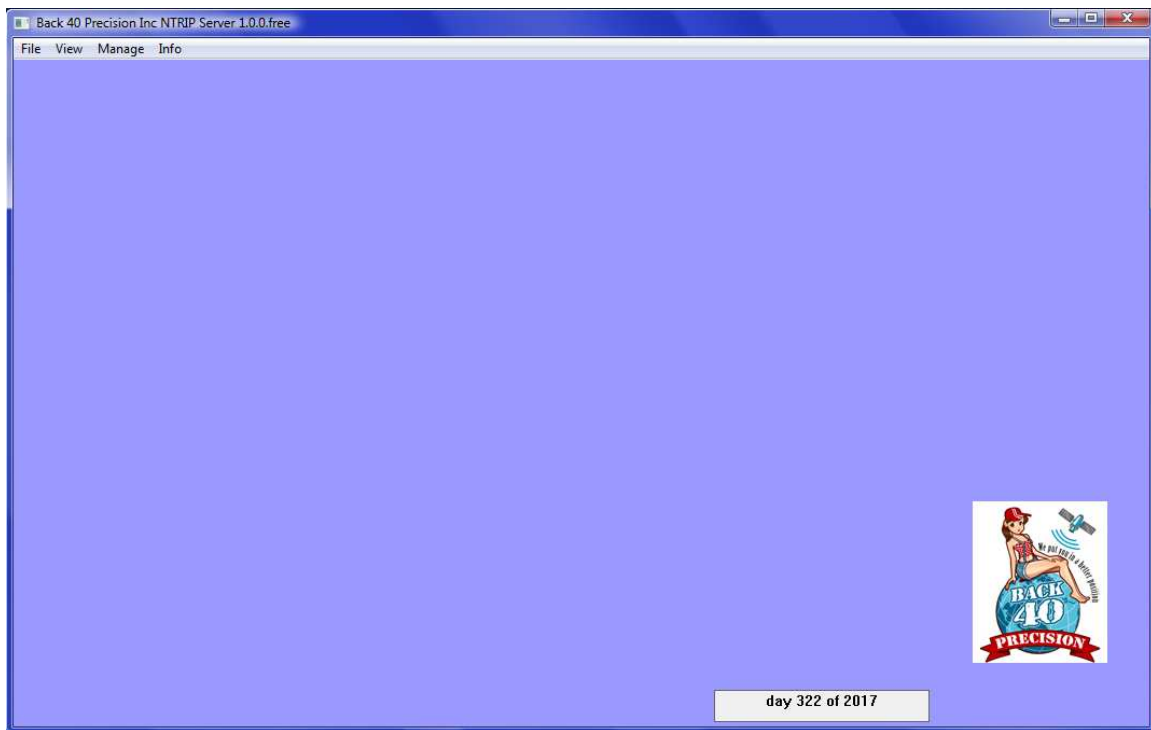




# Back 40 EZ-Net GNSS Caster Software User Guide

2017  
FREEWARE

Version 1.0.0.free



*"We Put You in a Better Position"* and *Girl on a Globe* is a registered trademark of Back 40 Precision Inc.

## Product Discription:

The software was designed to be as easy to use as was possible for the RTK network operator. The caster software can take GNSS satellite corrections in many message formats and perform conversion to other message formats. It is capable of significant ionospheric error calculations provided quality reference station data is provided to it. The software can deliver single baseline corrections to a user in the field or networked data corrections through the different *datastreams* available. The network operator can choose which streams will be made available to the user.

The caster can use **NTRIP** reference station logins or actively seek connection by simple TCP protocol to stations if they are setup that way.

Users log into the caster by the **NTRIP** protocol by **basic authentication**.

Back 40 EZ-Caster software is an NTRIP Caster program. This software is offered as FREEWARE. This software will not expire.

