Preset Reply Timings

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[1] `$Header: d:/Binder2/PRTimes/RCS/PRTimes.tex,v 1.8 2008-07-08 13:30:48-07 Hamilton Exp Hamilton $`

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1 Determining the Reply Timing for Presets with the Spectra IV

There have been some questions as to how fast the Spectra IV is in processing commands. Some evidence indicates that it is slower than previous units. From some evaluations, it appears that most commands have about the same response times in the Spectra IV and its predecessors. However there seems to be a problem when the Flash memory is being accessed. These problems were discovered with a Spectra IV model CBW35, Rev 1/070, consist of:

1. When a "Set Preset" command is sent, it takes a long time to save the data to flash with most replies taking a second, or more, to be sent out from the Spectra IV.

2. When a "Clear Preset" command is sent, it takes a long time clear the preset data from flash.

3. If a Spectra IV (model CBW35, Rev 1/070),is run from a Spectra III back box, then less than the maximum (255) presets may be saved. If a Spectra IV runs out of memory in the back box, then the Spectra IV is supposed to save the preset data in the camera units its self. This is not happening.

4. When a Spectra IV (model CBW35, Rev 1/070), running from a Spectra III back box, runs out of room, a typical reply takes about .8 second to be sent. These replies are "General Reply"s, which are the same as though the preset had been saved. It would be nice if a NAC reply were sent so that the head end could tell that the Spectra IV was not saving preset data.

   It was verified that the preset was not saved by reading out the pan angle when the preset was set and then reading out the pan angle when the preset was called. When the called pan angle did not match the setting pan angle, it was assumed that the preset had not been set.

5. When a Spectra IV (model TC16) is run from a Spectra III back box, and it gets to its maximum preset number of 128, then replies are almost instanteous. These replies are "General Reply"s, which are the same as though the preset had been saved. It would be nice if a NAC reply were sent so that the head end could tell that the Spectra IV was not saving preset data.

6. As an additional item, the unit being used for testing has a bad spot on its pan drive belt. Sometimes the unit stops pan motion. When this happens there is no indication to the head end that pan motion has stopped. In most applications this is not a problem because an operator is using the Spectra IV and they would immediately notice it. However as more and more users are using computer control of the Spectra line of units, not having the Spectra be able to inform the head end of a failure is not as useful as may be expected. It would be nice if when the microstep counter indicates that the unit had gone over 360^o and had not found the calibration tab an error of some type should be put out. It might be a "special alarm" that would be reserved for "hardware failure". (Obviously the hardware failure could be used for such things as over temperature, loss of pressure in pressure in pressurized units, etc.)

1.1 Test Files

The GlassKeyboard was used to generate test data using several different script files. The results of the command sending and the replies that were generated, were captured and then analyzed.

As investigating continued the delay times were increased from an original value of 1 second (1000 for the GlassKeyboard as the GlassKeyboard timer is a millisecond timer) to larger an larger values. There was an effort to use as small values as possible since using a 10 second delay for over 200 times, resulted in a long run times.

Investigating was done by starting at preset 1 and incrementing up to preset 255. As an experiment, one run (`08JAN08A` was made with starting at 255 and decrementing down to 1. The results were approximately the same in both cases and the "drecmenting" results are not shown.

Early testing used the delays indicated below. Later testing commented out the delays and used a `set_response_time(9999)` command to the GlassKeyboard wait for up to 10 seconds - 1 millisecond for a reply and to then go on. This speeded things up quite nicely.

1. Clearing a preset

   Presets were cleared with the following GlassKeyboard script. This was done for each of the "255" presets available.

   ```
   :clear_preset(01)
   :delay(3000)
   ```

2. Setting a preset

   Presets were set with the following GlassKeyboard script. This was done for each of the "255" presets available.

   ```
   :ptz(pr 25)
   :random_delay(1000,2000)
   :ptz()
   :delay(2000)
   :query_pan_position()
   :delay(1000)
   :print("Set preset 01")
   :set_preset(00)
   :delay(7000)
   ```

3. Calling a preset

   Presets were called with the following GlassKeyboard script. This was done for each of the "255" presets available.

