

Aircraft Scatter Propagation on 10 GHz using JT65C

Second Test over a 624 km Path

By Rex Moncur VK7MO and David Smith VK3HZ

This report relates to a second test of aircraft scatter on 10 GHz using JT65c during which a two way QSO was completed. This test was conducted on 22 May 2010 from Sunbury in Victoria to Mt Wellington Tasmania – a distance of 624 km. The report on our first test over this path may be found at: www.vk3hz.net/aep/AEP_on_10GHz.pdf

For this test, David replaced his DEMI kit pre-amp with a Kuhne pre-built unit and he received some 14 decodes compared to Rex only 7. On the earlier test with David's DEMI preamp, David received no decodes and Rex some 9 decodes. Whether this difference is due to the pre-amp or possibly due to a timing error on the previous tests we do not know. Nevertheless, the results on this second test suggest that if all the equipment is working correctly it should be easily possible to complete a QSO on a single aircraft at 620 km and that greater distances are possible.

Aircraft Schedules

The aircraft schedules showed the following aircraft might be useful during the planned period of operation.

Aircraft (ADS-B identifier)	Path	Approx Start of Scattering UTC	Approx End of Scattering UTC
JetStar JQ705 (JST705)	Melb - Hobart	2:00	2:20
Tiger TT5702	Melb - Launceston	2:10	2:30
Virgin DJ1322 (VOJ1323)	Melb – Hobart	2:30	2:50
Virgin DJ1366	Melb – Launceston	2:50	3:15

The aircraft were monitored on an ADS-B receiver. Only JQ705 and DJ1322 showed up on the ADS-B system and JQ705 was around 1 hour late.

Equipment

The equipment was the same as described in our first report, other than for the change of pre-amp by VK3HZ

Results

Received by VK3HZ

023401	0	-33	7.2	-630	4						
023601	2	-24	-0.2	-3	5	*	VK3HZ	VK7MO	QE37	0	10
023801	0	-22	-0.2	-5	4	*	VK3HZ	VK7MO	R-25	0	10
024001	2	-24	-0.2	-8	4	*	VK3HZ	VK7MO	R-25	0	10
024201	4	-18	-0.2	-8	4	*	VK3HZ	VK7MO	73	1	10
024401	3	-22	-0.2	-11	4	*	VK3HZ	VK7MO	QE37	0	10
024601	1	-28	0.0	-11	4	*	VK3HZ	VK7MO	-19	0	10
024801	2	-23	-0.3	32	15	*	VK3HZ	VK7MO	-19	0	10
025001	1	-26	-0.2	32	3	*	VK3HZ	VK7MO	-19	?	0 3
025201	0	-33	-1.2	153	46						
025401	0	-33	5.5	-159	4						
025601	0	-33	8.8	-412	52						
025801	6	-18	0.0	3	5	*	VK3HZ	VK7MO	-19	1	10
030001	6	-23	-0.1	46	6	*	VK3HZ	VK7MO	-19	0	10
030201	5	-23	-0.1	32	6	*	VK3HZ	VK7MO	-25	0	10
030401	1	-16	0.1	22	25	*	VK3HZ	VK7MO	R-25	1	10
030601	1	-21	-0.1	19	30	*	VK3HZ	VK7MO	R-27	0	10
030801	3	-23	0.0	-8	4	*	VK3HZ	VK7MO	R-27	1	10
031001	1	-29	0.0	-13	4	*					
031201	0	-29	-0.1	-19	1	*					

