



NTS 03-G+

USER MANUAL



Contents

1. INTRODUCTION.....	4
2. FRONT PANEL.....	5
LCD Display.....	5
Contrast Adjustment Mode.....	8
LED Indicators.....	8
Admin (USB) Port	9
3. BACK PANEL	10
P1A/B: Power Input.....	10
Earth Studs (M4 Nut).....	11
4. BACK PANEL – INPUTS AND OUTPUTS.....	12
Ant: Antenna Connector (SMA Connector).....	12
Antenna Cable Considerations	12
P2: IRIG-B Input (3-pin 3.81 mm Connector).....	13
P3: IRIG-B Output (3-pin 3.81 mm Connector).....	13
P4: Sync Alarm Relay (4-pin 3.81 mm Connector)	13
P5: Power Alarm Relay (4-pin 3.81 mm Connector)	13
ADMIN/ETH 1: Ethernet Administration Port (RJ45).....	14
ETH 2 – 6: Ethernet Communication Ports (RJ45/ST Fiber Connector).....	14
P6 – P9: Programable Output (50 OHM BNC Connector/ ST Fiber connector).....	15
P10 & P11: Programable Output (50 OHM BNC Connector).....	15
5. INSTALLATION	17
Identification.....	17
Mounting the NTS 03-G+	17
Operation.....	17
6. Factory Reset.....	18
The NTS 03-G+ features the ability to reset to default factory settings in the event that the administrator password is forgotten, or if the clock is rendered unreachable on the network due to incorrect settings, provided that physical access to the unit is available.....	18
7. FACTORY HARDWARE OPTIONS.....	19
Power Supply Options.....	19
Expansion Board Options	19
Slave Only Option (Fiber input).....	19
OCXO Option.....	19
Rubidium Option.....	19

8.	APPENDIX.....	20
	NTS 03-G+ Specifications.....	20
	Physical Specifications.....	20
	GNSS Receiver	20
	Input & Output Connector Specifications.....	20
	Input & Output Specifications.....	21
	DC-IRIG/AM-IRIG Availability.....	21
	IRIG-B Translation Chart.....	22
	Environmental Specifications	22
	Electrical Specifications	23
9.	WARRANTY	24

1. INTRODUCTION

The NTS 03-G+ provides a precision time reference with multiple independently-addressed Ethernet Ports and optional high drive IRIG-B outputs. A single NTS 03-G+ can support three Ethernet ports and two alarm ports on the base unit with two different expansions supporting:

- Three additional Ethernet ports and two alarm ports or
- One additional Ethernet port, two alarm ports, four DC IRIG-B (copper or fiber) and two DC/AM IRIG-B ports.

All NTS 03-G+ Ethernet ports function as Stratum 1 (NTP) and Grandmaster (PTP) sources. Each unit has a built-in GPS/GLONASS-synchronized master clock which provides the source reference time used by all of the Ethernet ports. In addition, either a high precision OCXO or Rubidium oscillator can increase holdover from hours to days.

With true dual/redundant power supply options (not just dual power input connectors), the NTS 03-G+ product is ideally suited for use in industrial environments and can provide NTP & PTP server functions to multiple independent Ethernet networks.

All NTS 03-G+ units feature a front panel display (See Figure 1) giving visual feedback about the time data being generated on the outputs. LED indicators provide “at a glance” status information.



Figure 1 – NTS 03-G+ front panel

The NTS 03-G+ features an administrative 10/100 Mb Ethernet port through which the unit’s inputs and outputs can be configured. When the IEEE 1588 v2 (PTP) option is enabled, the unit can operate as a PTP Grand Master, an ordinary PTP clock, or a Slave-Only Clock.

It comes complete with Ethernet cables to allow for customization and easy setup from the Windows™ Configuration software which is available to download from www.tekron.com. Optional accessories include antenna, low loss antenna cable, antenna pipe mounting components and lightning protection kit.

2. FRONT PANEL



Figure 2 – NTS 03-G+ front panel

NTS 03-G+ features two LED indicators on the front panel (See Figure 2), together with a 2-line by 16-character backlit LCD display.

SYNC LED: This LED shows the status of the current sync source (as per LED Indicators Table 2)

ALM LED: This LED shows the alarm status of the NTS 03-G+ (as per LED Indicators Table 3)

ADMIN (USB) Port: This port may be used to configure the clock using the Tekron Configuration Tool available for download on the Tekron website www.tekron.com.

