

N1

USER MANUAL



TEKRON

Table of Contents

1	Introduction.....	3
2	LED Indicators	4
3	Inputs and Outputs.....	4
	Antenna connector (SMA connector)	4
	Ethernet Port (RJ45 Connector)	5
4	Installation.....	5
	Identification.....	5
	In the box	5
	Mounting the N1.....	6
	GPS Antenna and Cable Installation	6
	Operation	7
5	Configuration software	7
	Introduction.....	7
	Connection via LAN	7
	Discovery Window	8
	Direct connection method.....	9
	Firmware Upgrade.....	11
	Toolbar	11
	Time Tab.....	12
	Network Tab	14
	GPS Tab.....	17
6	Factory Hardware Options.....	20
	Power Supply Options	20
	Lightning Protection Option	20
7	Appendix.....	21
	N1 Specifications	21
8	Warranty Statement.....	22

1 Introduction

The N1 – Tekron’s simple, powerful and cost effective synchronization solution for Protection Relays and other Intelligent Electronic Devices (IEDs).

Utilizing state of the art technology and an easy to install magnetic mount antenna, this compact unit locks onto atomic clock references from the GPS satellite constellation and produces NTP/SNTP time codes with accuracy and precision.

The N1 clips onto a standard DIN rail. Its rugged design is suitable for noisy electrical environments, while built in electrical isolation enhances reliability.

It comes complete with the most common components required for installation, a magnetic mounting GPS antenna with attached antenna cable, downloadable configuration software, a 110-240 Vac plug pack and cable, and an Ethernet cable. The Windows™ software and Ethernet connectivity make customization and setup easy. Other options include the timing optimized antenna, antenna mounting bracket, and lightning protection kit.

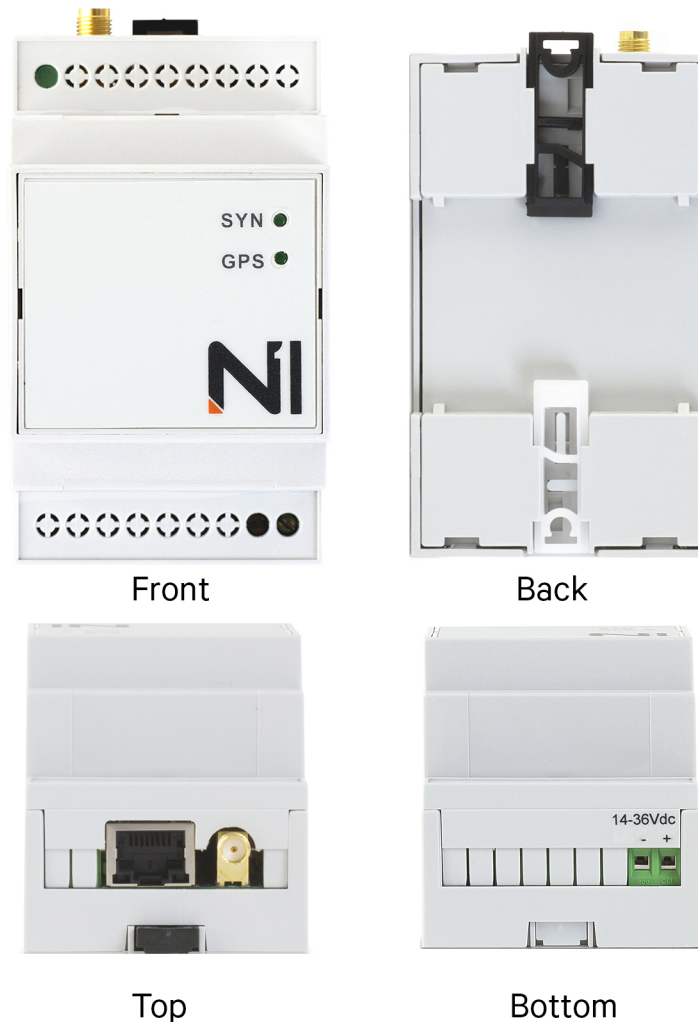


Figure 1 – N1 chassis layout

2 LED Indicators

The top of the N1 features two LED indicators. The GPS LED shows the status of the internal GPS receiver, while the SYN LED shows sync status of the unit. There is a third LED located next to the antenna input that indicates the Ethernet connection status.

Outputs are synchronized to UTC time only when the SYN LED is illuminated (on).

The table below provides information regarding the interpretation of the LEDs.

GPS LED	SYN LES	Description
•• •• •• •• •• •• •• •• 4 Flashes per second	OFF	Antenna fault; The antenna or antenna cable is either disconnected or faulty, or there is a short circuit somewhere.
•• •• •• •• 2 Flashes per Second	OFF	The antenna connection is good, N1 is searching the sky for satellites; but is not in sync to UTC time.
• • 1 Flash per Second	ON	N1 outputs are accurate to within 200 ns of UTC time, and therefore useable for sync purposes.

Refer to (O) for information regarding the interpretation of the LNK LED.

3 Inputs and Outputs

Antenna connector (SMA connector)

The “ant” antenna input provides an interface for an external active antenna via low-loss coaxial cable, 50 Ω impedance. 5 Vdc @ 50 mA max is supplied to power an active antenna. The total combined gain of the antenna system (antenna plus cable and connectors) should fall in the range of 10 to 35 dB, the optimum being 22 dB.

The N1 is normally supplied complete with magnetic mountable antenna with an attached lead-in cable, this combination provides an overall gain near the optimum of 22 dB. For lead-in lengths longer than 60 m, amplification and/or larger diameter, lower loss cable can be supplied to order.



Care should be taken to ensure that the connector is not cross-threaded when attaching the antenna lead-in cable. The connector should be tightened firmly by hand only. Do NOT over-tighten.