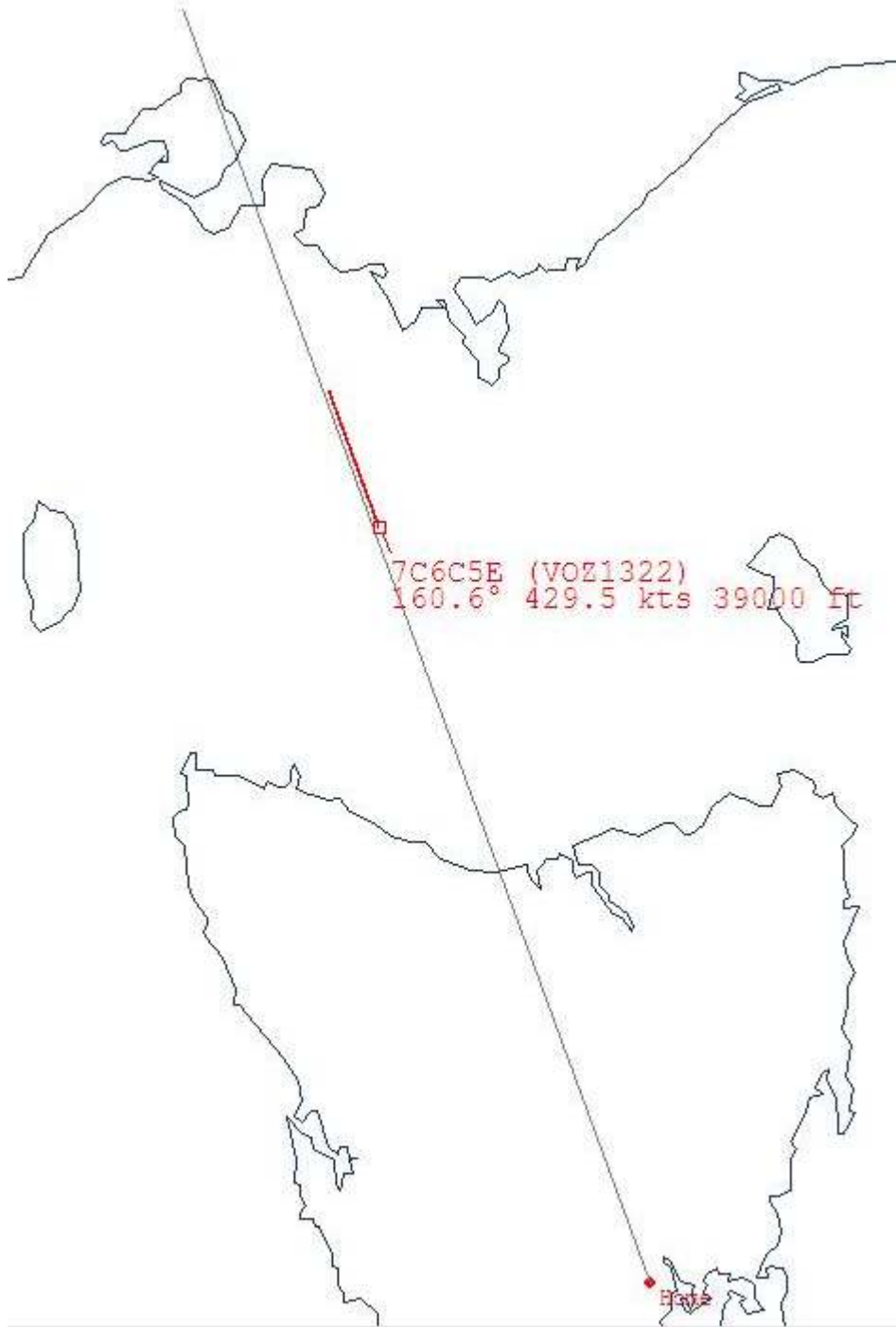
Received by VK7MO

023500	0	-32	0.4	13	3	*					
023700	3	-25	0.3	11	4	*	VK7MO	VK3HZ	-24	0	10
023900	0	-30	0.3	8	6	*					
024100	3	-24	0.1	8	4	*	VK7MO	VK3HZ	RRR	0	9
024300	7	-19	0.3	8	5	*	VK7MO	VK3HZ	73	0	10
024500	0	-33	6.8	186	17						
024700	0	-33	-0.1	40	38						
024900	0	-33	-0.6	493	28						
025100	0	-33	5.9	-369	29						
025300	0	-32	2.6	396	30	*					
025500	0	-32	0.7	-474	6	#					
025700	0	-33	6.1	406	6						
025900	0	-25	0.0	59	6	*	VK7MO	VK3HZ	-18	0	10
030100	2	-24	0.1	51	4	*	VK7MO	VK3HZ	-23	0	10