## Licence Agreement:

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EXCEPT AS PROVIDED IN THE INDEMNIFICATION SECTION OF THE CONTRACT, IN NO EVENT SHALL EITHER PARTY HAVE ANY OBLIGATION OR LIABILITY FOR ANY EXEMPLARY, PUNITIVE, INCIDENTAL, SPECIAL OR CONSEQUENTIAL DAMAGES (INCLUDING BUT NOT LIMITED TO LOSS OF PROFITS, USE OR GOODWILL), WHETHER BASED ON CONTRACT, TORT (INCLUDING NEGLIGENCE), STRICT LIABILITY, OR ANY OTHER THEORY OR FORM OF ACTION, EVEN IF SUCH PARTY HAS BEEN ADVISED OF THE POSSIBILITY THEREOF. THE TOTAL LIABILITY OF SUPPLIER (INCLUDING ITS SUBCONTRACTORS AND AGENTS), IF ANY, FOR DAMAGES RELATING TO ANY PRODUCTS SOLD UNDER THIS AGREEMENT SHALL BE AS SET FORTH IN THE LIMITATION OF LIABILITY SECTION OF THE CONTRACT.

## Minimum Computing Requirements:

Minimum Operating Systems: Microsoft Windows XP / Windows Server 2003

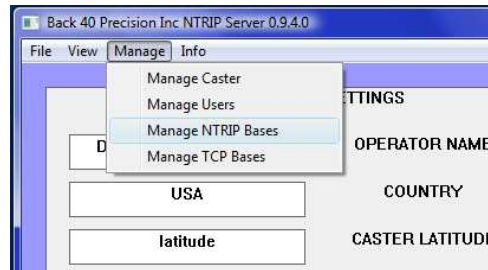
## Operation and Usage:

The caster is comprised of an executable file:  
A magnetic field coefficient file:  
Several text files which store settings and login data:

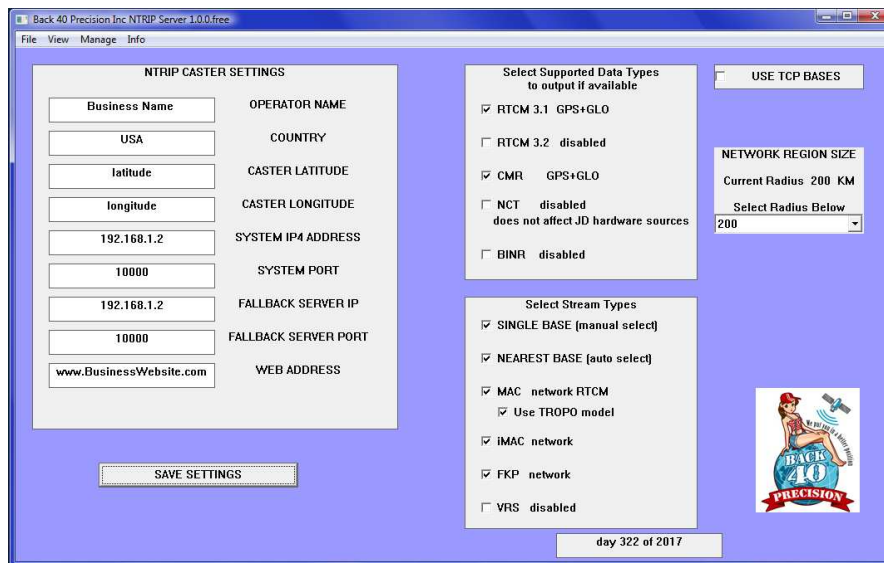
*NTRIPWincaster.exe, logo.bmp*  
*WMM.cof*  
*caster.txt, user.txt, base.txt, ect.*

## **Setting up the Caster**

On the top toolbar select “**Manage**” then click on “**Manage Caster**”.



The network operator should enter their specific information in the “**NTRIP Caster Settings**” box. You can then select “**Data Types**” and “**Stream Types**” to offer to your end users by selecting the checkbox next to the option. If you will be using TCP connected reference stations then check the “**Use TCP Bases**” checkbox. You may also select the radius, which the software will use when calculating networked data. The default is 200Km around the master base nearest the user. When all of your choices are set, press the “**SAVE SETTINGS**” button.



Information in the **NTRIP CASTER SETTINGS** box will appear in the *sourcetable* used by the client system to select a data type to request. Changing the *selected data types* and *selected stream types* will change what is listed in the *sourcetable*.