LCD Display

On initial power-up, the LCD display shows a copyright message, along with the serial number and revision level of the unit (See Figure 3a). Approximately 10 seconds after power-up, if the NTS 03-G+ is operating in its default mode (GNSS-synchronized), then the display changes automatically to indicate that it is waiting for satellites (See Figure 3b). Once one or more satellites have been discovered, it transitions to the operating default display (See Figure 3c). Figure 3d and Figure 3e show alternative time displays that the user can access by pushing the button on the front panel between the LED indicators. Successive button-pushes can be used to cycle through all the display screens in turn. Examples of the display screens are shown below.

```
NTS 03-G + Ver X.XX
(C) 2014      Sn18748
```

3a – Start Up (Clock ID)

```
UTC+1200  17MAR10
076      11:16:53  87A
```

3c – Operating Default

```
UTC:  MON 16 MAR10
075      23:16:53  87A
```

3e – UTC Time

```
WAITING FOR SYNC
GPS RX STAT: 00A
```

3b – Waiting for Satellites

```
LST:  TUE 17 MAR10
076      11:16:53  87A
```

3d – Local Time

```
*** ANT ***
075      23:16:53  87A
```

3f – Alarm



3g – IP Address

Figure 3 – LCD display screens (examples)

UTC” denotes Universal Time Coordinated (approximately equivalent to GMT). The top line of screen in [Figure 3c](#) shows the clock’s current local time offset from UTC (hours & minutes), together with local date. The local time day-of-year and time-of-day are on the bottom line.

[Figure 3c](#) shows that the clock is operating with a local time offset of 12 hours ahead of UTC. The local date is 17th March 2010, and the local time is 11:16:53 in the morning.

[Figure 3d](#) shows the same time and date, but also indicates that the time displayed is Local Standard Time, and that the day is Tuesday. “LST” denotes Local Standard Time. If daylight savings time is active, the “LST” in screen [3](#) changes to “LDT”, denoting Local Daylight Time.

[Figure 3e](#) shows the UTC time and date which is 23:16:53 (11:16:53pm) on the evening of Monday 16th March 2010.

[Figure 3f](#) shows that an antenna alarm is active in the clock. All active alarms will be displayed in the same way.

[Figure 3g](#) shows the basic Ethernet network settings for Admin/ ETH 1 port. In this example, it shows the port has been configured with a fixed IP address of 192.168.96.10.

All screens displayed after the initial start-up screen show a three-character status field at the bottom right-hand side of the display. When the NTS 03-G+ is operating in its default mode (GNSS-synchronized), this field provides further details about the GNSS function as shown in [Figure 4](#)[Figure 5](#) and [table 1a](#) below.

When the NTS 03-G+ is sync’d from a source other than GNSS, this field directly indicates the sync source.). [Table 1b](#) shows the alternate sync sources supported by the NTS 03-G+.

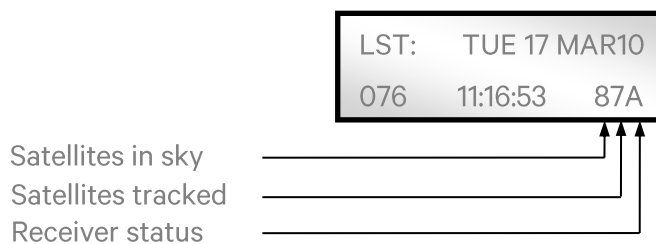


Figure 4 – Satellite tracking status

Character	Values	Description
Satellites in the sky	"0 - 9": 0 - 9 "A - E": 10-14 "F": >14	This character represents the total number of satellites currently present in the sky according to the GNSS almanac. "0" in this position means that NTS 03-G+ has lost its knowledge of the GNSS satellites' orbit geometries. This occurs if the unit has been in storage for an extended period, or if the GNSS receiver has been reset. It will typically take 20 minutes (worst case two hours) for the unit to gain sufficient GNSS synchronization for the NTS 03-G+ to recommence normal operation (Position hold).
Satellites tracked	"0 - 9": 0 - 9 "A - E": 10-14 "F": >14	This digit represents the number of satellites currently being used to compute the time solution. A "0" value means that no updated time solution is available, ("out of lock" condition). If this condition persists for the "Sync Hold" time the clock will indicate the "out of sync" condition.
Receiver status	"A"	NTS 03-G+ in Acquisition mode - attempting to get satellite fixes.
	"G"	"Poor satellite geometry": Satellites are positioned in almost a straight line so best accuracy cannot be obtained, but the unit will still sync to UTC.
	"2"	A 2D position is in use (no height). This may occur before Position Hold mode has been reached if only 3 satellites are tracked. Synchronization is not compromised.
	"3"	A 3D position is in use, which includes height. A site survey begins next, so this mode is rarely seen.
	"S"	Site Survey in progress. NTS 03-G+ is calculating an accurate position; once complete the mode will change to Position hold.
	"P"	"Position hold": Position is known accurately, and the GNSS is providing its most accurate time, typically better than 40 ns to UTC.

