Analysis of Crosstalk and Antenna Coupling at the Allen Telescope Array

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Garrett "Karto" Keating/ATA

ALLEN TELESCOPE ARRAY

Summary

The following is a collection tests and analysis on antenna coupling, crosstalk suppression and shortcomings of the current system employed at the Allen Telescope Array (ATA). The analysis presented here in this memo is ongoing, and as such it should not be considered complete at this time. As further analysis becomes available, this memo will be updated accordingly.

Tests and measurements for this analysis was started on January 28, 2013. Testing and analysis was perfomed by G. K. Keating, E. Klaseen and W. C. Barott. Some of the analysis presented here in based on work performed by T. Catanach and W. C. Barott in summer of 2010.

Initial Measurements and Analysis

On January 28, 2013, observations were taken in order to quantify the degree of coupling between antennas with the ATA. Observations were taken using the FX64A correlator, at a frequency of 6500 MHz, observing the North Celestial Pole. The choice of position was to prevent the geometric delay of any given antenna from changing over the course of the one hour observation. The choice in frequency was to both eliminate the possibility of astronomical sources from contributing to the measured flux (the sensitivity of the antennas and the density of point sources at 6500 are significantly diminished at high frequencies) and eliminate possible solar contamination of the data. Observations used 41 unique antpols, producing 400 unique baselines, with both X and Y polarizations in the correlator configuration. 50 minutes of integration time for each baseline was taken on the NCP, and 3C84 was observed for calibration purposes. The correlator was set to dump on 10 second intervals, with a well time of 10 minutes on the NCP and 1 minute on 3C84.

Data Processing

Data were normalized using the autocorrelation data. Using data from 3C84, a relative bandpass gains solution was generated for the dataset to remove any potential bandpass structure from affecting the data analysis. Absolute gains were not applied so as to allow the analysis to produce a measurement of coupling relative to the antenna power, without needing to calculate system temperatures for each antenna. Data were scanned for RFI features, though none were identified. The first and last 100 channels, along with the innermost 3 channels, were all flagged to avoid effects caused by edge or DC channels. Data were then integrated across time, to produce a single 1024 channel spectra for each baseline for the full 50 minutes of observing time. Spectra were then Fourier Transformed into the delay domain, and the peak power (along with the location of the bin it was located in) was measured, along with the approximate delay corresponding to zero-delay in the IF-chain[1]. If significant coupling exists in the IF-chain, then the peak power will correspond the aforementioned delay bin. Delay calculations are approximate, since not all antennas have correct fixed delay measurements (though most should lie within 10 nanoseconds, or 1 delay bin, of the actual delay).

Noise-like data should integrate down as $S \propto \sqrt{N^{-1}}$, where S is the measured flux and N is the number of samples. With 296 10-second integrations, 1024000 spectra per integration and 821 channels per spectra, the integrated measured flux should be 2×10^{-6} smaller, or $57\ \mathrm{dB}$ down from the auto-correlated sum (abbreviated here as dBA). Assuming Gaussian statistics, the expected maximum delay sum will be 5 dB greater, for a nominal maximum of $-52\ \mathrm{dBA}$ for each baseline. With 400 different baselines, we expect no baselines greater than $-50\ \mathrm{dBA}$. Thus, any data with an integrated flux of $-49\ \mathrm{dBA}$ or greater were marked as suspicious, and potentially contaminated.

Analysis

In total, 69 of 400 baselines show measurable contamination, all in a delay bin close enough to the zero-IF delay bin to conclude that all contamination is taking place in the IF, between the RFCBs and the correlator. Of these, 44 of 69 contaminated baselines are those who share Walsh functions. While shared-Walsh baselines make up the majority of contaminated baselines, a slim majority of same-Walsh baselines (47 of 91 shared-Walsh baselines) show no significant signs of contamination. Additionally, 25 of 69 contaminated baselines have antennas using different (orthogonal) Walsh functions.

Walsh Function Performance

Walsh Function	Total Baselines	Contaminated
100 Hz (W=0)	112	22 (20%)
200 Hz (W=1)	119	15 (13%)
400 Hz (W=2)	85	11 (13%)
800 Hz (W=3)	90	13 (14%)
1600 Hz (W=4)	85	13 (15%)
3200 Hz (W=5)	74	5 (7%)
6400 Hz (W=6)	54	2 (4%)
12800 Hz (W=7)	90	13 (14 %)

A count of contaminated baselines by Walsh function shows no clear pattern, though the W=0 Walsh function does show a slightly higher number of contaminated baselines, while the W=5 and W=6 Walsh functions show fewer than expected contaminated baselines. Despite the spread, there does not seem to be any single Walsh function that is strongly associated with the observed contamination.

Analysis of the antpol-by-antpol data shows widely varing performance (shown on the following page), with some antennas showing no significant contamination, and others showing extremely high contamination (in some cases between a third to a half of all baselines). This may be explained by varying performance of the analog Walshing – antpols with imperfect phase switching will be more likely to correlate with coupled signals, even on different-Walsh baselines. According to Billy Barott, there are

[1]Data passing to the correlator are corrected so that the wavefront from an astronomical source arrives at all antennas at the same time. This correction has two components: the geometric component (due to antennas being “nearer” or “farther” from the source) and the fixed/bulk component (due to differences in fiber cable lengths from the antenna to the SPR).

known RFCBs with out-of-phase phase switching (due to imperfect response of the first RF mixer inside the RFCB), which may reduce the effective “crosstalk shielding” to 10 dB. Given that the worst same-Walsh baseline has coupling of $-32\ \mathrm{dBA}$, whereas the worst different-Walsh baseline has a coupling of $-44\ \mathrm{dBA}$, it would seem likely that this problem is part the reason for the not insignificant number of contaminated different-Walsh baselines. One other piece of evidence that may help to support the above hypotheses – in all cases for different-Walsh contaminated baselines, the RFCBs associated with the antennas for that baseline are nearly always in the same chassis (23 of 25), with the remainder of cases being in the same RFCB block (group of 2 chassis, connected by LO distribution block).

Antenna Pol Performance

Antpol	Total Baselines	Contaminated	Antpol	Total Baselines	Contaminated
1X	20	3 (15%)	17Y	17	3 (17.6%)
1Y	19	7 (36.8%)	19X	20	3 (15%)
2Y	19	4 (21.1%)	19Y	18	3 (16.7%)
3X	20	3 (15%)	20X	20	5 (25%)
3Y	19	5 (26.3%)	22X	18	6 (33.3%)
4X	20	6 (30%)	24X	19	3 (15.8%)
4Y	19	2 (10.5%)	24Y	18	2 (11.1%)
5X	19	3 (15.8%)	25X	19	1 (5.3%)
5Y	18	4 (22.2%)	25Y	19	2 (10.5%)
6X	19	1 (5.3%)	30X	17	3 (17.6%)
6Y	18	3 (16.7%)	30Y	19	2 (10.5%)
7Y	18	8 (44.4%)	31X	18	2 (11.1%)
10X	18	5 (27.8%)	31Y	17	5 (29.4%)
10Y	18	3 (16.7%)	36X	20	3 (15%)
13X	18	6 (33.3%)	36Y	19	3 (15.8%)
13Y	17	3 (17.6%)	38X	19	1 (5.3%)
15X	19	1 (5.3%)	39X	18	1 (5.6%)
15Y	18	3 (16.7%)	39Y	17	0 (0%)
16X	20	6 (30%)	40X	18	3 (16.7%)
16Y	19	2 (10.5%)	40Y	17	5 (29.4%)
17X	20	4 (20%)			

There are a few other statistics of note: of all the contaminated baselines, more than half (38 of 69) have antennas with RFCBs on the same chassis (38 of 95 baselines total with the RFCBs in the same chassis), and nearly all were in the same RFCB block (65 of 69 contaminated baselines, out of 205 baselines total with RFCBs in the same block). Of all baselines created on a common iBob (i.e. two antpols plugged into the same iBob), only a small number of them showed contamination (2 of 15). Of all baselines connected to a common iBob chassis, again a limited number (35 of 211) show contamination. These numbers suggest that the primary source of the coupling is not inside the iBobs themselves, but rather somewhere upstream in the IF chain.

Discussion

In analyzing the data, there was some additional evaluation that was made of the 20 worst baselines in terms of coupling, all of which were same-Walsh baselines. Of these 20, 6 were separated by a single iBob (with an antenna of a different Walsh function between them). With these 6, it's possible that the two antennas from the contaminated baseline are coupled with the antenna between the two of them, and because the coupled signal has been similarly modulated (during the de-Walsh step).

What is more interesting is the number of bad baselines that appear to come from RFCBs that are near to one another. There are two potential explanations for this. First would be that there is some common noise being generated within the LO splitter blocks or Walsh distribution nodes. The Walsh distribution nodes are unique to each RFCB chassis, so should this be a problem, it would not account for the nearly half of corrupted baselines with antennas connected to different RFCB chassis, and would not account for the different-Walsh antenna pairs that are observed as being corrupted.

The second explanation rests with the fact that get to FXA, long (2-3 meter) RG-316 cables are required to connect the RFCBs to the iBobs. In the past, to keep things reasonably organized, cables have been bundled together, typically putting together most cables from a block of RFCBs. While the cables should have a reasonable amount of shielding on them, it is possible that some coupling could be happening along the length of these cables. Additionally, these wires have typically been coiled up to keep them organized, which may be increasing their aptitude for coupling.

