

# SARTrack GPS tracking using Tait TP9300 radios – quick start guide

John Yaldwyn ZL4JY AREC



Revision 6 – July 2016

# SARTrack introduction

Tait portable TP9300 (and 9400) use the Tait audio FSK CCDI data protocol

- Compatible with almost all analog repeaters
- Built in GPS transmits position using bursts (periodic or on PTT release)

John ZL4JY has worked with Bart Kindt CEO, the SARTrack developer and Tait to get these new portables working with SARTrack and to develop codeplugs for AREC use

- Need to use SARTrack from at least Version 0.9.745

Base station can be any modern Tait mobile radio

- Tait TM8100, TM8200, TM9300, and TM9400

Radio IDs are from the world-wide amateur digital radio identification system

- ✓ Tait TP9300 radios are DMR compatible, TP9400 are P25

Example Motueka ZL2GK DMR IDs are 5303054, 5303055 to 5303059

- 0530 prefix (New Zealand), 4 digit suffix, refer: <http://www.dmr-marc.net/cgi-bin/trbo-database/>

Tait CCDI supports this format

- SARTrack is set up for 4 digit prefix and 4 digit suffix to suit DMR out-of-the box

# Example SARTrack topo map view – single object

The screenshot displays the SARTrack software interface. The main window, titled "Map: New Zealand Topo", shows a topographic map of the Tasman Bay region in New Zealand. A single tracked object is highlighted with a yellow box, displaying the ID "T05303058" and a "Timeout: 15h 46m". The map includes labels for various locations such as Uruwhenua, Upper Takaka, Riwaka, Brooklyn, and Port Motueka, as well as rivers like the Riwaka River and Motueka River. The interface includes a sidebar with navigation and tool options, a status bar at the bottom with coordinates and zoom level, and a taskbar at the very bottom showing the system time as 07:36 on Tuesday, 29/12/2015.

**SARTrack**

Map: New Zealand Topo

ON-LINE

Uruwhenua

Upper Takaka

812

894

850

980

1070

1121

1473

1342

Hailes Knob 1279

Mt Campbell 1331

Hoary Head

803

Hut

Hut

1047

682

287

60

Riwaka River

South Bay Riwaka River

Brooklyn

Riwaka

Lower Moutere

Port Motueka

Mariri

Jackett Island

Motueka River

Outer Island

Kaiteriteri

Tokongawha Pt

Sandy Bay

Marahau

Otuwhero Inlet

Fisherman I

Adele Island

Tasman Bay

Tasman

41° 00'

46

45

T05303058

Timeout: 15h 46m

NZ Topo Map © LINZ

4000 Meters

**COLOR INFO:** ACTIVE STATION TIMED OUT LAST KNOWN POSITION PRIORITY ACTIVE OBJECT TRACKER OBJECT

Lat/Long: 41°06.7274S , 172°59.9990E Goog: E 19258270 N -5028894 ZoomLevel: [12] OSM: Queued=0 Failed=0 TC=0 Local Map: No Map

07:36  
ENG Tuesday  
29/12/2015



# Example SARTrack Google Earth view – multiple objects

The screenshot displays the SARTrack software interface. On the left is a sidebar with a menu including Maps, Google, Stations, Objects, Messages, Operations, Setup, Tools, Replay, Help, and Debug. Below the menu is a 'Connectio...' section with a 'Setup' button and a list of server connections: Server, TIC, AGWPE, IFeeds, GPS Mike, Heetsync, Icom, Tait, AIS COM, AIS TCP, GPS, and Database. The main window is titled 'Map: New Zealand Topo' and shows a Google Earth view of a residential area. A black line traces a path through the area, with three yellow callout boxes indicating tracked objects: T05303054 (Timeout: 15h 44m), T05303055 (Timeout: 15h 44m), and T05303058 (Timeout: 15h 44m). The street 'Eginton St' is labeled. A scale bar indicates 20 Meters. The bottom status bar shows 'COLOR INFO: ACTIVE STATION TIMED OUT STATION LAST KNOWN POSITION PRIORITY ACTIVE OBJECT TRACKER OBJECT' and 'Lat/Long: 41°06.4058S, 173°00.6538E'. The system tray at the bottom shows the time as 07:34 on Tuesday, 29/12/2015.

Name	Tactic
T05303054	
T05303055	
T05303058	

# Quick start

## Start SARTrack

Select Tait radio, set COM port to that which connects to base radio

- Can use Tait radio programming cable via MIC jack to get started, optionally a codeplug change is needed to allow AUX RS-232 connection at rear of base radio

Set base ID to 1042, Prefix to 0530, Baud rate to 9600, and tick connect to radio

When base starts to receive positions tracking data initially appears in the Object Information box as shown in the example below