   ```
   :ptz(pl 25)
   :random_delay(1000,2000)
   :ptz()
   :delay(2000)
   :print("Call preset 01")
   :go_to_preset(01)
   :delay(1000)
   :query_pan_position()
   :delay(1000)
   ```

1.2 Investigation Results

On the attached plots and tables, presets in the range of $83 \rightarrow 99$ are indicated with zero reply times in the graphs and the numeric preset numbers in the tables. This was done to allow for consistent indexing of the data.

The Spectra IV has "255" presets. (The Esprit has 80 presets.) These are assigned as follows: presets 33, 34 and $83 \rightarrow 99$ are "predefined" and have very specific uses. All the rest of the presets ($255 - 19 = 236$, $128 - 19 = 109$ and $82 - 2 = 80$ depending on the model) are normal programmable presets.

The plots were done using gnuplot running in "auto" mode. This results in different Y values as the reply time maximums changed on different values.

On the plots, the Y axis is the reply time in seconds. The X axis is the preset number.

1. Using a Spectra IV SE, rev 1.070, in a Spectra III back box gets the results shown in Figure 1, page 6 and Table 1, page 6.

2. Using a Spectra IV non-SE, rev 1.070 in a Spectra III back box gets the results shown in Figure 2, page 7 and Table 2, page 7.

3. Using an Esprit ES31 CBW24, rev 3.80, gets the results shown in Figure 3, page 8 and Table 3, page 8. A test run was made with a Spectra III and its results were about the same as the results obtained with the Esprit and so are not show here. The range of values here was quite narrow and when first plotted looked like "noise". The results shown here have been smoothed to give a better idea of the actual range of them.

4. Using a Spectra IV SE, rev 1.070, in a Spectra IV back box gets the results shown in Figure 4, page 9 and Table 4, page 9.

5. Using a Spectra IV SE, rev 1.070, in a Spectra IV back box. This time the presets were set from 255 down to 1, which had similar times to the above example. However this time the times are those of clearing the presets when the clearing starts at 1 and incrementing up to 255. The results are shown in Figure 5, page 10 and Table 5, page 10.

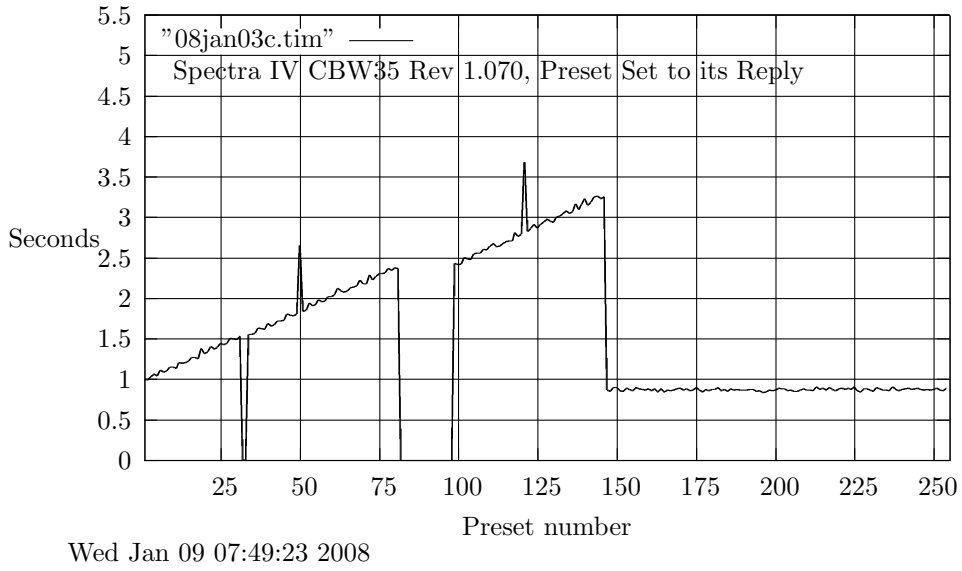

Figure 1: Spectra IV, CBW35, Preset Set to its Reply in a Spectra III backbox, plotted