Select Supported Data Types to output if available

- RTCM 3.1 GPS+GLO
- RTCM 3.2 disabled
- CMR GPS+GLO
- NCT disabled  
does not affect JD hardware sources
- BINR disabled

In this version RTCM3.1 and CMR+ message types are supported. NCT from a Deere or NavCom receiver will be offered to the user as a manual single baseline choice only. This software may be used to provide single baseline connectivity to customers of a John Deere set of base stations. No data conversion is included for the NCT reference station data.

Choose the data types you wish to offer the customer. **SINGLE BASE** and **NEAREST BASE** are both a single baseline datastream.

**MAC:** (Master Auxillary Concept) includes the closest (master) base data and the ionospheric differences to the auxillary bases nearby.

**Use TROPO model:** adds the calculated tropospheric differences to the data being sent. This is from a fixed atmospheric model.

**IMAC:** (individualized master auxillary concept) this data type has already calculated the changes in ionospheric delays within the region surrounding the end user's position.

The master station's data is corrected for these regional changes and sent to the user for their specific position within the network. This is why it is called "individualized" data.

**FKP:** This data provides the nearest master station's data and a message containing the ionospheric differences in a North South and East West distance scale. The receiver then computes corrections to the master station data itself using these parameters.

Select Stream Types

- SINGLE BASE [manual select]
- NEAREST BASE [auto select]
- MAC network RTCM
  - Use TROPO model
- IMAC network
- FKP network
- VRS disabled

## Manage Users:

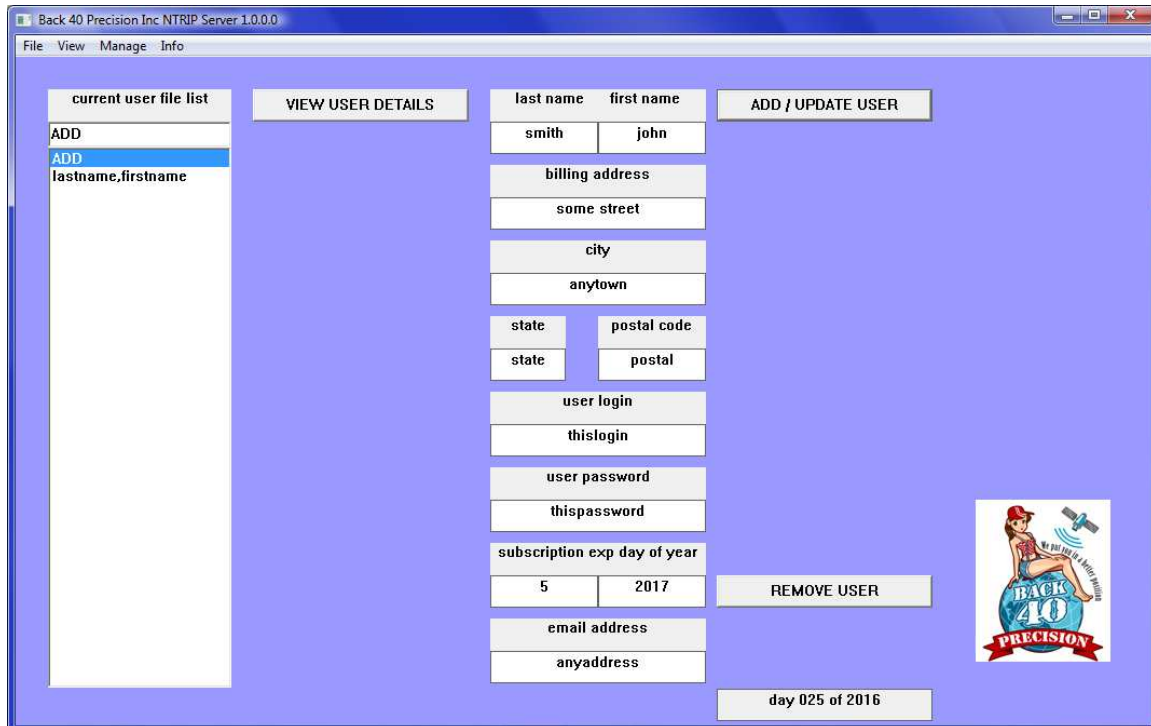
On the top toolbar select “**Manage**” then click on “**Manage Users**”.

