



Working with GDA2020



Description

This guide provides tips on how to work with GDA2020 with Leica Captivate GNSS products.

GDA2020 is a static datum (just like GDA94), however, the co-ordinates differ approximately 1.5 – 1.8m in a north easterly direction due to tectonic plate movement.

When should I start using GDA2020?

Check what your local state regulations are. Some states switched to GDA2020 at the beginning of 2019. In NSW, SCIMS data has become available in GDA2020 since July 2019.

We recommend new jobs to use GDA2020 and existing jobs to stay in GDA94 unless there is a good likelihood of continuing with GDA2020. Where possible avoid having to transform coordinates as this requires additional office processing time and more potential for errors.

Do I need to use a transformation to work on GDA2020 with SmartNet?

No

It is not necessary to use a transformation in your rover's co-ordinate system.

The RTK Base Station's coordinates determine the Reference Frame used by your rover.

If you use a CORS network such as SmartNet Aus, choose a GDA2020 mountpoint from the source table. The rover operates on the version of GDA that is selected from the mountpoint.

When using a network RTK solution of any type you will have the capacity to choose between both GDA94 and GDA2020 reference coordinates by choosing the correct mountpoint

– see below on Mountpoints for more information.

Co-ordinate system definitions for GDA2020 on your Captivate rover

Your existing MGA co-ordinate systems should be defined similarly to this.

Name	MGA56
Transformation	<None>
Ellipsoid	GRS 1980
Projection	UTM 56
Geoid model	AG09_NSW_VIC
CSCS model	<None>

Note that there is NO Transformation. The definition includes the GRS1980 Ellipsoid and the appropriate UTM zone Projection. It may also include a Geoid, in this case a 2009 file.










For GDA2020, we may simply update this for Geoid2020, however for clarity, it may be better to create or install new systems.

Installing co-ordinate system for GDA2020 on your Captivate rover

Download a full set of Australian Coordinate Systems here:

<https://survey.crkennedy.com.au/ts1555976140/attachments/BlogPost/66/GDA2020%20files.zip>

This downloaded ZIP file includes 2020 Geoid files (GEM) for all of Australia and a set of coordinate systems (TRFSET.DAT). Download and unzip this file which includes the following.

-  NT2020.gem
-  SA2020.gem
-  VIC2020.gem
-  QLD2020.gem
-  WA2020.gem
-  TRFSET.DAT
-  FNQ2020.gem
-  TAS2020.gem
-  NSWVIC2020.gem

NOTE: GDA2020 must be used with Geoid 2020.

NOTE: For NSW & Victoria there, are separate files for each state and also a combined file covering both states.

The TRFSET file includes the following.

Name	Last Modified	Transformation	Ellipsoid	Projection	Projection Type	Geoid Model
WGS84	26/07/2019 08:51:06		WGS 1984			
MGA56_94	31/07/2019 11:56:46		GRS 1980	UTM 56	UTM	AG09_NSW_VIC
MGA56_20	31/07/2019 11:56:46		GRS 1980	UTM 56	UTM	NSWVIC2020
MGA55_94	31/07/2019 11:56:46		GRS1980	UTM 55	UTM	AG09_NSW_VIC
MGA55_20_VIC	31/07/2019 11:56:46		GRS 1980	UTM 55	UTM	VIC2020
MGA55_20_TAS	31/07/2019 11:56:46		GRS 1980	UTM 55	UTM	TAS2020
MGA55_20_QLD	31/07/2019 11:56:46		GRS 1980	UTM55	UTM	QLD2020
MGA55_20_NSW	31/07/2019 11:56:46		GRS 1980	UTM55	UTM	NSW2020
MGA55_20_FNQ	31/07/2019 11:56:46		GRS 1980	UTM55	UTM	FNQ2020
MGA54_94	31/07/2019 11:56:46		GRS 1980	UTM 54	UTM	AG09_SA
MGA54_20	31/07/2019 11:56:46		GRS 1980	UTM 54	UTM	SA2020
MGA53_94	31/07/2019 11:56:46		GRS1980	UTM 53	UTM	AG09_SA
MGA53_20	31/07/2019 11:56:46		GRS 1980	UTM 53	UTM	NT2020
MGA52_94	31/07/2019 11:56:46		GRS 1980	UTM 52	UTM	AG09_WA
MGA52_20	31/07/2019 11:56:46		GRS 1980	UTM 52	UTM	WA2020
MGA51_94	31/07/2019 11:56:46		GRS 1980	UTM 51	UTM	AG09_WA
MGA51_20	31/07/2019 11:56:46		GRS 1980	UTM 51	UTM	WA2020
MGA50_94	31/07/2019 11:56:46		GRS1980	UTM 50	UTM	AG09_WA
MGA50_20	31/07/2019 11:56:46		GRS 1980	UTM 50	UTM	WA2020
MGA49_94	31/07/2019 11:56:46		GRS 1980	UTM 49	UTM	AG09_WA
MGA49_20	31/07/2019 11:56:46		GRS1980	UTM 49	UTM	WA2020