Table 1a – GNSS Status

Character	Values	Description
Alternate Sync Source	"PTP"	Clock is synchronized to a PTP Grandmaster
	"NTP"	Clock is synchronized to a NTP Server
	"SLC"	Clock is synchronized to an IRIG-B source on P2 input "Slave: Copper"
	"SLF"	Clock is synchronized to an IRIG-B source on the Fiber input "Slave: Fiber"
	"TST"	Clock is operating with manually set time. Please refer to configuration tool "Set Time" function for further details



If the clock is configured to synchronize to IRIG-B only (ignore GNSS) then “SL?” will be displayed in the status field if there is no IRIG-B signal input.

Contrast Adjustment Mode

The LCD contrast can be adjusted by entering the Contrast Adjustment Mode. This mode is entered by double pressing the button on the front panel.

Once in Contrast Adjustment Mode, pressing the button will lighten the contrast and decrease the contrast by one level. There are five different contrast levels and the LCD will cycle from the lightest to darkest if the button is pressed when on the lightest setting.

To exit the Contrast Adjustment Mode, simply double-press the button on the front panel again. The button will return to normal operations after this.

LED Indicators

The SYNC LED show the synchronization status of the clock to the active primary reference source. The primary reference source could be GNSS, PTP or IRIG-B.

State	Description
off	The NTS 03-G+ has no power
on	The NTS 03-G+ is synchronized to the source indicated by the LCD display
Slow Flash (1 per second)	The NTS 03-G+ is operating in the “holdover” state (Sync Hold timer running)
Fast Flash (5 per second)	The NTS 03-G+ is not synchronized. “Out of Sync” condition

LED Indicators Table 2 – SYNC LED

The ALM LED indicates the internal alarm status of the NTS 03-G. It has only two operating states:-

State	Description
off	The NTS 03-G+ is operating normally. i.e., there are no alarms
Fast Flash (5 per second)	Alarms are active. In this case, the actual alarm state is shown on the top line of the LCD display, replacing the normal date information (see example in Figure 3f above).

LED Indicators Table 3 – ALM LED

Alarm State	Definition
PwrA	Power A: Power is not present on the Power A (P1A) input
PwrB	Power B: Power is not present on the Power B (P1B) input
Hold	Holdover: The clock has lost sync, but the outputs are still active and indicating the appropriate loss of accuracy (oscillator drift).
Sync	Lost sync: The clocks has lost sync, the holdover time has expired and the outputs are not active
AntL	Antenna Low: An under-current state has been detected on the antenna input (antenna disconnected)
AntH	Antenna High: An over-current state has been detected on the antenna input (antenna short circuit)
Sats	Satellites Low: The number of satellites have fallen below the user configured threshold
IRIG	No IRIG-B Input: This alarm appears when IRIG-B input monitoring is enabled and there is no IRIG-B input signal.

Table 4 - Alarm Definitions

Admin (USB) Port



An Admin port (USB type B) is provided to support local configuration/administration. The USB port has the same configuration options as the Admin Ethernet port 1. The configuration software supplied with the NTS 03-G+ supports both USB and Ethernet configuration. A USB driver for the NTS 03-G+ can be downloaded from www.tekron.com. The NTS 03-G+ can be configured for USB only configuration to add an extra security layer.

3. BACK PANEL

Examples of NTS 03-G+ back panels are shown (See Figure 6 - Figure 9). Their appearance will vary when fiber Ethernet ports are fitted or the fiber slave option is selected.



Figure 6 – Rear panel of NTS 03-G+, 3 Port Option



Figure 7 – Rear panel of NTS 03-G+, 6 Port Option



Figure 8 – Rear panel of NTS 03-G+, 4 Port with BNC IRIG-B outputs



Figure 9 – Rear panel of NTS 03-G+, 4 Port with ST fiber outputs

P1A/B: Power Input



Power is applied to the unit via P1A and/or P1B (when fitted). The NTS 03-G+ can be ordered with high voltage AC input supplies or high or medium voltage DC supplies, or a combination. IEC-320 power connectors (shown to the left) are used for high voltage AC, and 5.08mm 2-pin connectors for low, medium or high voltage DC inputs. The polarity of DC power sources is not important as both the unit and case are isolated from the supply inputs. This enables the use of positive earth, negative earth or fully floating DC power sources. If either of the power supplies fails, the clock will remain operational provided that each power supply is powered from a different source.