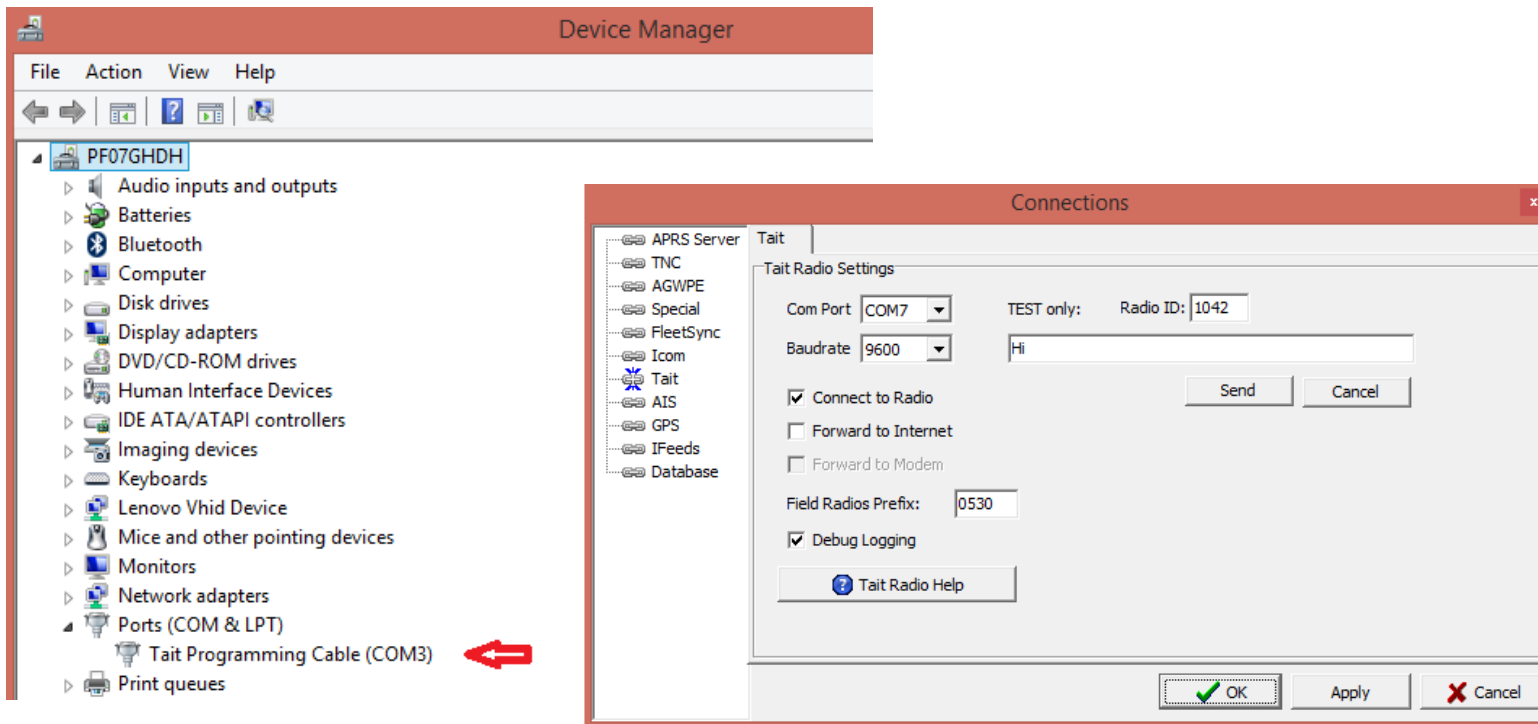
Name	Tactical Name	Status	Latitude	Longitude	Speed	Last Change	Owner	Information
T05303054		Active	41°06.3950S	173°00.5890E	0.26 kp/h	28 Dec 15:49	ZL4JY	Tait Radio Tracker
T05303055		Active	41°06.4060S	173°00.6050E	0.19 kp/h	28 Dec 15:49	ZL4JY	Tait Radio Tracker
T05303058		Active	41°06.4090S	173°00.6040E	0.11 kp/h	28 Dec 15:49	ZL4JY	Tait Radio Tracker

# COM port selection – detail

Navigate to Control Panel > All Control Panel Items > Device Manager

Locate COM 1, 2, etc, if using a desktop with a dedicated COM port(s), or find the correct serial to USB adapter (example shows Tait programming cable for testing)

In SARTrack Connection box click on Tait and then click Setup Tait radio (example shows COM7) also check Radio ID is set to 1042 and Field radio prefix is 0530