030300	1	-32		42	2		RRR	?			
030500	0	-27	0.2	13	4	*	VK7MO	VK3HZ	-16	?	0 5
030700	1	-27	0.1	11	5	*	VK7MO	VK3HZ	-21	0	6
030900	0	-33	-1.2	-32	27						
031100	2	-23	0.1	0	6	*	VK7MO	VK3HZ	-29	0	10
031300	0	-33	6.4	-16	3						

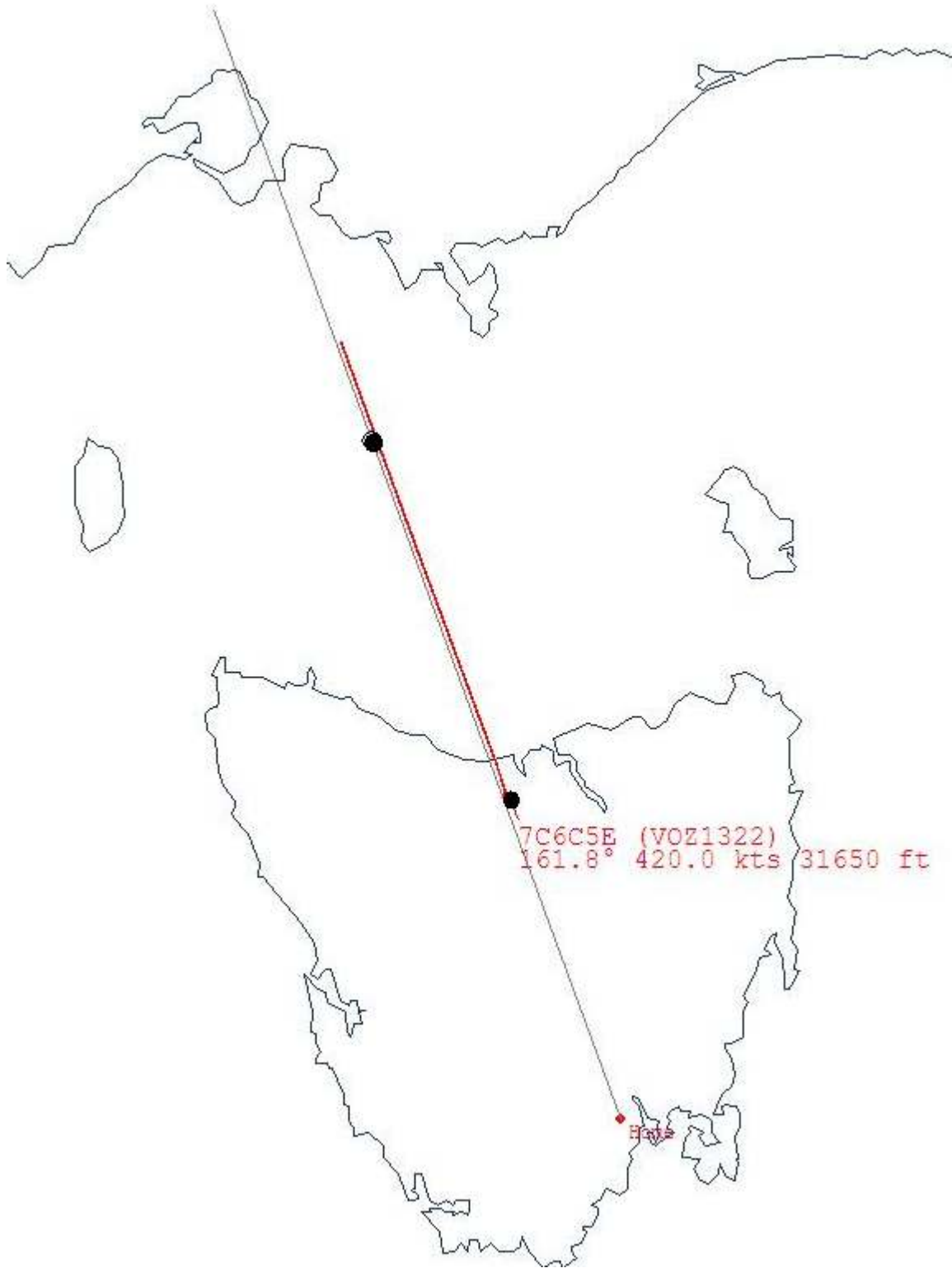
It appears from the above that two aircraft were involved - one which started at 0236 and was finished by 0250 for a total period of 14 minutes and the second which started at 0258 and was finished by 0311 for a total of 13 minutes. ADS-B screen grabs at each start and end period is documented below