	xx1	xx2	xx3	xx4	xx5	xx6	xx7	xx8	xx9	x10
00x	0.988166	0.999524	0.991762	1.037960	1.067413	1.043559	1.111163	1.088766	1.102605	1.157310
01x	1.153724	1.135956	1.212461	1.201658	1.208273	1.222385	1.274835	1.269208	1.258141	1.383219
02x	1.317959	1.340825	1.408011	1.372596	1.396839	1.449703	1.433375	1.446944	1.507153	1.498637
03x	1.493896	1.532774	0.005428	0.005386	1.556709	1.556814	1.576164	1.639574	1.626346	1.622777
04x	1.688844	1.661309	1.678221	1.720916	1.721955	1.731682	1.812178	1.794861	1.787335	1.806580
05x	2.652413	1.843658	1.858303	1.940929	1.915902	1.917491	1.979964	1.960356	1.969054	2.021994
06x	2.019261	2.042751	2.123871	2.092543	2.082154	2.095190	2.136779	2.142575	2.158244	2.224862
07x	2.180320	2.181190	2.293304	2.231419	2.276450	2.310027	2.307465	2.312855	2.369391	2.343219
08x	2.381451	2.374548	83	84	85	86	87	88	89	90
09x	91	92	93	94	95	96	97	98	99	2.430253
10x	2.418845	2.424365	2.505615	2.486188	2.480435	2.555476	2.558532	2.560568	2.607895	2.596266
11x	2.646550	2.675642	2.640357	2.644782	2.675434	2.702278	2.711867	2.712152	2.810928	2.762128
12x	2.796267	3.680745	2.829652	2.870460	2.916159	2.872256	2.917828	2.945694	2.979831	2.952205
13x	2.936425	3.005483	3.015068	3.052333	3.083766	3.049498	3.070199	3.167882	3.100774	3.160772
14x	3.228949	3.149836	3.189445	3.258914	3.259938	3.234652	3.254913	0.869417	0.856161	0.898505
15x	0.898323	0.859027	0.856928	0.889575	0.880851	0.858713	0.901005	0.881997	0.880226	0.866814
16x	0.883952	0.861162	0.887231	0.846321	0.881475	0.847777	0.866579	0.862099	0.872125	0.882584
17x	0.896212	0.871926	0.883870	0.857569	0.871980	0.900668	0.872170	0.848744	0.877878	0.859849
18x	0.875223	0.877014	0.899964	0.860836	0.875438	0.849861	0.881346	0.870408	0.875319	0.872986
19x	0.868626	0.869000	0.873763	0.878297	0.852909	0.864208	0.839025	0.846370	0.871449	0.863003
20x	0.870643	0.893429	0.881892	0.881266	0.858419	0.872969	0.851892	0.849547	0.866763	0.884079
21x	0.871450	0.871735	0.864260	0.905276	0.876771	0.891814	0.869053	0.898269	0.874419	0.860330
22x	0.887594	0.890587	0.875902	0.891760	0.876084	0.910147	0.862490	0.848949	0.882023	0.882630
23x	0.870824	0.855200	0.897203	0.886291	0.871136	0.869227	0.858532	0.907960	0.877776	0.864660
24x	0.879704	0.882266	0.895576	0.879339	0.886787	0.894625	0.878898	0.869184	0.878950	0.869182
25x	0.879538	0.889417	0.869206	0.861892	0.891761	—	—	—	—	—

Table 1: Spectra IV, CBW35, Preset Set to its Reply in a Spectra III backbox, values

