GBES Tracking Station Summary Report

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Introduction

This report is to investigate the "success rate" of the Green Bank Earth Station (NRAO OVLBI earth station) operations with the goal of determining if unattended tracking passes can/should be supported in the future. It is also intended to provide a history of NRAO OVLBI earth station tracking passes. In this report we will compare the success rate of unattended tracking passes with attended tracking passes including both recording and non-recording tracking passes.

Omissions and Comments

Currently only tracking passes from August 1, 1997 through March 31, 1998 are included in this report.

The purpose of the report is to present overall failure rates to determine operator scheduling. It is not intended as an absolute measure of the hardware and software failure rates of the NRAO OVLBI earth station. It should not be used to make decisions on software & hardware maintenance or improvements without more detailed information.

The information for this report was collected by the author from the NRAO OVLBI earth station logs, the operator log sheets, and the hardware & software maintenance logs. It is not guaranteed to be 100% accurate. The separation of errors into hardware and software errors reflects the (sometimes) arbitrary decision of the author and is intended to give a rough feel for the dependability of the software and the hardware. There was no attempt to distinguish between human errors and actual mechanical errors in the hardware category.

Organization

This report breaks the data into monthly sections with an overall review of the total NRAO OVLBI earth station performance at the end of the document. A table with the information for each tracking pass during the month will be presented. A discussion of the NRAO OVLBI earth station performance for that month will follow the each table.

For each month there is a table containing the information for each tracking pass during that month. The table consists of 10 columns. The first column is the "name" of the tracking pass. The tracking pass name has the following syntax; YYMMDDHHMM where YY is the year, MM is the month, DD is the day, HH is the hour and MM is the minute that the NRAO OVLBI earth station was scheduled to start transmitting to the satellite. The second column is the "percentage of good data" collecting during the tracking pass. This is defined as the total time that the data was valid between the scheduled start of the pass and the scheduled end of the pass divided by the total amount of time between the start and stop epochs of the tracking pass. It is noted that any given tracking pass cannot have 100% good data since it takes between 5 and 10 seconds to acquire a "good lock" with the satellite and thus declare the data as valid. The third column indicates whether the tracking pass was attended or unattended. An "X" indicates an unattended tracking pass. An "*" indicates that the tracking pass was scheduled to be unattended but Anthony Minter (AHM) or Glen Langston (GIL) checked in on the progress of the tracking pass and fixed any anomalous situation. A blank indicates that the tracking pass was attended. The fourth column gives the percentage of data "lost" during the tracking pass due to any and all failures. The fifth column gives the percentage of data lost for the tracking pass due to hardware problems or failures. The sixth column gives the percentage of data lost for the tracking pass due to software problems or failures. The seventh column gives the percentage of data that was recovered due to the actions of the operators, GIL or AHM. The eight column indicates the percentage of data that was lost for unattended tracking passes that could have been recovered if an operator had been present during the tracking pass. The ninth column indicates whether or not the tracking pass was a recording pass by giving the experiment code. Various notes on the tracking passes are given in the tenth column. In the fourth through eighth columns the percentages are given to the nearest integer due to these values having to be estimated by AHM.

August 1997

There was a total of 31 tracking passes in August of 1997 with 4 of these being unattended tracking passes. There were 5 tracking passes that lost data due to problems with HALCA or the schedule file (SRT file). Of the 27 attended tracking passes 22 collected the maximum amount of valid data possible. Software problems resulted in the loss of data on 2 attended tracking passes while hardware problems resulted in the loss of data on 2 of the attended tracking passes. The operators were able to increase the amount of valid data collected in 4 of the 5 passes were data was lost due to hardware or software problems. Of the unattended tracking passes 3 of 4 obtained the maximum amount of valid data. The unattended tracking pass that lost data lost 100% of its data. If an operator had been present for this pass (9708101904) then most of the data could have been salvaged. Also, this unattended tracking pass delayed the detection of the hardware problem by one day which could have prevented the loss of 27% of the data on the next pass.