ADS-B information

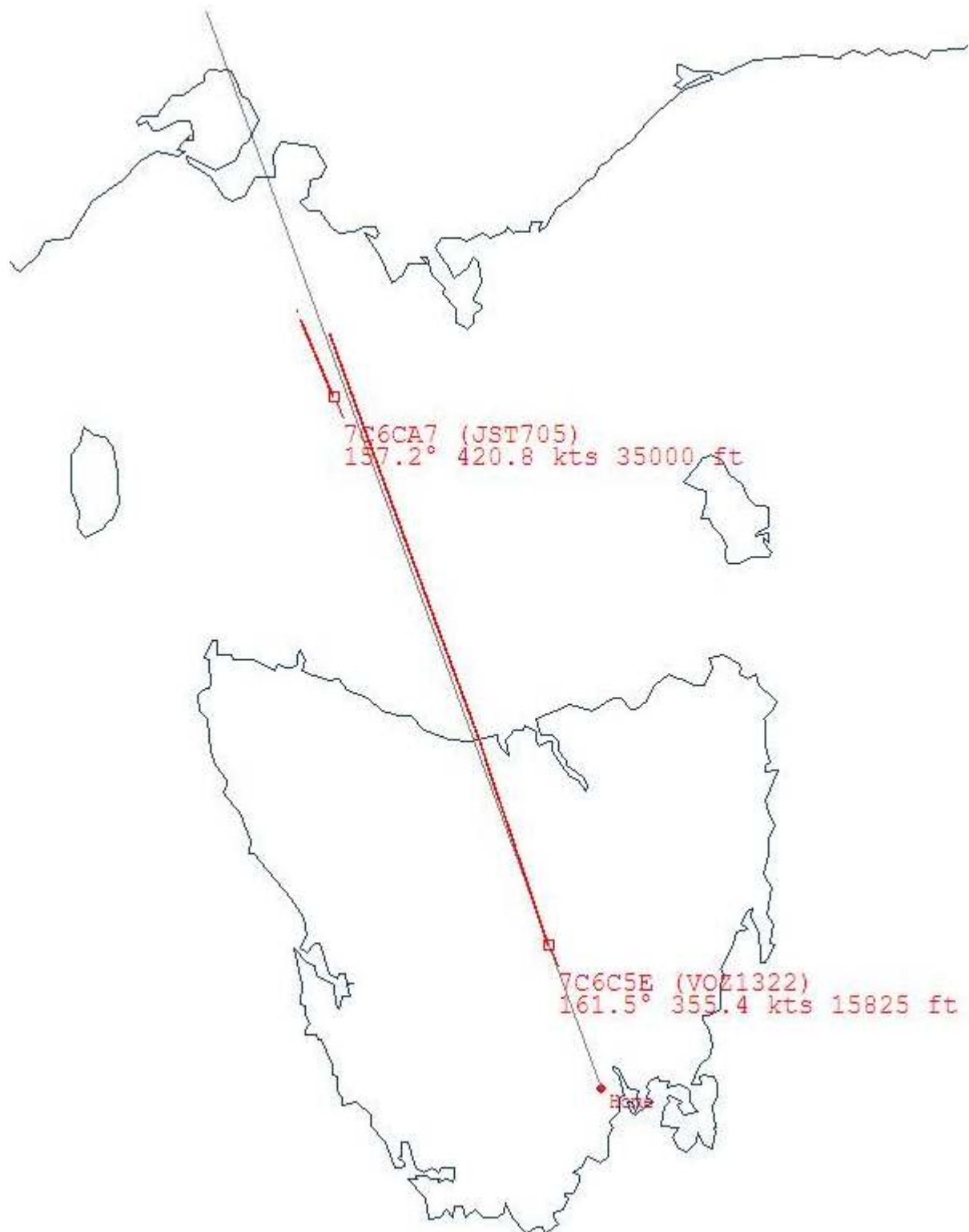
0236 UTC



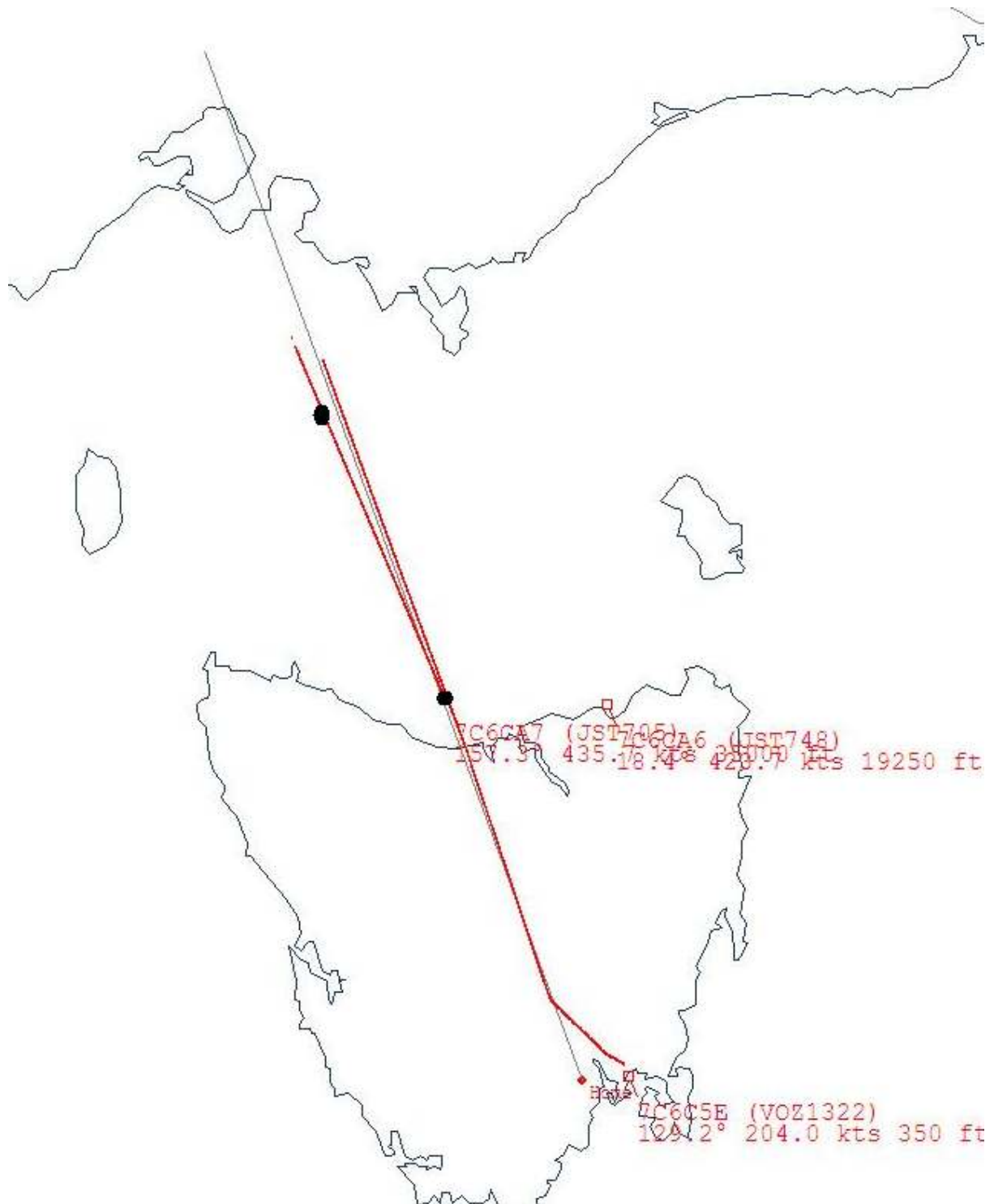
0250 UTC



0258 UTC



0311 UTC