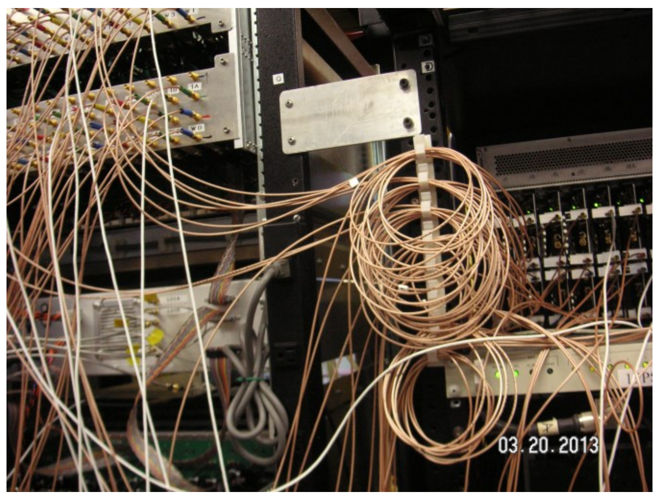
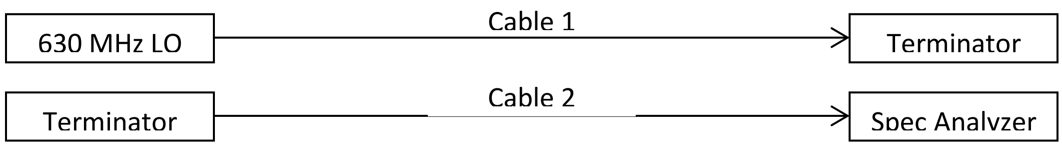


Figure 1*: The layout of RG316 wires connecting the RFCBs to the FXA correlator.*

Follow-up Measurements

In order to test the first scenario listed above – common noise in the LO splitter block – we connected the spectrum analyzer on site to the various taps on the splitter blocks themselves, using a low-loss cable and integrating over 100 samples. Our goal was to measure power at the primary LO frequency for LO2 and LO1B (at the time, set to 18.597 GHz), the power at the primary frequency minus 600 MHz (such that self-mixing would produce a signal in the IF band) and at 600 MHz (such that LO bleed-through in the mixer would produce signal in the IF band). We measured the taps for the antennas showing the greatest number of offending baselines (1A and 1G, or 1 and 7) and one nominal antenna (2A/11) and saw no appreciable amount of signal down to the noise floor (about 50-60 dB down from peak power). Given that whatever we saw was supposed to be either mixer LO bleed (noise at 630 MHz making it through to IF) or self-mixing (e.g. noise in LO2 at 14.3 GHz mixing with the primary 14.9 GHz tone), and that either one of these processes would likely further suppress any common noise at least another 10-20 dB, so any common noise that might be there is at such a low level that it couldn't produce the cross-talk that was measured earlier, particularly not the -30 to -40 dBA crosstalk that was being observed in the worst cases.

To examine the coupling between RG316, We had three series of measurements, one using a pair of RG316 cables (the primary cable in use at the ATA), one using a pair of LMR-100 cables (a few of which exist up at the site) and one using a mix of RG316 and LMR-100 cables. For each series of measurements, Cable 1 had one end connected to LO1A, and the second end connected to a 50 ohm terminator (when it wasn't plugged into the spectrum analyzer). Cable 2 had its first end connected to another terminator, and the other end plugged into the spectrum analyzer. LO1A was set to 630 MHz (roughly the center of the IF band), 0 dBm. The first measurements had the cables laid side-by-side, such that they looked a little bit like this:



Cable Crosstalk Analysis

Single Cable Tests with RG316			
		630 MHz	631 MHz
LOA @ end	Straight	-1.22	-118.9
	1-coil	-1.22	-119.2
	2-coil	-1.29	-119.1
	3-coil	-1.17	-118.8
Nothing @ end	Straight	-121.1	-132.2
	1-coil	-120.2	-132.3
	2-coil	-118.7	-132
	3-coil	-119.3	-132.2
Two Cable Coupling Tests			
RG316/RG316	Both Parallel	-91.64	-130.9
	1-coil	-83.12	-130.9
	2-coil	-74.17	-131.1
	3-coil	-88.71	-131.4
RG316/LMR100	RG316 in LOA	-131.7	-130.9
	LMR100 in LOA	-93.37	-131
LMR100/LMR100	6-coil	-112.8	-130

Most cables on the backend of LOB/FXA are in a two-coil RG316 configuration, which means that solely looking at cabling, which means that solely based on cabling, we expect antennas to show between -75 and -80 dB worth of coupling. However, it is important to note that these measurements show coupling in autocorrelated data – that is, the coupled/weak signal is being correlated against another weak signal. In the case of cross-correlating a pair of coupled antennas, the coupled/weak signal is being correlated against a “noiseless” copy of the signal. Thus, while an antenna might show θ dBA coupling in the autocorrelation, it will show $\sqrt{\theta}$ dBA coupling when cross-correlated against the antenna it’s coupled with. Hence our measured coupling of -75 to -80 dBA on the spectrum analyzer becomes -38 to -40 dBA coupling in cross-correlations in the correlator. As such, it is likely that coupling between cables is a leading factor (if not the dominant source) in coupling between antennas.

Implications

It is important to note that while coupling between cables would explain *how* signal from an antenna leaks into another's IF, it does not explain *why* it correlates, particularly with phase-switching in place. This might be caused by imperfections in the Walsh system, causing various antenna outputs to not be perfectly phase-switched, resulting in Walsh functions that are not completely orthogonal to one another. Earlier work done by T. Catanach and W. C. Barott in summer of 2010 show that some antennas with Walsh function "errors" of up to 10%, which would severely diminish the effectiveness of the Walsh distribution system. In addition to diminishing the effective cross-talk suppression, this may also show amplitude closure errors in data from the correlator, as same-Walsh baselines will show an excess of correlation (the two unWalshed components will correlate, since they have been modulated by the same signal in the deWalshing step). Catanach and Barott did find a relationship between the Walshing imperfections and the power coming in to the LO2 tap on the RFCB – given the above implications, it would be good to explore this further and examine this relationship further, and determine whether or not the phase-switching can be optimized by attenuating the LO2 signal within the RFCB. Testing would only require a handful of attenuators, and full implementation of the solution would require purchase and installation of between 50 and 100 high frequency (15 GHz) attenuators, which should not be prohibitive in cost or labor.

An additional source of Walshing errors may be coming from the Walsh function distribution box itself. Over the course of February 2013, engineering tests were showing a slow increase in the number of amplitude closure errors on FXA during maintenance tests. Further tests showed that power cycling the Walsh distribution box (which supplies the Walsh functions for the RFCBs) improved or fixed the observed problems on all occasions, suggesting that something inside the box may not be working correctly. If the distribution box were to be "losing time", it may cause the phase-switching to drift, causing both decreased crosstalk suppression and amplitude errors. The exact cause of the drift is unknown, though its effects appear to be noticeable after approximately two weeks. Testing of this problem would likely require continuous monitoring of the Walsh distribution over that period of time (which would likely require a sampler and hard-drive space ample enough to store a continuous stream of data for that period of time).

It should be noted that the measurements taken in the NCO test represent a worst case scenario – in particular, the benefits of delay-wrapping and fringe-washing. Delay-wrapping causes the coupling to be phase-wrapped over the band, and gives additional coupling attenuation of $P_{\mathrm{dBA,DW}} \approx \log_{10}(B_{MHz})$, where B_{MHz} is the bandwidth (in MHz) being integrated over during processing. As such, it's more beneficial for processes that require averaging over the entire band (e.g. calibration and continuum imaging), and provides no immediate benefit to single-channel imaging, with a maximal boost of 19 dB with 80 MHz of band averaging. Fringe washing, which is caused by the ever shifting position of baselines in the UV plane, is dependent on both frequency and declination/motion across the sky. For astronomical sources, this works out to be approximately $P_{\mathrm{dBA,FW}} \approx \log_{10}(\nu_{\mathrm{GHz}} \cdot \tau_{\min} \cdot \cos\delta)$, where ν_{GHz} is the frequency of the observation (in GHz), $\tau_{\min}$ is the integration time in minutes and δ is the declination of the source. There's an effective cap on how long one can integrate and still remain in the same UV cell (roughly 15 minutes, though it's highly dependent on the baseline), so the maximal effective coupling attenuation from this effect is about 17 dB at 3 GHz. This effect is suppressed in FXC, which does not currently have fringe rotation working within the iBobs (so the cross-talk simply stacks incoherently, rather than being continuously "wrapped" down). As such, for FXC, the above expression is modified substituting τ_{min} with $\sqrt{\tau_{\mathrm{min}}}$.

Ultimately, for noise-dominated observations (i.e. those targeting astronomical sources) will gain a boost of up to 36 dB of coupling suppression. Assuming a nominal coupling of $-40\ \mathrm{dBA}$, this means that the final residual coupling seen will be $-76\ \mathrm{dBA}$ per baseline. With an nominal SEFD of 10,000 Jy for a given ATA antenna, this limits imaging to roughly 0.25 mJy RMS. In the case of signal-dominated observations (e.g. GPS, solar), coupling will limit the image fidelity to whatever the nominal coupling level is, e.g. at $-40\ \mathrm{dBA}$, images will likely have a dynamic range of under 10,000 under "ideal" circumstances (any between 100 to 1,000 in less ideal circumstances). This is because the coupled signal not only correlates with its source antenna, but also correlates with other antennas, such that each baseline is a combination of the cross-correlations between the two primary antennas, and the cross-correlations of the source of the coupling with the antennas in the baseline (e.g. if antenna 1 is contaminated by antenna 2, then baseline 1-3 will also be contaminated by the cross-correlation of 2-3). These limitations do not completely ruin the imaging capacity of the ATA, though they are likely one of the current limiting factors in higher-fidelity imaging (which affects applications like astrometry).