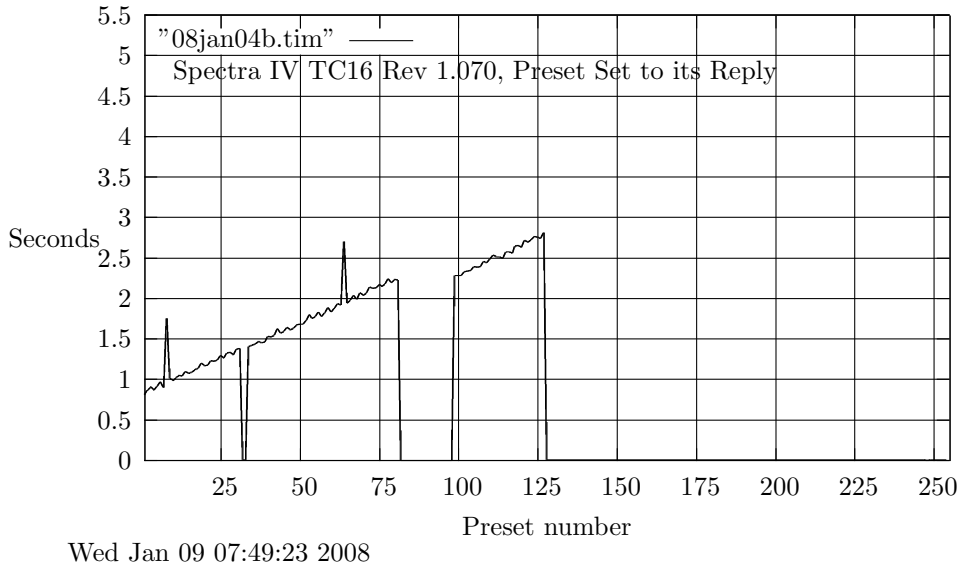

Figure 2: Spectra IV, TC16, Preset Set to its Reply in a Spectra III backbox, plotted

	xx1	xx2	xx3	xx4	xx5	xx6	xx7	xx8	xx9	x10
00x	0.814156	0.813271	0.866709	0.906424	0.868714	0.917725	0.968202	0.902437	1.755069	1.013297
01x	0.985199	1.028872	1.051631	1.042726	1.099211	1.073505	1.093766	1.121268	1.140354	1.204549
02x	1.171682	1.177099	1.236109	1.224678	1.241996	1.293610	1.261269	1.327933	1.338428	1.305120
03x	1.378013	1.386006	0.004309	0.004177	1.406033	1.419495	1.437804	1.472073	1.453193	1.461267
04x	1.533517	1.523284	1.551241	1.626735	1.569312	1.596241	1.641683	1.614857	1.636580	1.671631
05x	1.681737	1.681553	1.729757	1.801529	1.750564	1.775096	1.836695	1.780902	1.825302	1.889965
06x	1.831160	1.882256	1.938998	1.920406	2.704679	1.947414	1.982544	2.035851	1.988974	2.066866
07x	2.038427	2.072439	2.143454	2.128377	2.133013	2.175824	2.150905	2.180146	2.243610	2.199641
08x	2.233037	2.232243	83	84	85	86	87	88	89	90
09x	91	92	93	94	95	96	97	98	99	2.285174
10x	2.282332	2.281971	2.329184	2.342830	2.350276	2.395432	2.387977	2.391840	2.454599	2.438871
11x	2.490122	2.532804	2.513182	2.511890	2.500018	2.580069	2.576188	2.558483	2.648427	2.653531
12x	2.634991	2.716944	2.693898	2.727037	2.764783	2.755355	2.745514	2.812673	0.004116	0.004151
13x	0.004335	0.004607	0.004256	0.004258	0.004332	0.004412	0.004438	0.004441	0.004415	0.004309
14x	0.004204	0.004208	0.004130	0.004206	0.004274	0.004155	0.004282	0.004247	0.004467	0.004221
15x	0.004569	0.004569	0.004387	0.004648	0.004292	0.004362	0.004360	0.004415	0.004517	0.004126
16x	0.004280	0.004206	0.004256	0.004256	0.004545	0.004161	0.004567	0.004466	0.004389	0.004230
17x	0.004412	0.004415	0.004236	0.004465	0.004520	0.004362	0.004440	0.004074	0.004195	0.004649
18x	0.004232	0.004438	0.004492	0.004257	0.004412	0.004712	0.004595	0.004308	0.004570	0.004370
19x	0.004363	0.004258	0.004387	0.004439	0.004203	0.004441	0.004128	0.004230	0.004257	0.004205
20x	0.004229	0.004204	0.004232	0.004465	0.004389	0.004490	0.004233	0.004388	0.004178	0.004181
21x	0.004307	0.004386	0.004413	0.004232	0.004503	0.004075	0.004205	0.004466	0.004204	0.004255
22x	0.004189	0.004204	0.004569	0.004335	0.004360	0.004306	0.004386	0.004412	0.004059	0.004543
23x	0.004073	0.004466	0.004386	0.004513	0.004029	0.004335	0.004362	0.004554	0.004282	0.004448
24x	0.004152	0.004168	0.004386	0.004246	0.004412	0.004308	0.004016	0.004256	0.003942	0.004543
25x	0.004154	0.004372	0.004386	0.004335	0.004205	—	—	—	—	—