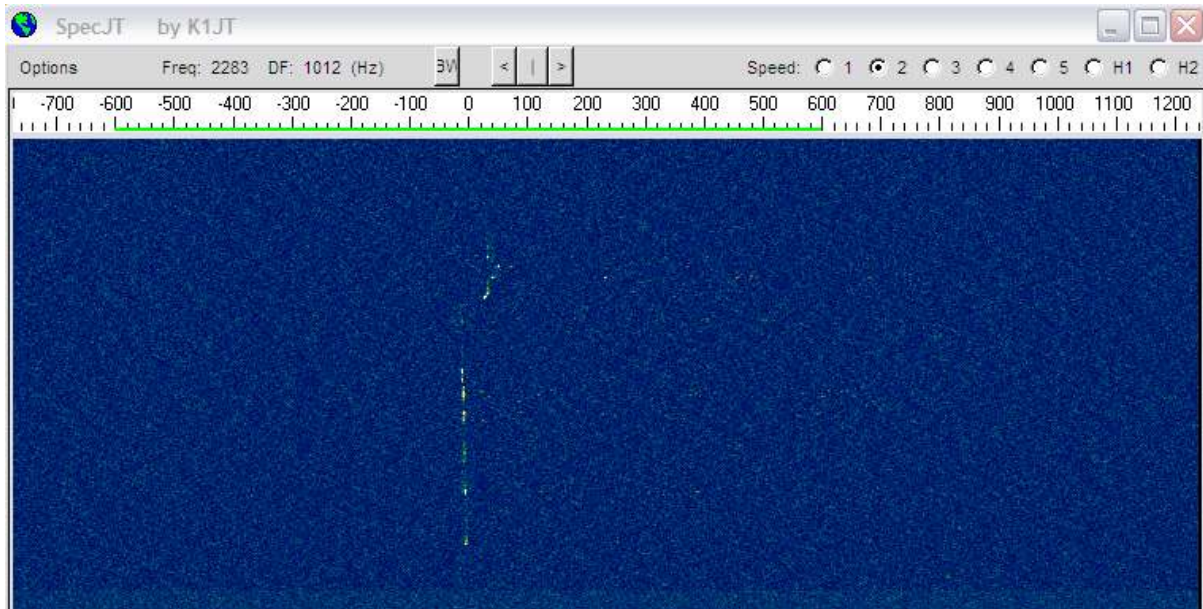


From these 4 ADS-B screen grabs it appears that only two aircraft - VOZ1323 and JST705 - were involved. The black dots indicate the time when the signals were first decoded and last decoded. While VOZ1323 flew very close to the path useful signals were still obtained