Users of COMPASS and RAPID are some are somewhat protected from these effects, as it currently checks for amplitude closure errors in processing data, and flags antennas that fail to converge during calibration (which are the kind of errors that these antenna couplings will produce). As such, the observed coupling should not affect measurements of the system temperature by COMPASS in any significant way (>1-2%), though it may still significantly affect imaging of narrow-bandwitch, short-integration observations, as the basis of most non-RFI RAPID flagging is wideband, long integration data (i.e. calibrator data of astronomical sources).

Appendix A: Full Table of Results

Definitions:

- **A1 –** First antenna in baseline pair (MIRIAD number)
- **A2 –** Second antenna in baseline pair (MIRIAD number)
- **Pol –** Polarization of baseline
- **W1** – Walsh function number for antenna 1
- **W2** – Walsh function number for antenna 2
- **gDels –** Geometric delay between antennas 1 and 2 (in nanoseconds)
- **bDels –** Bulk delay (e.g. line delay or fixed delay) between antennas 1 and 2 (in nanoseconds)
- **expBin –** Approximate delay bin that corresponds to zero IF delay (i.e. delay for maximal crosstalk)
- **maxBin** – Delay bin where maximum power was found
- **maxSig** – Peak measured power divided by theoretical noise (i.e. number of sigma above the theoretical expectation for noise)
- **Msup –** Minimum crosstalk suppression (in dB) for the baseline
- **SW** – Both antennas share the same Walsh function
- **SI** – Both antennas share an iBob
- **IC –** Both antennas have iBobs in the same chassis
- **RC –** Both antennas are in the same RFCB chassis
- **RB –** Both antennas are in the same block of RFCBs
- **TB –** Antenna RFCBs are stacked one on top of another

A1	A2	Pol	W1	W2	gDels(ns)	bDels(ns)	expBin	maxBin	maxSig	Msup	SW	SI	IC	RC	RB	TB
10	22	XX	3	3	-1.68E+02	-1.98E+02	-38.4	-38	330.14	-32	SW	--	--	--	RB	TB
6	10	XX	3	3	-1.69E+02	-1.08E+02	-29.1	-28	227.61	-33	SW	SI	IC	RC	RB	--
1	5	YY	0	0	1.67E+02	-5.45E+01	11.8	13	162.72	-35	SW	--	IC	RC	RB	--
31	39	YY	0	0	-2.54E+01	-6.17E+02	-67.4	-67	88.93	-37	SW	--	--	RC	RB	--
5	13	XX	1	1	-2.72E+02	-1.77E+02	-47.1	-45	75.16	-38	SW	--	IC	--	RB	--
3	7	YY	4	4	-8.57E+01	-2.54E+02	-35.6	-35	71.06	-38	SW	--	--	RC	RB	--
1	13	YY	0	0	-1.05E+02	-2.18E+02	-33.9	-32	66.1	-39	SW	--	IC	--	RB	TB
6	22	XX	3	3	-3.38E+02	-3.07E+02	-67.5	-65	53.31	-40	SW	--	--	--	RB	--
6	10	YY	2	2	-1.69E+02	-9.83E+01	-28.1	-27	52.72	-40	SW	SI	IC	RC	RB	--
1	17	YY	0	0	-8.81E+01	-6.92E+01	-16.5	-16	46.68	-40	SW	--	--	--	RB	--
3	15	XX	5	5	-2.62E+02	-6.46E+01	-34.2	-33	44.38	-41	SW	--	IC	--	RB	TB
39	40	XX	1	1	2.08E+01	7.79E+01	10.3	11	42.89	-41	SW	--	IC	--	RB	TB
1	13	XX	1	1	-1.05E+02	-2.18E+02	-33.9	-32	41.07	-41	SW	--	IC	--	RB	TB
3	15	YY	4	4	-2.62E+02	-6.25E+01	-34	-33	40.76	-41	SW	--	IC	--	RB	TB
5	13	YY	0	0	-2.72E+02	-1.64E+02	-45.7	-44	37.31	-41	SW	--	IC	--	RB	--
1	5	XX	1	1	1.67E+02	-4.04E+01	13.2	13	31.25	-42	SW	--	IC	RC	RB	--
7	19	YY	4	4	-2.75E+02	1.15E+01	-27.6	-27	31.2	-42	SW	--	--	--	RB	TB
5	17	YY	0	0	-2.55E+02	-1.47E+01	-28.2	-28	28.33	-42	SW	--	--	--	RB	TB
4	16	XX	7	7	-2.87E+02	-2.32E+02	-54.4	-54	26.99	-43	SW	--	--	--	RB	TB
2	6	YY	2	2	1.27E+02	-5.19E+01	7.8	10	26.87	-43	SW	--	--	RC	RB	--

A1	A2	Pol	W1	W2	gDels(ns)	bDels(ns)	expBin	maxBin	maxSig	Msup	SW	SI	IC	RC	RB	TB
31	39	XX	1	1	-2.54E+01	-6.16E+02	-67.3	-66	26.84	-43	SW	--	--	RC	RB	--
4	16	YY	6	6	-2.87E+02	-2.31E+02	-54.3	-54	23.7	-43	SW	--	--	--	RB	TB
39	40	YY	0	0	2.08E+01	7.57E+01	10.1	11	22.48	-43	SW	--	IC	--	RB	TB
24	40	YY	2	0	-2.21E+01	-1.18E+03	-125.8	-124	21.85	-44	--	--	--	RC	RB	--
25	30	XX	5	7	-1.33E+02	8.00E+01	-5.6	-5	21.5	-44	--	--	--	RC	RB	--
30	40	XX	7	1	8.35E+01	-1.40E+03	-138.5	-136	20.98	-44	--	--	IC	RC	RB	--
24	30	XX	3	7	-1.06E+02	2.29E+02	12.9	13	19.5	-44	--	--	--	RC	RB	--
2	10	YY	2	2	-4.27E+01	-1.50E+02	-20.2	-17	19.4	-44	SW	--	--	RC	RB	--
13	31	YY	0	0	-2.52E+02	-6.62E+02	-95.9	-96	17.7	-45	SW	--	IC	--	--	--
15	19	YY	4	4	-9.86E+01	-1.80E+02	-29.2	-26	17.7	-45	SW	--	IC	RC	RB	--
5	17	XX	1	1	-2.55E+02	-2.93E+01	-29.8	-28	16.93	-45	SW	--	--	--	RB	TB
13	31	XX	1	1	-2.52E+02	-6.67E+02	-96.3	-94	16.82	-45	SW	--	IC	--	--	--
30	38	XX	7	7	1.95E+01	-1.45E+03	-149.9	-149	16.72	-45	SW	--	IC	--	RB	TB
10	16	XX	3	7	-9.26E+01	-8.58E+01	-18.7	-18	14.95	-45	--	--	--	--	RB	--
13	17	YY	0	0	1.71E+01	1.49E+02	17.4	17	14.03	-46	SW	--	--	RC	RB	--
25	40	YY	4	0	-4.99E+01	-1.32E+03	-144	-142	13.89	-46	--	--	--	RC	RB	--
16	20	XX	7	7	-7.85E+01	5.36E+01	-2.6	1	13.87	-46	SW	--	--	RC	RB	--
1	3	YY	0	4	2.03E+02	1.47E+02	36.8	37	12.98	-46	--	--	IC	RC	RB	--
24	25	YY	2	4	2.77E+01	1.46E+02	18.2	20	12.49	-46	--	--	IC	RC	RB	--
1	2	YY	0	2	4.24E+01	3.49E+01	8.1	7	11.62	-46	--	--	--	RC	RB	--
4	20	XX	7	7	-3.65E+02	-1.78E+02	-57	-56	11.55	-46	SW	--	IC	--	RB	--
24	36	YY	2	2	-1.08E+02	-6.77E+02	-82.4	-82	11.04	-47	SW	--	IC	--	RB	--
10	13	XX	3	1	-1.05E+02	-1.05E+02	-22	-21	11.03	-47	--	--	IC	--	RB	--
13	17	XX	1	1	1.71E+01	1.48E+02	17.3	19	10.9	-47	SW	--	--	RC	RB	--
1	7	YY	0	4	1.18E+02	-1.07E+02	1.1	2	10.66	-47	--	--	--	RC	RB	--
6	7	YY	2	4	-5.13E+01	-8.98E+01	-14.8	-14	10.41	-47	--	--	--	RC	RB	--
24	36	XX	3	3	-1.08E+02	-6.73E+02	-81.9	-81	10.21	-47	SW	--	IC	--	RB	--
15	19	XX	5	5	-9.86E+01	-1.82E+02	-29.4	-25	9.95	-47	SW	--	IC	RC	RB	--
17	19	YY	0	4	-6.88E+01	-2.60E+01	-9.9	-9	9.4	-47	--	--	--	RC	RB	--
5	10	XX	1	3	-1.67E+02	-7.24E+01	-25.1	-23	8.24	-48	--	--	IC	RC	RB	--
10	36	XX	3	3	-4.47E+02	-8.08E+02	-131.6	-128	8.06	-48	SW	--	IC	--	--	--
30	40	YY	6	0	8.35E+01	-1.40E+03	-138.5	-136	8.05	-48	--	--	IC	RC	RB	--
3	4	XX	5	7	-9.58E+00	-1.17E+02	-13.3	-12	8.03	-48	--	SI	IC	RC	RB	--
13	22	XX	1	3	-6.35E+01	-9.33E+01	-16.4	-16	8.02	-48	--	--	--	RC	RB	--
3	19	YY	4	4	-3.60E+02	-2.43E+02	-63.2	-62	7.9	-48	SW	--	IC	--	RB	--
24	25	XX	3	5	2.77E+01	1.49E+02	18.5	19	7.8	-48	--	--	IC	RC	RB	--
20	22	XX	7	3	2.78E+00	-1.66E+02	-17.1	-17	7.52	-48	--	--	--	RC	RB	--
4	10	XX	7	3	-1.94E+02	-1.46E+02	-35.7	-35	7.15	-48	--	--	IC	RC	RB	--
1	17	XX	1	1	-8.81E+01	-6.97E+01	-16.5	-16	7.02	-49	SW	--	--	--	RB	--