A Lightning Protection device may be inserted into the antenna lead. A suitable device complete with additional cable connectors, a connector crimping tool and mounting hardware is available as an option (see (O) for details). Use of a Lightning Protector does not degrade the performance of the antenna system.

Ethernet Port (RJ45 Connector)

N1 units are fitted with an RJ45 Ethernet interface. This allows the unit to be configured over a LAN (Local Area Network) switch or by direct connection using an Ethernet cross over cable. The N1 includes NTP/SNTP output via the Ethernet interface. The interface supports 100 Mbps connectivity.

To the left of the antenna SMA connector is a green LED which provides connection information on the Ethernet port status.

The table below provides information regarding the interpretation of the LEDs.

LNK LED	Description
OFF	Ethernet cable is not connected or a fault has been detected
.....	Ethernet cable is connected
---- Rapid Flashing	Ethernet connectivity – Packets are being detected

4 Installation

Identification

Each N1 unit is shipped with an identification label on the side of the case. The label provides details of the clock, the power supply requirement, the serial number and firmware revision.



Check the identification label on the side of the unit to ensure that the correct model has been supplied before proceeding to install.

In the box

Each N1 standard kit ships with the following:

- N1 Time Code Generator
- GPS Magnetic Mount Antenna with attached 5m antenna cable and SMA connector
- 1 x 2m CAT5e Ethernet cable (Crossover)
- 1 x 2m CAT5e Ethernet cable (Straight through)
- Quick Start Guide

Mounting the N1

The clock is designed to be mounted to a standard DIN rail mount using the supplied clips on the base (Figure 2). The clips can also be used to screw mount the unit.

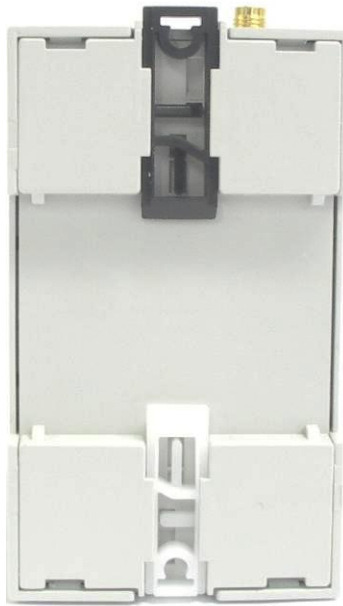


Figure 2 – Base of N1

GPS Antenna and Cable Installation

GPS Antenna

The N1 units' standard shipping configuration includes a magnetic mount antenna with an attached 5m antenna cable. Connect the antenna and cable to the clock by attaching it to the clock's SMA antenna port.

Available Accessories

- Timing optimized antenna
- Adjustable antenna mounting bracket
- Antenna cable
- In-line amplifier
- Lightning protection kit

Operation



The label on the side of N1 contains the voltage rating: **DO NOT** apply power outside of this rating.

Connect the antenna lead and the antenna (with a good view of the sky). Then connect the power source to the power input terminals on the base of the unit. The polarity of the power connection is unimportant.



The time required to achieve tracking and synchronization (given a good view of the sky) is typically within a minute. Reactivating a unit that previously has been synchronized thousands of kilometers away from the present position will take longer, but not more than 45 minutes.



Care should be taken to ensure that the connector is not cross-threaded when attaching the antenna lead-in cable. The connector should be tightened firmly by hand only. Do **NOT** over-tighten!

5 Configuration software

Introduction

Configuration software is available to download from www.tekron.com/downloads. This software is compatible with all versions of the Windows operating system from Windows XP through to Windows 7. The software uses the PC's Ethernet port to communicate with the clock. Each clock ships with a straight-wired Ethernet cable (for connection to a LAN switch) and a cross-over Ethernet cable (for direct connection to a PC).

Connection via LAN

Download and Install the Configuration software.

Apply power to N1 and connect the unit to a network switch located on the LAN using a CAT5e straight-wired Ethernet cable (2 m straight through cable supplied with clock). Using a PC connected to the LAN, run the configuration software program "TekronConfigTool-x.x.x.x".



Preset IP addresses are **NOT** required if PC and clock(s) are on the same IP sub-net.

Discovery Window

The window shown in (Figure 3) will appear. Clicking the 'Discover' button the configuration software will automatically locate and identify all Tekron "E" level clocks that are connected to the LAN on the same sub-net as the PC. The clocks serial number, IP address and status will be displayed in the discovery window. Select the type of unit you would like to configure and click "Open".