To ADD an authorized user, first click on “**ADD**” in the “**current user file list**” then press the “**VIEW USER DETAILS**” button. This will clear all of the edit fields for a new user to be entered.



Fill the user information out completely. Every box must have something entered into it. Once the data is entered press the “**ADD/UPDATE USER**” button.

To EDIT or REMOVE a user from the system, first click on that user in the “**current user file list**”. Then press the “**VIEW USER DETAILS**” button. That user’s information will appear in the edit fields. You may make changes to that user as needed. If you need to save the changes press the “**ADD/UPDATE USER**” button. If you want to remove the user press the “**REMOVE USER**” button.



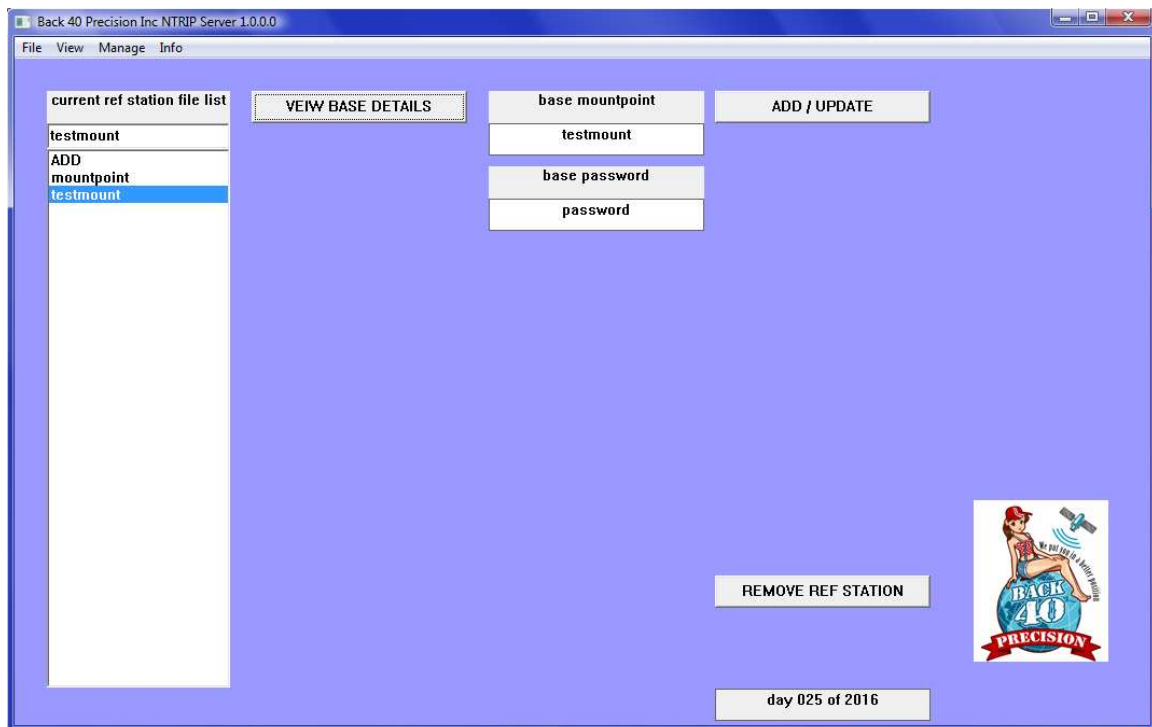
## Manage NTRIP Connected Bases

On the top toolbar select “**Manage**” then click on “**Manage NTRIP Bases**”.

To ADD an NTRIP reference station, first click on “**ADD**” in the “**current ref station file list**” then press the “**VIEW BASE DETAILS**” button. This will clear all of the edit fields for a new base to be entered.

Fill the **base mountpoint** and **base password** edit fields. Every box must have something entered into it. Once the data is entered press the “**ADD/UPDATE**” button.