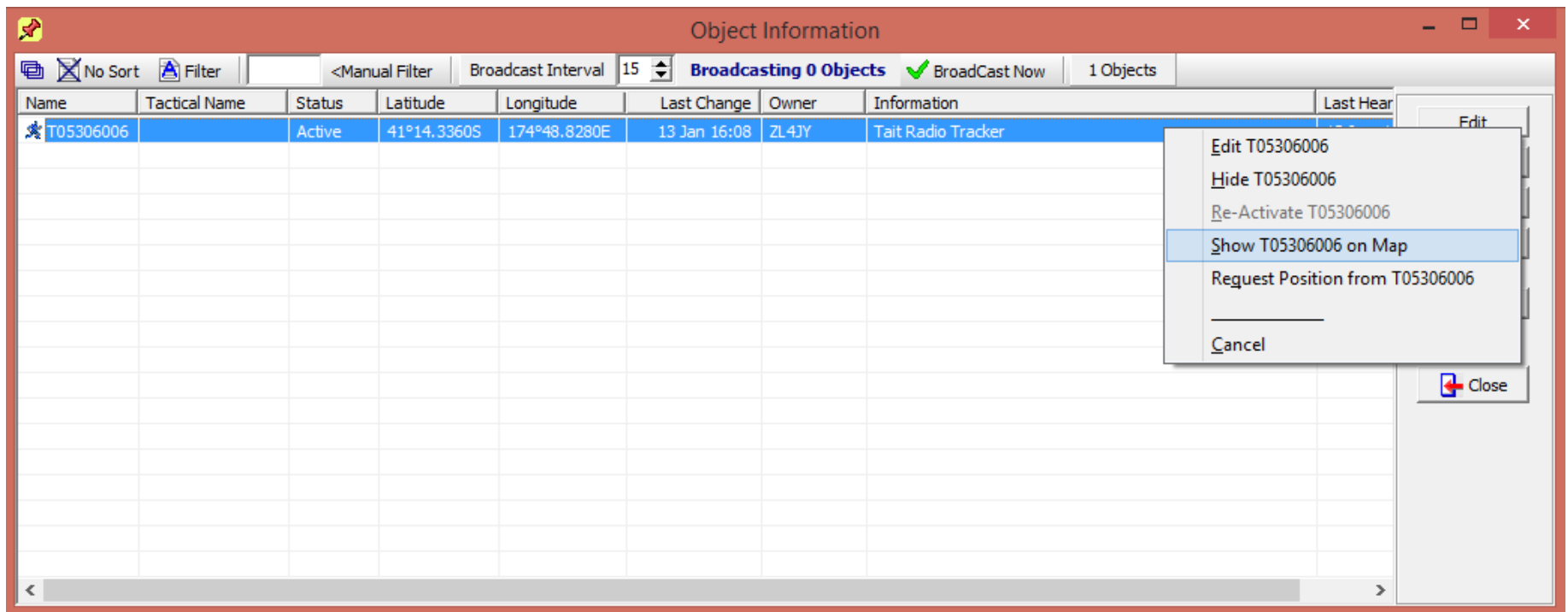


# Show tracked objects on map

Select Maps (topo) or Google (Google Earth) map window from top floating menu

Right click object in the Object information window

- Select Show T0530xxxx on Map
- Note that an Internet connection is required for map display



The screenshot shows the 'Object Information' window with a table containing one object. A context menu is open over the object, with 'Show T05306006 on Map' selected.

Name	Tactical Name	Status	Latitude	Longitude	Last Change	Owner	Information	Last Hear
T05306006		Active	41°14.3360S	174°48.8280E	13 Jan 16:08	ZL4JY	Tait Radio Tracker	

Context Menu Options:

- Edit T05306006
- Hide T05306006
- Re-Activate T05306006
- Show T05306006 on Map
- Request Position from T05306006
- Cancel



# Initial object tracking can be viewed on map

Map: New Zealand Topo

ON-LINE

PARKER ST

FEARON ST

THORP

POOLE STREET

NZ Topo Map © LINZ

250 Meters

T05303054  
T05303058  
Timeout: 15h 39m

COLOR INFO: ACTIVE STATION TIMED OUT LAST KNOWN POSITION PRIORITY ACTIVE OBJECT TRACKER OBJECT

Lat/Long: 41°06.3209S , 173°00.7428E    Goog: E 19259650 N -5027893    ZoomLevel: [16]    OSM: Queued=0 Failed=3 TC=0    Local Map: No Map

Object Information

No Sort Filter <Manual Filter Broadcast Interval 15 Broadcasting 0 Objects BroadCast Now 3 Objects

Name	Tactical Name	Status	Latitude	Longitude	Speed	Last Change	Owner	Information
T05303054		Active	41°06.3950S	173°00.5890E	0.26 kp/h	28 Dec 15:49	ZL4JY	Tait Radio Tracker
T05303055		Active	41°06.4060S	173°00.6050E	0.19 kp/h	28 Dec 15:49	ZL4JY	Tait Radio Tracker
T05303058		Active	41°06.4090S	173°00.6040E	0.11 kp/h	28 Dec 15:49	ZL4JY	Tait Radio Tracker

Edit  
Hide  
Delete  
Delete All  
Import GPX  
Close



Next select object and set it as a team

The screenshot shows a software window titled "Object Information". At the top, there are controls for "No Sort", "Filter", and "Broadcast Interval" set to 15. It indicates "Broadcasting 0 Objects" and "BroadCast Now" is checked. Below this is a table with columns: Name, Tactical Name, Status, Latitude, Longitude, Speed, Last Change, Owner, and Information. Three rows are visible, all with "Tait Radio Tracker" as the owner. A context menu is open over the second row (T05303055), listing actions like "Edit", "Hide", "Delete", "Delete All", "Import GPX", and "Close".

