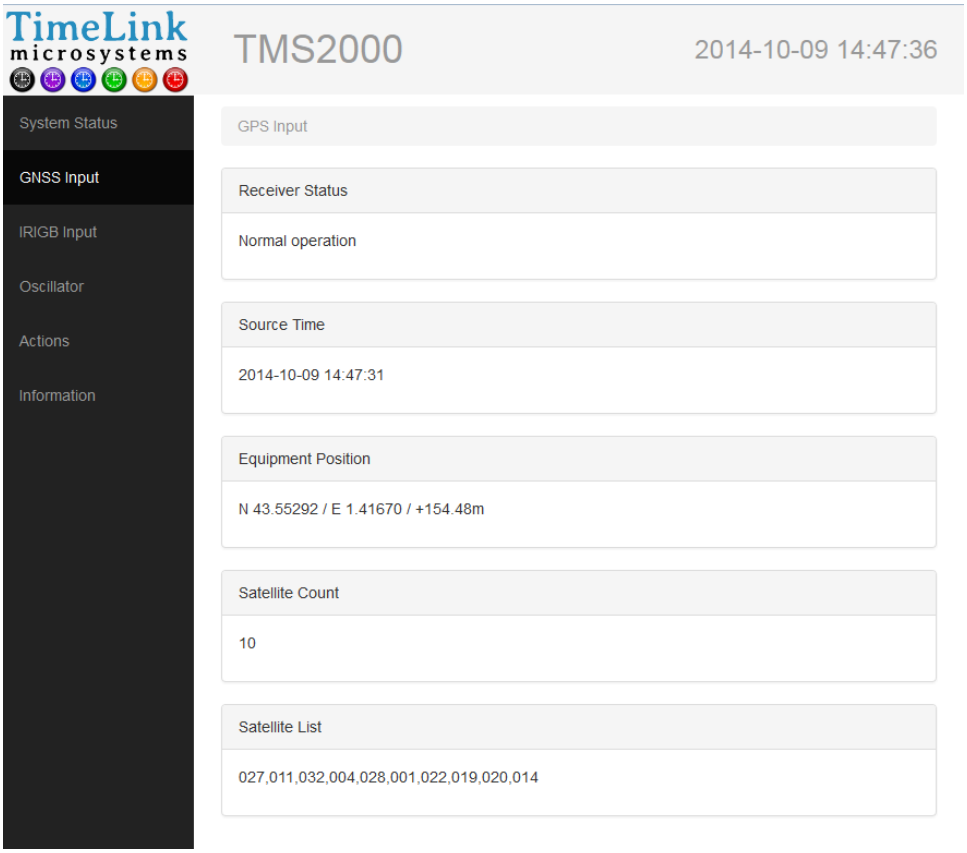
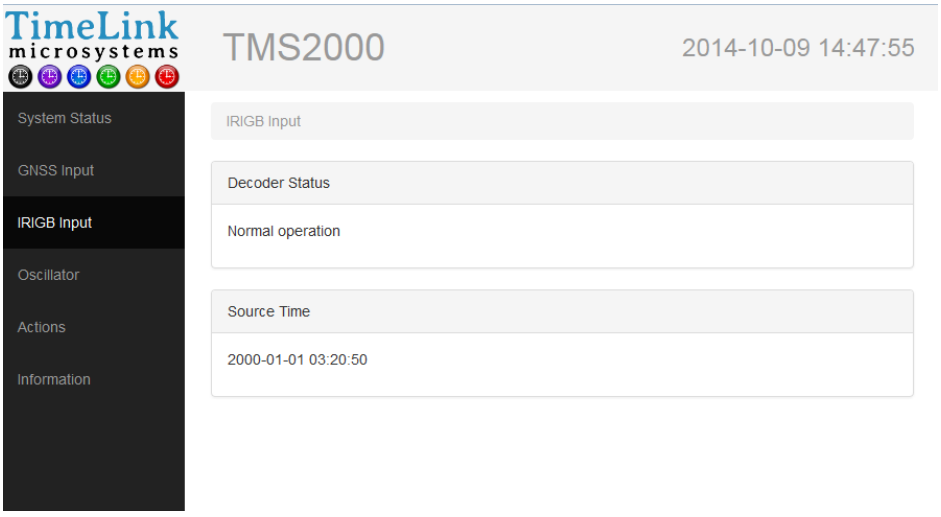