Of the 9 recording passes, 7 collected the maximum amount of good data while the other two recording passes lost 2% and 11% of the data during the pass.

- 22 of 27 attended passes had max good data.
- Operators helped increase amount of good data in 4 of 5 “bad” attended passes.
- 3 of 4 unattended passes had max good data.
- Operators would have increased amount of good data in 1 of 1 “bad” unattended passes.
- A total of 0.29 tracking passes lost data due to software problems.
- A total of 1.39 tracking passes lost data due to hardware problems.
- A total of 1.37 tracking passes lost data due to problems with HALCA.
- 7 of 9 recording passes were completely successful.
- A total of 0.13 recording passes lost data.

Table 1.0: GBES Tracking Pass Summary for August 1997

		no	% lost			Attended	Unattended		
pass	% good	op.	total	hardware	software	% recovered	% recoverable	exp	notes
9708011932	99.00		1			>50			pointing, 20' el offset
9708022104	86.30		13		13	86			ACU problem, late onto source
9708041600	0.00		100					V017d	No HALCA signal
9708050016	98.47							V017d	HALCA Ku antenna unwrap
9708051711	97.36		2	2		97		V047t	formatter and ACU problems
9708061942	99.85							VTP01	
9708081504	99.29								HALCA behind water tower legs
9708082129	88.51		11	11				V030p	azimuth jumps
9708091739	93.93		6						weak HALCA signal at beginning
9708100130	99.22	X							
9708101904	0.00	X	100	100			>50		Decoder hardware problem
9708112133	72.40		27	27		72			Decoder hardware problem
9708131500	87.68		12						HALCA vanished for 20 minutes
9708132128	91.82		8					VT817	HALCA not there first 20 min
9708141729	99.88								
9708151744	88.53		11						HALCA signal off GB early
9708162103	97.20								HALCA Ku antenna unwrap
9708181514	99.35								Azimuth jumps
9708191701	99.64								Azimuth jumps
9708202126	99.70								
9708220243	99.93								
9708221428	99.76								
9708222037	95.80							V034b1	HALCA Ku antenna unwrap
9708231547	83.01		16		16	73			ACU stopped
9708241824	99.82	X							
9708252205	99.79								
9708271512	99.86								
9708281633	99.93								
9708291933	99.48							VT822	Azimuth jumps
9708302239	99.63							VS07g	
9708311322	98.99	X							

September 1997

There was a total of 29 tracking passes in September of 1997 with 6 of these being unattended tracking passes. There were 2 tracking passes that lost data due to problems with HALCA or the schedule file (SRT file). Of the 23 attended tracking passes 11 collected the maximum amount of valid data possible. Software problems resulted in the loss of data on 4 attended tracking passes while hardware problems resulted in the loss of data on 9 of the attended tracking passes. Two passes lost data due to both hardware and software problems. The operators were able to increase the amount of valid data collected in 5 of the 12 passes were data was lost due to hardware or software problems. Of the unattended tracking passes 6 of 6 obtained the maximum amount of valid data.

Of the 6 recording passes, 2 collected the maximum amount of good data while the other recording passes lost 2%, 6%, 9% and 4% of the data during the passes.

- 11 of 23 attended passes had max good data.
- Operators helped increase amount of good data in 5 of 12 "bad" attended passes.
- 6 of 6 unattended passes had max good data.
- A total of 0.22 tracking passes lost data due to software problems.
- A total of 2.48 tracking passes lost data due to hardware problems.
- A total of 1.00 tracking passes lost data due to problems with HALCA.
- 2 of 6 recording passes were completely successful.
- A total of 0.21 recording passes lost data.