A1	A2	Pol	W1	W2	gDels(ns)	bDels(ns)	expBin	maxBin	maxSig	Msup	SW	SI	IC	RC	RB	TB
31	36	YY	0	2	-9.07E+01	-4.11E+01	-13.8	-11	6.99	-49	--	SI	IC	RC	RB	--
5	7	YY	0	4	-4.89E+01	-5.23E+01	-10.6	-10	6.98	-49	--	--	--	RC	RB	--
16	30	XX	7	7	-3.52E+02	1.80E+02	-18.1	-21	6.67	-49	SW	--	IC	--	--	--
17	31	YY	0	0	-2.69E+02	-8.11E+02	-113.3	-114	6.58	-49	SW	--	--	--	--	--
31	40	YY	0	0	-4.54E+00	-5.42E+02	-57.3	-56	6.56	-49	SW	--	--	--	RB	--
7	15	YY	4	4	-1.76E+02	1.92E+02	1.6	3	6.53	-49	SW	--	--	--	RB	--
17	20	XX	1	7	-8.33E+01	-7.53E+01	-16.6	-14	6.39	-49	--	--	--	RC	RB	--
1	10	YY	0	2	-3.48E-01	-1.15E+02	-12.1	-11	6.24	-49	--	--	IC	RC	RB	--
31	40	XX	1	1	-4.54E+00	-5.38E+02	-56.9	-56	6.03	-49	SW	--	--	--	RB	--
5	6	YY	0	2	2.45E+00	3.75E+01	4.2	6	5.74	-49	--	--	IC	RC	RB	--
7	10	YY	4	2	-1.18E+02	-8.45E+00	-13.3	-12	5.58	-50	--	--	--	RC	RB	--
38	39	XX	7	1	4.32E+01	-3.36E+01	1	1	5.57	-50	--	--	IC	RC	RB	--
4	30	XX	7	7	-6.39E+02	-5.18E+01	-72.4	-74	5.54	-50	SW	--	--	--	--	--
2	3	YY	2	4	1.61E+02	1.12E+02	28.7	30	5.31	-50	--	--	--	RC	RB	--
7	16	YY	4	6	-2.11E+02	-9.07E+01	-31.6	-30	5.27	-50	--	--	IC	--	RB	--
13	15	YY	0	4	4.69E+01	3.03E+02	36.7	37	5.25	-50	--	--	IC	RC	RB	--
19	20	XX	5	7	-1.45E+01	-4.91E+01	-6.7	-7	5.25	-50	--	--	IC	RC	RB	--
16	22	XX	7	3	-7.57E+01	-1.13E+02	-19.7	-19	5.14	-50	--	--	IC	RC	RB	--
3	19	XX	5	5	-3.60E+02	-2.46E+02	-63.6	-63	4.92	-50	SW	--	IC	--	RB	--
4	7	YY	6	4	-7.61E+01	-1.40E+02	-22.7	-21	4.89	-50	--	--	--	RC	RB	--
24	40	XX	3	1	-2.21E+01	-1.18E+03	-125.6	-124	4.8	-50	--	--	--	RC	RB	--
22	36	XX	3	3	-2.79E+02	-6.09E+02	-93.2	-88	4.71	-50	SW	--	--	--	--	--
13	16	XX	1	7	1.23E+01	1.92E+01	3.3	4	4.65	-50	--	--	--	RC	RB	--
4	13	XX	7	1	-2.99E+02	-2.51E+02	-57.7	-56	4.51	-50	--	--	IC	--	RB	--
4	22	XX	7	3	-3.62E+02	-3.44E+02	-74.1	-74	4.45	-51	--	--	--	--	RB	--
17	31	XX	1	1	-2.69E+02	-8.15E+02	-113.7	-110	4.44	-51	SW	--	--	--	--	--
7	36	YY	4	2	-5.65E+02	-8.15E+02	-144.7	-144	4.36	-51	--	--	--	--	--	--
1	6	YY	0	2	1.69E+02	-1.70E+01	15.9	17	4.21	-51	--	--	IC	RC	RB	--
25	40	XX	5	1	-4.99E+01	-1.32E+03	-144.1	-143	4.2	-51	--	--	--	RC	RB	--
3	4	YY	4	6	-9.58E+00	-1.14E+02	-12.9	-12	4.19	-51	--	SI	IC	RC	RB	--
25	30	YY	4	6	-1.33E+02	8.10E+01	-5.5	-5	4.12	-51	--	--	--	RC	RB	--
1	4	YY	0	6	1.94E+02	3.37E+01	23.9	24	4.05	-51	--	--	IC	RC	RB	--
3	13	XX	5	1	-3.09E+02	-3.68E+02	-71	-69	4.05	-51	--	--	IC	--	RB	--
7	31	YY	4	0	-4.75E+02	-7.74E+02	-130.9	-130	4.05	-51	--	--	--	--	--	--
15	17	YY	4	0	-2.98E+01	-1.54E+02	-19.3	-18	4.05	-51	--	--	--	RC	RB	--
3	5	XX	5	1	-3.68E+01	-1.91E+02	-23.9	-23	4.03	-51	--	--	IC	RC	RB	--
2	40	YY	2	0	-4.04E+02	-1.46E+03	-195.1	-40	3.93	-51	--	--	IC	--	--	--
15	31	YY	4	0	-2.99E+02	-9.65E+02	-132.6	-133	3.93	-51	--	--	IC	--	--	--
16	30	YY	6	6	-3.52E+02	1.80E+02	-18.1	-20	3.84	-51	SW	--	IC	--	--	--

A1	A2	Pol	W1	W2	gDels(ns)	bDels(ns)	expBin	maxBin	maxSig	Msup	SW	SI	IC	RC	RB	TB
20	30	XX	7	7	-2.74E+02	1.26E+02	-15.5	-18	3.81	-51	SW	--	--	--	--	--
5	6	XX	1	3	2.45E+00	3.58E+01	4	6	3.73	-51	--	--	IC	RC	RB	--
10	24	XX	3	3	-3.39E+02	-1.35E+02	-49.7	-46	3.69	-51	SW	--	IC	--	--	--
17	40	YY	0	0	-2.74E+02	-1.35E+03	-170.6	-166	3.69	-51	SW	--	IC	--	--	--
1	3	XX	1	5	2.03E+02	1.50E+02	37.1	37	3.68	-51	--	--	IC	RC	RB	--
6	16	XX	3	7	-2.62E+02	-1.94E+02	-47.8	-45	3.68	-51	--	--	--	--	RB	--
5	22	XX	1	3	-3.35E+02	-2.71E+02	-63.5	-62	3.64	-51	--	--	--	--	RB	--
19	22	XX	5	3	-1.17E+01	-2.15E+02	-23.8	-24	3.52	-52	--	--	--	RC	RB	--
6	36	YY	2	2	-6.17E+02	-9.05E+02	-159.5	-158	3.5	-52	SW	--	IC	--	--	--
6	40	YY	2	0	-5.31E+02	-1.41E+03	-203	67	3.49	-52	--	--	--	--	--	--
3	10	XX	5	3	-2.04E+02	-2.63E+02	-49	-48	3.46	-52	--	--	IC	RC	RB	--
19	25	YY	4	4	-1.55E+02	-3.12E+00	-16.6	-17	3.45	-52	SW	--	IC	--	--	--
13	30	XX	1	7	-3.40E+02	1.99E+02	-14.8	-117	3.36	-52	--	--	--	--	--	--
1	10	XX	1	3	-3.48E-01	-1.13E+02	-11.9	-12	3.35	-52	--	--	IC	RC	RB	--
20	38	XX	7	7	-2.54E+02	-1.32E+03	-165.3	-100	3.35	-52	SW	--	--	--	--	--
19	25	XX	5	5	-1.55E+02	-2.82E+00	-16.5	-16	3.32	-52	SW	--	IC	--	--	--
2	16	YY	2	6	-1.35E+02	-2.32E+02	-38.5	-236	3.28	-52	--	--	IC	--	RB	--
3	13	YY	4	0	-3.09E+02	-3.65E+02	-70.7	334	3.28	-52	--	--	IC	--	RB	--
13	36	XX	1	3	-3.43E+02	-7.03E+02	-109.6	-106	3.28	-52	--	--	IC	--	--	--
4	5	XX	7	1	-2.73E+01	-7.35E+01	-10.6	-11	3.26	-52	--	--	IC	RC	RB	--
3	10	YY	4	2	-2.04E+02	-2.63E+02	-48.9	-210	3.25	-52	--	--	IC	RC	RB	--
17	36	YY	0	2	-3.60E+02	-8.52E+02	-127.1	-125	3.25	-52	--	--	--	--	--	--
5	25	YY	0	4	-4.78E+02	-4.39E+01	-54.8	315	3.24	-52	--	--	IC	--	--	--
31	38	XX	1	7	-6.86E+01	-5.83E+02	-68.3	-67	3.23	-52	--	--	--	RC	RB	--
10	31	XX	3	1	-3.57E+02	-7.72E+02	-118.3	18	3.21	-52	--	--	IC	--	--	--
2	25	YY	2	4	-3.54E+02	-1.33E+02	-51.1	-73	3.2	-52	--	--	--	--	--	--
4	30	YY	6	6	-6.39E+02	-5.11E+01	-72.4	-80	3.2	-52	SW	--	--	--	--	--
10	39	XX	3	1	-3.82E+02	-1.39E+03	-185.6	249	3.2	-52	--	--	--	--	--	--
2	15	YY	2	4	-1.01E+02	4.99E+01	-5.3	-222	3.18	-52	--	--	--	--	RB	--
6	20	XX	3	7	-3.40E+02	-1.40E+02	-50.4	115	3.18	-52	--	--	IC	--	RB	--
16	19	YY	6	4	-6.40E+01	1.02E+02	4	73	3.17	-52	--	--	--	RC	RB	--
5	19	YY	0	4	-3.23E+02	-4.08E+01	-38.2	398	3.15	-52	--	--	IC	--	RB	--
5	39	XX	1	1	-5.49E+02	-1.46E+03	-210.7	481	3.15	-52	SW	--	--	--	--	--
1	31	XX	1	1	-3.57E+02	-8.85E+02	-130.2	-354	3.13	-52	SW	--	IC	--	--	--
1	19	YY	0	4	-1.57E+02	-9.53E+01	-26.4	-423	3.12	-52	--	--	IC	--	RB	--
15	39	YY	4	0	-3.24E+02	-1.58E+03	-200	501	3.12	-52	--	--	--	--	--	--
25	39	YY	4	0	-7.07E+01	-1.40E+03	-154.2	224	3.12	-52	--	--	--	--	RB	--
1	38	XX	1	7	-4.26E+02	-1.47E+03	-198.5	-324	3.1	-52	--	--	--	--	--	--
1	40	XX	1	1	-3.62E+02	-1.42E+03	-187.1	-263	3.1	-52	SW	--	--	--	--	--