The input voltage range is marked below the P1A/B connectors. Refer to section 6.1 for a list of orderable ranges.



Check the label on the unit base for power supply voltage ratings before powering the unit.

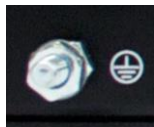
If IEC connectors are used, then a 2 A, 250V 5x20 mm glass or ceramic fuse should be fitted into the IEC connector.



If 2-pin connectors are used, then a 5 A fuse of appropriate voltage rating should be fitted into the non-earthed power supply line.

NOTE: The Fuse working voltage should be greater than the supply voltage.

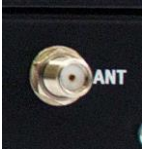
Earth Studs (M4 Nut)



Two M4 bolts (to chassis) are provided for earthing.

4. BACK PANEL – INPUTS AND OUTPUTS

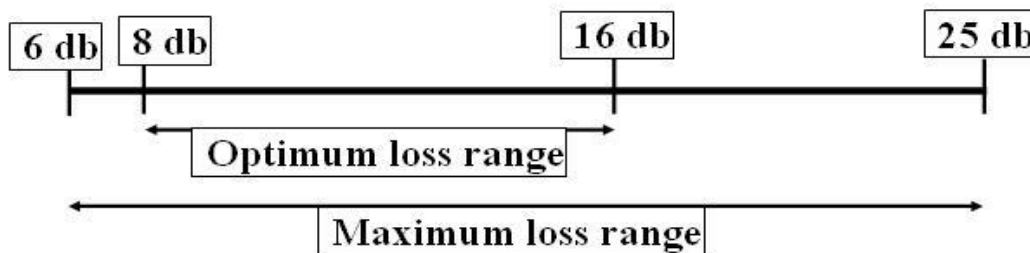
Ant: Antenna Connector (SMA Connector)



The “ant” antenna input provides an interface for an external active antenna to be installed. The antenna should be connected using a high quality, low-loss 50 Ω coaxial cable. The center conductor supplies 5 V DC (100 mA max) to power an active antenna. The GNSS receiver inside the NTS 03-G+ is a high-sensitivity unit that supports a wide range of antenna and lead-in cable combinations. The overall gain of the installed antenna system (antenna gain less the combined losses in cable, connectors and any amplifiers/splitters/protection devices included) must fall in the range of 0 dB to 40 dB, with 5 dB to 35 dB preferred.

Antenna Cable Considerations

Tekron offers a timing-optimized, narrow-band antenna (nominal gain 38 dB) for use with the NTS 03-G. When installed with a 30 m (100ft) lead-in cable (CNT-240) and a lightning protection device, the overall antenna system gain is around 23 dB, comfortably within the preferred range. For lead-in lengths longer than about 60 m (200ft), amplification and/or lower loss cable should be considered and can be supplied to order.



Note: The following figures are based on an average GNSS signal strength of -130dBm at sea level.

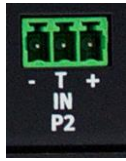
	32.8 dB/100 m (10dB/100ft). Plus 1 dB/connector
CNT-240	Approx. Optimum Length Range: 18 to 42 meters Approx. Maximum Length Range: 12 to 70 meters
	16.73 dB/100 m. Plus 1 dB/connector
CNT-400	Approx. Optimum Length Range: 34 to 79 meters Approx. Maximum Length Range: 23 to 129 meters

Note: The examples shown above are based on an average GNSS signal strength of -130 dBm at sea-level and assume that the antenna is positioned with a clear view of the sky, with a lightning protection device fitted in the lead-in cable. It is highly recommended that such a device be installed. A suitable lightning protection device complete with additional cable connectors, connector crimping tool, and mounting hardware is available as an optional kit. The lightning protection device inserts a further 2.5dB of loss into the antenna system (largely due to the loss in the additional connectors). This is equivalent to 8 m (25 ft) of CNT-240 cable, or 4 m (13 ft) of CNT-400 cable.



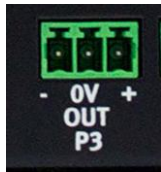
Care should be taken to ensure that the connector is not cross-threaded when attaching the antenna lead-in cable. The connector should be tightened firmly by hand or by a SMA torque wrench only. DO NOT OVER TIGHTEN.