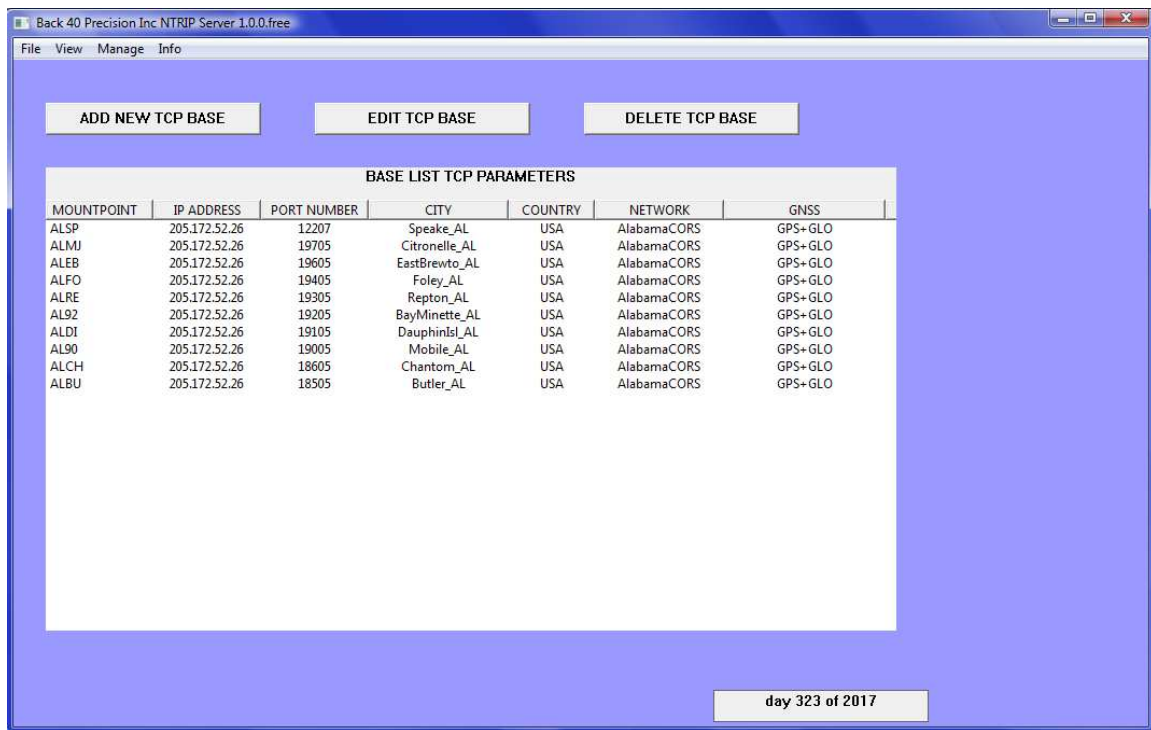
To EDIT or REMOVE a base from the system, first click on that base in the “**current ref station file list**”. Then press the “**VIEW BASE DETAILS**” button. That base’s information will appear in the edit fields. You may make changes to the password. If you need to save the changes press the “**ADD/UPDATE**” button. If you want to remove the base press the “**REMOVE REF STATION**” button. (NOTE if you need to change a base *mountpoint* you must first REMOVE the station then add the new *mountpoint*. You cannot edit the old mountpoint.)



## Manage TCP Connected Bases:

On the top toolbar select “**Manage**” then click on “**Manage TCP Bases**”.

This window will display a list of TCP base connection details. Any base in this list, the Caster will attempt a connection to using the information.



ADD NEW TCP BASE

enter MOUNTPOINT name

enter IP address

enter PORT

information for Sourcetable

LOCATION / CITY

COUNTRY

NETWORK NAME

GPS

GLONASS

BeiDou

GALILEO

SAVE

CANCEL

EDIT TCP BASE

selected MOUNTPOINT

AL90

enter IP address

205.172.52.26

enter PORT

19005

information for Sourcetable

LOCATION / CITY

Mobile\_AL

COUNTRY

USA

NETWORK NAME

AlabamaCORS

GPS

GLONASS

BeiDou

GALILEO

SAVE

CANCEL

REMOVE TCP BASE

selected MOUNTPOINT

AL90

LOCATION / CITY

Mobile\_AL

COUNTRY

USA

NETWORK NAME

AlabamaCORS

DELETE

CANCEL

To add to the list press the “ADD TCP BASE” button. The rectangular window on the left of this page will appear. Fill out the information and press the “SAVE” button.