This includes all UTM zones for Australia in both GDA94 & GDA2020 with appropriate Geoid files. For Zone 55 there are separate versions for each state with Geoid 2020. For GDA94 we have NSW/VIC covered (for Geoid) only.

NOTE: *it is NOT necessary to use a transformation. All you need to do is select either a GDA94/2020 mountpoint and the appropriate co-ordinate system to work in those co-ordinates. We do not recommend using a transformation. If you really need to transform data, we recommend to do it in the office using Infinity.*

To backup:

- If your rover has existing coordinate systems, you may want to delete or backup these first to avoid confusion.
- From the Home Screen select Settings, Tools, Transfer User Objects.
- Select the Object type you wish to transfer.
- Select from “Internal memory” To device “SD card” or “USB”. Select the individual object you wish to transfer: Coordinate system or Geoid field file.
- F1 – OK.
- Repeat for all objects or instead tick the box “Transfer all objects of the selected type” to transfer all in one step.

To delete:

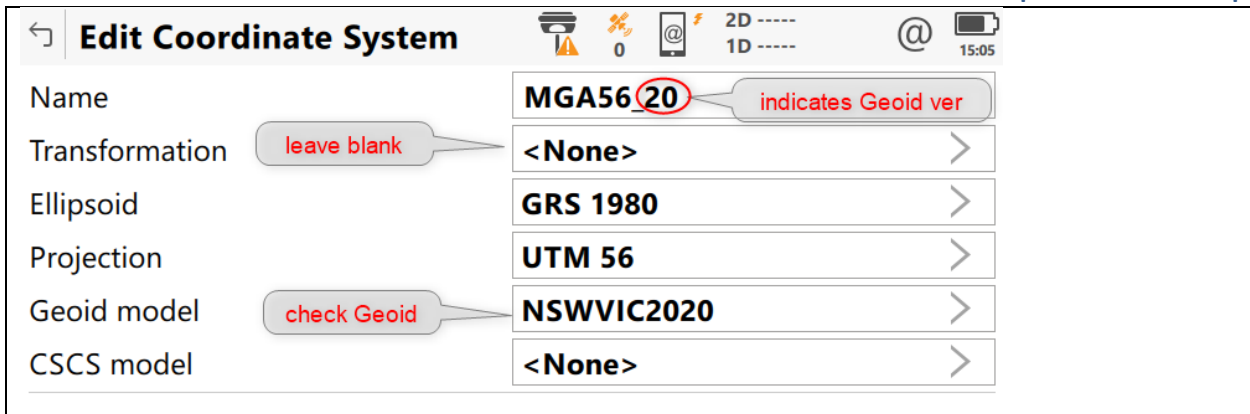
- Press Enter on the object selection field.
- Select the object required.
- F4 – Delete.

To install new files:

- Copy TRFSET.DAT to a USB stick or memory card in the \DBX folder.
- Copy the required GEM files to the \Data\Gps\Geoid folder and insert in your Captivate sensor.
- Select the From option you want and set “To device” to “Internal memory”.
- For some object types, you can transfer all objects of the same type in one step by selecting the checkbox.
- OK to continue.
- Repeat this process for each object type you require.

To check the new coordinate systems include the correct Geoid:

- Home screen / Settings / System / Restrict Access.
- Select Edit access restrictions.
- F6 Next, F6 Next.
- Create & edit coordinate systems
- F3 Edit.