Table 2.0: GBES Tracking Pass Summary for September 1997

		no	% lost			Attended	Unattended		
pass	% good	op.	total	hardware	software	% recovered	% recoverable	exp	notes
9709011434	99.64	X							
9709021642	99.93								
9709032032	0.00		100						No signal from HALCA
9709051342	97.35		2	2				VT820	Azimuth jumps
9709061457	99.93							VT821	
9709071733	99.51	X							
9709082118	0.00		100	?	?				Costas never locked
9709092005	99.54								HALCA signal late
9709101344	90.47		9		9	90			Decoder got stuck
9709111508	0.00		100	100					TWT problem
9709121830	99.81								
9709132156	99.75	X							
9709142027	93.18		6		6	93		V047r	ACU problem - ant. not moving
9709151419	99.29	X							
9709152032	99.04							V047k	
9709161533	99.17								Azimuth jumps
9709171652	90.92		9	9				V041d	Azimuth jumps
9709182227	96.33		3	3					Azimuth, Elevation jumps
9709191303	97.99		2	2					Azimuth jumps
9709201418	97.57								Azimuth jumps, HALCA ant wrap
9709202049	29.60		70	65	5	29			ACU stopped, HALCA Ku ant. wrap
9709211659	37.31		62	62		37			Demodulator problems
9709230000	97.43	X							Very short pass
9709232028	96.06		3	1	2	96			Computer hung-up, Azimuth jumps
9709251439	95.21		4	4				V022c	Azimuth jumps
9709261732	99.79								Azimuth jumps
9709272112	99.69								
9709282038	99.56	X							Azimuth jumps
9709302222	0.00		100						HALCA not commanded

October 1997

There was a total of 28 tracking passes in October of 1997 with 5 of these being unattended tracking passes. Of the 23 attended tracking passes 11 collected the maximum amount of valid data possible. Software problems resulted in the loss of data on 3 attended tracking passes while hardware problems resulted in the loss of data on 10 of the attended tracking passes. The operators were able to increase the amount of valid data collected in 7 of the 11 passes were data was lost due to hardware or software problems. Of the unattended tracking passes 0 of 5 obtained the maximum amount of valid data. The presence of an operator at the "bad" unattended tracking passes would have increased the amount of good data in 5 of 5 passes.

Of the 7 recording passes, 2 collected the maximum amount of good data while the other recording passes lost 3%, 1%, 100%, 100% and 20% of the data during the pass.

- 11 of 23 attended passes had max good data.
- Operators helped increase amount of good data in 7 of 12 "bad" attended passes.
- 0 of 5 unattended passes had max good data.
- Operators would have increased amount of good data in 4 of 5 "bad" unattended passes.
- A total of 0.35 tracking passes lost data due to software problems.
- A total of 3.88 tracking passes lost data due to hardware problems.
- 2 of 7 recording passes were completely successful.
- A total of 2.24 recording passes lost data.

Table 3.0: GBES Tracking Pass Summary for October 1997

		no	% lost			Attended	Unattended		
pass	% good	op.	total	hardware	software	% recovered	% recoverable	exp	notes
9710031231	99.52							V041a	Elevation jump
9710041406	99.58								
9710061629	98.75	*	1	1		99	100		GIL fixed TWT problem
9710071747	96.75								HALCA Ku antenna unwrap
9710081247	85.12		14	1	13	21			Azimuth jumps; ACU stopped
9710101525	97.17								HALCA Ku antenna unwrap
9710110014	5.82	X	94	94			94		Breaks turned on
9710111656	96.38		3	3				V101e	Azimuth jumps
9710121924	72.63	X	27	27			27		Breaks turned on
9710132019	98.61		2	2		>75			Az, El jumps, breaks turned on
9710142143	97.85		2	2					Az, El jumps
9710151541	90.25		9	9		>90			Az, El jumps, breaks turned on
9710161925	93.75		6	6		25			breaks turned on
9710171819	97.97		1	1				V053e1	Az,El jumps; HALCA Ku ant. wrap
9710182003	99.95								
9710191437	98.84	X	1	1					Az, El jumps
9710201557	0.00		100	100				V053e2	TWT firmware problems
9710211721	90.79		9		9	91			Computer hung up
9710221835	0.00		100	100				VT824	breaks set; El jumps, TWT problems
9710231959	79.08		20	20		79		VT825	Decoder problems
9710242358	98.91								Elevation jumps
9710251624	99.70								Elevation jumps
9710261749	78.91	X	21	21			21		El jumps; breaks turned on
9710272144	99.12								Elevation jumps
9710282100	85.56		14		13	31			HALCA Ku ant wrap; CPU crashed
9710291509	97.97								HALCA Ku antenna unwrap
9710301703	99.48							V508d	Elevation jumps
9710311751	98.41								El jumps; HALCA ant wrap; breaks on