Table 2: Spectra IV, TC16, Preset Set to its Reply in a Spectra III backbox, values

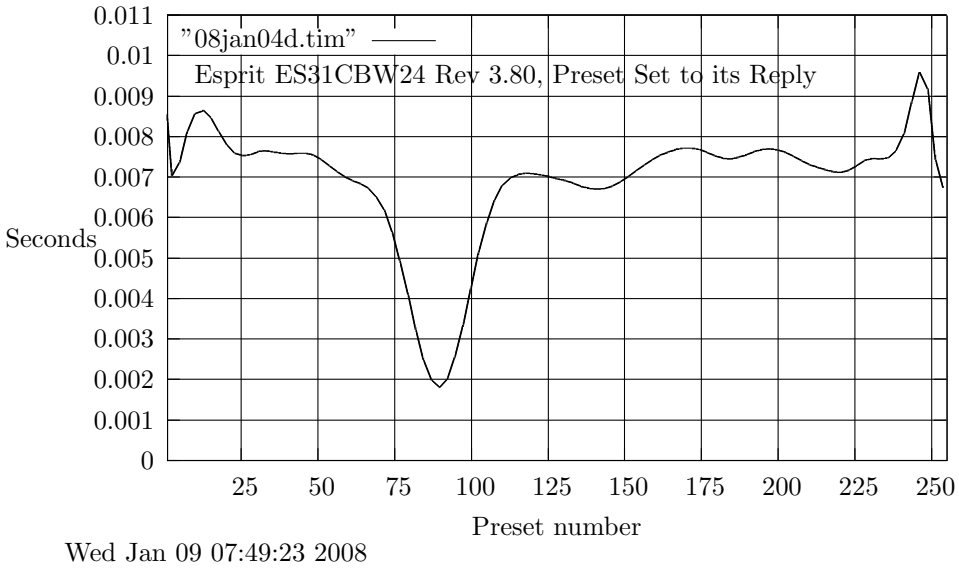

Figure 3: Esprit, CBW24, Preset Set to its Reply, plotted and smoothed

	xx1	xx2	xx3	xx4	xx5	xx6	xx7	xx8	xx9	x10
00x	0.009520	0.005042	0.007120	0.008556	0.006107	0.006630	0.005563	0.010119	0.010299	0.006864
01x	0.008139	0.009649	0.010613	0.006995	0.007803	0.009027	0.010823	0.007849	0.008740	0.006040
02x	0.007751	0.008375	0.005637	0.007829	0.009075	0.006160	0.007982	0.008008	0.005535	0.005014
03x	0.007046	0.010970	0.008564	0.011838	0.006967	0.005190	0.006004	0.008796	0.005693	0.008479
04x	0.010535	0.006187	0.005198	0.005874	0.008114	0.006941	0.007436	0.014728	0.005250	0.009182
05x	0.005894	0.007255	0.008661	0.007227	0.005065	0.006750	0.008393	0.006419	0.008791	0.005406
06x	0.006811	0.006628	0.006004	0.006449	0.007253	0.005649	0.008504	0.006629	0.008660	0.006604
07x	0.005794	0.006775	0.006109	0.006392	0.009286	0.006499	0.006525	0.005226	0.006605	0.006292
08x	0.007281	0.006244	83	84	85	86	87	88	89	90
09x	91	92	93	94	95	96	97	98	99	0.007959
10x	0.006436	0.005276	0.004961	0.007436	0.012515	0.005456	0.009036	0.005795	0.008964	0.006447
11x	0.008114	0.006318	0.007775	0.010717	0.005405	0.005119	0.006212	0.006663	0.008661	0.005743
12x	0.006838	0.008846	0.009144	0.006587	0.005580	0.007566	0.005457	0.005380	0.005926	0.007592
13x	0.012594	0.005092	0.008217	0.006303	0.005667	0.007438	0.007333	0.006228	0.005329	0.005421
14x	0.006864	0.007306	0.008480	0.005535	0.005093	0.005145	0.008711	0.005249	0.006968	0.006318
15x	0.007333	0.008009	0.004935	0.008401	0.007098	0.008089	0.005561	0.006211	0.010248	0.008921
16x	0.008324	0.005327	0.007647	0.008012	0.006523	0.007280	0.010432	0.006237	0.008920	0.006681
17x	0.006500	0.008051	0.006797	0.008969	0.009053	0.010509	0.006959	0.006107	0.008921	0.008687
18x	0.007880	0.005274	0.007228	0.007544	0.005718	0.006247	0.005395	0.005128	0.010587	0.008688
19x	0.008870	0.008893	0.005795	0.006135	0.009910	0.008843	0.007796	0.007308	0.007723	0.007826
20x	0.005276	0.008740	0.006969	0.009023	0.007932	0.010404	0.006110	0.006288	0.007489	0.006682
21x	0.007358	0.006135	0.008269	0.005067	0.008201	0.009016	0.007904	0.005943	0.006915	0.006552
22x	0.008530	0.007437	0.005482	0.006784	0.006032	0.005819	0.007620	0.008297	0.008609	0.008477
23x	0.008640	0.006654	0.008493	0.004860	0.007895	0.006759	0.007228	0.008398	0.008536	0.006238
24x	0.007464	0.007567	0.006317	0.007879	0.012308	0.006552	0.010431	0.011785	0.011775	0.009440
25x	0.007897	0.006656	0.007830	0.005977	0.006732	—	—	—	—	—