A1	A2	Pol	W1	W2	gDels(ns)	bDels(ns)	expBin	maxBin	maxSig	Msup	SW	SI	IC	RC	RB	TB
2	39	YY	2	0	-4.25E+02	-1.53E+03	-205.3	-420	3.1	-52	--	--	IC	--	--	--
16	31	XX	7	1	-2.64E+02	-6.86E+02	-99.6	-33	3.09	-52	--	--	--	--	--	--
22	38	XX	3	7	-2.57E+02	-1.16E+03	-148.2	7	3.09	-52	--	--	IC	--	--	--
6	19	YY	2	4	-3.26E+02	-7.83E+01	-42.4	-188	3.08	-52	--	--	IC	--	RB	--
3	25	XX	5	5	-5.15E+02	-2.49E+02	-80.1	54	3.07	-52	SW	--	IC	--	--	--
1	40	YY	0	0	-3.62E+02	-1.42E+03	-187	-180	3.06	-52	SW	--	--	--	--	--
19	38	XX	5	7	-2.69E+02	-1.37E+03	-172	236	3.06	-52	--	--	--	--	--	--
3	5	YY	4	0	-3.68E+01	-2.02E+02	-25	-148	3.05	-52	--	--	IC	RC	RB	--
10	15	YY	2	4	-5.80E+01	2.00E+02	14.9	450	3.05	-52	--	--	IC	--	RB	--
15	22	XX	5	3	-1.10E+02	-3.97E+02	-53.2	193	3.05	-52	--	--	--	RC	RB	--
7	17	YY	4	0	-2.06E+02	3.75E+01	-17.6	-447	3.04	-52	--	--	IC	--	RB	--
13	40	YY	0	0	-2.56E+02	-1.20E+03	-153.1	439	3.04	-52	SW	--	--	--	--	--
7	40	YY	4	0	-4.79E+02	-1.32E+03	-188.2	500	3.03	-52	--	--	IC	--	--	--
17	25	YY	0	4	-2.24E+02	-2.92E+01	-26.5	243	3.02	-52	--	--	--	--	--	--
20	40	XX	7	1	-1.90E+02	-1.28E+03	-154	121	3.01	-52	--	--	--	--	--	--
30	36	XX	7	3	-2.62E+00	-9.02E+02	-94.8	72	3.01	-52	--	--	--	--	RB	--
30	39	XX	7	1	6.27E+01	-1.48E+03	-148.9	101	3.01	-52	--	SI	IC	--	RB	--
7	24	YY	4	2	-4.57E+02	-1.38E+02	-62.4	-7	3	-52	--	--	--	--	--	--
1	25	XX	1	5	-3.12E+02	-9.87E+01	-43	-466	2.99	-52	--	--	IC	--	--	--
6	25	YY	2	4	-4.81E+02	-8.14E+01	-58.9	114	2.99	-52	--	--	IC	--	--	--
38	40	XX	7	1	6.40E+01	4.43E+01	11.4	208	2.99	-52	--	--	IC	--	RB	--
3	30	XX	5	7	-6.49E+02	-1.69E+02	-85.7	472	2.98	-52	--	--	--	--	--	--
15	39	XX	5	1	-3.24E+02	-1.59E+03	-200.4	-234	2.98	-52	--	--	--	--	--	--
5	16	XX	1	7	-2.59E+02	-1.58E+02	-43.8	-42	2.97	-52	--	--	--	--	RB	--
5	31	XX	1	1	-5.24E+02	-8.44E+02	-143.4	358	2.97	-52	SW	--	IC	--	--	--
6	25	XX	3	5	-4.81E+02	-9.41E+01	-60.3	-69	2.97	-52	--	--	IC	--	--	--
10	31	YY	2	0	-3.57E+02	-7.65E+02	-117.7	-462	2.97	-52	--	--	IC	--	--	--
17	36	XX	1	3	-3.60E+02	-8.51E+02	-126.9	-385	2.97	-52	--	--	--	--	--	--
24	30	YY	2	6	-1.06E+02	2.27E+02	12.7	-55	2.97	-52	--	--	--	RC	RB	--
4	17	XX	7	1	-2.82E+02	-1.03E+02	-40.3	152	2.96	-52	--	--	--	--	RB	--
10	16	YY	2	6	-9.26E+01	-8.22E+01	-18.3	-263	2.96	-52	--	--	--	--	RB	--
1	15	YY	0	4	-5.83E+01	8.49E+01	2.8	4	2.95	-52	--	SI	IC	--	RB	--
3	6	XX	5	3	-3.44E+01	-1.55E+02	-19.8	-475	2.95	-52	--	--	IC	RC	RB	--
10	13	YY	2	0	-1.05E+02	-1.03E+02	-21.8	-32	2.95	-52	--	--	IC	--	RB	--
10	30	XX	3	7	-4.45E+02	9.41E+01	-36.8	-94	2.95	-52	--	--	--	--	--	--
4	19	XX	7	5	-3.51E+02	-1.29E+02	-50.3	96	2.94	-52	--	--	IC	--	RB	--
3	31	YY	4	0	-5.60E+02	-1.03E+03	-166.5	374	2.93	-52	--	--	IC	--	--	--
5	25	XX	1	5	-4.78E+02	-5.83E+01	-56.3	-111	2.93	-52	--	--	IC	--	--	--
10	40	XX	3	1	-3.61E+02	-1.31E+03	-175.3	247	2.93	-52	--	--	--	--	--	--