To Edit one of the TCP bases, first click on the MOUNTPOINT in the list area of the TCP Management screen. Then after the base Mountpoint is highlighted press the “EDIT TCP BASE” button. The small window shown in the center of this page will be shown. Edit the information and press the Save button.

To Remove a TCP base from the list, first click on the MOUNTPOINT in the list area of the TCP Management screen. Then after the base Mountpoint is highlighted press the “DELETE TCP BASE”. The small window on the right of this page will appear. Press the “DELETE” button and the base information will be removed from the list.



## View Online User Information

On the top toolbar select “**View**” then click on “**View Users**”.

The window will display all currently connected users and all of the information being sent back to the caster such as GPS position. You can view more details by double clicking on the username in the “**User**” column of the “**Online Clients**” box. You can also click once on the username and press the “**VIEW USER DETAILS**” button on the right side.

The screenshot shows the 'ONLINE CLIENTS' window with the following table:

USER	REQ STREAM	LATITUDE	LONGITUDE	ALTITUDE	CORR TYPE	NO SATS	HDOP	DIFF AGE	STATION
user1:password1	BALD	38.000000	-89.099998	200.000000	RTK	10	1.000000	4.000000	0

On the right side of the window, there is a button labeled 'VIEW USER DETAILS'. At the bottom right, there is a logo for 'BACK 40 PRECISION' featuring a woman holding a globe. At the bottom center, a status bar displays 'day 253 of 2016'.

The 'USER DETAILS SNAPSHOT' window displays the following information:

- Current Date / Time:** 09/Sep/2016:08:37:55 GMT
- CLIENT DEVICE:** LefebureNTRIPClient@20121217
- MESSAGES SENT:**
  - RTCM3.x.1004
  - RTCM3.x.1005
  - RTCM3.x.1008
  - RTCM3.x.1012
  - RTCM3.x.1013
- CONNECT TIME:** 09/Sep/2016:08:37:13 GMT
- USER:** user1:password1
- REQUESTED STREAM:** BALD
- USER LATITUDE:** 38.000000
- USER LONGITUDE:** -89.099998
- USER ALTITUDE:** 200.000000

At the bottom, there is a table for station information:

USING BASES	STATION NAME	LOCATION	OWNER NETWORK	DIST KILOMETERS
MASTER	BALD	Baldwin_IL USA	Back40Precision	69.209528
AUX1 BASE				
AUX2 BASE				
AUX3 BASE				

## View Online Reference Station Information

On the top toolbar select "View" then click on "View Bases".

The window will display all currently connected bases and some basic information. You can view more details by double clicking on the mountpoint name in the "MOUNTPPOINT" column of the "ONLINE REFERENCE STATIONS" box. You can also click once on the mountpoint name and press the "VIEW BASE DETAILS" button on the right side.

The screenshot shows a software window titled "Back 40 Precision Inc NTRIP Server 0.9.4.0". The main content area is titled "ONLINE REFERENCE STATIONS" and contains a table with the following data:

MOUNTPPOINT	LOCATION	BASE ID	LATITUDE	LONGITUDE	ALTITUDE	ANTENNA	MAG FIELD nTesla
BALD	Baldwin_IL	1	38.166100	-89.863100	115.818664		43722.718070

Below the table is a large empty space and a button labeled "VIEW BASE DETAILS". In the bottom right corner, there is a logo for "BACK 40 PRECISION" featuring a woman sitting on a globe. At the bottom center, it says "day 253 of 2016".

The screenshot shows a window titled "BASE DETAILS SNAPSHOT" with several data tables:

mountpoint	location	country	network
BALD	Baldwin_IL	USA	Back40Precision

ecef X meters	ecef Y meters	ecef Z meters
11997.298700	-5021134.192200	3920027.442100

latitude	longitude	altitude meters
38.166100	-89.863100	115.818664

receiver model	receiver serial	receiver firmware	antenna model	antenna serial
SINOGNSS K508	00805837	2.5.7		