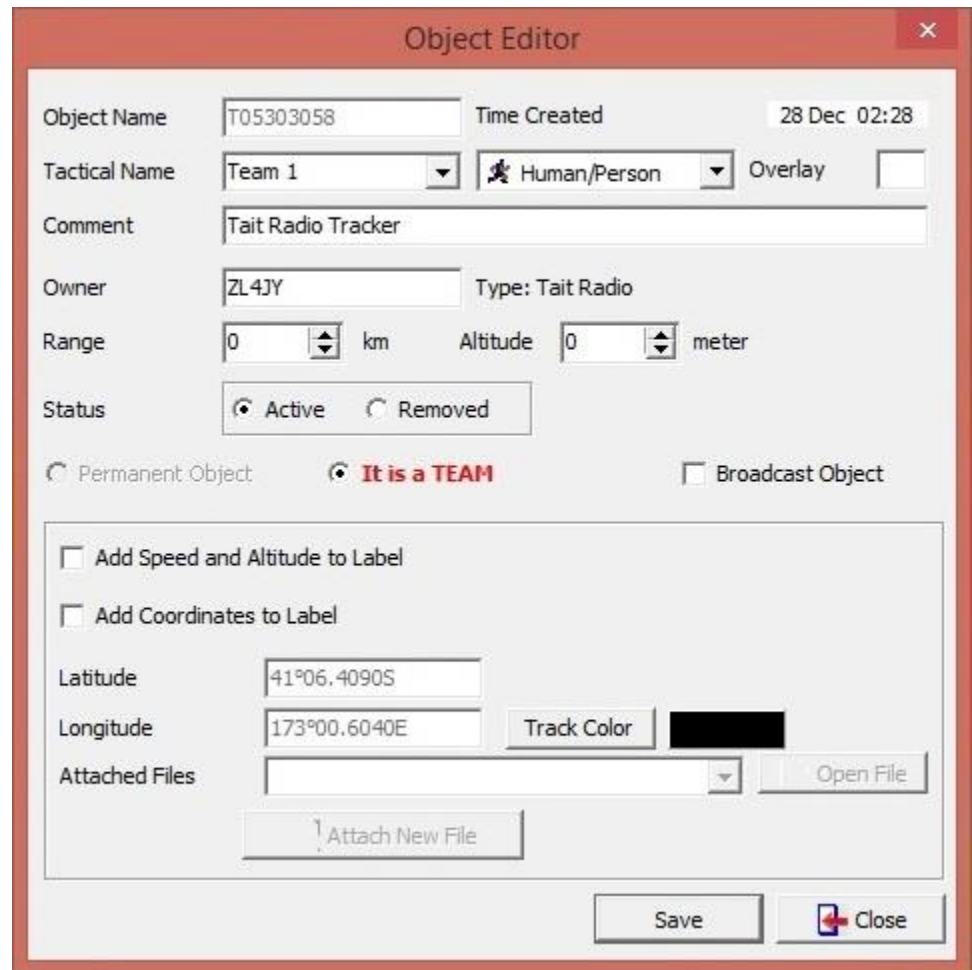
Name	Tactical Name	Status	Latitude	Longitude	Speed	Last Change	Owner	Information
T05303054		Active	41°06.3950S	173°00.5890E	0.26 kp/h	28 Dec 15:49	ZL4JY	Tait Radio Tracker
T05303055				50E	0.19 kp/h	28 Dec 15:49	ZL4JY	Tait Radio Tracker
T05303058				40E	0.11 km/h	28 Dec 15:49	ZL4JY	Tait Radio Tracker

Right click object name ...

# Select object and set it as a team

Right click object name ...

... enter team name in the Tactical Name box to make the team to radio assignment



Object Editor

Object Name: T05303058 Time Created: 28 Dec 02:28

Tactical Name: Team 1 Human/Person Overlay

Comment: Tait Radio Tracker

Owner: ZL4JY Type: Tait Radio

Range: 0 km Altitude: 0 meter

Status:  Active  Removed

Permanent Object  **It is a TEAM**  Broadcast Object

Add Speed and Altitude to Label

Add Coordinates to Label

Latitude: 41°06.4090S

Longitude: 173°00.6040E Track Color: XXXXXXXXXX

Attached Files:  Open File

Attach New File

Save Close

# Tait mobile DB15 auxiliary connector to PC DB9 wiring

Using the programming cable is adequate for testing but prevents microphone use  
PC to base radio connection should ideally use the auxiliary connector on the rear of the Tait TM9100/8200/9300 and 9400 radios as the standard external serial interface

- Edit codeplug Global Features > Serial Protocol > CCDI UART Port from MIC to AUX to change from the programming cable and MIC to the AUX auxiliary connector

The auxiliary connector only supports a subset of the RS232 standard but will work with most computer COM ports and USB serial port cables

Where interface difficulty is experienced use the Tait TMAA01-02 RS-232 Option Board



TAIT END DB15 MALE	FUNCTION	COM PORT END DB9 FEMALE
3	RXD	3
11	TXD	2
15	AGND	5
	DTR/DSR	Loop 4 to 6
	RTS/CTS	Loop 7 to 8

# Common issues

Unable to use Tait Programming Application on the TM9300 mobile

- If you are using the Tait programming cable for testing then the TM9300 mobile is set up with CCDI operation via the microphone connector. To get around this leave the mobile off until after you click read Radio > Read in the Programming Application then turn the mobile on.

If you are using the Tx9300 radios in DMR mode in conjunction with Motorola radios and you get the key lock symbol on the display and muted audio then the radio firmware must be upgraded

- Requires firmware 2.08.00.0073 or later
- DMR and P25 Terminals Calibration Application version 2.23.0.64, Tait Firmware Upgrade Tool 1.25.0.29, TM8200/TM9300/TP9300 Programming Application 2.8.22

If you are using the Tx9300 radios in DMR mode and are experiencing distorted audio the above firmware will also address this issue

If you are using the TM9100 you may need a feature key (SFE) to enable CCDI operation



# To program a LandSAR plan

LandSAR portables have 80 to 100 channels in one bank while AREC portables usually have multiple banks for different purposes or operating areas