GNSS screen



IRIGB screen

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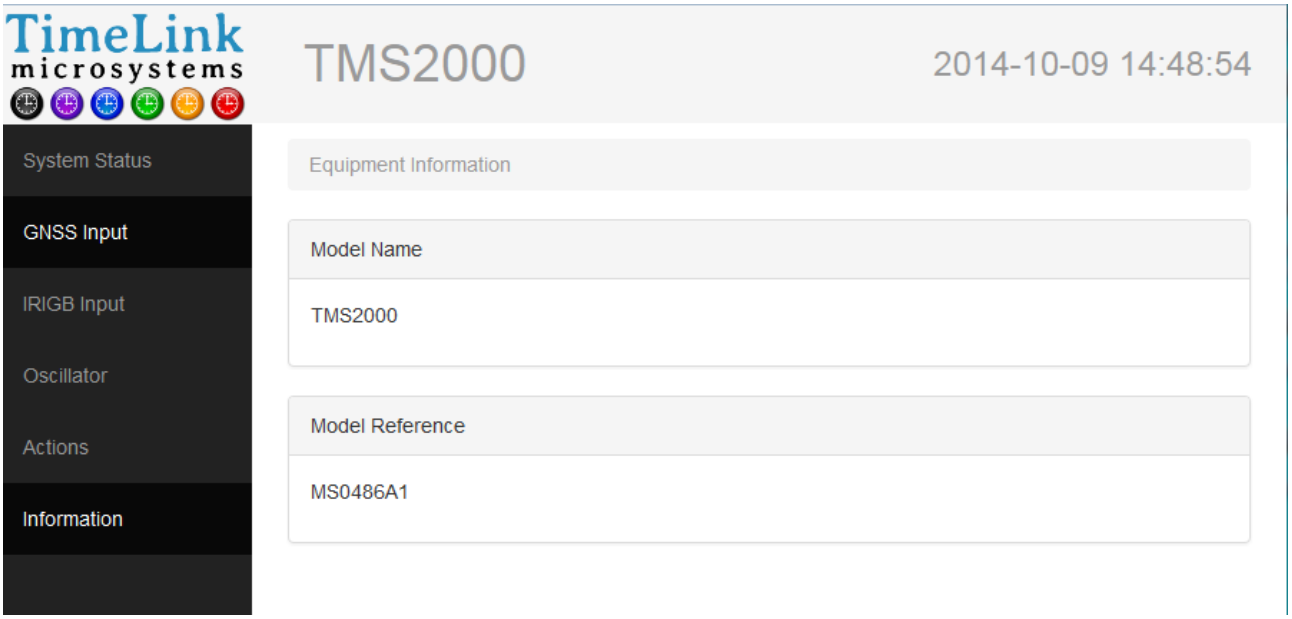
Oscillator screen



