

Guide to Dynaview IIb

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Guide to Dynaview III

1 General description

1.1 How Dynaview III can help your operation

Dynaview III keeps track of the length of the images on a web on the fly. It displays and optionally records these lengths for the operator as the roll of material is processed. No longer do you have to stop the web, cut out a sample, and wait for the measurement before you know the exact length of the images that are rolled up ready for the next process.

In some applications it is possible to save the cost of a Dynaview with the first roll of material that is saved from the scrap bin.

The operator has a screen that shows a scrolling graph of the last few minutes of image length. It displays the exact length as well as any trend toward longer or shorter.

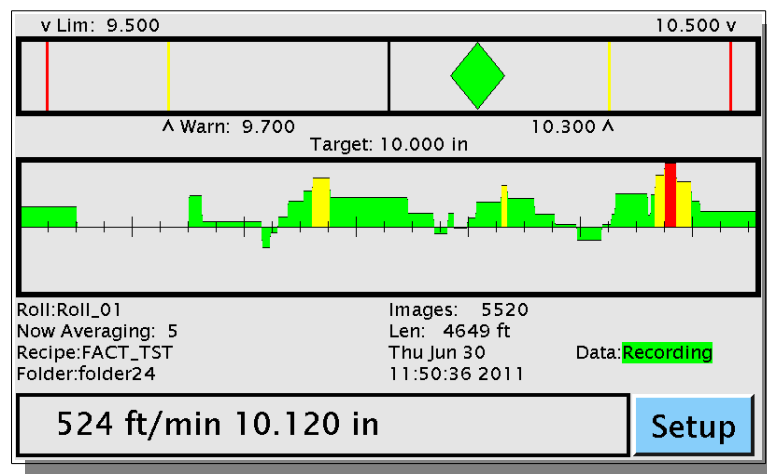


Figure 1 – Main Dynaview Screen

You can set limit and warning alarms on the image length. Target length and alarms are part of a job setup and are retained in a named recipe. The Dynaview can store recipes in a two level directory structure.

Data is organized by job and by roll. Dynaview can optionally print a one-page graph of deviation from target length vs. footage for each roll processed. It can optionally print or save the raw data for each roll as well. Data can be stored locally on a USB storage device and can be made available over a network. Storage options are part of a recipe and so are stored along with target length, alarm levels, etc.

Dynaview includes a simple web server, so the current image length, web speed, job description, and roll number information is available to any web browser with appropriate permissions.

Dynaview has an analog output, where the output value is proportional to deviation from target length.

Recipe files are ASCII text files, so they can be remotely maintained via Excel or another application if the Dynaview is connected to a network.

Dynaview can act as a peripheral to your factory information system. As an option, Dynaview can be a Modbus TCP server. Dynaview exposes all of its sensor data and can if needed relegate all recipe management to the Modbus client.

1.2 What Dynaview III does

Dynaview keeps track of image length using a mark sensor and a rotary encoder with a wheel. Dynaview constantly processes these signals to generate the display for the operator and the required reports. It updates reports on ½ second intervals.

1.3 What Dynaview III looks like

Dynaview III is contained in an enclosure that is about 12"x8"x4.75" (300mm x 200mm x 125mm) and is suitable for surface mounting. There is a color touch sensitive screen on the face of the enclosure. The screen is approximately 3.62"x6" (94mm x 155mm) and is backlit. All operator interaction is via the touch screen.

1.4 Can an ordinary operator use Dynaview III?

Dynaview includes several features that make it easy to use. Some of these are:

- Intuitive touch screen input.
All controls are via the touch screen. Large buttons make the screens easy to navigate.
- Logical arrangement of screens.
Dynaview III is the descendant of Dynaview II and incorporates the experience that Porcine Associates LLC has accumulated with the previous model.
- Context-sensitive help screens.
Every screen has a help button that displays information on that specific screen.
- Special mark sensor setup screen.
The operator can view the signal from the mark sensor on a special oscilloscope-like display. In this way the sensitivity and the orientation of the mark sensor is easily adjusted.
- Memorized setups (recipes).
Once a setup is made for a particular job it can be memorized. Later when the job is run again the setup can be recalled with just a few touches on the screen. Recipes are kept in a two-level hierarchy. At the first level there is a named folder, then within that folder there are named recipes.

1.5 What you have to do for installation

The Dynaview enclosure must be mounted where the operator can view and use the touch screen.

Signals and power for the mark sensor and wheel are attached using industry-standard connectors that are supplied. The Dynaview requires 24VDC power, and a suitable 24V external power supply is also supplied. If 24VDC is available, the external power supply is not required.