Table 3: Esprit, CBW24, Preset Set to its Reply, values

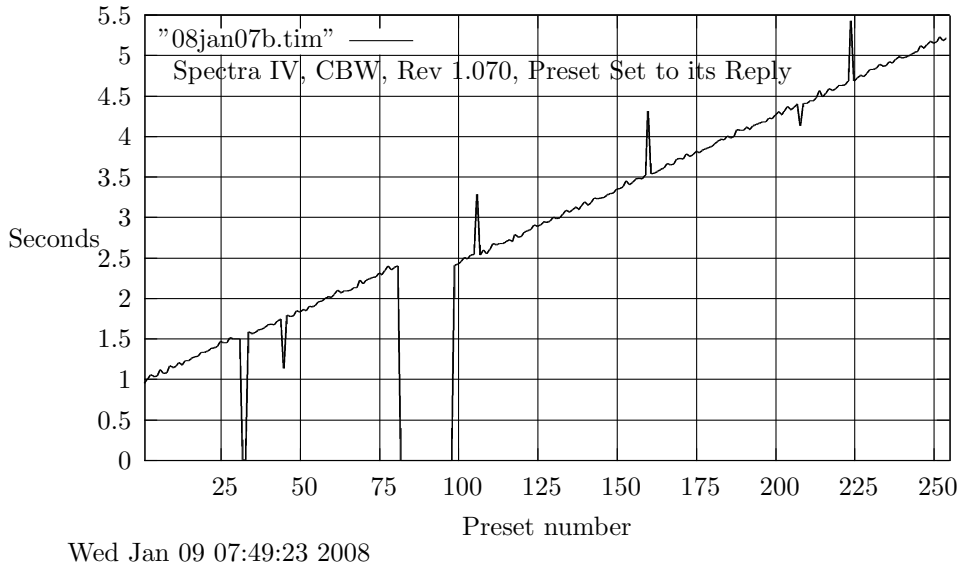

Figure 4: Spectra IV, CBW35, Preset Set to its Reply in a Spectra IV backbox, plotted