It is possible to combine both approaches in the Tait TP9300 portable

- In Conv Key Settings check that the Scroll Keys are set to Channels Menu
- In the LandSAR zone, label channel 0 “Use Up/Dn Keys” and enter freqs of 000.0 MHz
- Complete the entry of the LandSAR channels
- In the 16-Way Selector tab for the matching zone set Selector Positions to either pick the 16 national channels or if a dedicated national zone has been created, set all Selector Positions to Channel 0
- If multiple LandSAR plans are to be programmed (for neighbouring regions ie LandSAR National, LandSAR North Otago, LandSAR Canterbury) then add additional zones and repeat.
- Sample codeplugs are available with the LandSAR plans already entered from John Yaldwyn

Channels

Summary Detailed Advanced Signaling Preset Selcall Preset Calls DTMF Preset Calls Signaling Decode

Number	Label	Rx Freq	Tx Freq	Rx Sig	Tx Sig	Power
0	Use Up/Dn Keys	000.000000	000.000000	None	None	High
1	DOC01	142.450000	139.450000	None	C151.4	High
2	DOC02	142.462500	139.462500	None	C151.4	High
3	DOC03	142.475000	139.475000	None	C151.4	High
4	DOC04	142.487500	139.487500	None	C151.4	High
5	DOC05	142.500000	139.500000	None	C151.4	High
6	DOC06	142.512500	139.512500	None	C151.4	High
7	DOC07	142.525000	139.525000	None	C151.4	High
8	DOC08	142.537500	139.537500	None	C151.4	High
9	DOC09	142.550000	139.550000	None	C151.4	High
10	DOC10	142.925000	139.925000	None	C151.4	High
11	DOC11	142.937500	139.937500	None	C151.4	High
12	DOC12	142.950000	139.950000	None	C151.4	High
13	DOC13	142.962500	139.962500	None	C151.4	High
14	DOC14	150.837500	150.837500	None	C151.4	High
15	DOC15	140.550000	140.550000	None	C151.4	High
16	DOC17	140.625000	140.625000	None	C151.4	High
17	DOC19	142.975000	139.975000	None	C151.4	High
18	DOC20	143.037500	140.037500	None	C151.4	High
19	EE122	163.725000	168.325000	None	C141.3	High
20	EE196	164.650000	169.250000	None	C141.3	High
21	ESB164	143.050000	140.050000	None	None	High
22	ESB57	141.712500	138.712500	None	C141.3	High
23	ESB57R	138.712500	141.712500	None	C141.3	High
24	ESB58	141.725000	138.725000	None	C141.3	High
25	ESB59	141.737500	138.737500	None	C141.3	High
26	ESB59R	138.737500	141.737500	None	C141.3	High
27	ESB60	141.750000	138.750000	None	C141.3	High
28	ESX07	140.587500	140.587500	None	C141.3	High
29	ESX39	140.987500	140.987500	None	None	High
30	ESX53	143.662500	143.662500	None	C141.3	High
31	FIRE1	143.825000	143.825000	None	None	High
32	FIRE2	143.787500	143.787500	None	None	High
33	FIRE3	140.925000	140.925000	None	None	High

Channels

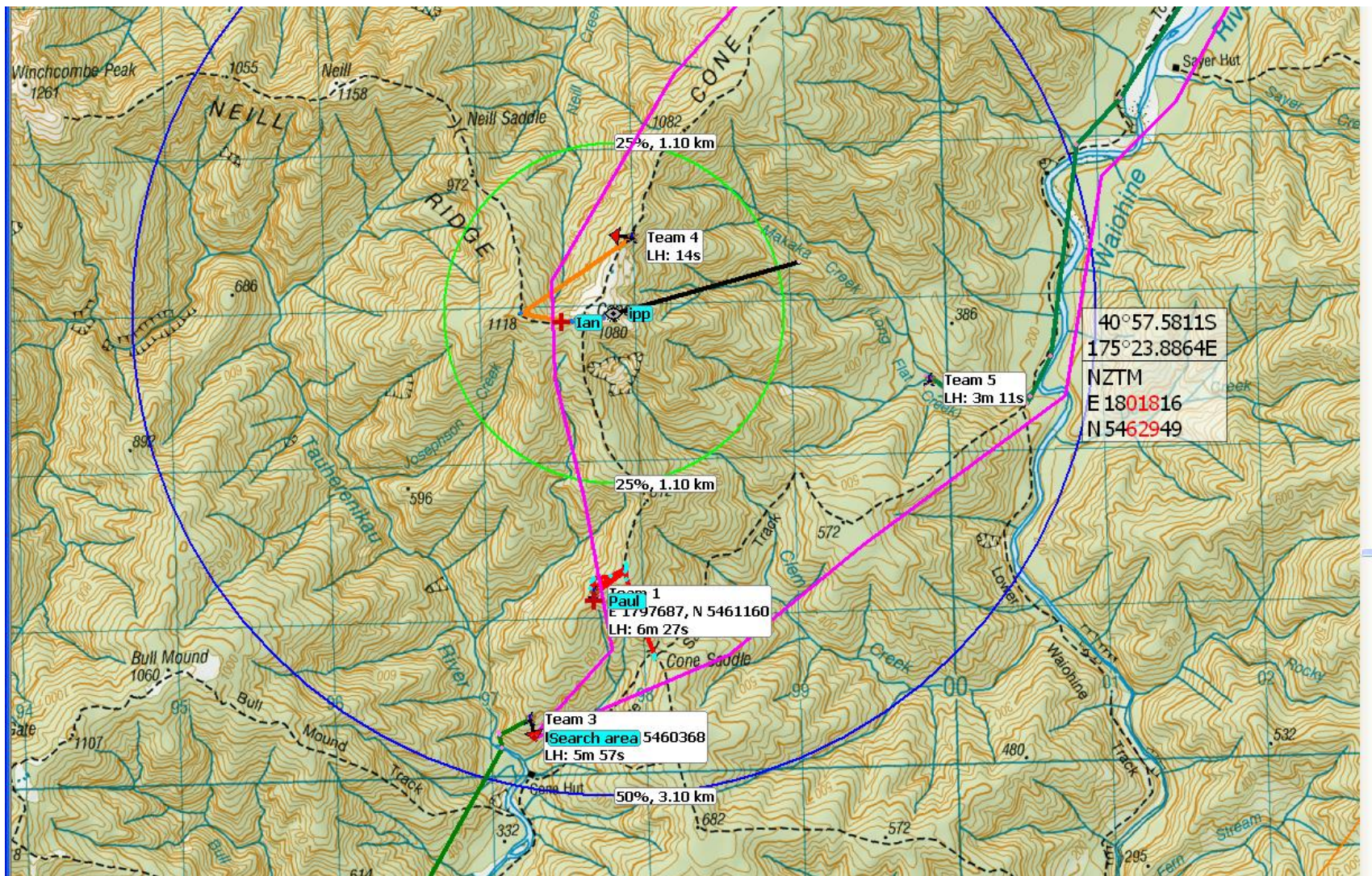
Use Up/Dn Keys [v] [←] [→] [+] Add [⊕] Repeat [X] Delete