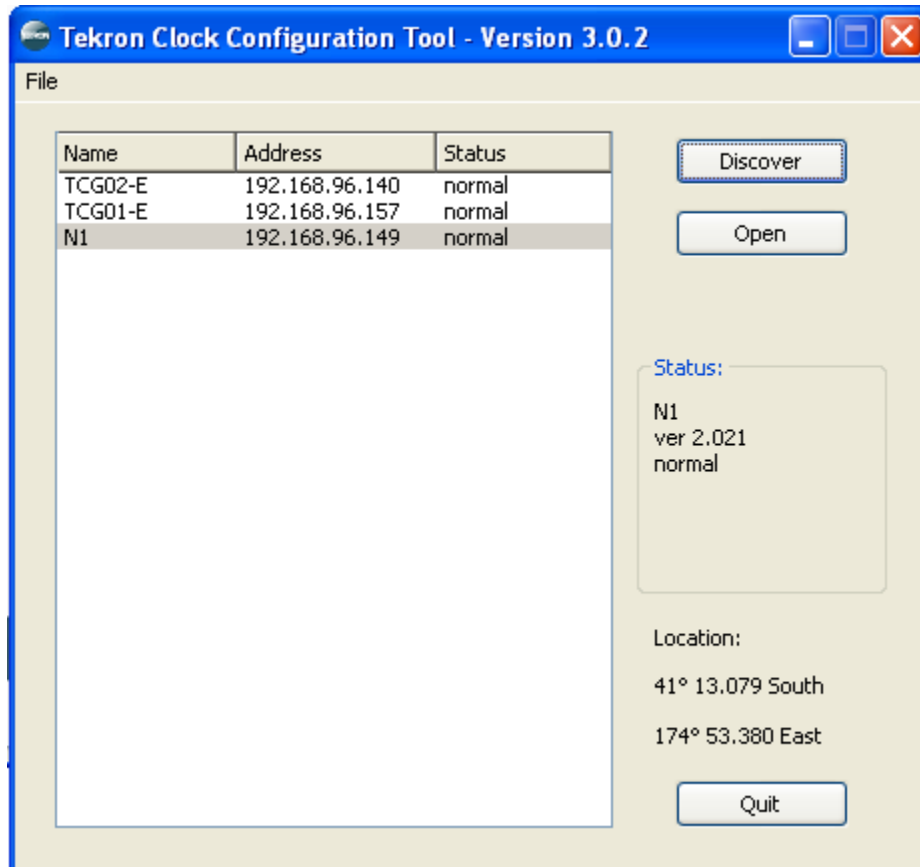



Figure 3 – Unit selection

 If no units are found on the network and you are confident that the N1 is connected properly, check the Windows firewall settings on your PC to ensure that the program is not being blocked.

Add Clock

Tekron clocks that have already been configured with an IP address also support remote configuration over one or more network routers (WAN). The user can communicate with the target clock by selecting "Add Clock" under the File menu and entering the clock's IP address in the field provided. The "Add Clock" feature can also be accessed by right clicking on the clock list. The availability of the remote configuration feature over a WAN is dependent on the WAN configuration. Please refer to your WAN support personnel for further information.

Open Saved Configuration

General clock configuration data that was saved on your PC as a ".tcf" file" (reference the save file chapter) can be previewed by selecting the "Open Saved Config" from the File menu.

Save & Open Clock Lists

The units that are being displayed inside the discovery window can be saved to a text file by selecting the “Save Clock List” from the File menu. These units can then be loaded back into the discovery window by selecting “Load Clock List” from the File menu. Note that the default file (“clock_ip.txt”) if saved in the same directory as the configuration tool will be loaded into the discovery window automatically once the executable is run again. Please ensure that the files are named accordingly when saving.

After successful connection, the configuration tool opens with the “Time” tab active (Figure 4).