P2: IRIG-B Input (3-pin 3.81 mm Connector)



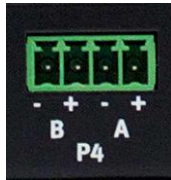
This port accepts an RS422 format un-modulated IRIG-B signal (B004 + IEEE C37.118.1 extensions). When configured appropriately, the NTS 03-G+ can synchronize to this source rather than the internal GNSS receiver, thus operating as a slaved device from another NTS 03-G+ Master source. Connection of the incoming RS422 line (120 Ω twisted pair recommended) is to pins “+” and “-” of the mating connector. An RS422 termination load is provided on pin “T”, and can be activated by linking pins “T” and “-” in the mating connector.

P3: IRIG-B Output (3-pin 3.81 mm Connector)



This port transmits an un-modulated IRIG-B or programmable pulse in RS422 format on pins “+” and “-” of the pluggable connector. It can be used as the Master Source signal to drive the P2 inputs of one or many Slave NTS 02/03-G+ units. The IRIG-B timing pulses (both leading and trailing edges) from this port are typically to within 100 ns of UTC. A low drive TTL-compatible output signal (single-ended, 0V referenced) can be obtained by connecting the signal cable to “+” and “0V” instead of to “+” and “-”.

P4: Sync Alarm Relay (4-pin 3.81 mm Connector)

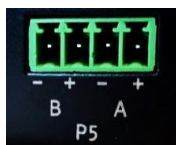


The port provides two alarm output channels. The alarm outputs are type “A” (normally-open) dry contact types. Note: the “Normally-Open” descriptor refers to the de-energized state of the relay. The NTS 03-G+ operates with the alarm relays energized during normal operation, and de-energized in the alarm state. It follows that, in the event of all power to the clock being lost, both of the alarm relays default to the “alarm” state (open contact). The “+” and “-” symbols are included for reference purposes only, as the alarm contacts are not polarized.

P4 A is a GNSS signal fail (antenna disconnected or antenna short (over-current)) alarm. Activation of the alarm (opening of the contact) is delayed by 10 seconds from the onset of the triggering condition.

P4 B is a synchronization fail alarm. This alarm is active (contact open) when the unit is initially powered on, and remains active until synchronization is achieved. The contact then closes, deactivating the alarm. If a loss of synchronization later occurs, then the NTS 03-G+ will operate in “Sync Hold” mode for a period defined by the “Sync Hold time”. At the expiry of the “Sync Hold time”, the alarm condition is again activated (contact open). Note that the “Sync Hold Time” is configurable up to a maximum of 970 days. The default setting is 2 minutes. A configurable option is also provided to disable the “Sync Hold Time”, allowing the unit to remain in “Sync Hold” mode indefinitely.

P5: Power Alarm Relay (4-pin 3.81 mm Connector)

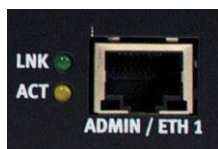


The plug-able connector provides two alarm output channels. Wiring size is up to 1.00 mm². The alarm outputs are type A (normally-open) dry contact types. Note: the “Normally-Open” descriptor refers to the de-energized state of the solid state relay. The convention used in the NTS 03-G+ is to have the alarm relays energized during normal operation, and de-energized in the alarm state.

In the case that all power to the clock is lost, all the alarm relays then default to the “alarm” state (open contact). The “+” and “-” symbols are included for reference purposes only, as the alarm contacts are not polarized.

P5 A is a power A fail alarm and P5 B is a Power B fail alarm. Alarm signaling is delayed by 10 seconds. That is, if power supply A fails, the Power A alarm contact will open 10 seconds¹ later.

ADMIN/ETH 1: Ethernet Administration Port (RJ45)



The Ethernet administration port (ETH1), features an RJ45 connector and supports 10/100 Mbps, Auto MDiX & Auto Negotiate. The LEDs convey Link (LNK) and Activity (ACT) status for the port. This port is used to configure the clock via the Tekron Configuration Tool, which is available for download from the Tekron website at www.tekron.com.

ETH 2 – 6: Ethernet Communication Ports (RJ45/ST Fiber Connector)



The Ethernet communication ports (ETH2 – 6), feature an RJ45 (10/100 Mbps, Auto MDiX & Auto Negotiate) or ST Fiber (100 Mbps) connectors (orderable option). The LEDs convey Link (LNK) and Activity (ACT) status for the port.

PRP: Parallel Redundancy Protocol

The NTS 03-G+ supports Parallel Redundancy Protocol (PRP) on ports ETH2 and ETH3, and when fitted with the 6 port option, ETH5 and ETH6. When enabled via the Tekron Configuration Tool, the ports ETH2 and ETH3 (or ETH5 and ETH6) are paired and operate as a single redundant interface. PRP support requires the purchase of a PRP License from Tekron.