MESSAGE NUMBER	FREQUENCY SEC
1004	1
1005	10
1008	10
1012	1
1033	10
1074	1
1084	1
CMR0	1
G5V	1

SV number	SYSTEM	Azimuth	Elevation	Phase Range freq1	Phase Range freq2	Phase Range freq3	Code range freq1	Code range freq2	Code range freq3	sig
1	GPS	82	49	21261365.399000	21261365.836500	0.000000	21261364.680000	21261374.360000	0.000000	930231
7	GPS	161	35	21975461.751000	21975461.855500	0.000000	21975466.234000	21975473.014000	0.000000	650252
8	GPS	54	13	24582096.204000	24582098.759000	0.000000	24582100.538000	24582110.758000	0.000000	298570
11	GPS	59	44	21548427.532500	21548427.879500	0.000000	21548427.158000	21548433.058000	0.000000	584670
13	GPS	282	22	23408068.879500	23408068.878500	0.000000	23408074.944000	23408080.924000	0.000000	628617
17	GPS	247	48	21722757.351000	21722758.079000	0.000000	21722754.356000	21722760.616000	0.000000	613882
19	GPS	238	23	23299361.863500	23299362.192000	0.000000	23299360.566000	23299365.766000	0.000000	502050
28	GPS	339	63	21058650.394000	21058650.875000	0.000000	21058648.860000	21058654.540000	0.000000	547964
30	GPS	179	63	20622576.694000	20622575.910000	0.000000	20622578.404000	20622587.464000	0.000000	866880
24 CHAN= 2	GLO	33	29	21876255.180500	21875997.372000		21876259.516000	21876095.676000		163825
14 CHAN= -7	GLO	129	48	20234934.842000	20234948.295000		20234937.608000	20234952.868000		148176
15 CHAN= 0	GLO	15	78	19272314.006000	19272326.511500		19272314.892000	19272327.672000		125475
16 CHAN= -1	GLO	325	22	22346855.193000	22346868.787000		22346854.972000	22346867.232000		123322
17 CHAN= 4	GLO	341	84	19196884.117000	19196895.803000		19196883.852000	19196895.152000		113047
18 CHAN= -3	GLO	222	39	20947879.312000	20947894.813500		20947877.384000	20947889.184000		117500

On the top toolbar select “View” then click on “View SV Orbit”.

The window will display the currently received orbital positions for the GPS and Glonass constellations. The caster must receiver RTCM orbit parameter messages from at least one of the bases.

The screenshot shows the 'Back 40 Precision Inc NTRIP Server 0.9.4.0' application window. The 'View' menu is open, highlighting 'View SV Orbit'. The main window displays 'SATELLITE ORBITS' data for GPS and Glonass constellations. The data is organized into two tables. The first table shows satellite parameters for SV PRN 1, 7, 8, 11, 13, and 30, including GPS TOW (481138), GLO TOD (59921), BDU TOW (0), and GAL TOW (0). The second table shows GLO ID, CHANNEL, and EMPH TIME for satellites 24, 14, 15, 16, 17, and 18. A logo for 'BACK 40 PRECISION' is visible in the bottom right corner of the window, and a status bar at the bottom indicates 'day 253 of 2016'.

SV PRN	pos X	pos Y	pos Z	IODE	WEEK
1	-24974202.808301	-1183151.057637	1180068.461874	2	889
7	7596389.555841	-6484588.302348	-7040725.472896	15	889
8	-164489.152686	-24123782.410521	-7926481.749058	21	889
11	-24588066.047178	5377886.368304	2054968.221015	79	889
13	-23433903.857215	25378481.060736	5134568.363535	52	889
30	-25893057.150553	25910234.298499	5514722.109791	61	889