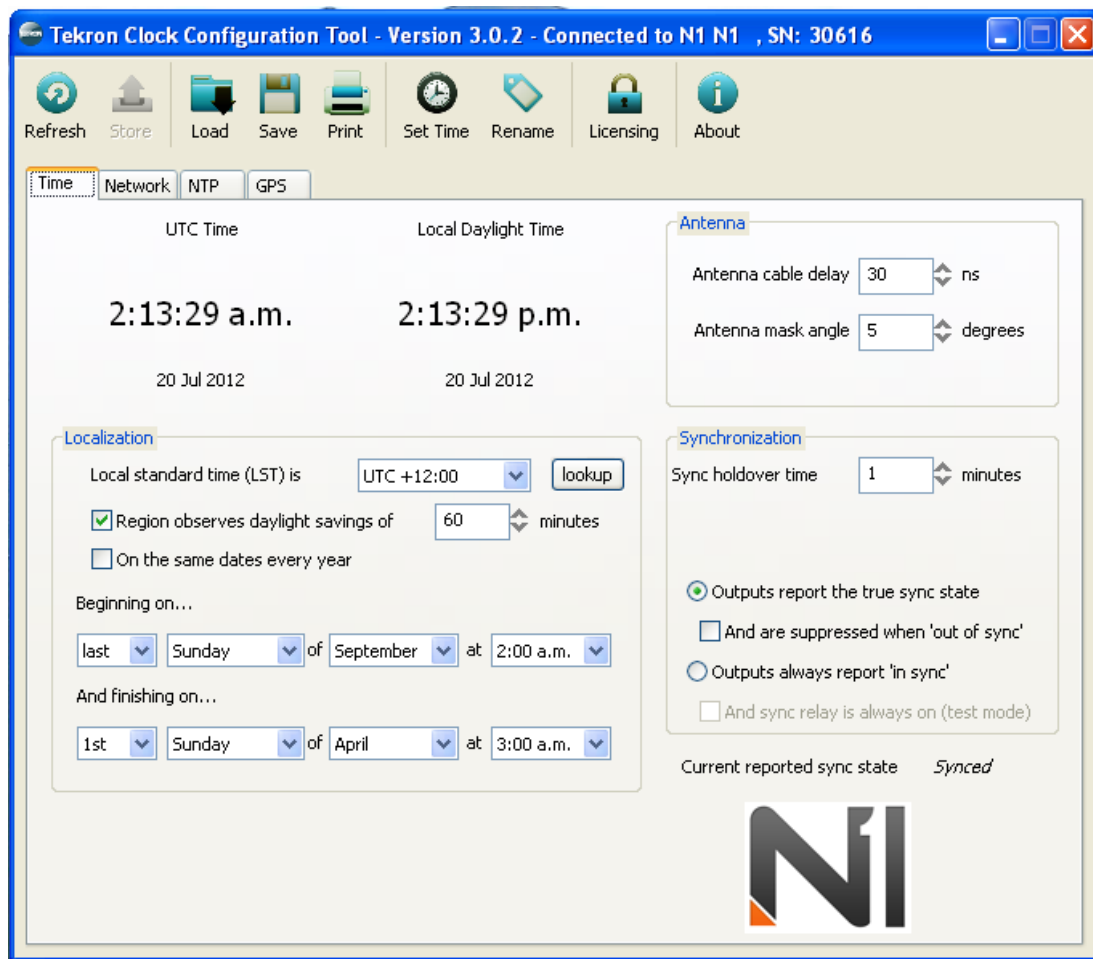


Figure 4 – Time configuration tab

Direct connection method

Download and Install the Configuration software from www.tekron.com/downloads

Apply power to N1, connect the unit via an Ethernet crossover cable (supplied) to a PC and run the configuration software program “TekronConfigTool-x.x.x.x”. As in the case of connection via a LAN, a window will appear showing the serial number of the N1 unit connected. Select the serial no of the unit and click “open” to see the “Time” tab as per (Figure 4).



If the N1 unit is not found and you are confident that the units are connected properly, check the Windows firewall settings on your PC to ensure that the program is not being blocked.

Firmware Upgrade

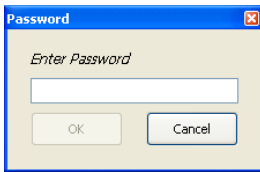
For instructions on how to upgrade the firmware of your clock, please refer to the upgrade procedures as detailed on our website (www.tekron.com/downloads).

Toolbar

Refresh and Store



Changes made in the configuration tool can be applied to the N1 using the “Store” button. Note that the “Store” button can only be selected when the configuration displayed does not match what is actually stored in the clock. After storing the configuration changes, the N1 may reset, registering a loss of sync for a brief period.



If password protection is enabled on the clock, an authentication window will appear when the “Store” button is pressed. Enter your password and click “OK” to proceed. If the correct password has been entered and the write is successful, this window will disappear. Otherwise, it will indicate failure and prompt for a retry.

If password protection is disabled on the clock, the configuration tool will immediately attempt to write its changes to the device. The Write window that appears will prompt for a retry on failure, and close on success.

The “Refresh” button can be used to undo any changes that have been made to the configuration options on screen that have not yet been stored using the “Store” button.

Load, Save and Print



General clock configuration data can be saved on your PC as a “.tcf” file using the “Save” button, and loaded using the “Load” button. Note that configuration options are not applied to the N1 until the “Store” button is pressed. The “Print” button prints a text document listing all currently stored configuration data.

Set Time



When the true time is unknown and the antenna is disconnected, the time can be arbitrarily set using the “Set Time” button. This function allows the N1 to be used as a signal source for testing the ability of externally attached equipment to correctly process received time codes through unusual time transitions such as the 28/29 February rollover during leap years, or daylight savings transitions.

The N1 would normally be configured with **“Outputs report “in sync” always”** and **“And sync relay is always on”** settings activated when arbitrarily setting the time.

Rename



The N1 clocks can be configured using the “Rename” button with a name up to 16 alpha numeric characters long to differentiate each unit from others on the same network.

Licensing



The “Licensing” button opens a window in which new license keys can be entered to enable additional functionality. N1 has the NTP/SNTP license installed upon purchase, there is no need to enter a license code to activate this feature. PTP is not a feature supported on the N1 GPS clock.

About



The “About” button displays copyright information, and firmware/software version numbers.

Time Tab

The “Time” tab (Figure 4) displays the current time and contains regional, antenna and synchronization settings.

Localization

Localization

Local standard time (LST) is UTC +12:00 lookup

☒ Region observes daylight savings of 60 minutes

☐ On the same dates every year

Beginning on...

last Sunday of September at 2:00 a.m.

And finishing on...

1st Sunday of April at 3:00 a.m.

Local Standard Time (LST)

The time offsets define the number of hours (and, in rare cases, minutes) that the local time differs from UTC time. A positive offset means that the local time is ahead of UTC.

Lookup...

The “Lookup...” button provides a convenient way to automatically set time offset and daylight savings parameters simply by selecting a geographical location. Note: this information is derived from Windows™ Date and Time settings, so should be verified as correct before use.

Region observes daylight savings

Selecting this option allows the N1 to be configured to make daylight savings changes automatically.

Further options are then made available including:

- DST (Daylight Savings Time) offset in reference to LST (Local Standard Time).
- Fixed date or fixed rule for calculating a date method.

Antenna

Antenna Cable Delay

Antenna

Antenna cable delay ns

Antenna mask angle degrees

All antenna systems introduce signal delay (depending on the cable length). To optimize the precision of the output signals enter a value in this field corresponding to 4ns per meter of antenna cable. For example, if the antenna cable has a length of 3 meters, enter “12”. If the antenna cable has a length of 30 meters, enter “120”.

Antenna Mask Angle

This is the elevation above the horizon below which satellites will not be used in time and position calculations. A good starting value is 5°, but this may need to be increased in areas with land based obstacles to prevent time quality loss due to multi-pathing effects. Increasing this value reduces the field of sky view so may reduce the number of satellites in view at any given time.



The mask angle will only take effect when the clock is in “Position Lock”

Synchronization

Sync Holdover Time

Synchronization

Sync holdover time minutes

P6a/6b Inputs

☒ Outputs report the true sync state

☐ And are suppressed when 'out of sync'

☐ Outputs always report 'in sync'

☐ And sync relay is always on (test mode)

This parameter is used to control the period after loss of satellite sync that will be tolerated before N1 will show the “loss of sync” status, and release the “sync” relay. Correct installation will make the “loss of sync” event rare, although in areas with poor GPS coverage there can be occasions where satellite tracking is momentarily lost. The “sync holdover” feature is used to mask these effects.