A1	A2	Pol	W1	W2	gDels(ns)	bDels(ns)	expBin	maxBin	maxSig	Msup	SW	SI	IC	RC	RB	TB
13	36	YY	0	2	-3.43E+02	-7.03E+02	-109.7	481	2.93	-52	--	--	IC	--	--	--
16	17	YY	6	0	4.82E+00	1.28E+02	13.9	64	2.93	-52	--	SI	IC	RC	RB	--
22	40	XX	3	1	-1.93E+02	-1.11E+03	-136.8	83	2.93	-52	--	--	IC	--	--	--
24	38	XX	3	7	-8.62E+01	-1.22E+03	-136.9	119	2.93	-52	--	--	--	--	RB	--
4	24	YY	6	2	-5.33E+02	-2.78E+02	-85.1	181	2.92	-52	--	--	IC	--	--	--
10	25	YY	2	4	-3.11E+02	1.68E+01	-30.9	311	2.92	-52	--	--	IC	--	--	--
3	36	XX	5	3	-6.51E+02	-1.07E+03	-180.6	-375	2.91	-52	--	--	IC	--	--	--
3	36	YY	4	2	-6.51E+02	-1.07E+03	-180.4	236	2.91	-52	--	--	IC	--	--	--
16	40	YY	6	0	-2.69E+02	-1.22E+03	-156.6	374	2.91	-52	--	--	IC	--	--	--
19	30	YY	4	6	-2.88E+02	7.79E+01	-22.1	-439	2.91	-52	--	--	--	--	--	--
1	19	XX	1	5	-1.57E+02	-9.59E+01	-26.5	-79	2.9	-52	--	--	IC	--	RB	--
6	24	XX	3	3	-5.09E+02	-2.43E+02	-78.8	-465	2.9	-52	SW	--	IC	--	--	--
2	31	YY	2	0	-3.99E+02	-9.15E+02	-137.9	-216	2.89	-52	--	--	--	--	--	--
3	16	XX	5	7	-2.96E+02	-3.49E+02	-67.7	-399	2.89	-52	--	--	--	--	RB	--
5	16	YY	0	6	-2.59E+02	-1.43E+02	-42.2	107	2.89	-52	--	--	--	--	RB	--
5	39	YY	0	0	-5.49E+02	-1.44E+03	-208.9	-177	2.89	-52	SW	--	--	--	--	--
7	13	YY	4	0	-2.23E+02	-1.11E+02	-35	167	2.89	-52	--	--	--	--	RB	--
10	36	YY	2	2	-4.47E+02	-8.06E+02	-131.5	69	2.89	-52	SW	--	IC	--	--	--
13	25	XX	1	5	-2.07E+02	1.19E+02	-9.2	-101	2.89	-52	--	--	IC	--	--	--
17	24	XX	1	3	-2.51E+02	-1.78E+02	-45	421	2.89	-52	--	--	--	--	--	--
3	24	XX	5	3	-5.43E+02	-3.98E+02	-98.7	156	2.88	-52	--	--	IC	--	--	--
10	39	YY	2	0	-3.82E+02	-1.38E+03	-185.1	247	2.88	-52	--	--	--	--	--	--
16	39	YY	6	0	-2.90E+02	-1.30E+03	-166.7	-350	2.88	-52	--	--	IC	--	--	--
19	36	YY	4	2	-2.91E+02	-8.26E+02	-117.1	452	2.88	-52	--	--	IC	--	--	--
2	5	YY	2	0	1.24E+02	-8.94E+01	3.7	-281	2.87	-52	--	--	--	RC	RB	--
4	5	YY	6	0	-2.73E+01	-8.82E+01	-12.1	-388	2.87	-52	--	--	IC	RC	RB	--
4	15	XX	7	5	-2.52E+02	5.26E+01	-20.9	-221	2.87	-52	--	--	IC	--	RB	--
6	40	XX	3	1	-5.31E+02	-1.42E+03	-204.4	-123	2.87	-52	--	--	--	--	--	--
36	39	XX	3	1	6.53E+01	-5.81E+02	-54	92	2.87	-52	--	--	--	RC	RB	--
3	17	XX	5	1	-2.91E+02	-2.20E+02	-53.6	382	2.86	-52	--	--	--	--	RB	--
4	15	YY	6	4	-2.52E+02	5.11E+01	-21.1	-74	2.86	-52	--	--	IC	--	RB	--
10	19	YY	2	4	-1.57E+02	2.00E+01	-14.3	465	2.86	-52	--	--	IC	--	RB	--
13	15	XX	1	5	4.69E+01	3.03E+02	36.7	402	2.86	-52	--	--	IC	RC	RB	--
13	19	YY	0	4	-5.18E+01	1.23E+02	7.5	-464	2.86	-52	--	--	IC	RC	RB	--
15	40	YY	4	0	-3.03E+02	-1.51E+03	-189.8	504	2.86	-52	--	--	--	--	--	--
16	38	XX	7	7	-3.33E+02	-1.27E+03	-167.9	-172	2.86	-52	SW	--	IC	--	--	--
36	39	YY	2	0	6.53E+01	-5.76E+02	-53.6	-73	2.86	-52	--	--	--	RC	RB	--
2	17	YY	2	0	-1.30E+02	-1.04E+02	-24.6	73	2.85	-52	--	--	IC	--	RB	--
3	38	XX	5	7	-6.29E+02	-1.62E+03	-235.6	193	2.85	-52	--	--	--	--	--	--

A1	A2	Pol	W1	W2	gDels(ns)	bDels(ns)	expBin	maxBin	maxSig	Msup	SW	SI	IC	RC	RB	TB
20	24	XX	7	3	-1.68E+02	-1.03E+02	-28.4	403	2.85	-52	--	--	IC	--	--	--
22	24	XX	3	3	-1.71E+02	6.34E+01	-11.3	-361	2.85	-52	SW	--	--	--	--	--
1	15	XX	1	5	-5.83E+01	8.57E+01	2.9	417	2.84	-52	--	SI	IC	--	RB	--
5	10	YY	0	2	-1.67E+02	-6.07E+01	-23.9	-23	2.84	-52	--	--	IC	RC	RB	--
5	31	YY	0	0	-5.24E+02	-8.26E+02	-141.5	94	2.84	-52	SW	--	IC	--	--	--
6	16	YY	2	6	-2.62E+02	-1.80E+02	-46.4	465	2.84	-52	--	--	--	--	RB	--
15	17	XX	5	1	-2.98E+01	-1.55E+02	-19.4	-495	2.84	-52	--	--	--	RC	RB	--
25	31	XX	5	1	-4.53E+01	-7.86E+02	-87.2	-137	2.84	-52	--	--	IC	--	RB	--
1	16	XX	1	7	-9.29E+01	-1.99E+02	-30.6	105	2.83	-52	--	--	--	--	RB	--
10	20	XX	3	7	-1.71E+02	-3.21E+01	-21.3	27	2.83	-52	--	--	IC	--	RB	--
15	36	YY	4	2	-3.89E+02	-1.01E+03	-146.4	17	2.83	-52	--	--	IC	--	--	--
17	39	XX	1	1	-2.94E+02	-1.43E+03	-180.9	237	2.83	-52	SW	--	IC	--	--	--
17	39	YY	0	0	-2.94E+02	-1.43E+03	-180.7	-23	2.83	-52	SW	--	IC	--	--	--
31	36	XX	1	3	-9.07E+01	-3.58E+01	-13.3	272	2.83	-52	--	SI	IC	RC	RB	--
1	6	XX	1	3	1.69E+02	-4.60E+00	17.2	121	2.82	-52	--	--	IC	RC	RB	--
3	30	YY	4	6	-6.49E+02	-1.65E+02	-85.3	389	2.82	-52	--	--	--	--	--	--
4	17	YY	6	0	-2.82E+02	-1.03E+02	-40.4	338	2.82	-52	--	--	--	--	RB	--
4	40	XX	7	1	-5.55E+02	-1.46E+03	-210.9	202	2.82	-52	--	--	--	--	--	--
17	25	XX	1	5	-2.24E+02	-2.90E+01	-26.5	3	2.82	-52	--	--	--	--	--	--
3	39	XX	5	1	-5.86E+02	-1.65E+03	-234.6	87	2.81	-52	--	--	--	--	--	--
1	36	YY	0	2	-4.48E+02	-9.22E+02	-143.6	357	2.81	-53	--	--	IC	--	--	--
4	13	YY	6	0	-2.99E+02	-2.52E+02	-57.8	-204	2.81	-53	--	--	IC	--	RB	--
7	30	YY	4	6	-5.63E+02	8.94E+01	-49.6	-48	2.81	-53	--	--	IC	--	--	--
15	30	YY	4	6	-3.87E+02	-1.02E+02	-51.3	-419	2.81	-53	--	--	--	--	--	--
7	25	YY	4	4	-4.29E+02	8.38E+00	-44.2	-46	2.8	-53	SW	--	--	--	--	--
3	25	YY	4	4	-5.15E+02	-2.46E+02	-79.8	181	2.79	-53	SW	--	IC	--	--	--
4	10	YY	6	2	-1.94E+02	-1.49E+02	-36	159	2.79	-53	--	--	IC	RC	RB	--
5	19	XX	1	5	-3.23E+02	-5.55E+01	-39.7	427	2.79	-53	--	--	IC	--	RB	--
10	15	XX	3	5	-5.80E+01	1.98E+02	14.7	-310	2.79	-53	--	--	IC	--	RB	--
16	25	XX	7	5	-2.19E+02	9.99E+01	-12.5	364	2.79	-53	--	--	--	--	--	--
16	31	YY	6	0	-2.64E+02	-6.83E+02	-99.3	397	2.79	-53	--	--	--	--	--	--
25	39	XX	5	1	-7.07E+01	-1.40E+03	-154.4	-315	2.79	-53	--	--	--	--	RB	--
4	24	XX	7	3	-5.33E+02	-2.81E+02	-85.4	-501	2.78	-53	--	--	IC	--	--	--
5	30	XX	1	7	-6.12E+02	2.17E+01	-61.9	-55	2.78	-53	--	--	--	--	--	--
6	30	XX	3	7	-6.14E+02	-1.41E+01	-65.9	356	2.78	-53	--	--	--	--	--	--
16	39	XX	7	1	-2.90E+02	-1.30E+03	-166.9	463	2.78	-53	--	--	IC	--	--	--
15	20	XX	5	7	-1.13E+02	-2.31E+02	-36	39	2.77	-53	--	--	IC	RC	RB	--
2	4	YY	2	6	1.51E+02	-1.16E+00	15.8	414	2.76	-53	--	--	--	RC	RB	--
5	20	XX	1	7	-3.38E+02	-1.05E+02	-46.4	245	2.76	-53	--	--	IC	--	RB	--