Information screen

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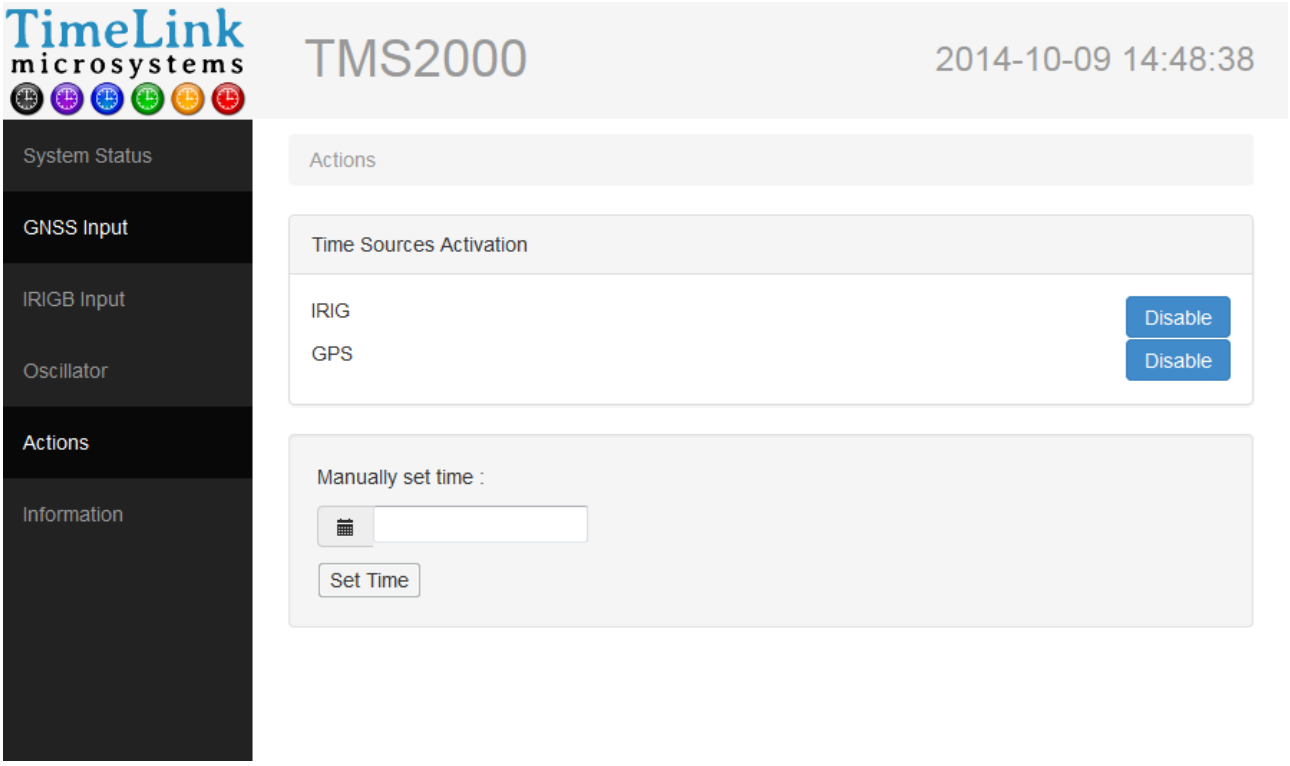
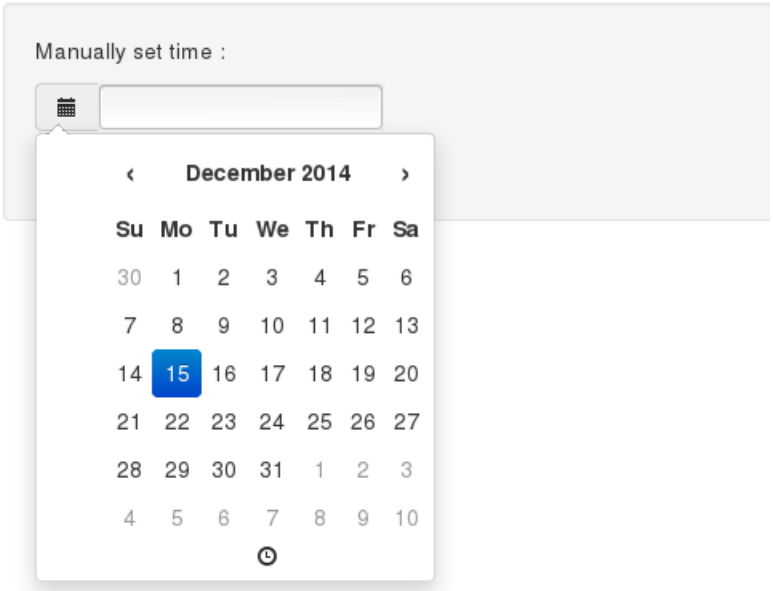


Actions screen

4.1.1. Setting time manually

The 'Actions' screen offers you the ability to set yourself the system time. For this, you need to disable all time sources available on the device by clicking the "Disable" button in front of each of them.