November 1997

There was a total of 22 tracking passes in November of 1997 with 4 of these being unattended tracking passes. Of the 18 attended tracking passes 9 collected the maximum amount of valid data possible. Problems with HALCA resulted in the loss of data from 1 tracking pass. Software problems resulted in the loss of data on 2 attended tracking passes while hardware problems resulted in the loss of data on 7 of the attended tracking passes. The operators were able to increase the amount of valid data collected in 6 of the 9 passes were data was lost due to hardware or software problems. Of the unattended tracking passes 0 of 4 obtained the maximum amount of valid data. The presence of an operator at the "bad" unattended tracking passes would have increased the amount of good data in 1–2 of 4 passes.

Of the 5 recording passes, 3 collected the maximum amount of good data while the other two recording passes lost 2% and 10% of the data during the pass.

- 9 of 18 attended passes had max good data.
- Operators helped increase amount of good data in 6 of 9 "bad" attended passes.
- 0 of 4 unattended passes had max good data.
- Operators would have increased amount of good data in 1–2 of 4 "bad" unattended passes.
- A total of 0.16 tracking passes lost data due to software problems.
- A total of 4.31 tracking passes lost data due to hardware problems.
- A total of 1.00 tracking passes lost data due to problems with HALCA.
- Inclement weather resulted in the loss of 0.08 tracking passes.
- 3 of 5 recording passes were completely successful.
- A total of 0.12 recording passes lost data.

Table 4.0: GBES Tracking Pass Summary for November 1997

		no	% lost			Attended	Unattended		
pass	% good	op.	total	hardware	software	% recovered	% recoverable	exp	notes
9711011914	98.72								HALCA Ku antenna unwrap
9711031528	97.48		2	2		>90			Az jumps; decoder problem
9711041654	98.70								HALCA Ku antenna wrap
9711051803	96.96		2	2				V053e3	HALCA Ku antenna wrap; El jumps
9711081545	88.07		10	2		>90			HALCA ant wrap; El jumps; SNOW
9711091711	36.39	X	63	63			63		Az, el jumps; breaks set
9711101819	98.03							V330c	HALCA Ku antenna wrap; El jumps
9711121438	97.83								HALCA Ku antenna wrap; El jumps
9711141716	99.04								Elevation jumps
9711151835	0.00		100					VT907	no signal from HALCA
9711171646	93.25		6		6				Dispatch, Monchk problems
9711181612	96.52		3	3		96			Breaks turned on
9711191903	99.86								
9711201851	89.05		10		10			VS04s	El jumps; CPU crashed
9711221703	95.27		4	4		95			TWT problems
9711241747	99.20							V046a	
9711251249	85.40		14	14		85			Peltier problems
9711261500	99.92								
9711281903	0.00	X	100	100			??		Decoder problems
9711291143	58.73		41	41		55			Decoder problems
9711292033	0.00	X	100	100					Decoder problems
9711301314	0.00	X	100	100					Decoder problems

December 1997

There was a total of 26 tracking passes in December of 1997 with 6 of these being unattended tracking passes. Of the 20 attended tracking passes 14 collected the maximum amount of valid data possible. Software problems resulted in the loss of data on 1 attended tracking passes while hardware problems resulted in the loss of data on 4 of the attended tracking passes. The operators were able to increase the amount of valid data collected in 3 of the 6 passes were data was lost due to hardware or software problems. Of the unattended tracking passes 3 of 6 obtained the maximum amount of valid data. The presence of an operator at the "bad" unattended tracking passes would have increased the amount of good data in 3 of 3 passes.

