

3V-CPI

Data Post Processing Instructions

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This document provides a short walk through of data processing for the 3V-CPI using 3VCPiView 1.0.38, and the 3V-CPI 2DS Realtime version 1.0.85. It also covers installation of these programs. Please note that these are development releases with several known bugs. If you have any questions or need assistance, please contact Ted Fisher <ted@specinc.com> 303-449-1105. Thanks.

There are two main sections to this document:

- Data Processing Walk Through for 3V-CPI 2DS
- Data Processing Walk Through for 3V-CPI CPI

Sample Manually Created Data Directory Structure:

C:\DC3\rf01_3v2ds\	Top Level 2D-S Directory
C:\DC3\rf01_3vcpi\	Top Level CPI Directory
C:\DC3\rf01_3v2ds\base120518222150\	A directory for every base file
C:\DC3\rf01_3v2ds\base120518223631\	

Please make rf###_3v2ds and rf###_3vcpi directories for every flight. Also, for each 2D-S base file, make a subdirectory with the base file's date, and put each base*.2DSCPI file and base*.2DSCPIHK file into this subdirectory.

The programs generate a number of subdirectories and intermediate files. The 2D-S Playback will generate a number of SORTED files from each base files. For each SORTED file, a Data# directory is generated. Under the Data#, are ascii/ and png/ subdirectories containing the data.

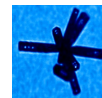
CPI image png files will be added to automatically generated subdirectories named images_of_<date time>_roi.

Data Processing Walk Through 2DS

The 2DS portion of the 3V-CPI produces raw data files with the naming format: baseYYMMDDHHMMSS.2DSCPI (data) and baseYYMMDDHHMMSS.2DSCPIHK (house keeping). These are processed using the Realtime software into SORTED files, which can be read by the IDL 3V-CPI View program. 3V-CPI View has two stages of data processing for 2D-S. It reads the SORTED files, and produces a new Data subdirectory with .bin binary files. These .bin files are then readable with 3V-CPI View to perform cleaning, produce image pages, particle size distribution (PSD), and time series. There are two batch processing modes, 1Hz ASCII, and PNG. These modes automatically produce the intermediate .bin files and final data products. The .bin files can still be opened later by 3V-CPI View for more detailed analysis.

Below is a step by step guide to process a 2DS file to make images and export ASCII data of PSD and time series.

2DS Playback



- 1) Open the 2DS Realtime program "SPEC_3V-CPI_2DS.exe" Desktop Icon: **SPEC 3V-CPI**
Start ->SPEC_3V-CPI->SPEC_3V-CPI
also usually located in:
"C:\Program Files\SPEC\SPEC_3V-CPI\SPEC_3V-CPI_2DS.exe"
- 2) In the toolbar, click "**Open Playback File**" and browse to the baseYYMMDDHHMMSS.2DSCPI file to be processed. This opens the "Select Playback Period" dialog.
- 3) Ensure "**Enable File Splitting**" is checked. Set **500,000 Particles/File** for processing. Press "**Start Playback**" and then "**Yes**" to generate SORTED files. If you only want to browse the data, you can select "No" to not generate files, and use the slider at the bottom of the Main Display window to skip around the data files.
- 4) Select "**Maximum Playback RUN**" from the menu, and "**Without Timestamps (faster)**". Checking "**Disable Bitmap Display**" will maximize processing speed.
- 5) The percent file completion is displayed at the bottom of the "Main Display" window. There may be an issue with detecting the end of some files. This will manifest at 100% completion, and the last file growing with dummy particles. Just stop Playback and close the file. Please send SPEC the file so we can examine it.
- 6) A popup window will display when Playback is complete for this base file.

3V-CPI View Generating .1Hz ASCII Output of 2D-S Data

- 1) Open IDL Development environment. To open multiple IDL sessions, execute the **idlde.exe** program in IDL's bin directory. Be sure that IDL is set up to change directories on open (File or Window ->Preferences

2) Run the following command in IDL (always in a new session via Start->IDL or with .reset command in IDL, potentially choose a new workspace number and click OK)

@compile3vcpi

3) From the drop down menu, select “**Archive_multi_Ice_ascii**”, and select the first SORTED file in the directory to process.

4) In the popup, make sure **M1** is checked and click **OK**.

1Hz Batch processing is now running. It can take some time depending on the number of SORTED files.

5) After the batch processing has completed, the various 1Hz files need to be concatenated. Copy all of the H and V .txt files from the various Data*/ascii/ directories into a single directory.

6) In IDL either start a new session or type .reset. Make sure the **GV_3VCPI_R0_header.ict** is up to date. Run the command **concat_3vcpi_dc3**, and select the first H*.txt. This will concatenate all H and V text files, and produce the final 1Hz files.