Once deactivated sources, you can enter the time by clicking the icon . This opens a dialog box offering you to first entry date:



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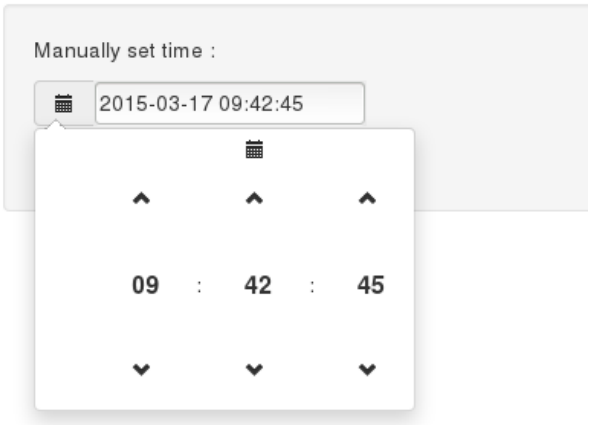
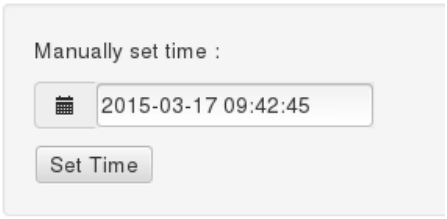
Once the new date selected, click the icon at the bottom of the dialog box to access the time entry:



After finishing input, you can close the dialog box by clicking outside of it, then click on "Set Time" to put the equipment at the selected time:



4.2. UDP frame

A UDP frame can be sent to one or more recipients. The configuration of the recipient list is detailed in the section referring to the system configuration.

The frame contains the following fields separated by ',':

- date and hour of the frame: 2014-09-15 12:00:00
- Time Quality Indicator QF5
- Frequency quality indicator: QF4
- value of the estimate of the frequency stability: -1.230e-11
- difference between the generated PPS and t UTC PPS: -007ns
- current value of the DAC of the oscillator: 0412437
- name of the time source that synchronizes equipment: GPS
- value of the GNSS status: C: 000: O
- value of the acquisition status of the IRIG-B signal: 0
- number and list of alarm codes: [0, NONE]

Example of frame:

```
2014-10-09 14:59:34,QT5,QF4,+3.610e-10,+008ns,0669564,GPS,C:100:O,0,[0,NONE]
```

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Remarks:

The status of GNSS has 3 information's separated by the character ':':

- antenna status: 'C' for connected, 'N' for not connected, 'S' for short circuit
- value of the survey: from 000 to 100 (000 is not abnormal if the survey is off)
- status of decoding: 'O' for correct decoding, 'N' for incorrect

The status of the acquisition of the IRIG-B signal is a figure whose values are:

- 0: nominal acquisition
- 6: Signal decoding error
- 8: No Signal

Alarm List is equal to 'NONE' when it is empty; otherwise it contains a list of error code separated by:

':'.

The values following 'QF' or 'QT' indicate a figure from 0 to 5 corresponding to the following tables:

For the time:

Bars	**accuracy**	**Corresponding status of the equipment**
0	> 10µs	Malfunction if steady. (Normal at startup)
1	1µs to 10µs	
2	1µs to 500ns	
3	500ns to 100ns	
4	100ns to 50ns	Nominal
5	< 50ns	

Accuracy is a picture of the difference between the PPS generated by the equipment and the PPS issued by the reference source.