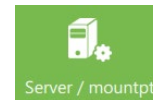
Selecting a GDA2020 mountpoint with SmartNet

The GPS rover operates on the version of GDA that is used by the RTK base. When using a network RTK solution of any type you will have the capacity to choose between both GDA94 and GDA2020 reference coordinates by choosing the correct mountpoint.

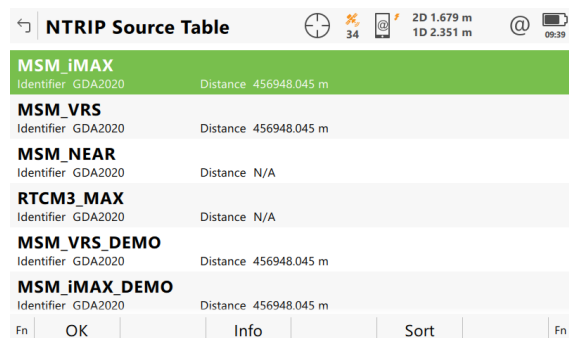
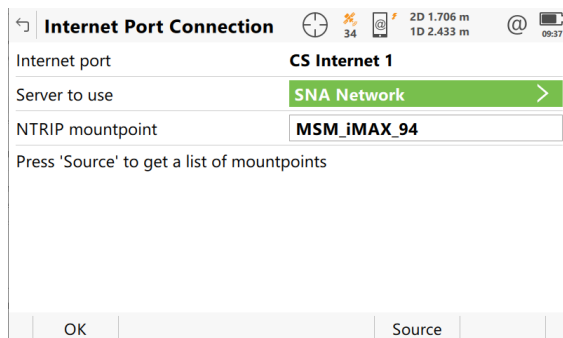
To change the mountpoint select the Phone



icon and then

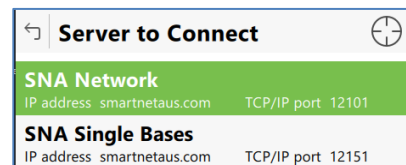


You can select different NTRIP mountpoints by choosing F5 Source.



The reference frame is listed as the identifier so select one with GDA2020.

We recommend having two servers: SNA Network and; SNA Single to allow easy switching to the single base solutions if required.



Understanding the SmartNet Mountpoint options

Depending on your Port setting you can choose from several different types of mountpoint. The table below shows the port numbers for each state. Note that Port 1x101 provides the network mountpoints and Ports 1x151 provide the single baseline mountpoints.

Table 2b: Port Number according to States

State	Ports for Survey and Agric Customers		
	Survey Network	Agric Network	Single Base
NSW/ACT	12101	12103	12151
NT	18101	18103	18151
QLD	14101	14103	14151
SA	15101	15103	15151
TAS	17101	17103	17151
VIC	13101	13103	13151
WA	16101	16103	16151

Mountpoints for network solutions

Using Port 1x101, the mountpoint Source Table will display the options below. All options require a GGA position message be sent to SmartNet. An explanation of the mountpoint option follows.

← NTRIP Source

MAC_RTCM3.1

Identifier GDA94

NB_RTCM3.1

Identifier GDA94

VRS_RTCM3.1

Identifier GDA94

iMAX_RTCM3.1

Identifier GDA94

MSM_iMAX

Identifier GDA2020

MSM_VRS

Identifier GDA2020

MSM_NEAR

Identifier GDA2020

RTCM3_MAX

Identifier GDA2020

MSM_VRS_DEMO

Identifier GDA2020

MSM_iMAX_DEMO

Identifier GDA2020

MSM_NEAR_94

Identifier GDA94

MSM_VRS_94

Identifier GDA94

MSM_iMAX_94

Identifier GDA94

MSM_VRS_DEMO_94

Identifier GDA94

MSM_iMAX_DEMO_94

Identifier GDA94

- MAC** – MAC (Master Auxiliary Concept) network solution is calculated using multiple reference stations in your area. The nearest single reference station (Master) sends the correction incorporating correction differences from other nearby stations in the network (Auxilliary). The rover handles the network computations.
- NB** – (Nearest Base) the closest reference station is automatically selected in a single baseline solution.
- VRS** – a VRS (Virtual Reference Station) network solution is calculated using multiple reference stations in your area. A virtual reference station is calculated nearby from which corrections are sent.
- iMAX** – (Individualised Master Auxiliary). Similar to MAC except the network computations are handled by the network server rather than the rover. This automatically reverts to a Nearest Base solution when outside the network area or within 5km of a reference station. ***This is currently our preferred network solution mountpoint as it should provide the best possible solution.***