Of the 14 recording passes, 8 collected the maximum amount of good data while the other recording passes lost 21%, 100%, 100%, 67% and 3% of the data during the pass. Two of the recording passes lost data due to inclement weather.

- 14 of 20 attended passes had max good data.
- Operators helped increase amount of good data in 3 of 6 "bad" attended passes.
- 3 of 6 unattended passes had max good data.
- Operators would have increased amount of good data in 3 of 3 "bad" unattended passes.
- A total of 0.22 tracking passes lost data due to software problems.
- A total of 3.72 tracking passes lost data due to hardware problems.
- Inclement weather resulted in the loss of 0.53 tracking passes.
- 8 of 14 recording passes were completely successful.
- A total of 2.91 recording passes lost data.

Table 5.0: GBES Tracking Pass Summary for December 1997

		no	% lost			Attended	Unattended		
pass	% good	op.	total	hardware	software	% recovered	% recoverable	exp	notes
9712011427	68.09		21	21		68		VS07b	TWT/Decoder problems
9712021803	99.73								
9712031040	89.82							VS03j	HALCA downlink antenna unwrap
9712031933	99.85								
9712041159	93.77							V003b	
9712051342	99.81								
9712061641	79.91	X	20		20		>90		Decoder problem, GIL fixed
9712071803	99.46	X							
9712081055	95.84	X							HALCA downlink antenna unwrap
9712081803	96.37							V138d	HALCA downlink antenna unwrap
9712091837	0.00		100	50				VS05j	ICE storm, TWT late in GBES
9712101336	0.00		100	100				V029a	TWT problem
9712101559	33.86		67					V029a	TWT problem
9712111727	99.84							V029l	
9712121733	99.92							V004b1	
9712141235	99.27	X							
9712151453	97.12		2		2	97			Antenna ACU problem at start
9712171627	99.27							VS05s	
9712181746	99.55							V050j	
9712201404	99.24							V081b	
9712211523	98.93							V035a1	HALCA downlink antenna unwrap
9712211753	99.02								
9712221642	96.53		3			~ 25		V067b1	ICE storm,pointing
9712241325	65.89	X	34	34			>90		transmitter no lock, AHM fixed
9712261539	0.00	X	100	100			>90		transmitter not locking
9712291402	99.59								

January 1998

There was a total of 26 tracking passes in January of 1998 with 12 of these being unattended tracking passes. Of the 14 attended tracking passes 6 collected the maximum amount of valid data possible. Software problems resulted in the loss of data on 0 attended tracking passes while hardware problems resulted in the loss of data on 8 of the attended tracking passes. The operators were able to increase the amount of valid data collected in 1 of the 8 passes were data was lost due to hardware or software problems. Of the unattended tracking passes 3 of 12 obtained the maximum amount of valid data. The presence of an operator at the “bad” unattended tracking passes would have increased the amount of good data in 4 of 9 passes. Two unattended tracking passes (9801041728 and 9801061109) delayed the detection of a hardware problem by 2 days by not having an operator present or a call-out task. This resulted in an extra 1–2 tracking passes being lost.

Of the 10 recording passes, 1 collected the maximum amount of good data while the other recording passes lost 100%, 15%, 100% , 100% , 100% , 100% , 100% and 1% of the data during the pass.

- 6 of 14 attended passes had max good data.
- Operators helped increase amount of good data in 1 of 8 “bad” attended passes.
- 3 of 12 unattended passes had max good data.
- Operators would have increased amount of good data in 4 of 9 “bad” unattended passes.
- A total of 0.00 tracking passes lost data due to software problems.
- A total of 12.01 tracking passes lost data due to hardware problems.
- Inclement weather resulted in the loss of 0.50 tracking passes.
- 1 of 10 recording passes were completely successful.
- A total of 6.16 recording passes lost data.