The mark sensor and encoder are attached to the Dynaview via M12-style connectors located on the lower side panel. The power switch and power connector, the console port and network connector are also on the lower side panel of the enclosure. The USB connectors for a printer or memory stick are on the face of the enclosure. Connectors for other less-used signals are located inside the Dynaview enclosure. There is a port with a clamp strain relief on the lower side panel for the wires carry these signals. Porcine Associates LLC offers an optional alarm light and sound post that can mount on the top of the enclosure. It extends about 18" (45cm) from the top.

Several features of the Dynaview are only available if the Dynaview is connected to a local area network. There is an RJ45 100baseT connector on the bottom of the enclosure for this purpose. If printing is desired, a suitable printer must be available. Either a local USB printer or a network printer will work. The Dynaview can support a wireless 802.11b or 802.11g network connection via an external bridge.

1.6 A note about GPL and GPL'ed software

Dynaview III uses several software packages that are under the GNU-GPL. Under the terms of that license a copy of the license plus the sources to all GPL'ed packages used are available from Porcine Associates LLC on request. Please note that the main Dynaview application is *not* licensed under the GPL, only several helper applications including Linux.

2 Installation

2.1 Overview

At the top level, Dynaview III is designed to be a stand-alone repeat-length measurement instrument. No knowledge of Linux or networking is required for the core features of the Dynaview III. These features include:

- Display of the current image length and recent history
- Maintenance of recipes
- Announcement and acknowledgment of alarms
- Saved data on a USB memory device
- Printed and graphed data
- Use of the analog output
- Connection to a LAN that has a DHCP server and a name server already in place

Other more advance features require some knowledge of networking and Unix (Linux). Support for other than the core features listed above is available from Porcine Associates LLC on a time and materials basis.

2.2 Power, sensors, and enunciator



Illustration 1: Dynaview I/O panel

2.2.1 Power

Dynaview comes with an external 24VDC power supply that runs from 100–240VAC, 50–60Hz. If 24V is available you can dispense with the external supply and use the 24V directly. The power connector is the circular plastic one on the side of the Dynaview.

2.2.2 Web sensors

Dynaview uses a mark sensor (eye) to sense images, and a rotary encoder with dual wheels to sense length and speed. Normally both are installed close together in a low-tension zone just before the web is wound up. A suitable mark sensor, wheel and encoder are include with the Dynaview package. These two sensors plug into M12-style connectors on the lower side panel of the Dynaview. They are keyed differently so cannot be inserted incorrectly.

Ultimately the mark sensor and encoder signals attach to X4 and X5 on the internal I/O board. Here are the pin outs:

X4 pin	Signal
1	+24V
2	GND
3	mark sensor Signal Input
4	Lt/Dk output

Table 1: X4 mark sensor connector on the internal I/O board

X5 Pin	Signal
1	+24V
2	GND
3	Encoder input

Table 2: X5 encoder connector on the internal I/O board

2.2.2.1 Mark Sensor

Ideally the mark sensor should monitor a clear path where there is only one feature per image length. Often there is an eye mark expressly for this purpose.

The mark sensor must be mounted in the correct orientation relative to the movement of the web and at the correct distance from the web. Consult the installation instructions that come with the mark sensor.

2.2.2.2 Encoder and Wheel

The wheel must track the web speed. Normally it runs on the web near the location of the mark sensor. Watch closely that the wheel is aligned with the movement of the web. Sometimes you can run the wheel on an idler roll, but often these rolls do not move at web speed as there is a layer of air separating the web and the idler.

2.2.3 Alarms

2.2.3.1 Outputs

Dynaview optionally includes a light and audible alarm post already wired. If you want to use an external alarm, two open–drain, switch–to–ground outputs are available. See “binary outputs” below.

2.2.3.2 Acknowledge input

The operator can always acknowledge an alarm by touching the Dynaview screen. If you wish to use an additional alarm acknowledgment button, an input is available. See “binary inputs” below.

2.2.4 New roll signal

Dynaview needs to know when a roll has been completed in order to generate a roll report. The operator can signal this to the Dynaview by using the touch screen, or you can wire in a binary signal from the process. See “binary inputs” below.

2.3 Other I/O Connections

2.3.1 Binary inputs

Four general purpose binary inputs are provided. Of these two are used currently: the new roll signal and the alarm acknowledgment signal. All binary inputs are optically isolated, although all share the same system ground. Connect the inputs to a positive voltage source to assert the signal. +24V is provided on the connector for this purpose, so a contact closure between the +24V provided on pin X2-1 or X2-5 and the selected input on pin X2-2, X2-3, X2-6 or X2-7 will assert the signal. See Table 3: X2 on the internal I/O board below.