PRP operation is compliant with IEC 62439-3 (2016), and supports PTP master or slave operation in IEEE 1588v2 Default profiles or C37.238 Power profile.

NOTE:

At no time will the NTS attempt to operate as an Ethernet Router, Switch or Hub.

¹ Note: The alarm contact will open 10 seconds after the NTS registers the failure. This can be longer than 10 seconds since the PSU has storage which allows the switch over between PSUs during faults.

P6 – P9: Programable Output (50 OHM BNC Connector/ ST Fiber connector)

These ports can be ordered as either two BNCs (copper, 5V, 150mA) or as two ST Fiber transmitters.



Figure 10 – BNC Connector



Figure 11 – ST Fiber Connector

These ports provide high drive, isolated TTL outputs. Each output can be uniquely programmed through the configuration tool. All ports are electrically isolated from the main clock. The outputs are paired P6 and P7 as one pair and P8 and P9 as the second pair. Each pair shares a common reference and power supply.

The user may configure these outputs in either inverted or non-inverted polarity with:

- A configurable number of pulses per second, minute, hour, day with adjustable pulse-width and offset
- IRIG-B
- DCF-77 time codes

P10 & P11: Programable Output (50 OHM BNC Connector)

Figure 12 – BNC Connector with switch

These two ports provide two high drive, isolated TTL outputs (paired) or two AM IRIG-B outputs. They share a common earth but have separate drivers with the AM IRIG-B transformer isolated from the rest of the system and the DC IRIG-B optically isolated. A switch located under the connector



allows the port to be selected as either AM or DC IRIG-B

Use either a coaxial cable or a shielded twisted pair (Using Tekron BNC to 2pin adaptor), to feed signal from P10/P11 to any connected IED. When using shielded twisted pair, connect the shield to ground.

The mark/space amplitude modulation ratio of the AM IRIG-B is 3:1, and peak to peak output level is 7.2 V_{pp} (max), 120 Ω impedance. The output is fully floating, and is transformer-isolated to 3.75 kV.



Most devices with AM IRIG-B time sync inputs have an input impedance of between 4 k Ω and 20 k Ω , and maximum allowable peak-to-peak level of 6 V. The P10/P11 output is designed to drive multiple devices in parallel, with a terminating resistor (typically 100-

180 Ω) fitted at the far end of the coax line feeding all of the attached loads. In this way P10/P11 can drive at least 20, and typically 30 or more devices without any external amplification. The terminating resistor is essential to ensure correct voltage levels.

5. INSTALLATION

Identification

Each NTS 03-G+ unit is shipped with identification labels on the base and side. The label provides details of the particular options fitted to the unit, the power supply requirement and the serial number.



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

Mounting the NTS 03-G+

The NTS 03-G+ is designed to be mounted in a 19" rack. The unit is mounted to the 19" rack by using the four corner front panel screws.

Operation



Check the label on the base for voltage requirements before switching on!

Connect the antenna lead and the antenna (with a good view of the sky). Then connect the power source to **P1A/B**.

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

As described in [LCD Display](#), the button on the front panel will toggle the display on the LCD and can also enter the [Contrast Adjustment Mode](#).

Once powered up, the operator can determine correct operation of the NTS 03-G+ by observing the LEDs. The ALM LED should be off and the SYNC LED should be on solid. If the LEDs are flashing, refer to [LED Indicators](#) for an explanation of the status.

To reset the unit, the power must be cycled. To cycle the power, it is recommended that the external power source switch that the NTS 03-G+ is connected to; is turned OFF, wait a full ten seconds, and then turned ON again. This will result in the NTS 03-G+ having to resynchronize with the GNSS satellites.

6. Factory Reset

The NTS 03-G+ features the ability to reset to default factory settings in the event that the administrator password is forgotten, or if the clock is rendered unreachable on the network due to incorrect settings, provided that physical access to the unit is available.

This feature is disabled by default in order to maximize security, and must be enabled via the Tekron Configuration Tool before it can be used. When disabled, there is no method to gain full access to the unit without the administrator password, and if the administrator password is forgotten, the unit must be returned to Tekron for reprogramming at the customer's expense.

This feature may be permanently disabled by Tekron on request.

For further details on this feature, see the configuration tool manual (www.tekron.com/downloads)

7. FACTORY HARDWARE OPTIONS

Power Supply Options

This table shows the two different power supply connection inputs that may be ordered with NTS 03-G. The NTS 03-G+ supports dual power supplies, which are independently configurable during manufacture.