Table 6.0: GBES Tracking Pass Summary for January 1998

		no	% lost			Attended	Unattended		
pass	% good	op.	total	hardware	software	% recovered	% recoverable	exp	notes
9801041728	0.00	X	100				100		command file not running
9801061109	0.00	X	100	100					power outage ; TWT problem
9801071246	0.00		100	100					power outage ; TWT problem
9801081347	0.00		100	100				V110a2	power outage ; TWT problem
9801091506	99.26							V147a	
9801111124	99.04	X							
9801121243	84.79		15			> 50		V110a3	Azimuth jumps
9801131545	98.76								HALCA downlink antenna unwrap
9801141636	0.00		100	100				VS07u	Twt problem
9801161217	0.00	X	100	100					TWT loose part
9801162301	0.00	X	100	100					TWT loose part
9801171259	0.00		100	100				V140b1	TWT problem
9801181418	0.00		100	100				VT833	TWT problem
9801191947	0.00		100	100				V110a4	TWT problem
9801201036	0.00	X	100	100					TWT problem
9801202137	0.00		100	100				VS05q	TWT problem
9801211200	0.00	X	100	100					TWT problem
9801221426	99.88								
9801231558	99.03							V018a	
9801241954	49.14	X	50				> 90		Snow, pointing
9801251052	98.35	X							
9801261222	99.79								V140b2
9801271436	99.86								
9801281603	98.67	*	1	1		60	60	V037a	AHM/GIL op, az jumps
9801301107	73.72	X	26				100		az rate set too slow
9801311249	99.67	X							

February 1998

There was a total of 17 tracking passes in February of 1998 with 10 of these being unattended tracking passes. Of the 7 attended tracking passes 7 collected the maximum amount of valid data possible. Of the unattended tracking passes 5 of 10 obtained the maximum amount of valid data. The presence of an operator at the "bad" unattended tracking passes would have increased the amount of good data in 1–3 of 5 passes. There were 4 tracking passes where there were problems with HALCA and 3 tracking passes where there were problems with the SRT files or orbit prediction files.

Inclement weather caused the complete loss of one tracking pass. The observatory was on emergency shutdown and the operator did not notify GIL or AHM that he was not attending the tracking pass. The tracking pass could have been performed due to the low elevation of HALCA during the whole tracking pass without any danger to the safety of the NRAO OVLBI earth station.

Of the 2 recording passes, 2 collected the maximum amount of good data. One recording pass was affected by the SRT file not reflecting the current orbital parameters after HALCA came out of a safehold mode.

- 7 of 7 attended passes had max good data.
- Operators helped increase amount of good data in 0 of 0 "bad" attended passes.
- 5 of 10 unattended passes had max good data.
- Operators would have increased amount of good data in 1–3 of 5 "bad" unattended passes.
- A total of 0.03 tracking passes lost data due to software problems.
- A total of 0.07 tracking passes lost data due to hardware problems.
- A total of 4.00 tracking passes lost data due to problems with HALCA.
- SRT and orbit prediction file problems resulted in the loss of 0.84 tracking passes.
- 2 of 2 recording passes were completely successful.
- A total of 0.00 recording passes lost data.

Table 7.0: GBES Tracking Pass Summary for February 1998

		no	% lost			Attended	Unattended		
pass	% good	op.	total	hardware	software	% recovered	% recoverable	exp	notes
9802011505	99.93	X							
9802021846	92.06	X	7	7					TWT module put in system late
9802031004	95.21	X	4				4?		UNKNOWN CAUSE
9802032122	99.18								
9802041123	0.00	X	100				100?		Snow - op not inform not here
9802051311	99.18	X							
9802061539	99.90								
9802071957	99.28							V140b3	
9802081020	0.00	X	100						HALCA IN SAFEHOLD-no call-out
9802091140	0.00		100						HALCA IN SAFEHOLD
9802101331	0.00		100						HALCA IN SAFEHOLD
9802151515	98.93		1						SRT off 5-15 min from SAFEHOLD
9802181051	0.00	X	100						HALCA in SAFEHOLD
9802201437	93.03	X	3		3				'bad' orb pred; TWT glitches
9802211946	19.19		80					VS11f	'bad' srt times
9802241617	97.17		2						snow, pointing
9802251502	98.45	X							HALCA Ku antenna unwrap
9802281329	98.76	*	1				100		GIL, ant. in 2nd limit (Az¿90)