Zones

LandSAR Nat [v] [←] [→]

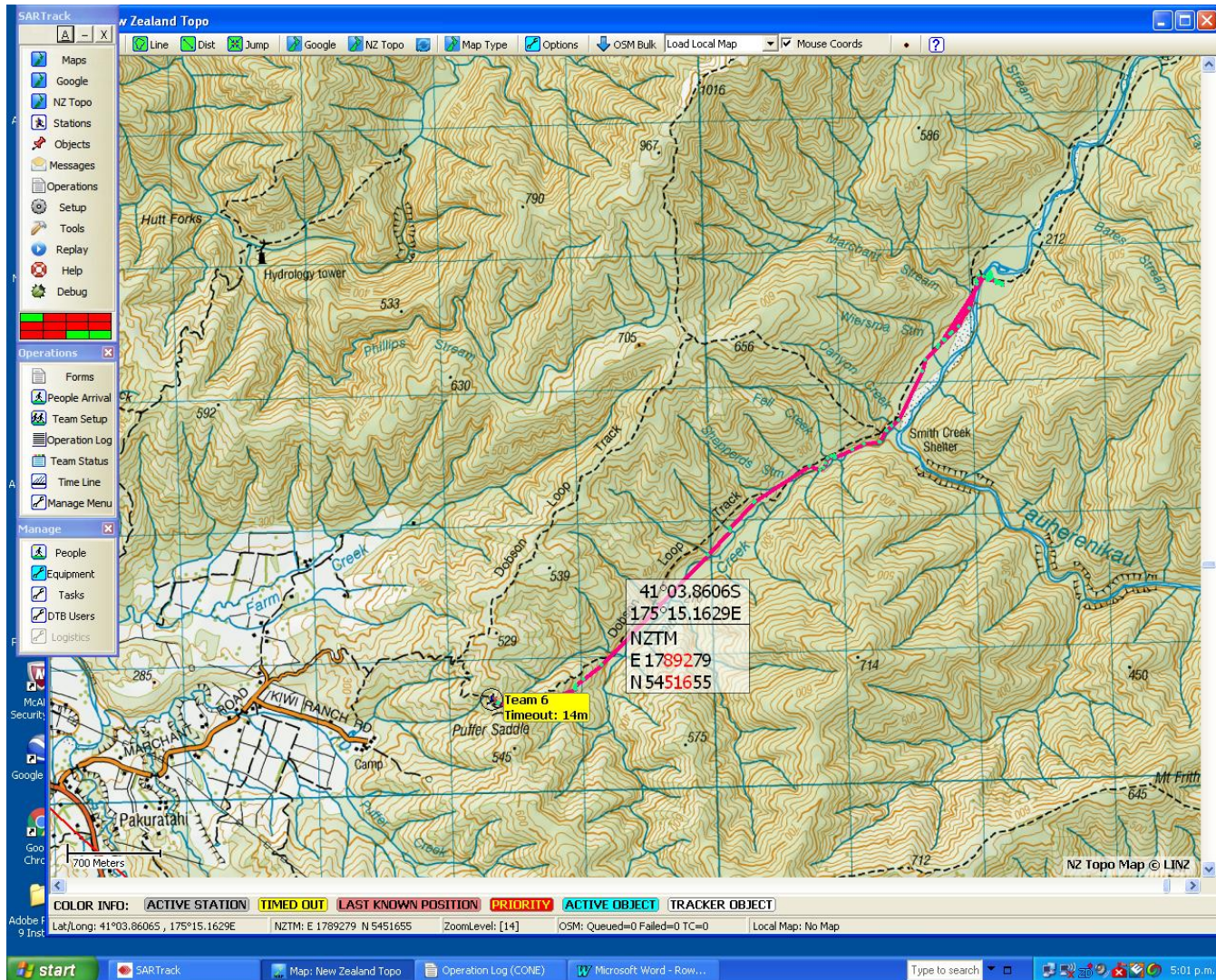


# SARTrack SAREX March 2016, images: Rowena ZL2ROW





# SARTrack SAREX March 2016, images: Rowena ZL2ROW



# SARTrack SAREX March 2016, images: Rowena ZL2ROW

Status	Date	Time	F/T	Reference	Radio#	Type	Summary	Operator	Sender	No.
Open	12/03/2016	3:07:09 p.m.	FROM	Operations		Message	T2 can you give present position - GR 008659	Margaret ...	WSAR2 Advisor	81
Mistake	12/03/2016	3:07:33 p.m.	FROM	T6		Standard	(Mistake) TRM - Team 6 has located Gordon Belfort at the Tutuwai Bridge he is fine and hi	Margaret ...	WSAR2 Advisor	82
Open	12/03/2016	3:12:35 p.m.	TO	Team 3		Task	NEW TASK: T3 proceed to Cone Hut - response @ 1513 On Way	Margaret ...	WSAR2 Advisor	85
Open	12/03/2016	3:14:06 p.m.	TO	Operations		Message	T3 is now clear of race	Margaret ...	WSAR2 Advisor	83
Open	12/03/2016	3:14:17 p.m.	FROM	Cone Marshals		Standard	TRM - Danny (Cone Marshal) has made it to Walls Whare. Mel has not made it to Wa	Dee Pearce	WSAR6 Coms	84
Open	12/03/2016	3:17:26 p.m.	FROM	Operations		Standard	T3 Head up to Cone Hut and call in on arrival to get further tasking	Margaret ...	WSAR2 Advisor	113
Open	12/03/2016	3:19:55 p.m.	TO	Kaitoke Base		Standard	TRM - SAR Base advising that TEC 3 and Team 6 have passed the Tauherenikau bridg	Dee Pearce	WSAR6 Coms	88
Open	12/03/2016	3:21:29 p.m.	FROM	T6		Standard	RM - Team 6 has located Gordon Belfort at the Tutuwai Bridge he is fine and his	Dee Pearce	WSAR6 Coms	89
Open	12/03/2016	3:22:22 p.m.	FROM	Kaitoke Base		Standard	TRM - Don is about to depart from Kaitoki Base.	Dee Pearce	WSAR6 Coms	91
Open	12/03/2016	3:22:46 p.m.	FROM	Team 5		Standard	T5 arrived at track junction at Makaka Creek	Margaret ...	WSAR2 Advisor	95
Open	12/03/2016	3:23:20 p.m.	TO	Operations		Message	T1 GR976612 Tracked to this point	Margaret ...	WSAR2 Advisor	94
Open	12/03/2016	3:25:01 p.m.	TO	Team 5		Standard	T5 search up Makaka Creek to true right fork	Margaret ...	WSAR2 Advisor	96
Open	12/03/2016	3:32:32 p.m.	FROM	Team 3		Standard	T3 At Cone Hut awaiting instructions	Margaret ...	WSAR2 Advisor	97
Open	12/03/2016	3:36:13 p.m.	FROM	Operations		Standard	All teams - For training purposes all teams please change radio operator	Margaret ...	WSAR2 Advisor	111
Open	12/03/2016	3:40:04 p.m.	FROM	Team 1		Message	T1 At GR 976612 Try to relocate Block 14 track off Cone Saddle track and attemp	Margaret ...	WSAR2 Advisor	115
Open	12/03/2016	3:40:09 p.m.	TO	Team 3		Standard	T3 Radio in on arrival at GR 970603	Margaret ...	WSAR2 Advisor	118
Open	12/03/2016	3:40:51 p.m.	FROM	Operations		Standard	T3 Proceed to GR970603 up Tauherenikau River from Cone Hut to old bridge site.	Margaret ...	WSAR2 Advisor	117
Open	12/03/2016	3:45:09 p.m.	FROM	Team 1		Standard	T1 Return to Cone Ridge track and continue with original task up to Cone Summit	Margaret ...	WSAR2 Advisor	119
Open	12/03/2016	3:50:30 p.m.	FROM	Operations		Standard	T4 Travel along Neil / Winchcombe ridge track to spot height 1118. Sign cut trac	Margaret ...	WSAR2 Advisor	120