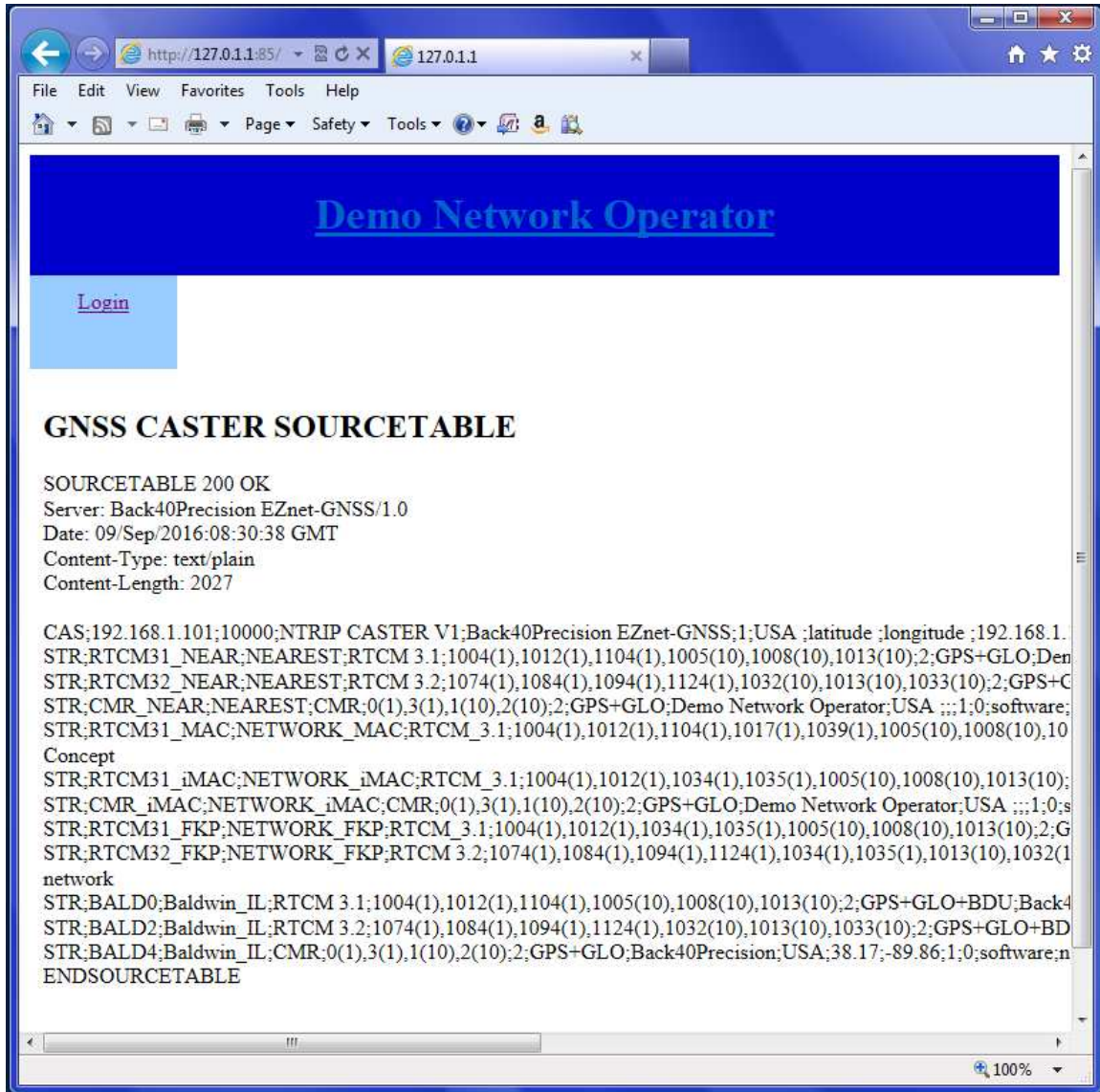
GLO ID	CHANNEL	pos X	pos Y	pos Z	EMPH TIME
24	9	11661290.319393	-31536877.883012	22460780.958816	59400
14	0	10682615.874279	-10180952.690551	3726254.557383	59400
15	7	0.000000	0.000000	0.000000	57600
16	6	-22169846.752002	-29643623.317610	23001332.172374	59400
17	11	362167.924195	-15748724.210746	19144752.217913	59400
18	4	-21951539.268749	-10301097.119076	5285422.511467	59400

## Interfacing with the caster

**TCP Ports:** To access the caster these ports are used.

- 10000 –User login and plain text sourcetable
- 3000 -Reference Station Login
- 80 -Web page based sourcetable

*Here is an example of the web page sourcetable.*



*Here is an example of a plain text sourcetable.*

Back 40 Precision Inc.  
7760 West Springview Road  
Baldwin, IL 62217  
[www.back40precision.com](http://www.back40precision.com)

[info@back40precision.com](mailto:info@back40precision.com)