March 1998

There was a total of 22 tracking passes in March of 1998 with 3 of these being unattended tracking passes. Of the 19 attended tracking passes 14 collected the maximum amount of valid data possible. Of the unattended tracking passes 3 of 3 obtained the maximum amount of valid data. There were 3 tracking passes where there were problems with HALCA.

Of the 11 recording passes, 7 collected the maximum amount of good data while the other recording passes lost 2%, 4%, 38% and 43% of the data during the pass.

- 14 of 19 attended passes had max good data.
- Operators helped increase amount of good data in 3 of 5 “bad” attended passes.
- 3 of 3 unattended passes had max good data.
- A total of 0.64 tracking passes lost data due to software problems.
- A total of 0.43 tracking passes lost data due to hardware problems.
- A total of 3.00 tracking passes lost data due to problems with HALCA.
- 7 of 11 recording passes were completely successful.
- A total of 0.87 recording passes lost data.

Table 8.0: GBES Tracking Pass Summary for March 1998

		no	% lost			Attended	Unattended		
pass	% good	op.	total	hardware	software	% recovered	% recoverable	exp	notes
9803011332	97.12		2		2			V115b	software TWT bug
9803021803	99.36							V030a	
9803031803	95.98		4			95		V047l	Ant. in 2nd limit (Az¿90)
9803051245	98.14								
9803052233	97.13							VS07g	
9803061558	98.66								
9803091301	75.89		24		24				software TWT bug
9803101416	61.13		38		38			V053f1	software TWT bug
9803111455	99.93							V010h1	
9803141252	0.00		100						HACLA not commanded
9803151353	0.00		100					V034b3	HALCA not commanded
9803181229	99.78								
9803191223	56.18		43	43		56		VT715	Intermittent Ku-synth problem
9803211703	99.71							V064b1	
9803221803	99.85							V064a1	
9803231131	99.86							VT716	
9803241142	99.90								
9803251304	99.12					100			brakes set before pass
9803271158	99.61								
9803281058	99.23	X							
9803281348	99.24	X							
9803291147	0.00	X	100						HALCA in SafeHold

Table 9.0: GBES Tracking Pass Summary for March 1998

		no	% lost			Attended	Unattended		
pass	% good	op.	total	hardware	software	% recovered	% recoverable	exp	notes
9804021046	86.01		13		3				high winds, computer locked up

March 1998

Overall Summary: August 1997 – March 1998

• 94 of 152 attended passes had max good data.

• Operators helped increase amount of good data in 31 of 57 "bad" attended passes.

• 23 of 50 unattended passes had max good data.

• Operators would have increased amount of good data in 14–17 of 27 "bad" unattended passes.

• A total of 1.91 tracking passes lost data due to software problems.

• A total of 28.29 tracking passes lost data due to hardware problems.

• A total of 10.37 tracking passes lost data due to problems with HALCA.

• SRT and orbit prediction file problems resulted in the loss of 0.84 tracking passes.

• Inclement weather resulted in the lost of 1.11 tracking passes.

• 32 of 64 recording passes gathered the maximum amount of valid data.

• 47 of 64 recording passes gathered 80% or more of the maximum amount of valid data.

• A total of 12.64 recording passes lost data.

The attended tracking passes have an average of 62% which obtain the maximum amount of good data while unattended tracking passes average 46%. Operators have increased the amount of good data on 54% of the "bad" attended tracking passes. Operators would have increased the amount of good data on 52%–63% of the "bad' unattended tracking passes. Unattended tracking passes have also resulted in at least two delays in detecting hardware errors. This possibly resulted in three other tracking passes have unnecessary 'bad' data if the hardware problem had been detected immediately.