Note: iMAX can also be used by legacy receivers that do not support MAC, or when you don't want the rover to make its own decisions about the network stations to be used.
- RTCM3.1** supports GPS & Glonass only.
- MSM** supports all constellations (GPS, Glonass, Galileo, Beidou etc).
- Identifier describes GDA 1994 or 2020 Epoch used.
- NB** and **NEAR** refer to Nearest single base solutions.

Note: iMAX automatically reverts to Nearest Base when within 5km of a base station, or outside the network area.
- DEMO** mountpoints are only for CRK staff to use in demonstration situations. They use a small cluster of sites close to some CRK offices.

NOTE: To keep your network solutions simple, we recommend selecting **MSM_iMAX** or **MSM_iMAX_94** (depending which GDA epoch you want). Your rover will then use as many satellites as both it and the network cell you're working in supports. The added advantage is that it will have a network solution when possible and automatically revert to a Nearest Base when appropriate. This simplifies your choice of mountpoints.

Transforming GDA data

If you collect data in the field using the wrong GDA version, you can transform it to the required GDA version using an appropriate transformation file attached to the job's coordinate system. In effect this swaps the reference frame used by the mountpoint.

NOTE: if you do this you should check on a known point to make sure of the results.

NOTE: we don't recommend this approach as it can easily lead to confusion and wrong results (the mountpoint reference is then different to the transformation reference frame). It would be better to do the transformations in an office software such as Infinity.

The example below shows a transformation to go from GDA94 to GDA2020.

Edit Coordinate System	
Name	GDA94_2020-56
Transformation	GDA94-GDA2020
Ellipsoid	GRS1980
Projection	UTM 56
Geoid model	NSWVIC2020
CSCS model	<None>

Please use the GDA2020 geoid with the transformation. Contact surveysupportstaff@crkennedy.com.au for a copy of the transformations.

AusPos

If you use your own base station you can obtain GDA2020 coordinates for local site PMs from government state websites for example. All Auspos data is reported in Geoid 2020 and both GDA94 and GDA2020.

Other resources

There are some good resources online that will help answer your questions, else contact one of our support team on:

surveysupportstaff@crkennedy.com.au

<http://www.icsm.gov.au/datum/gda2020-fact-sheets>

Examples

A Surveyor Jack wants to work in NSW, Zone 56, GDA2020 with a network solution. He can set his job coordinate system to: with Server and Mountpoint:

General	<u>Coordinate system</u>	Codelist	Linked jobs	Linked
Coordinate system	MGA56_20			
Residuals	No distribution			
Transformation	<None>			
Ellipsoid	GRS 1980			
Projection	UTM 56			
Geoid model	NSWVIC2020			
CSCS model	<None>			

SNA Network
IP address smartnetaus.com TCP/IP port 12101

MSM_iMAX
Identifier GDA2020

B Surveyor Katrina wants to work in NSW, Zone 55 with GDA94 and a Nearest Base solution. She can set the coordinate system to: with Server and Mountpoint:

General	<u>Coordinate system</u>	Codelist	Linked jobs	Linked
Coordinate system	MGA55_94			
Residuals	No distribution			
Transformation	<None>			
Ellipsoid	GRS1980			
Projection	UTM 55			
Geoid model	AG09_NSW_VIC			
CSCS model	<None>			

SNA Network
IP address smartnetaus.com TCP/IP port 12101

MSM_NEAR_94
Identifier GDA94

C Surveyor Jesse wants to work in NSW, Zone 56 with GDA2020 and a Single Base solution. He can set the coordinate system to: with Server and Mountpoint:

General	<u>Coordinate system</u>	Codelist	Linked jobs	Linked
Coordinate system	MGA56_20			
Residuals	No distribution			
Transformation	<None>			
Ellipsoid	GRS 1980			
Projection	UTM 56			
Geoid model	NSWVIC2020			
CSCS model	<None>			

SNA Single Bases
IP address smartnetaus.com TCP/IP port 12151

MSM_NWCS
Identifier GDA2020