Designator	Input Range
Medium Voltage (2 pin)	20 – 75 Vdc
High Voltage (IEC320 Inlet)	85 - 265 Vac
High Voltage (2 pin)	85 - 265 Vac; 90 - 300 Vdc

Expansion Board Options

This table shows two additional Expansion board configurations that may be ordered with NTS 03-G.

Expansion	Description
Expansion 1 – 3x Ethernet	Additional 3 Ethernet ports (RJ45 or Fiber)
Expansion 2 – 1x Ethernet, 4x DC IRIG-B, 2x AM/DC IRIG-B	Additional Ethernet port (RJ45 or Fiber) Additional 4 High Drive OR ST Fiber DC IRIG-B ports Additional 2 High Drive DC IRIG-B OR AM IRIG-B ports

Slave Only Option (Fiber input)

NTS 03-G+ can be ordered as a slave-only device in which case, the SMA Antenna Jack is removed, and an ST Fiber receiver port (multi-mode) is fitted instead. The unit will then synchronize to an incoming IRIG-B signal on either P2 (RS422 format signal required) or on the Fiber input

OCXO Option

NTS 03-G+ can be ordered with a GPS Locked precision OCXO. This can provide better than $\pm 10 \mu\text{s}$ holdover over 24 hours (7 days aging).

Rubidium Option

NTS 03-G+ can be ordered with a GPS Locked Rubidium oscillator. This can provide better than $\pm 10 \mu\text{s}$ holdover over 7 days (7 days aging).

8. APPENDIX

NTS 03-G+ Specifications

Physical Specifications

Performance Property		Metric
Dimensions	Width	430 mm
	Depth	270 mm
	Height	45 mm
	Weight	2.0 kg

GNSS Receiver

L1/GLONASS (1575.42 / 1598 MHz) Frequency, C/A Code, 32 Channel, parallel-tracking receiver

Performance Property		Metric
Position Accuracy	Horizontal	<9 m (90%)
	Altitude	<18 m (90%)
Timing Accuracy		15 ns (1 sigma) to UTC
Acquisition	Reacquisition	<2 s (90%)
	Hot Start	<18 s (90%)
	Warm Start	<45 s (90%)
	Cold Start	<50 s (90%)
Sensitivity	Acquisition	-155 dBm
	Tracking	-160 dBm

Input & Output Connector Specifications

Type	Electrical	Physical	Accuracy at the port
AM IRIG-B (modulated)	7.2 V _{p-p}	50 OHM BNC	≤2 μs of UTC
TTL (DC)	5 V	50 OHM BNC	≤100 ns of UTC
Fiber (λ=820 nm)	N/A	ST	≤100 ns of UTC

Input & Output Specifications

Performance Property	Metric	Isolation
Ethernet Port (Administrator)	RJ45, 10/100 BASE-T	1.5 kV Isolation
Ethernet Ports (2 – 6) - Copper	RJ45, 10/100 BASE-T	1.5 kV Isolation
- Fiber	ST Fiber, 100 BASE-FX	n/a
USB	Type B	n/a
P2, RS422/485	200 mV sensitivity	n/a
P3, RS422/485	3.3 V drive level	n/a
P4 Relay	300V, 100 mA (AC/DC)	3.5 kV Isolation
P5 Relay	300V, 100 mA (AC/DC)	3.5 kV Isolation
P6, P7 - Copper	TTL - 5V, 150mA	3 kV Isolation
- Fiber	ST Fiber	n/a
P8, P9 - Copper	TTL - 5V, 150mA	3 kV Isolation
- Fiber	ST Fiber	n/a
P10, P11 - Copper	TTL - 5V, 150mA	3 kV Isolation
- AM-IRIG	AM-IRIG	3 kV Isolation

DC-IRIG/AM-IRIG Availability

Port	Signal Support	Base Model	6 Port	4 Port + IRIG-B
P3	IRIG-B004	X	X	X
P6, P7	IRIG-B00 x ¹ , IRIG-B22x, DCF77, Pulses ²			X
P8, P9	IRIG-B00x, IRIG-B22x, DCF77, Pulses			X
P10, P11	IRIG-B00x, IRIG-B22x, DCF77, Pulses, AM IRIG-B12x			X

¹x = 0 to 7

²Programmable pulses ranging from pulse per second to pulse per day. Refer to configuration manual for full details.