	xx1	xx2	xx3	xx4	xx5	xx6	xx7	xx8	xx9	x10
00x	0.961397	0.959634	1.006851	1.055501	1.031971	1.042906	1.121007	1.074237	1.083037	1.166760
01x	1.147075	1.169312	1.205721	1.179784	1.228818	1.229085	1.265382	1.283596	1.291162	1.338090
02x	1.334522	1.351890	1.385980	1.393871	1.407974	1.473323	1.456931	1.453479	1.515772	1.498270
03x	1.500669	1.500432	0.004949	0.005068	1.589313	1.567150	1.579599	1.613689	1.618824	1.639948
04x	1.674679	1.680486	1.677502	1.725492	1.749522	1.134548	1.797049	1.778170	1.783870	1.848975
05x	1.837151	1.866800	1.846164	1.902230	1.894522	1.914078	1.962238	1.964027	1.997251	2.026854
06x	2.014495	2.051605	2.105224	2.066631	2.094704	2.096398	2.103663	2.130901	2.134601	2.225095
07x	2.180303	2.228767	2.244807	2.262519	2.271397	2.317047	2.293845	2.346816	2.399053	2.356761
08x	2.387048	2.401709	83	84	85	86	87	88	89	90
09x	91	92	93	94	95	96	97	98	99	2.412765
10x	2.429133	2.456772	2.504867	2.487247	2.533428	2.545561	3.286449	2.535406	2.598791	2.553767
11x	2.605043	2.678819	2.663374	2.676604	2.682407	2.706449	2.727569	2.700511	2.789365	2.754912
12x	2.764590	2.825016	2.838612	2.856606	2.910007	2.892411	2.907437	2.944260	2.938507	2.956344
13x	3.002290	2.990356	2.993193	3.042254	3.086343	3.068170	3.100483	3.126684	3.099185	3.142229
14x	3.191855	3.156605	3.185277	3.240485	3.235900	3.238820	3.247698	3.275927	3.292395	3.303896
15x	3.352490	3.361112	3.378569	3.450851	3.404809	3.439054	3.478714	3.481881	3.477535	3.527716
16x	4.314992	3.538949	3.551919	3.573482	3.596829	3.614298	3.665121	3.649566	3.658533	3.721631
17x	3.732593	3.718950	3.785147	3.753089	3.773570	3.819783	3.800668	3.832156	3.844965	3.867830
18x	3.879288	3.912935	3.944990	3.964500	3.957205	4.002699	3.985392	3.995510	4.082258	4.076005
19x	4.078975	4.120328	4.085172	4.131191	4.151161	4.160616	4.183765	4.183729	4.226371	4.219002
20x	4.264807	4.310513	4.268009	4.317620	4.372437	4.333766	4.360746	4.400970	4.135796	4.409077
21x	4.409182	4.442102	4.442527	4.477283	4.563715	4.485823	4.539278	4.591188	4.570639	4.594444
22x	4.630435	4.633375	4.641543	4.686266	5.431188	4.684367	4.728011	4.760304	4.743818	4.777099
23x	4.826020	4.827725	4.842127	4.892491	4.869157	4.877543	4.921995	4.907935	4.951605	4.982724
24x	4.966735	4.976096	4.991685	5.020069	5.040770	5.048245	5.121344	5.088272	5.133906	5.173975
25x	5.153568	5.165094	5.230826	5.185667	5.211814	—	—	—	—	—

Table 4: Spectra IV, CBW35, Preset Set to its Reply in a Spectra IV backbox, values

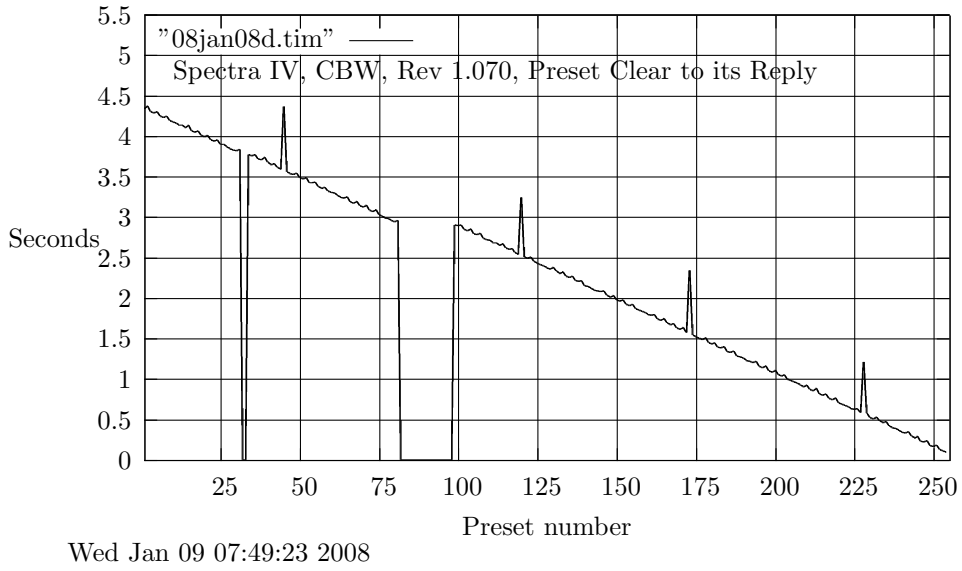

Figure 5: Spectra IV, CBW35, Preset Clear to its Reply clears incrementing, sets decrementing, plotted