The accuracy of all outputs when there is a complete satellite “blackout” is maintained to the sub-microsecond level over short periods (a few minutes), and to within 200 µs for up to 40 minutes. A single satellite signal sufficiently recovers accuracy to within 1 µs.



The N1 has a default Sync Holdover Time of 60 seconds.

Network Tab

This tab contains network addresses and options such as SNMP and Syslog (Figure 5).

The screenshot shows the Tekron Clock Configuration Tool interface. The title bar reads "Tekron Clock Configuration Tool - Version 3.0.2 - Connected to N1 N1, SN: 30616". The interface has a menu bar with icons for Refresh, Store, Load, Save, Print, Set Time, Rename, Licensing, and About. Below the menu bar are tabs for Time, Network (selected), NTP, and GPS. The main content area is divided into two panels. The left panel, titled "Network Configuration", shows the MAC Address as 00:1D:7F:01:01:3C, a checked box for "Obtain an IP address automatically", and fields for IP Address (192.168.96.149), Netmask (255.255.255.0), and Gateway (192.168.96.254). The right panel, titled "SNMP and Syslog Reporting", shows a dropdown for "Report Low Satellites" set to "never", a text field for "SNMP community name" set to "public", a list box for "SNMP trap destinations" with "Add", "Del", and "Edit" buttons, a "Syslog Local File" field set to "0", and a list box for "Syslog destinations" with "Add", "Del", and "Edit" buttons. At the bottom right of the interface is the NI logo.

Figure 5 – Network configuration tab

Network configuration

MAC Address

Shows the MAC address assigned to the unit. This field cannot be modified.

IP Configuration

Selecting “Obtain an IP address automatically” will invoke DHCP operation. Networks that include a DHCP server offer automatic address allocation via **D**ynamic **H**ost **C**onfiguration **P**rotocol (DHCP). In such a network, the unit will automatically use DHCP to fetch a dynamic address if it does not already have a fixed address configured.

IP Address

If a DHCP server is unavailable, or if fixed addressing is preferred, an IP address can be entered manually

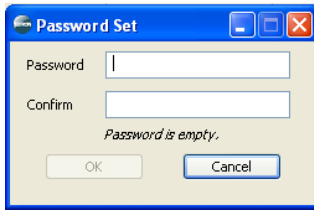
Netmask

Defaults to 255.255.255.0.

Gateway

Please refer to your network administrator for the correct setting in this field.

Security



Enabling Password Protection

Click on the “Set” button. A window prompt will appear to enter and confirm your new password. Note that the password will only be stored inside the unit once the “Store” button has been clicked.

New Password

When entering a new password it should contain at least 1 character. Underneath the entry field an indicator will display the ‘strength’ of the password chosen. If the device already contains a password, you will be prompted for the previous password when this change is stored.

Confirm Password

Retype the new password. A warning message will be displayed if the two password fields do not match.

Clear Password

The password protection can be removed by clicking on the “Clear” button. Underneath the button a text indicator will display “Password is not set” label. Note that the password will only be removed once the “Store” button has been clicked and a correct password has been entered.

Resetting Password

To reset your password you will need to contact Tekron and provide the MAC address and security code (located in the top right hand corner) numbers of your unit. You will then be issued a license key which will allow you to set a new password (5.6.5).

Block Incoming Broadcasts

Enabling “Block incoming broadcasts” will cause the clock to ignore all broadcast messages, including DHCP and configuration discovery messages.

Simple Network Management Protocol (SNMP) and Syslog reporting

SNMP and Syslog Reporting

Report Low Satellites:

SNMP community name:

SNMP trap destinations:

Add

Del

Edit

Syslog Local File:

Syslog destinations:

Add

Del

Edit

Report low satellites

If the number of GPS Satellites drops below this threshold, an SNMP message “low satellites” is generated. After the unit has been operating with four satellites or more, the clock is tuned such that it can maintain full specified accuracy even if satellite visibility drops to just one satellite. For this reason, the default value for this parameter is “1”. This prevents the transmission of numerous unnecessary “low satellites” messages.

SNMP community name

The default value is “public”. This may be changed to suit the specific SNMP architecture on the network if required. If SNMP is not implemented for other purposes on the network, then the “public” setting allows the use of a simple SNMP trap display utility running on a remote monitoring PC to display the status messages sent from the unit.

SNMP trap destination

This parameter allows for up to five destination IP addresses to be entered. Machines on any or all of these IP addresses can then receive the status messages from the unit. Even if there is no formal SNMP system running on the network, the messages can be received and displayed on the destination machines running “Windows NT” or higher using the freeware utility “SNMPTRAP.EXE”, which is on the CD supplied with the N1 kit.

SNMP walk

Please use Tekron’s MIB file which can be found on the provided software CD.

Syslog local file

Normally you would set to zero unless further categorizations of the Syslog messages are required.

Syslog destination

One or two IP addresses may be entered to define destination machines running system logs.

NTP

NTP

☒ Do not respond when unsynched

☒ Send broadcasts:

☒ Send multicasts:

Multicast IP Address:

☒ Use MD5 authentication

Key 1	HEX	31	32	33	34	35	36	37	38
Key 2	HEX	31	32	33	34	35	36	37	38
Key 3	HEX	31	32	33	34	35	36	37	38
Key 4	HEX	00	00	00	00	00	00	00	00
Key 5	HEX	00	00	00	00	00	00	00	00

NTP Enable

Select this box to enable the clock to function as a Network Time Protocol (NTP/SNTP) server.

Compatibility: Do not respond when unsynchronized

Selecting this option causes the time server not to respond to NTP time sync requests unless it is itself synced to UTC time.

Broadcasts: Send broadcasts

If this option is selected, the unit prompts for a poll interval. The unit will then broadcast time packets at the interval specified.