Open	12/03/2016	3:52:51 p.m.	TO	Kaitoke Base		Standard	TRM - Advised Kaitoke Base the Team 6 have passed Smiths Creek.	Dee Pearce	WSAR6 Coms	114
Open	12/03/2016	3:56:28 p.m.	FROM	Cone Marshals		Standard	TRM - Cone Marshal Mel has made it out of Walls Whares and enroute to Carterton	Dee Pearce	WSAR6 Coms	116
Open	12/03/2016	3:57:09 p.m.	FROM	Team 1		Standard	T1 on main track to Cone Peak and progressing along	Margaret ...	WSAR2 Advisor	131
Open	12/03/2016	3:59:31 p.m.	TO	Kaitoke Base		Standard	TRM - SAR Base advises that all of the Marshals with the exception of TEC3 who	Dee Pearce	WSAR6 Coms	122
Open	12/03/2016	4:00:20 p.m.	FROM	Operations		Standard	T1 Ask dog handler whether he thinks its worth continuing with previous tracking	Margaret ...	WSAR2 Advisor	121
Open	12/03/2016	4:18:31 p.m.	FROM	Team 4		Standard	T4 At GR 972629 spot height 1118. Came across 3 track traps with no human sign.	Margaret ...	WSAR2 Advisor	134
Open	12/03/2016	4:21:33 p.m.	FROM	Team 1		Clues	T1 At GR 17976888 5461162 Located Paul who has a bee sting	Margaret ...	WSAR2 Advisor	136
Open	12/03/2016	4:21:33 p.m.	TO	Operations		Standard	T1 advised wasp nest at GR976612	Margaret ...	WSAR2 Advisor	137
Open	12/03/2016	4:27:49 p.m.	FROM	T6		Standard	TRM - Team 6 are near Puffer Saddle and changing over radio channel to Climie.	Dee Pearce	WSAR6 Coms	127
Open	12/03/2016	4:30:14 p.m.	FROM	Operations		Standard	T4 Go back to Cone Ridge track and proceed along Cone Ridge towards Totara Flats	Margaret ...	WSAR2 Advisor	135
Open	12/03/2016	4:32:47 p.m.	FROM	Team 1		Message	T1 Patient Paul was stung by wasps at 9.51 today. Known to be allergic to stings	Margaret ...	WSAR2 Advisor	140
Open	12/03/2016	4:32:56 p.m.	FROM	TMR T6		Standard	TMR T6 nearly at top of Puffer Saddle. Are switching to Climie Repeater.	Dee Pearce	WSAR6 Coms	130
Open	12/03/2016	4:33:44 p.m.	FROM	Kaitoke Base		Standard	TMR Kaitoke Base advised that TEC 3 and T6 are nearly at the top of the Puffer a	Dee Pearce	WSAR6 Coms	132
Open	12/03/2016	4:36:24 p.m.	FROM	Team 5		Message	T5 Are they to carry on to the next Creek Junction	Margaret ...	WSAR2 Advisor	142
Open	12/03/2016	4:40:50 p.m.	TO	Team 3		Message	T3 Get on to bottom of spur on true left of river and follow up old track to GR9	Margaret ...	WSAR2 Advisor	145
Open	12/03/2016	4:43:51 p.m.	TO	Kaitoke Base		Standard	TMR Kaitoke Base - were told that TEC 3 and T6 have switched to Climie	Dee Pearce	WSAR6 Coms	138
Open	12/03/2016	4:45:25 p.m.	TO	Team 5		Message	T5 Continue on from GR 999 624 up true right stream	Margaret ...	WSAR2 Advisor	144
Open	12/03/2016	4:46:55 p.m.	FROM	T6		Standard	TMR TEC 3 has gone ahead of T6 and is heading down to Kaitoke. TEC 3 does not ha	Dee Pearce	WSAR6 Coms	139
Open	12/03/2016	4:48:17 p.m.	FROM	Kaitoke Base		Standard	TMR Kaitoke base advises that finish line is packed up and Mike is just waiting	Dee Pearce	WSAR6 Coms	141