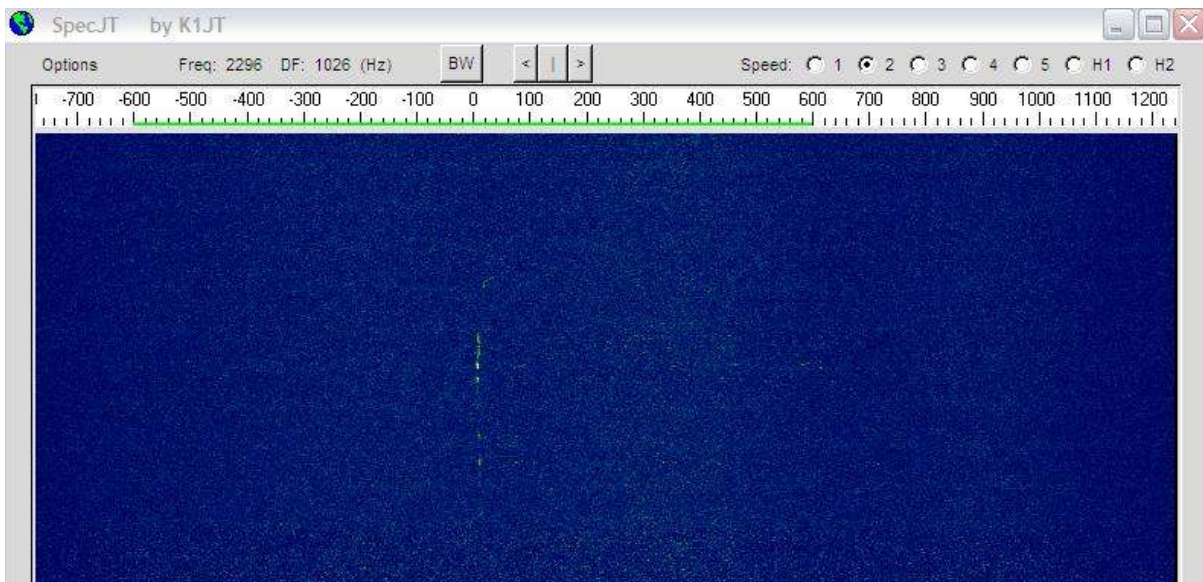
from JST705 even though it started off well away from the path – suggesting that one does not have to be too closely aligned for scatter to be useful.

Waterfall Results

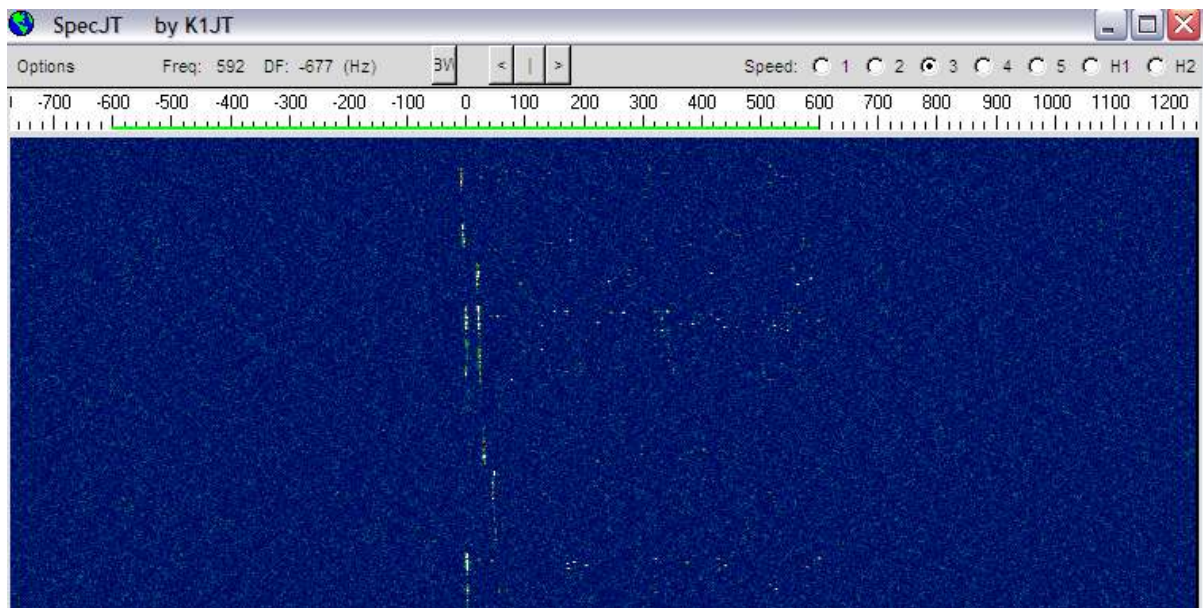
The following shows the waterfall results at David’s end for the first period 0236 to 0254 UTC.