Send multicasts

If this option is selected, the unit prompts for a poll interval and Multicast Group IP. The unit will then broadcast time packets at the interval specified to the multicast group specified.

Security: Use MD5 authentication

The N1 supports fully encrypted requests. If this option is selected, the unit then prompts for five ASCII or Hex keys.



The length of the MD5 keys is limited to 8 characters; longer keys will be clipped.

GPS Tab

The information in the “GPS” tab helps with troubleshooting and optimizing an antenna installation.

Satellite Visibility

Visible satellites are shown on a polar-display. The rings mark the 'elevation' and the sectors mark 'azimuth'. The center of the display represents directly overhead and the elevation is 90° at this point. The edge of the display, elevation = 0°, represents the horizon. The 'azimuth' is a compass direction where 0° represents true north, 90° is east and 180° is south. Satellites being used are marked by a colored cross on the display, and a green bar on the Satellite Signal Strength Indicator, otherwise it is grey on both.

Satellite trails and a minimum elevation plot (the blue area) are also shown in the polar display. Over time this minimum elevation plot will show the viewable horizon. An example of a minimum elevation plot obtained from Wellington, New Zealand is shown in (Figure 6).



To ensure reliable performance, when operating N1 at extreme southern latitudes, position the antenna with a clear view of the northern sky. Similarly, when operating in extreme northern latitudes, the antenna must be able to “see” the southern sky.

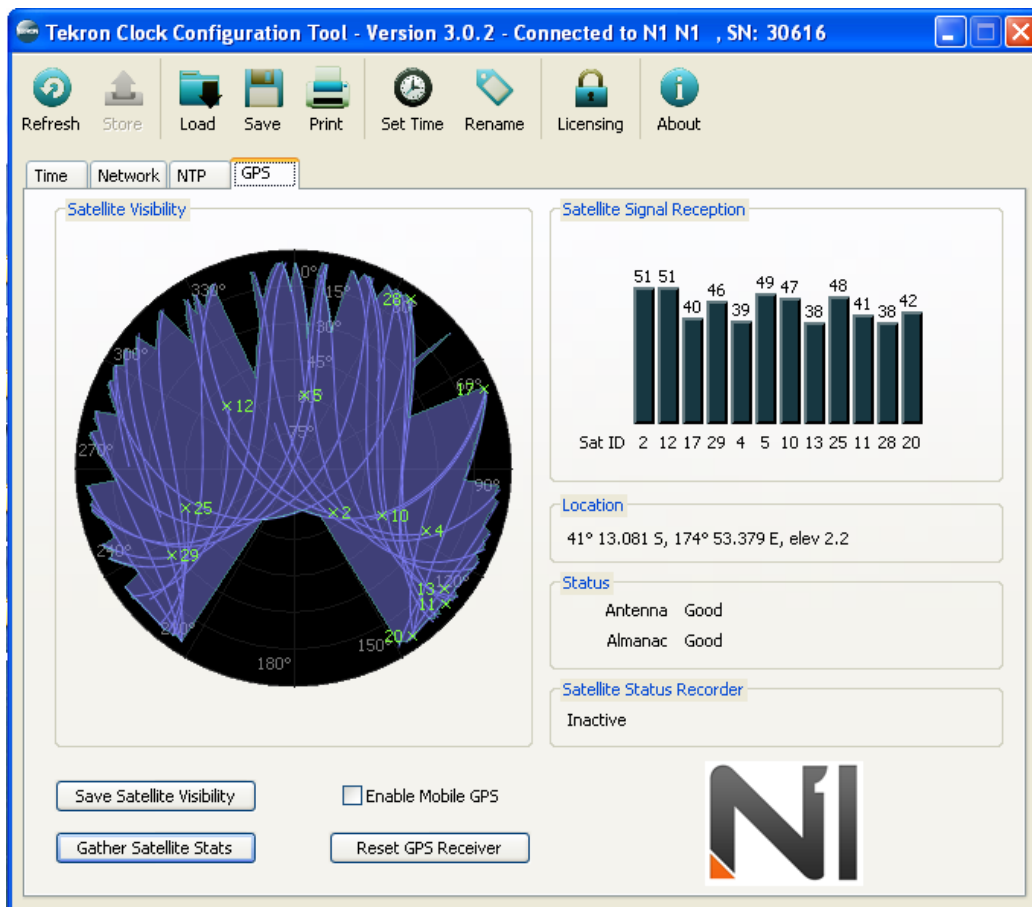


Figure 6 – GPS configuration tab showing trails and minimum elevations

Satellite Signal Reception

The satellite signal strength indicator gives real-time information regarding the signal reception from GPS satellites.

- Dark blue indicate satellites are being used for timing.
- Grey bars indicate poor reception.

Location

This shows the latitude, longitude and elevation of the installation.

Status

This shows the Antenna and Almanac status.

Reset GPS Receiver

This forces the GPS receiver to hard reset. This also wipes the GPS receiver's memory, by doing this the receiver loses track of all previously tracked satellites (resets the Almanac).

Save Satellite Visibility

By clicking on this button the current satellite visibility image can be saved as a .BMP image inside a specified location.

Gather Satellite Stats

This feature enables satellite statistics to be gathered for the purpose of commissioning and evaluating the antenna position and GPS reception. The "Gather Satellite Stats" button opens a separate window giving recording options for the information.