TRM - Cone Marshal Mel has made it out of Walls Whares and enroute to Carterton.

Click on LOG entry above to see full message.

Colors: OUT IN Actioned Automatic Priority Mistake



# Notes on SARTrack compatibility

**Automatic Packet Reporting System (APRS)** is an amateur radio standard used in the original SARTrack equipment. It works with any radio as the APRS sensor had both GPS and a radio modem built in. All the radio needs to do is transmit the audio tones over the air and the modems at each end do the rest. For more information see:

[https://en.wikipedia.org/wiki/Automatic\\_Packet\\_Reporting\\_System](https://en.wikipedia.org/wiki/Automatic_Packet_Reporting_System)

**Tait CCDI Analog** is a Tait developed system that sends command and control messages uses MPT1327 fast frequency shift keying (FFSK) tones over the air. Tait have a range of radios that support GPS location reporting using the Computer Controlled Data Interface (CCDI) method, some using standard external NMEA GPS sensors that are connected to the radio via RS-232 (within the radio the GPS location messages are converted to CCDI) and some with built in GPS sensors.

**Icom IDAS** radios support position reporting over analog using a built in GPS sensor. Typical radios include the IC-F3263DT. Some AREC groups are using these radios, particularly where an existing support infrastructure exists for Icom radios.

**Icom Analog** radios such as the IC-F50 can also have GPS sensors connected externally using a OPC-966 (or similar cable) and the portable will then report positions using the Icom SDM short data message format (based on MDC/BIIS).

**Cellular** phone positions can be displayed by using a separate program to capture the cellular positions as reported (for example by Google Latitude) and storing them in a SARTrack database for display.

**Maritime AIS** is an IMO standardized automatic tracking system used on ships. It contumeliously transmits vessels positions. It is widely used by all vessels over 300 tons and optionally by smaller craft. Transmission can be picked up by shore stations or satellite. It is supported by AREC in Wellington who have AIS receiving station installed to cover Cook Strait. See: <http://arec.info/marine-traffic/>

SARTrack supports all of the above protocols AT THE SAME TIME. In a recent SAREX in the Wairarapa, AREC tested both Tait CCDI and Icom IDAS portables running on the same radio repeater and reporting into the same SARTrack computer. No problems were experienced with this multi-vendor scenario.

John Yaldwyn

[jy@xtra.co.nz](mailto:jy@xtra.co.nz)

#### NOTES

AREC is the public service arm of NZART Inc

SARTrack is a trademark of SARTrack Limited

Tait is a trademark of Tait Ltd, IDAS is a service mark of Icom Japan

Tait, Linz, Google, and DigitalGlobe images shown under fair use doctrine