A1	A2	Pol	W1	W2	gDels(ns)	bDels(ns)	expBin	maxBin	maxSig	Msup	SW	SI	IC	RC	RB	TB
5	24	YY	0	2	-5.06E+02	-1.90E+02	-73	391	2.76	-53	--	--	IC	--	--	--
13	16	YY	0	6	1.23E+01	2.07E+01	3.5	477	2.76	-53	--	--	--	RC	RB	--
15	16	XX	5	7	-3.46E+01	-2.84E+02	-33.4	314	2.76	-53	--	--	--	RC	RB	--
25	36	XX	5	3	-1.36E+02	-8.22E+02	-100.4	-266	2.76	-53	--	--	IC	--	RB	--
4	39	XX	7	1	-5.76E+02	-1.53E+03	-221.3	-285	2.75	-53	--	--	--	--	--	--
5	36	XX	1	3	-6.14E+02	-8.80E+02	-156.7	511	2.75	-53	--	--	IC	--	--	--
6	17	YY	2	0	-2.57E+02	-5.23E+01	-32.4	37	2.75	-53	--	--	--	--	RB	--
6	38	XX	3	7	-5.95E+02	-1.46E+03	-215.7	-467	2.75	-53	--	--	--	--	--	--
16	40	XX	7	1	-2.69E+02	-1.22E+03	-156.6	-405	2.75	-53	--	--	IC	--	--	--
17	24	YY	0	2	-2.51E+02	-1.75E+02	-44.7	-91	2.75	-53	--	--	--	--	--	--
19	40	YY	4	0	-2.05E+02	-1.33E+03	-160.6	467	2.75	-53	--	--	--	--	--	--
30	36	YY	6	2	-2.62E+00	-9.04E+02	-95.1	-379	2.75	-53	--	--	--	--	RB	--
30	39	YY	6	0	6.27E+01	-1.48E+03	-148.7	-357	2.75	-53	--	SI	IC	--	RB	--
1	4	XX	1	7	1.94E+02	3.31E+01	23.8	-456	2.74	-53	--	--	IC	RC	RB	--
1	16	YY	0	6	-9.29E+01	-1.97E+02	-30.4	-218	2.74	-53	--	--	--	--	RB	--
2	30	YY	2	6	-4.88E+02	-5.23E+01	-56.6	-402	2.74	-53	--	--	IC	--	--	--
6	36	XX	3	3	-6.17E+02	-9.16E+02	-160.7	-160	2.74	-53	SW	--	IC	--	--	--
6	39	XX	3	1	-5.51E+02	-1.50E+03	-214.7	492	2.74	-53	--	--	--	--	--	--
10	19	XX	3	5	-1.57E+02	1.69E+01	-14.6	510	2.74	-53	--	--	IC	--	RB	--
13	39	YY	0	0	-2.77E+02	-1.28E+03	-163.3	494	2.74	-53	SW	--	--	--	--	--
19	39	XX	5	1	-2.26E+02	-1.41E+03	-171	-284	2.74	-53	--	--	--	--	--	--
3	17	YY	4	0	-2.91E+02	-2.17E+02	-53.3	375	2.73	-53	--	--	--	--	RB	--
4	36	XX	7	3	-6.42E+02	-9.53E+02	-167.3	169	2.73	-53	--	--	IC	--	--	--
13	30	YY	0	6	-3.40E+02	2.01E+02	-14.6	249	2.73	-53	--	--	--	--	--	--
15	38	XX	5	7	-3.67E+02	-1.55E+03	-201.4	-94	2.73	-53	--	--	--	--	--	--
4	31	YY	6	0	-5.51E+02	-9.14E+02	-153.6	-261	2.72	-53	--	--	IC	--	--	--
15	31	XX	5	1	-2.99E+02	-9.70E+02	-133.1	47	2.72	-53	--	--	IC	--	--	--
15	25	YY	4	4	-2.53E+02	-1.83E+02	-45.8	339	2.71	-53	SW	--	IC	--	--	--
22	25	XX	3	5	-1.43E+02	2.12E+02	7.3	-428	2.71	-53	--	--	--	--	--	--
2	36	YY	2	2	-4.90E+02	-9.56E+02	-151.7	-140	2.7	-53	SW	--	--	--	--	--
3	6	YY	4	2	-3.44E+01	-1.64E+02	-20.8	-167	2.7	-53	--	--	IC	RC	RB	--
3	24	YY	4	2	-5.43E+02	-3.92E+02	-98	-94	2.7	-53	--	--	IC	--	--	--
10	25	XX	3	5	-3.11E+02	1.41E+01	-31.2	-152	2.7	-53	--	--	IC	--	--	--
15	40	XX	5	1	-3.03E+02	-1.51E+03	-190	-61	2.7	-53	--	--	--	--	--	--
3	40	XX	5	1	-5.65E+02	-1.57E+03	-224.2	123	2.69	-53	--	--	--	--	--	--
6	13	YY	2	0	-2.74E+02	-2.01E+02	-49.8	-242	2.69	-53	--	--	IC	--	RB	--
1	30	XX	1	7	-4.45E+02	-1.87E+01	-48.6	-447	2.68	-53	--	--	--	--	--	--
6	39	YY	2	0	-5.51E+02	-1.48E+03	-213.1	425	2.68	-53	--	--	--	--	--	--
13	24	XX	1	3	-2.34E+02	-3.00E+01	-27.7	-323	2.68	-53	--	--	IC	--	--	--

A1	A2	Pol	W1	W2	gDels(ns)	bDels(ns)	expBin	maxBin	maxSig	Msup	SW	SI	IC	RC	RB	TB
13	38	XX	1	7	-3.21E+02	-1.25E+03	-164.6	-376	2.68	-53	--	--	--	--	--	--
15	30	XX	5	7	-3.87E+02	-1.04E+02	-51.5	-504	2.68	-53	--	--	--	--	--	--
22	31	XX	3	1	-1.88E+02	-5.73E+02	-79.9	-346	2.68	-53	--	--	--	--	--	--
24	39	XX	3	1	-4.30E+01	-1.25E+03	-135.9	89	2.68	-53	--	--	--	--	RB	--
30	31	YY	6	0	8.81E+01	-8.63E+02	-81.3	490	2.68	-53	--	--	--	--	RB	--
36	40	YY	2	0	8.62E+01	-5.01E+02	-43.5	-328	2.68	-53	--	--	--	--	RB	--
2	7	YY	2	4	7.53E+01	-1.42E+02	-7	499	2.67	-53	--	--	IC	RC	RB	--
4	36	YY	6	2	-6.42E+02	-9.55E+02	-167.4	469	2.67	-53	--	--	IC	--	--	--
13	25	YY	0	4	-2.07E+02	1.20E+02	-9.1	70	2.67	-53	--	--	IC	--	--	--
36	40	XX	3	1	8.62E+01	-5.03E+02	-43.7	100	2.67	-53	--	--	--	--	RB	--
3	20	XX	5	7	-3.75E+02	-2.95E+02	-70.3	-356	2.66	-53	--	--	IC	--	RB	--
5	24	XX	1	3	-5.06E+02	-2.07E+02	-74.8	-72	2.66	-53	--	--	IC	--	--	--
5	40	XX	1	1	-5.28E+02	-1.38E+03	-200.4	491	2.66	-53	SW	--	--	--	--	--
6	19	XX	3	5	-3.26E+02	-9.13E+01	-43.7	-355	2.66	-53	--	--	IC	--	RB	--
16	36	XX	7	3	-3.55E+02	-7.22E+02	-112.9	142	2.66	-53	--	--	--	--	--	--
19	31	YY	4	0	-2.00E+02	-7.85E+02	-103.3	494	2.66	-53	--	--	IC	--	--	--
19	40	XX	5	1	-2.05E+02	-1.33E+03	-160.6	-40	2.66	-53	--	--	--	--	--	--
3	31	XX	5	1	-5.60E+02	-1.03E+03	-167.3	17	2.65	-53	--	--	IC	--	--	--
4	6	XX	7	3	-2.48E+01	-3.77E+01	-6.6	-296	2.65	-53	--	--	IC	RC	RB	--
4	40	YY	6	0	-5.55E+02	-1.46E+03	-210.9	-487	2.65	-53	--	--	--	--	--	--
13	24	YY	0	2	-2.34E+02	-2.63E+01	-27.3	-448	2.65	-53	--	--	IC	--	--	--
13	39	XX	1	1	-2.77E+02	-1.28E+03	-163.6	-248	2.65	-53	SW	--	--	--	--	--
17	30	XX	1	7	-3.57E+02	5.10E+01	-32.1	183	2.65	-53	--	--	IC	--	--	--
10	17	YY	2	0	-8.77E+01	4.60E+01	-4.4	-74	2.64	-53	--	--	--	--	RB	--
25	31	YY	4	0	-4.53E+01	-7.82E+02	-86.8	-54	2.64	-53	--	--	IC	--	RB	--
5	15	XX	1	5	-2.25E+02	1.26E+02	-10.4	-498	2.63	-53	--	--	IC	--	RB	--
16	24	XX	7	3	-2.47E+02	-4.92E+01	-31	102	2.63	-53	--	--	--	--	--	--
19	24	YY	4	2	-1.83E+02	-1.49E+02	-34.8	-105	2.63	-53	--	SI	IC	--	--	--
19	30	XX	5	7	-2.88E+02	7.72E+01	-22.1	71	2.63	-53	--	--	--	--	--	--
20	36	XX	7	3	-2.76E+02	-7.75E+02	-110.3	-10	2.63	-53	--	--	IC	--	--	--
16	17	XX	7	1	4.82E+00	1.29E+02	14	-452	2.62	-53	--	SI	IC	RC	RB	--
17	22	XX	1	3	-8.05E+01	-2.41E+02	-33.8	-236	2.62	-53	--	--	IC	RC	RB	--
17	40	XX	1	1	-2.74E+02	-1.35E+03	-170.6	-249	2.62	-53	SW	--	IC	--	--	--
19	39	YY	4	0	-2.26E+02	-1.40E+03	-170.7	122	2.62	-53	--	--	--	--	--	--
20	31	XX	7	1	-1.86E+02	-7.40E+02	-97	325	2.62	-53	--	--	IC	--	--	--
24	39	YY	2	0	-4.30E+01	-1.25E+03	-135.9	358	2.62	-53	--	--	--	--	RB	--
1	25	YY	0	4	-3.12E+02	-9.84E+01	-43	-380	2.61	-53	--	--	IC	--	--	--
6	15	XX	3	5	-2.27E+02	9.03E+01	-14.4	-493	2.61	-53	--	--	IC	--	RB	--
1	30	YY	0	6	-4.45E+02	-1.74E+01	-48.5	-461	2.6	-53	--	--	--	--	--	--