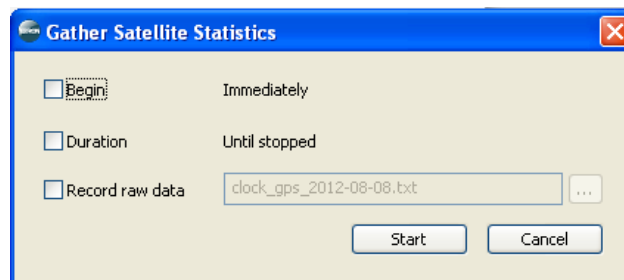


Figure 7 – Gather Statistics

Begin

This feature gives the user the option to commence recording the satellite statistics at a defined time and date. If not selected the recording will commence immediately.

Duration

Select the length of time for satellite recording to last. If not selected the data recording will continue until the user selects the "Stop" button.

Record Raw Data

Selecting this option will enable you to save to a .txt file the raw satellite data. If you choose not to use this option, the raw data will be deleted once the configuration tool is closed.

View Gathered Stats

Clicking on this button will open a window which displays a summary of the recorded satellite information. This information can either be disregarded or printed as a 'Commissioning Report' along with clock information (Including clock type, firmware revision(s) etc) and configuration settings of the clock.

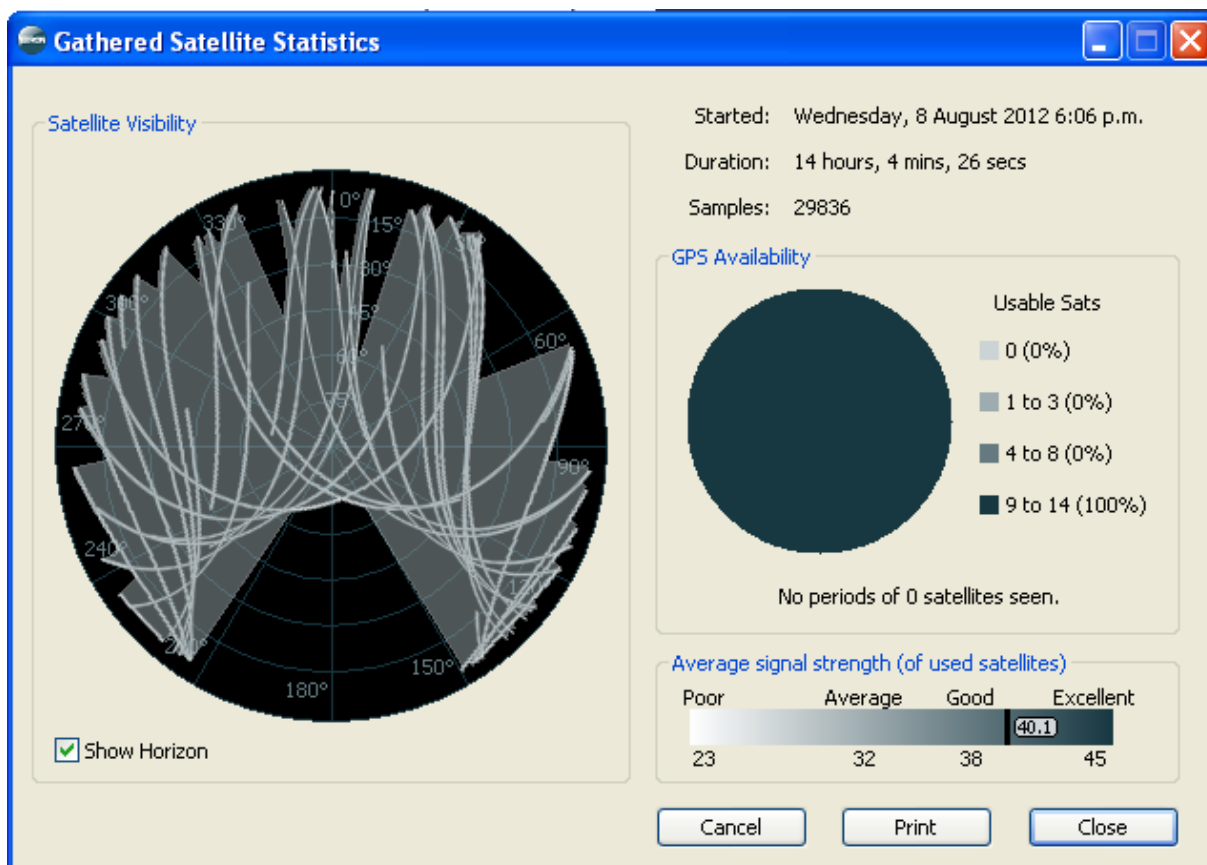


Figure 8 – Gathering satellite statistics

Inside the “Gathered Satellite Statistics” window select the ‘Cancel’ button to close the window and abandon all current saved data. The ‘Close’ button will close the current window without affecting the saved results and the ‘Print’ button will print the commissioning report to a user selectable printer.

6 Factory Hardware Options

Power Supply Options

The N1 is available in the following power supply configuration.

Designator	DC Input Range
L (Low) *(110 – 240 Vac Plug Pack supplied with every clock)	14-36 Vdc

Lightning Protection Option

A lightning Protection kit may be fitted into the antenna lead-in cable. The kit contains a protection device, two coaxial cable connectors, a connector crimp tool, and mounting hardware.

General

The first line of protection against the effects of lightning-induced surge events involves positioning the antenna in a “lightning-protected zone” as far as is possible. In practice, this means ensuring that there is at least one other earth-bonded structure located in the same rooftop area (e.g. another antenna, or a lightning rod) that reaches significantly higher than the top of the GPS antenna. The GPS Antenna should then be mounted so that it lies within a 45-degree angle from the top of the other earth-bonded structure. The GPS antenna mount itself should also be securely bonded directly to the building protection earth – and *not* connected via any of the other earthed structures.

However, this will *not* provide immunity from damage caused by a direct lightning strike, or voltages induced in the antenna lead-in cable due to side flashes or induction.