A histogram of the success rate of the attended and unattended tracking passes is shown in Figure 9.1. A histogram has been made for both the attended and the unattended tracking passes. Each histogram has been normalized by the total number of tracking passes in that category. The histogram bins have a width of 5%.

It is easily seen from Figure 9.1 and the above summary that the unattended tracking passes have a success rate that is 20% less than that of the attended passes. Operators, on average, increase the amount of good data collected by about 50%. This average would hold true even for the unattended tracking passes.

Only 50% of recording passes have gathered the maximum amount of valid data possible while 58% of all tracking passes have the maximum amount of valid data. If we exclude the recording passes from January, 1998 then we have that 57% of recording passes have gathered the maximum amount of valid data. 73% of the recording passes have gathered more than 80% of the maximum amount of valid data. Only one recording pass lost data due to an error that would have affected only the recording of the data (*i.e.* the pass would have had maximum valid data if it were a non-recording pass). In Figure 9.2 we plot the success rate of recording and non-recording passes. It is clearly seen that the non-recording and recording passes have the same distribution. This indicates that there is no real statistical difference between recording and non-recording passes and that the observed differences are due to small number statistics.

Conclusions

The data indicate that the presence of operators during tracking passes increases the amount of valid data gathered.

Updated versions of this document will be made available at

`http://www.gb.nrao.edu/ovlbi/summaryReport/index.html`

Figure 10.1: Histogram comparing the success rates of attended and unattended tracking passes from August 1997 through March 1998.

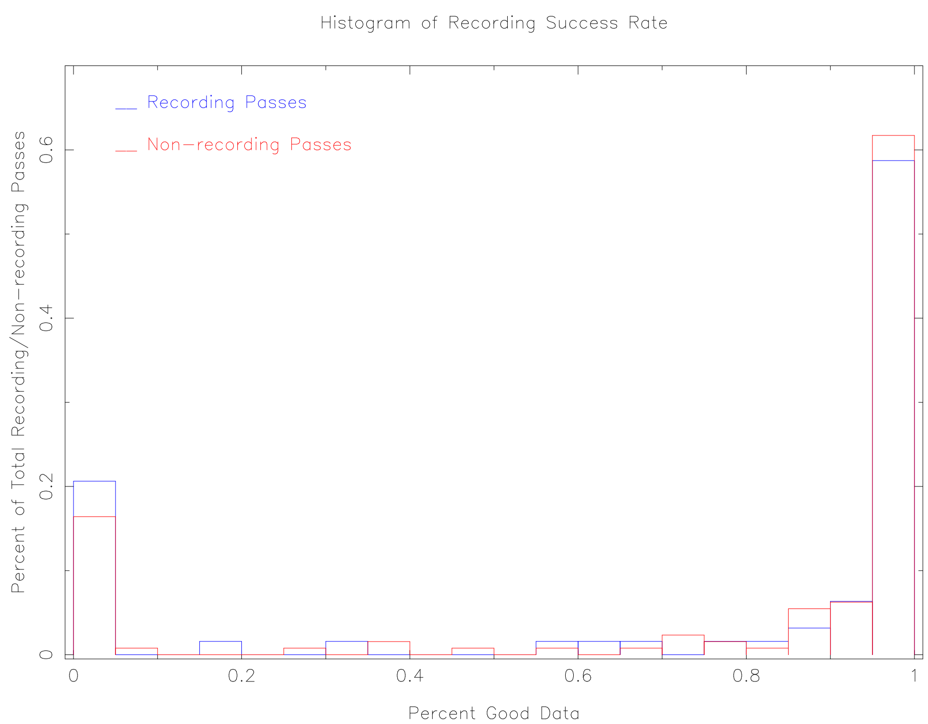

Figure 10.2: Histogram showing the success rates of recording passes and non-recording passes from August 1997 through March 1998.