A1	A2	Pol	W1	W2	gDels(ns)	bDels(ns)	expBin	maxBin	maxSig	Msup	SW	SI	IC	RC	RB	TB
4	6	YY	6	2	-2.48E+01	-5.07E+01	-7.9	-468	2.6	-53	--	--	IC	RC	RB	--
4	19	YY	6	4	-3.51E+02	-1.29E+02	-50.3	-274	2.6	-53	--	--	IC	--	RB	--
4	38	XX	7	7	-6.19E+02	-1.50E+03	-222.3	-36	2.6	-53	SW	--	--	--	--	--
6	13	XX	3	1	-2.74E+02	-2.13E+02	-51.1	251	2.6	-53	--	--	IC	--	RB	--
36	38	XX	3	7	2.21E+01	-5.47E+02	-55	-12	2.6	-53	--	--	--	RC	RB	--
1	24	XX	1	3	-3.40E+02	-2.48E+02	-61.6	103	2.59	-53	--	--	IC	--	--	--
1	24	YY	0	2	-3.40E+02	-2.44E+02	-61.2	-120	2.59	-53	--	--	IC	--	--	--
6	15	YY	2	4	-2.27E+02	1.02E+02	-13.2	-197	2.59	-53	--	--	IC	--	RB	--
10	24	YY	2	2	-3.39E+02	-1.29E+02	-49.1	-375	2.59	-53	SW	--	IC	--	--	--
10	38	XX	3	7	-4.25E+02	-1.35E+03	-186.6	-252	2.59	-53	--	--	--	--	--	--
13	20	XX	1	7	-6.62E+01	7.29E+01	0.7	-493	2.59	-53	--	--	IC	RC	RB	--
15	24	YY	4	2	-2.81E+02	-3.29E+02	-64	-293	2.59	-53	--	--	IC	--	--	--
1	20	XX	1	7	-1.71E+02	-1.45E+02	-33.2	27	2.58	-53	--	--	IC	--	RB	--
1	22	XX	1	3	-1.69E+02	-3.11E+02	-50.3	-276	2.58	-53	--	--	--	--	RB	--
6	24	YY	2	2	-5.09E+02	-2.27E+02	-77.2	16	2.58	-53	SW	--	IC	--	--	--
16	25	YY	6	4	-2.19E+02	9.90E+01	-12.6	-276	2.58	-53	--	--	--	--	--	--
1	31	YY	0	0	-3.57E+02	-8.80E+02	-129.8	-89	2.57	-53	SW	--	IC	--	--	--
2	13	YY	2	0	-1.48E+02	-2.53E+02	-42	370	2.57	-53	--	--	--	--	RB	--
2	24	YY	2	2	-3.82E+02	-2.79E+02	-69.3	-68	2.57	-53	SW	--	--	--	--	--
3	39	YY	4	0	-5.86E+02	-1.65E+03	-233.9	-391	2.57	-53	--	--	--	--	--	--
6	31	YY	2	0	-5.26E+02	-8.64E+02	-145.7	104	2.57	-53	--	--	IC	--	--	--
10	17	XX	3	1	-8.77E+01	4.31E+01	-4.7	74	2.57	-53	--	--	--	--	RB	--
5	15	YY	0	4	-2.25E+02	1.39E+02	-9	11	2.56	-53	--	--	IC	--	RB	--
24	31	YY	2	0	-1.76E+01	-6.36E+02	-68.5	-509	2.56	-53	--	--	IC	--	RB	--
1	39	YY	0	0	-3.82E+02	-1.50E+03	-197.2	72	2.55	-53	SW	--	--	--	--	--
5	40	YY	0	0	-5.28E+02	-1.37E+03	-198.8	334	2.55	-53	SW	--	--	--	--	--
13	19	XX	1	5	-5.18E+01	1.22E+02	7.4	-73	2.55	-53	--	--	IC	RC	RB	--
15	25	XX	5	5	-2.53E+02	-1.84E+02	-45.9	39	2.55	-53	SW	--	IC	--	--	--
19	24	XX	5	3	-1.83E+02	-1.52E+02	-35.1	-479	2.55	-53	--	SI	IC	--	--	--
2	19	YY	2	4	-1.99E+02	-1.30E+02	-34.5	169	2.54	-53	--	--	--	--	RB	--
4	39	YY	6	0	-5.76E+02	-1.53E+03	-221	436	2.54	-53	--	--	--	--	--	--
7	39	YY	4	0	-5.00E+02	-1.39E+03	-198.3	9	2.54	-53	--	--	IC	--	--	--
5	36	YY	0	2	-6.14E+02	-8.67E+02	-155.3	457	2.53	-53	--	--	IC	--	--	--
6	31	XX	3	1	-5.26E+02	-8.80E+02	-147.4	485	2.53	-53	--	--	IC	--	--	--
13	40	XX	1	1	-2.56E+02	-1.21E+03	-153.3	23	2.53	-53	SW	--	--	--	--	--
3	22	XX	5	3	-3.72E+02	-4.61E+02	-87.4	433	2.52	-53	--	--	--	--	RB	--
4	31	XX	7	1	-5.51E+02	-9.18E+02	-154	407	2.52	-53	--	--	IC	--	--	--
3	16	YY	4	6	-2.96E+02	-3.45E+02	-67.2	-394	2.51	-53	--	--	--	--	RB	--
10	40	YY	2	0	-3.61E+02	-1.31E+03	-174.9	-141	2.51	-53	--	--	--	--	--	--

A1	A2	Pol	W1	W2	gDels(ns)	bDels(ns)	expBin	maxBin	maxSig	Msup	SW	SI	IC	RC	RB	TB
15	24	XX	5	3	-2.81E+02	-3.33E+02	-64.5	-155	2.51	-53	--	--	IC	--	--	--
16	36	YY	6	2	-3.55E+02	-7.24E+02	-113.1	-445	2.51	-53	--	--	--	--	--	--
20	39	XX	7	1	-2.11E+02	-1.36E+03	-164.3	-92	2.51	-53	--	--	--	--	--	--
3	40	YY	4	0	-5.65E+02	-1.57E+03	-223.8	188	2.5	-53	--	--	--	--	--	--
5	30	YY	0	6	-6.12E+02	3.71E+01	-60.3	306	2.5	-53	--	--	--	--	--	--
1	36	XX	1	3	-4.48E+02	-9.20E+02	-143.5	393	2.49	-53	--	--	IC	--	--	--
6	30	YY	2	6	-6.14E+02	-4.00E-01	-64.4	-245	2.49	-53	--	--	--	--	--	--
17	30	YY	0	6	-3.57E+02	5.18E+01	-32	140	2.49	-53	--	--	IC	--	--	--
24	31	XX	3	1	-1.76E+01	-6.37E+02	-68.6	129	2.49	-53	--	--	IC	--	RB	--
4	25	XX	7	5	-5.06E+02	-1.32E+02	-66.8	-510	2.48	-53	--	--	IC	--	--	--
6	17	XX	3	1	-2.57E+02	-6.51E+01	-33.8	-255	2.48	-53	--	--	--	--	RB	--
17	38	XX	1	7	-3.38E+02	-1.40E+03	-182	-325	2.48	-53	--	--	IC	--	--	--
19	31	XX	5	1	-2.00E+02	-7.89E+02	-103.7	468	2.47	-53	--	--	IC	--	--	--
16	19	XX	7	5	-6.40E+01	1.03E+02	4.1	-395	2.46	-53	--	--	--	RC	RB	--
19	36	XX	5	3	-2.91E+02	-8.25E+02	-117	-355	2.46	-53	--	--	IC	--	--	--
22	39	XX	3	1	-2.14E+02	-1.19E+03	-147.2	398	2.46	-53	--	--	IC	--	--	--
15	36	XX	5	3	-3.89E+02	-1.01E+03	-146.3	237	2.45	-53	--	--	IC	--	--	--
16	24	YY	6	2	-2.47E+02	-4.70E+01	-30.8	48	2.45	-53	--	--	--	--	--	--
20	25	XX	7	5	-1.40E+02	4.63E+01	-9.9	477	2.45	-53	--	SI	IC	--	--	--
4	25	YY	6	4	-5.06E+02	-1.32E+02	-66.9	197	2.44	-53	--	--	IC	--	--	--
5	38	XX	1	7	-5.92E+02	-1.43E+03	-211.7	-72	2.44	-53	--	--	--	--	--	--
22	30	XX	3	7	-2.77E+02	2.92E+02	1.7	-404	2.43	-53	--	--	IC	--	--	--
25	38	XX	5	7	-1.14E+02	-1.37E+03	-155.5	-284	2.42	-53	--	--	--	--	RB	--
30	31	XX	7	1	8.81E+01	-8.66E+02	-81.6	-391	2.42	-53	--	--	--	--	RB	--
25	36	YY	4	2	-1.36E+02	-8.23E+02	-100.6	236	2.41	-53	--	--	IC	--	RB	--
10	30	YY	2	6	-4.45E+02	9.78E+01	-36.4	-108	2.4	-53	--	--	--	--	--	--
17	19	XX	1	5	-6.88E+01	-2.62E+01	-10	-467	2.37	-53	--	--	--	RC	RB	--
1	39	XX	1	1	-3.82E+02	-1.50E+03	-197.5	147	2.35	-53	SW	--	--	--	--	--
15	16	YY	4	6	-3.46E+01	-2.82E+02	-33.2	-253	2.29	-53	--	--	--	RC	RB	--