X2 Pin	Signal
1	+24V
2	Spare input 1
3	Alarm Ack. Input
4	Gnd
5	+24V
6	Spare input 2
7	New Roll Input
8	Gnd

Table 3: X2 on the internal I/O board

2.3.2 Binary outputs

Four general-purpose binary outputs are provided. Of these two are used currently. The output device is an open drain FET, an AUIPS2051L. Maximum voltage is 60V and maximum current is 1.5A. This acts like a switch to ground when active. Wire one side of the load to +24V and the other to the output connector.

X7-Pin	Signal
1	+24V
2	+24V
3	Major Alarm Output
4	Minor Alarm Output
5	Spare #1 Output
6	Spare #2 Output
7	Gnd

Table 4: X7 on the internal I/O board

2.3.3 Analog output

A single analog output is provided. It follows deviation from target length where ½ scale indicates the measured length is on target. By default this signal is 4-20ma. A 0.1% 100 ohm resistor is supplied so you can use this output as a voltage source. With the resistor connected the default output signal is 0.4-2.0V.

This output is switch selectable for current mode. Choose a mode via switch SW MODE on the I/O board - see Table 5: Switch SW MODE settings below. See Figure 2: Internal I/O board locations on page 8 for the location of SW MODE.

S1 position	Analog output
0	4-20mA
1	0-20mA
2	0-24mA
3-6	unused
7	disable battery backup

Table 5: Switch SW MODE settings

Note - Position 7 should never be used without special instructions from the factory. Without the battery backup there is a great potential to damage the file system underlying the Dynaview application.

X8-Pin	Signal
1	Gnd and 4-20ma return
2	4-20ma source

Table 6: X8 on the internal I/O board

The current output is on pin X8-2 and the return is on X8-1. Current is sourced from X8-2 using the system 24V power supply. No external power supply is necessary. Half scale (10ma or 12ma, depending on mode) indicates that the measured length is on target. See Table 6: X8 on the internal I/O board above.

2.3.4 Other miscellaneous connections

These connections on X6 are reserved for future use. See Table 7: X6 on the internal I/O board below.

X6 - Pin	Signal
1	+24V
2	+24V
3	Spare #3 input
4	mark sensor sync input
5	Strobe output
6	Gnd