The final 1Hz files are named:

```
GV3VCPI_DC3_<YYYYMMDDhhmm>_M1M4_HVave.txt  
GV3VCPI_DC3_<YYYYMMDDhhmm>H_M1M4comb3V.txt  
GV3VCPI_DC3_<YYYYMMDDhhmm>V_M1M4comb3V.txt  
  
GV3VCPI_DC3_<YYYYMMDDhhmm>_R0.ict
```

The first three files can be opened with the SPEC Matlab plotting routine, **plot_3VCPI_2DS.m**. The .ict file is in ICARTT format, and can be opened with **Fscanbrowser**.

7) To plot Particle Size Distributions and Time Series, use **plot_3VCPI_2DS.m**. Open plot_3VCPI_2DS.m in Matlab (main program, not the editor). Set the working directory to 3VCPI_matlab_1.1, and set the path to 3VCPI_matlab_1.1 and include subdirectories.

8) Run plot_3VCPI_2DS.m with **F5**, and select the three **GV3VCPI_DC3*.txt** files. This will open a time series. Select a start and stop time with the mouse. A popup window will allow you to refine these times. Press OK to preview, or enter a “1” then press OK to save the plots. Press F5 to select a different time or to zoom. Use the “**wiper**” command to clean up Matlab, for opening a different data file.

3V-CPI View Generating .PNG Pages of Images of 2D-S Data

(note this will go much faster AFTER the 1Hz files have been generated, as many of the intermediate files are reused)

1) Open IDL Development environment. To open multiple IDL sessions, execute the **idlde.exe** program in IDL's bin directory. Be sure that IDL is set up to change directories on open (File or

Window ->Preferences->

2) Run the following command in IDL: (always in a new session via Start->IDL or with .reset command in IDL, potentially choose a new workspace number and click OK)

@compile3vcpi

3) From the drop down menu, select “**Archive_multi_Ice_png**”, and select the first SORTED file in the directory to process.

4) In the popup window, type “**L1n ge .5**” and click “**Accept**”. This will set a reasonable selection criteria. Also, on occasion, the Accept button seems not to close the window. Use the X to close the window.

PNG Batch processing is now running. It can take some time depending on the number of SORTED file. PNG images will flash to the screen.

5) The various png files are found under Data*/png/*

3V-CPI View Viewing 2D-S Data

(NOT PART OF GENERAL BATCH PROCESSING SKIP TO CPI BELOW)

1) Run the following command in IDL: (always in a new session via Start->IDL or with .reset command in IDL)

@compile3vcpi

2) Using the left open button, "Convert SORTED....2DSCPI Files into .BIN", select your file. This will produce a subdirectory for the processed files and displays progress in the Status Bar. This step can be skipped if the .bin files have been produced by batch processing.

3) Using the right open button, "Load .BIN Files for Plotting", open the Data\horiz*.bin file.

4) Using the magnifier button, "Zoom into Data", select a region from the Horizontal Particle Concentration plot. This will open a new GUI window, "Zoomed Data From <time1> to <time2>".

5) This GUI shows Time Series Plots, Particle Size Distribution, and has Hstrip and Vstrip buttons to view the individual particles and save png pages of all the particles. CompTMS (Compare Time Series) and CompPSD (Compare Particle Size Distributions) allow the user to view manipulate graphs of derived parameters, save the plots or ASCII data of the plots.

Please see the 2DS View Manual for more information.

Data Processing Walk Through CPI

1) Open IDL Development environment. To open multiple IDL sessions, execute the **idlde.exe** program in IDL's bin directory. Be sure that IDL is set up to change directories on open (File or Window ->Preferences)

2) Run the following command in IDL: (always in a new session via Start->IDL or with .reset command in IDL, potentially choose a new workspace number and click OK)

@compile3vcpi



3) For batch processing, select the **Ice Crystal Icon** to open the CPI View portion of the program. Select **File->Overnight** and select the first YYYYMMDDhhmm.roi file in the directory. All .roi files will be processed using standard options. Click on "Proceed" in the Auto-Extract popup. The red progress bar will show progress for each .roi file, and png pages will be generated after each .roi file is processed.

[NOTE] Version 1.0.38 has one additional popup for adjusting the CPI time offset. It will open once and only once, after the first .roi file is processed, and will pause processing. Please click "Accept" to close this popup and proceed with batch processing. The functionality will be moved to a more convenient location for future versions.

4) To manually examine an .roi file in more detail, without batch processing: Use the Open button to navigate to your YYYYMMDDhhmm.roi file. This will scan through the file looking for frame locations, and may prompt with a dialogue to "automatically search for a background?" -- click Yes. The first time a CPI file is loaded will take some time. After the .obj file has been generated, subsequent loading of the file will be significantly faster. Images can be scrolled through using the slider bar "Frame Number" in the center left of the GUI.