	xx1	xx2	xx3	xx4	xx5	xx6	xx7	xx8	xx9	x10
00x	4.362282	4.347075	4.374704	4.304670	4.291320	4.310435	4.251736	4.231918	4.250800	4.193776
01x	4.177700	4.165848	4.141944	4.140927	4.107803	4.139341	4.068352	4.053064	4.070272	4.016215
02x	3.995094	4.014029	3.962648	3.942699	3.961717	3.904303	3.900468	3.875329	3.848400	3.831214
03x	3.822674	3.839036	0.005506	0.005637	3.779590	3.763403	3.779521	3.723715	3.710564	3.742284
04x	3.680200	3.649809	3.667778	3.615617	3.596087	4.373585	3.564455	3.543976	3.534652	3.546814
05x	3.491189	3.474114	3.489106	3.433194	3.426970	3.434678	3.382344	3.359679	3.377853	3.324967
06x	3.312075	3.299472	3.271319	3.251762	3.241268	3.252231	3.195956	3.180173	3.201164	3.143795
07x	3.128230	3.151734	3.087492	3.072310	3.095824	3.034365	3.020956	2.998195	2.987178	2.960007
08x	2.947257	2.966424	0.005563	0.005690	0.005457	0.005575	0.005299	0.005534	0.005300	0.005585
09x	0.005586	0.005220	0.005352	0.005515	0.005460	0.005874	0.005585	0.005975	0.005721	2.908925
10x	2.897180	2.909392	2.851579	2.837031	2.858481	2.801188	2.787022	2.801371	2.739783	2.727805
11x	2.720928	2.689521	2.685434	2.658244	2.674990	2.624784	2.604592	2.617491	2.566710	2.548246
12x	3.249419	2.512596	2.494807	2.509392	2.454758	2.437387	2.421892	2.402309	2.378898	2.365278
13x	2.382617	2.336433	2.308714	2.327831	2.276790	2.256296	2.278509	2.218378	2.210331	2.216890
14x	2.160488	2.152577	2.128273	2.104963	2.097961	2.085745	2.094601	2.040434	2.018922	2.039132
15x	1.986381	1.964939	1.985538	1.927075	1.913716	1.928067	1.871396	1.859547	1.843221	1.828663
16x	1.803121	1.795642	1.804509	1.747101	1.733820	1.750825	1.698168	1.676138	1.694705	1.634970
17x	1.622934	1.641920	1.584053	2.347544	1.552100	1.524887	1.510724	1.494574	1.518141	1.454392
18x	1.438768	1.456814	1.402648	1.390355	1.407360	1.345251	1.333870	1.352308	1.291762	1.281736
19x	1.261372	1.235565	1.225748	1.207283	1.223586	1.164705	1.148586	1.172073	1.108142	1.094106
20x	1.117190	1.057113	1.040226	1.061850	1.000250	0.988613	0.969106	0.957698	0.929784	0.912634
21x	0.932960	0.876954	0.859600	0.890001	0.818976	0.804287	0.819704	0.764783	0.750826	0.776128
22x	0.713961	0.693245	0.680096	0.660306	0.641216	0.630175	0.641866	0.590626	1.213251	0.585747
23x	0.528976	0.513376	0.534889	0.486164	0.462880	0.480173	0.423820	0.404151	0.391684	0.369290
24x	0.349729	0.336152	0.355815	0.297257	0.277646	0.297543	0.240798	0.232986	0.244235	0.183218
25x	0.175719	0.190774	0.133729	0.119131	0.105353	—	—	—	—	—

Table 5: Spectra IV, CBW35, Preset Clear to its Reply clears incrementing, sets decrementing, values

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