Table 7: X6 on the internal I/O board

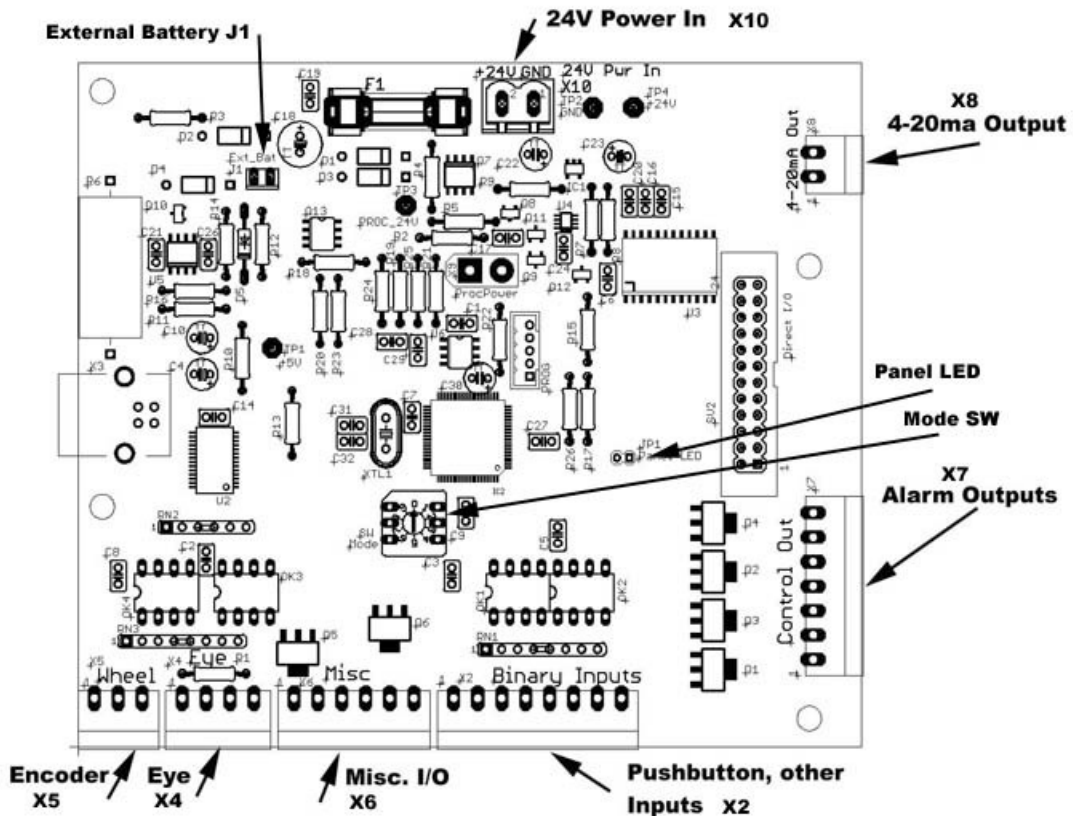


Figure 2: Internal I/O board locations

2.4 Optional internal USB drive

It is possible to install a USB drive inside the Dynaview case that will store all reports indefinitely. Without this internal drive only the last ten reports are retained, and then only until the Dynaview is turned off.

2.4.1 Installation

The USB drive selected to use must have the following characteristics:

- The drive must be formatted to FAT32. This is the default for USB drives.

- The root directory of the drive must contain a file named “Dynaview”. Dynaview does not look at the contents of this file, only that a file with the correct name exists. The file name is case sensitive, so “dynaview” and “Dynaview” are different.

Open the case of the Dynaview and locate the empty USB connector. See Illustration 2: USB location below.

There are two USB connectors stacked as one assembly. One of the connectors already has a cable plugged in. If the existing cable is plugged into the top connector, move it to the bottom. Insert the USB drive into the free connector.

The next time the Dynaview is turned on it will recognize the drive and start to use it.



Illustration 2: USB location

2.4.2 Accessing the report files

The internal drive’s contents are exposed via the Dynaview's ftp server. You can see and copy the files using a browser or an FTP client. It will show up as a subdirectory from the standard ftp directory (“ftp://<network address>/”), where “network address” is the address of the Dynaview. This could be an address in dotted notation (192.168.0.134 as an example) or the name of the Dynaview (Dynaview-910060) depending on if you have a name server on the subnet. Ask your IT person about this. The current Dynaview address in dotted notation is shown on the About Dynaview screen (Touch “Setup” on the main screen, then touch “About”).

The URL of the root directory of the new internal drive is “ftp://<network address>/usb”. Reports are organized by folder and recipe. If you have a folder called “Acme” and a recipe called “Pack04”, the reports created by this recipe will be found at: “ftp://<network address>/usb/Acme/Pack04/”. File and folder names are case sensitive.

2.4.3 File Maintenance

Remember that the Dynaview FTP server is read-only. Eventually (or at regular intervals) the internal drive will have to be removed to delete stale report files. You can do this on a machine running Microsoft Windows or Macintosh running iOS if you wish.

2.5 Dynaview configuration

Once the Dynaview is installed physically, some setup of the Dynaview application must be done. From the top-level screen (see Figure 1 – Main Dynaview Screen on page 1) touch “Setup”. The Job Control Screen (see Figure 12: Job control screen on page 17) will appear. Again touch “Setup”. The Setup screen (see Figure 19: Setup Screen on page 23) will appear. If operator passwords are enabled there will be an intermediate screen asking for the password. Read more about passwords in section 2.5.8, Manage Passwords. Now touch “Setup Dynaview” and the following screen will appear.

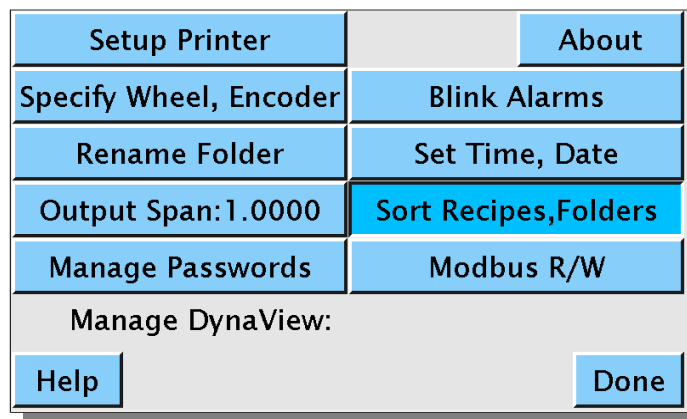


Figure 3: Manage Dynaview screen

2.5.1 Setup Printer

Touch the "Setup Printer" button to display the following screen.