5) Select the menu item "Extraction Tools->Auto Extract Features". Click "Proceed" in the popup dialog. This will calculate Particle Information, which will be available in mouse-over of the images. Progress is displayed in the lower left under "Progress..." with a red progress bar.

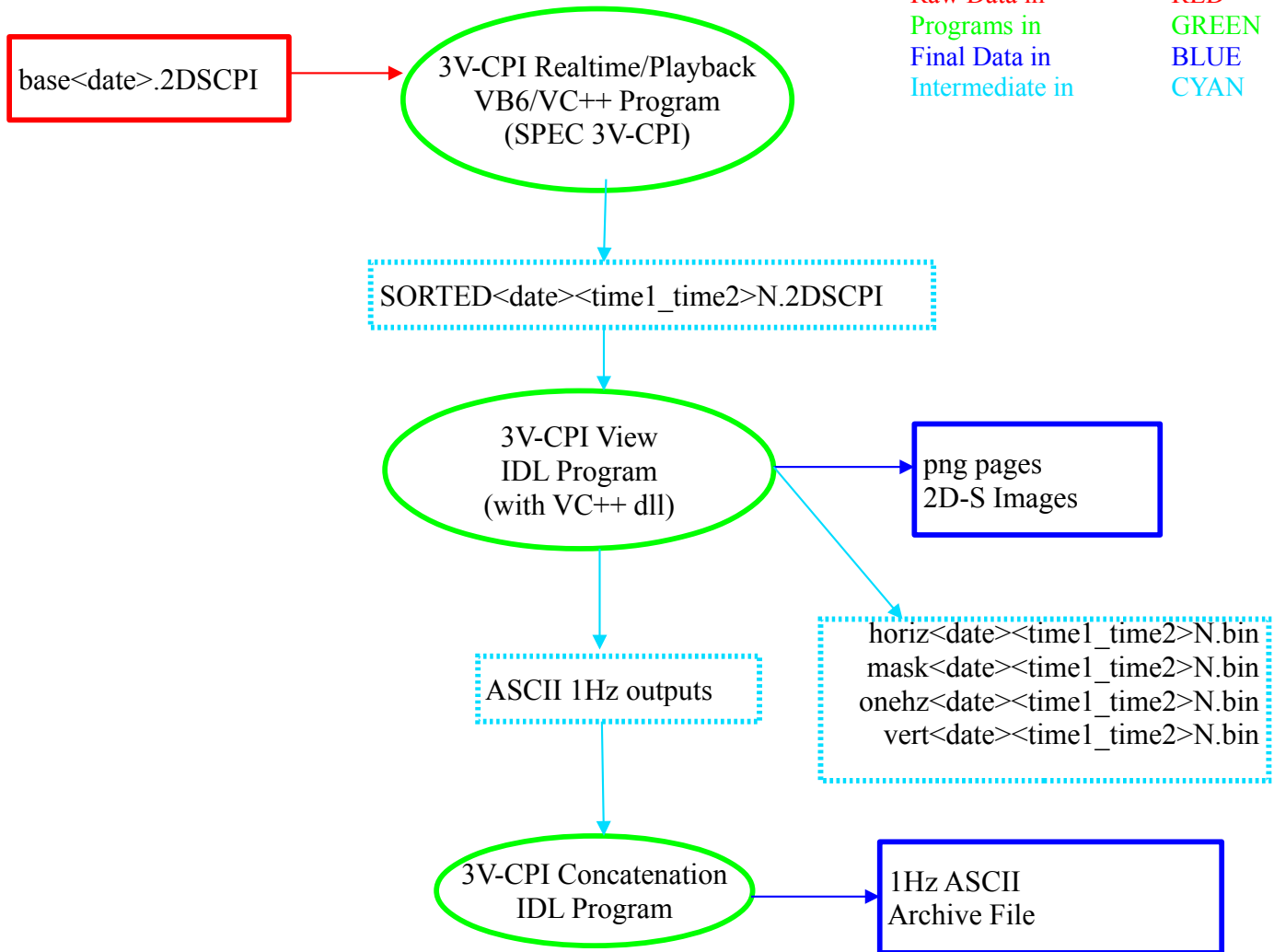
6) Clicking the red/blue plot button, or selecting "Tools->Generate/View Plots", will bring up a new GUI window, "Specify Plotting Options".

7) To generate image pages with the 2DS hex particle ID's, select "Output Options" On. Check "Flash png Images when created", "Send Accepted Particles to png files", and "HexTime". Then press the "Process" button at the top left. The first 3 hex words are the particle timestamp, followed by the 2DS IDs 90 (Horizontal) and 45 (Vertical).

Please refer to the CPI View manual for more information.

3V-CPI 2D-S Data Processing Flow Diagram

Raw Data in RED
 Programs in GREEN
 Final Data in BLUE
 Intermediate in CYAN



3V-CPI CPI Data Processing Flow Diagram