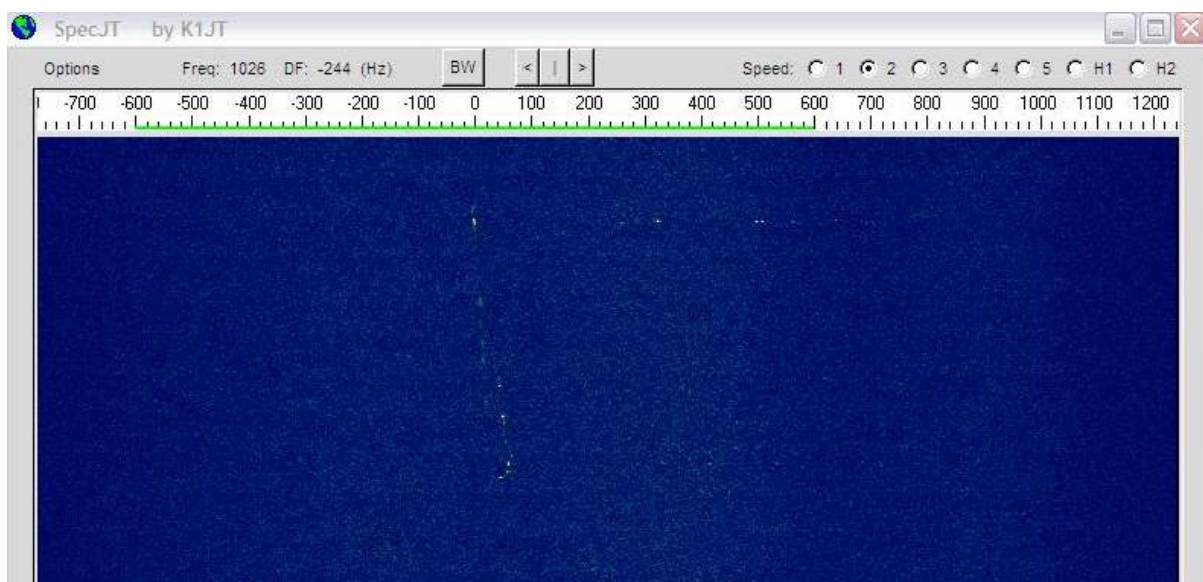
The same period at Rex’s end gave:



Below is shown the waterfall results for 0258 to 0308 UTC it seems that two aircraft were involved at least part of the time JST705 as indicated in the ABS-B and probably the slightly higher one in frequency is the Melbourne to Launceston flight DJ1366 which was scheduled for this time but presumably did not transmit an ADS-B signal.



The same period at Rex's end gave:



There is some evidence of the two traces separated by a similar distance on Rex's waterfall display also.

Overall the waterfall display at Rex's end shows much less signal consistent with the lower number of decodes.

Discussion

Again it has been demonstrated that JT65c can be effective for aircraft scatter at 10 GHz between portable stations and these tests show it is possible to complete a QSO with a single aircraft pass. Good decodes were still obtained on the second aircraft which was not so closely aligned with the path of propagation although these results might be affected by

the presence of a second aircraft. While the waterfall display shows significant signal level variation, this is not so evident as short bursts that were noted in the initial tests.