 **All Tekron antenna installations should follow the guidelines above – regardless of whether a separate lightning protection device is to be fitted to the antenna lead-in cable.**

In areas with a low incidence of electrical storms, careful attention to antenna positioning and earth connections may be all the protection deemed necessary. The antenna lightning protection kit (LP kit) affords additional security through the use of an impulse suppressor installed in the antenna lead-in coax cable. In the event of a lightning-derived high voltage surge occurring on the coaxial cable, the impulse suppressor activates, short-circuiting the cable directly to the protection ground.

 **While the LP kit provides a high degree of protection, there is no guarantee of protection against ALL surge related events, including a direct lightning strike to the antenna. Careful antenna positioning is strongly advised!**

The performance of the antenna system under normal (non-surge) conditions is unaffected by the introduction of a correctly installed EMP Protector.

7 Appendix

N1 Specifications

Physical Specifications		
Performance Property		Metric
Dimensions	Width	55 mm
	Depth	60 mm
	Height	90 mm
Weight		150 g
GPS Receiver		
L1 (1575.42 MHz) Frequency, C/A Code, 14 Channel, parallel-tracking receiver		
Performance Property		Metric
Position Accuracy	Horizontal	<9 m (90%)
	Altitude	<18 m (90%)
Timing Accuracy		<60 ns to UTC
Acquisition	Reacquisition	<2 s (90%)
	Hot Start	<3 s (90%)
	Warm Start	<35 s (90%)
	Cold Start	<38 s (90%)
Sensitivity	Acquisition	-146 dBm
	Tracking	-160 dBm
Voltage		2.7 ~ 3.6 Vdc
Environmental Specifications		
Performance Property		°C
Operating Temperature Range		-10 ~ +65°C
Electrical Specifications		
Performance Property		Metric
Power Supply	Low Voltage	14 ~ 36 Vdc
Power drain		4 W max

8 Warranty Statement

Tekron International Ltd (Tekron) warrants for a period of TWO years from the date of shipment that each Product supplied shall be free of defects in material and workmanship. During this period, if the customer experiences difficulty with a product and is unable to resolve the problem by phone with Tekron Technical Support, a Return Material Authorization (RMA) will be issued. Following receipt of an RMA number, the customer is responsible for returning the product to Tekron, freight prepaid. Tekron, upon verification of warranty will, at its option, repair or replace the product in question and return it to the customer, freight prepaid. No services are handled at the customer's site under this warranty.



Tekron shall have no obligation to make repairs, or to cause replacement required through normal wear and tear or necessitated in whole or in part by catastrophe, fault or negligence of the user, improper or unauthorized use of the Product, or use of the Product in such a manner for which it was not designed, or by causes external to the Product, such as, but not limited to, power or failure of building services.

A product will not be warranted if it is an accessory not carrying the Tekron brand name. In this case, warranties are limited to the warranty provided by the original manufacturer of the accessory. Examples of such products and accessories are antennas, cables, etc.

There are no understandings, agreements, representations or warranties, express or implied, including warranties of merchantability or fitness for a particular purpose, other than those specifically set out above or by any existing contract between the parties. Any such contract states the entire obligation of Tekron. The contents of this document shall not become part of or modify any prior or existing agreement, commitment or relationship.

The information, recommendation, description and safety notations in this or other documents supplied by Tekron are based on general industry experience and judgment with respect to such hardware and software. THIS INFORMATION SHOULD NOT BE CONSIDERED TO BE ALL INCLUSIVE OR COVERING ALL CONTINGENCIES. NO OTHER WARRANTIES, EXPRESS OR IMPLIED, INCLUDING WARRANTIES OF FITNESS FOR A PARTICULAR PURPOSE OR MERCHANTABILITY, OR WARRANTIES ARISING FROM COURSE OF DEALING OR USAGE OF TRADE, ARE MADE REGARDING THE INFORMATION, RECOMMENDATIONS, DESCRIPTIONS AND SAFETY NOTATIONS CONTAINED HEREBYAND IN HARDWARE AND SOFTWARE SPECIFICATION DOCUMENTATION, OR INSTRUCTIONS SUPPLIED BY Tekron. In no event will Tekron be responsible to the user in contract, in tort (including negligence), strict liability or otherwise for any special, indirect, incidental or consequential damage or loss of equipment, plant or power system, cost of capital, loss of profits or revenues, cost of replacement power, additional expenses in the use of existing software, hardware, equipment or facilities, or claims against the user by its employees or customers resulting from the use of the information, recommendations, descriptions and safety notations supplied by Tekron. Tekron liability is limited (at its election) to (1) refund of buyer's purchase price for such affected products (without interest); (2) repair of such products, or (3) replacement of such products, provided however, that the buyer follows the procedures set forth herein.

Warranty claims must be received by Tekron within the applicable warranty period. A replaced product, or part thereof, shall become the property of Tekron and shall be returned to Tekron at the Purchaser's expense.

A return material authorization number issued by Tekron must accompany all return material.

WARNING

This product has been designed to comply with the limits for a Class A digital device pursuant to Part 15 of FCC rules. These limits are designed to provide reasonable protection against such interference when operating in a commercial environment.

Notes

The information in this manual may change without notice. The manufacturer assumes no responsibility for any errors that may appear in this manual.

Ethernet is a trademark of XEROX Corporation. Windows, Windows 95, Windows 98, Windows 2000, Windows NT, Windows XP, Windows Vista, and Windows 7 are trademarks of Microsoft™ Corp.

Copyright ©2014 Tekron International Ltd. All rights reserved. No part of the contents of this document may be transmitted or reproduced in any form or by any means without the written permission of Tekron International Ltd. Published in New Zealand.