IRIG-B Translation Chart

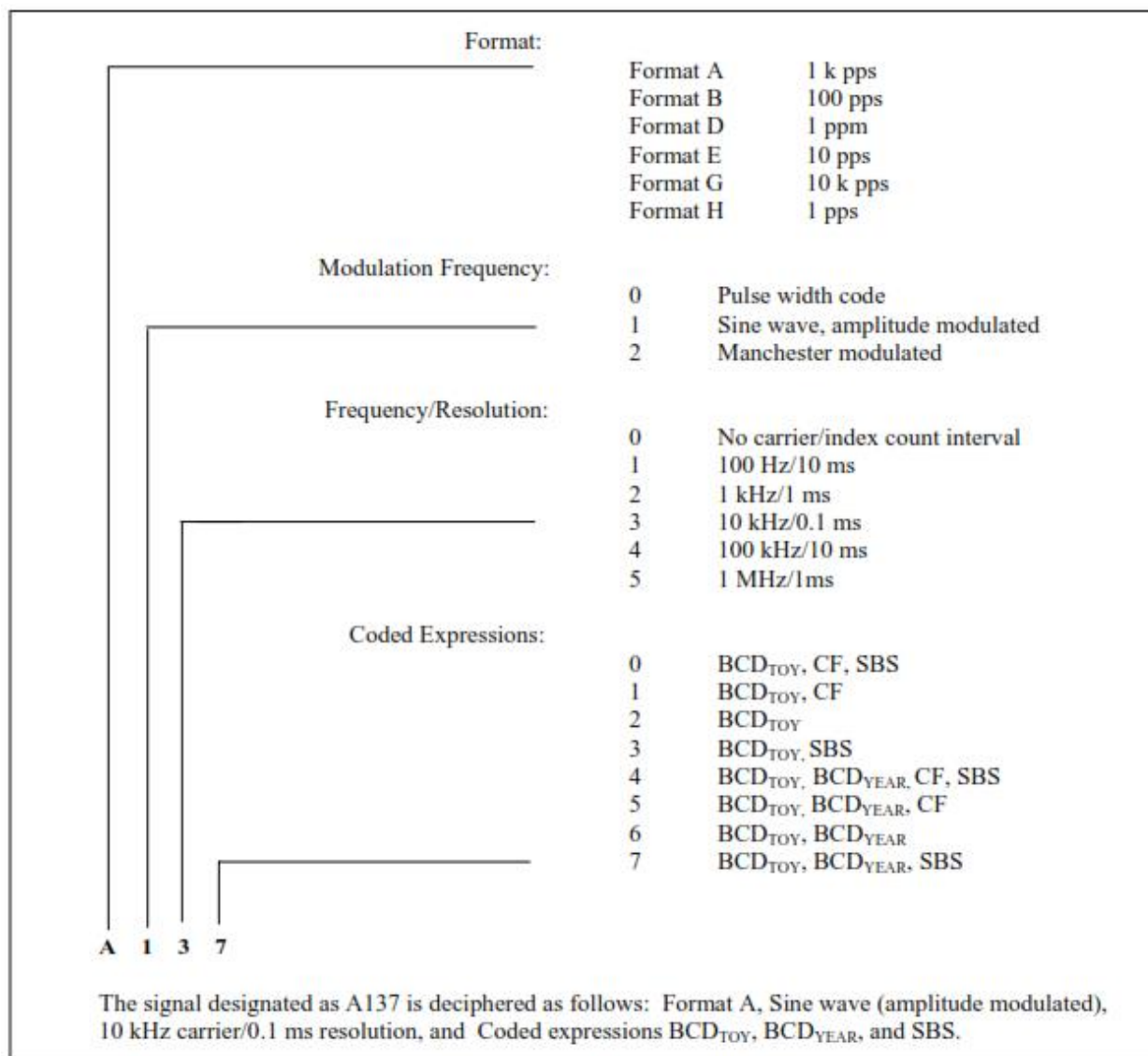


Figure 13 – Image sourced from IRIG Standard 200-04

Environmental Specifications

Performance Property	Metric
Operating Temperature Range	-10 to +65 °C -10 to +60 °C (Rubidium)
Operating Humidity	10 ~ 95% non-condensing

Electrical Specifications

Performance Property		Metric
Power Supply	Medium Voltage	20 ~ 75 Vdc
	High Voltage	90 ~ 300 Vdc 85 ~ 265 Vac
Power drain	Expansion 2 with Rubidium/OCXO 28W Expansion 1 or 3 with Rubidium/OCXO 22W NTS-03G+ without Rubidium/OCXO 12W	

9. WARRANTY

For terms and conditions of Tekron's Warranty see the Web Site

<http://tekron.com/about-tekron/warranty>



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

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