For the frequency :

Bars	**Stability**	**Corresponding status of the equipment**
0	> 1e-8	Malfunction if steady. (Normal at startup)
1	1e-8 à 5e-9	
2	5e-9 à 1e-9	
3	1e-9 à 5e-10	Nominal
4	5e-10 à 1e-10	
5	< 1e-10	

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5. MAINTENANCE

The maintenance on the equipment comes down to updating the software.

5.1. Updating the software

Important: The software update can only be performed by the user `'root'` (cf. §3.3.2.4).

The software update is done using the tool '/ usr / bin / update' available on the equipment. Its use requires the following:

- be copied to the SD card (s) file (s) to update.
- to connect via SSH or from the equipment console (after re-inserting the SD card and restarted the equipment)
- Use the tool **`'/usr/bin/update'`**

5.2. File for the update

The software update is performed by writing the binary file in the directory 'update' of the SD card in the permanent memory of the processor.

To do so please type the following command from a command shell.

```
"/usr/bin/update -u /config/update/<file>"
```

Where <file> is the name of the binary file that contains the update to perform..

It is recommended to verify that the file you just flash is the same as your source. For that please enter the following command:

```
"/ Usr / bin / update -c / config / update / <file>"
```

The result of this command will tell you if the files are identical.

If you see a message indicating that the files are different re-try again the two previous orders.

Note: If the update cannot be done it is likely that the flash memory of the processor may be damaged. It is then necessary to return the equipment or just the module to Timelink microsystems for investigation.

As, no sensitive data are located on the data processor module, no data will be visible by Timelink microsystems.

5.3. Resetting the GNSS

To reset the GNSS it is necessary to connect in console or ssh on the equipment. Once connected type the following command from a command shell:

```
"/ Usr / bin / coldStart"
```

While resetting the GNSS equipment will operate in free-running mode (not disciplined by GNSS) and at the end of the reset it back to its nominal operation.

Note: It is recommended to re-start the equipment after this operation in order to have a better estimate of the stability of the oscillator as the 'coldStart induces abnormal measures which temporarily affect this calculation.

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6. ANNEXES

6.1. Changing the configuration files

The only configuration file that can be changed on these devices is the file 'user.ini'.

You can edit this file in two ways:

- from the equipment
- with a PC fitted with an SD card reader

6.1.1. Changing from equipment

To begin, please log into the system from the console port or from SSH access.

Once connected and logged into the system just use the editor 'vi' provided in the equipment to edit the file 'user.ini'.

Type **`'vi /config/user.ini'`**, change the values that can be changed, save the file and exit the editor.

After editing the file you must restart the device by typing 'reboot' for the new values to take effect.

6.1.2. Changing from a PC equipped with an SD card reader

To modify the file you must first stop the equipment, extract the SD card and insert it into the card reader on your PC.

Use a text editor to edit the file 'user.ini' from your PC. Eject the card and insert it back into the device and restart it.

Important note:

According to the editor used you must check that the encoding of line breaks are in UNIX format and not WINDOWS otherwise you will not be able to read the file from the device (only LF, not CR, LF).

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Summary of parameters values on the TMS2000.

Category	Parameter	Default value	Optional value
[NETWORK]	IP	192.168.10.190	
	MASK	255.255.255.0	
	MAC	According to serial number (S/N) of the equipment	
	GW	192.168.10.254	
	BROADCAST	192.168.10.255	
	NAMESERVER	8.8.8.8	
[NTP_SERVER]	ENABLE	Y	
	VERSION	AUTO	
	NOTIME	NO_ANSWER	
[IRIGB_IN]	ENABLE	Y	
	CODE	2	
	YEAR	2014	
[GPS]	UTC_OFFSET	16	
[RM]	PUSH_TO	192.168.10.191:9000	
Password 'maintenance'		tms2000	
Password 'root'		tms2000	

*** End of document ***

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