Note that Dynaview requires a printer to understand either Postscript or PCL-5 printer languages. A dumb printer (so-called WinPrinter) will not work.

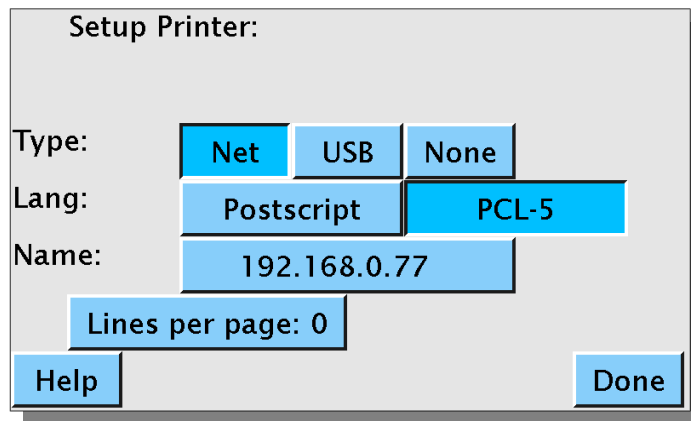


Figure 4: Setup Printer Screen

2.5.1.1 Type:

Here you tell Dynaview if a printer is attached and what type of printer it is. The first line lets you specify a network printer, a USB printer, or no printer installed.

2.5.1.2 Lang:

Dynaview can use either a Postscript printer or a PCL-5 printer. Specify which type is installed here.

2.5.1.3 Name:

If a network printer is installed, Dynaview must be able to find the printer on the network. Specify either the network address in dotted notation or the network printer name. If your network does not have a name server installed you will have to specify the name in dotted notation, i.e. a name similar to 192.168.0.77. Touch the button with the printer name on it to change it.

2.5.1.4 Lines per page:

In order for pagination to work correctly for text reports, specify the number of text lines per page here. You may have to determine this empirically. If your reports include too much white space at the bottom of each page, increase the number of lines per page. If your reports print only one or two lines of text on every other page, decrease the number of lines per page. Specifying 0 results in Dynaview using its best guess based on the other settings.

2.5.2 Specify Wheel, Encoder

Refer to Figure 3: Manage Dynaview screen on page 10. Touch "Specify Wheel, Encoder" button to display the following screen.

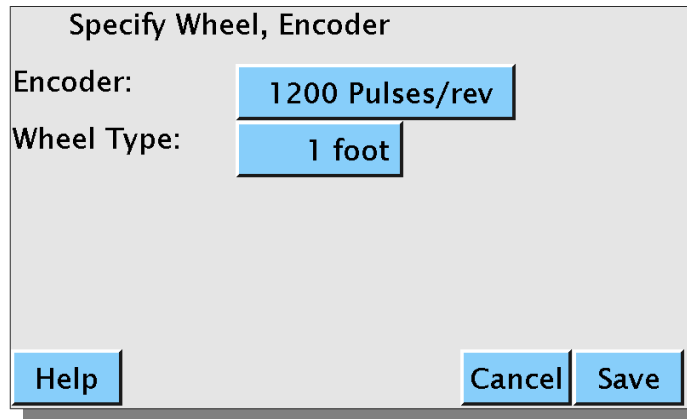


Figure 5: Specify Wheel, Encoder screen

2.5.2.1 Encoder:

When you touch the button on the line with the *Encoder:* label, Dynaview displays a screen with a pick list similar to Figure 23: Pick Units Screen (see page 25). Choose your encoder type from the list. The default is 1200 pulses/revolution.

2.5.2.2 Wheel Type:

When you touch the button on the line with the *Wheel Type:* label, Dynaview displays a screen with a pick list similar to Figure 23: Pick Units Screen. Choose your wheel circumference from the list. The default is one foot circumference.

2.5.3 Blink Alarms

Refer to Figure 3: Manage Dynaview screen on page 10. The Blink Alarms button is a toggle. When highlighted the warning and limit binary outputs will pulse at a one second rate. If not highlighted the outputs are steady on. If you have a light post attached to the output the light will blink to attract more attention when this toggle is set.

2.5.4 Rename Folder

Refer to Figure 3: Manage Dynaview screen on page 10. Each folder has a short name (9 characters maximum) and a long description (40 characters maximum). You can change both short and long names for any folder. If you touch the "Rename Folder" button the following screen appears.

2.5.4.1 Choose folder

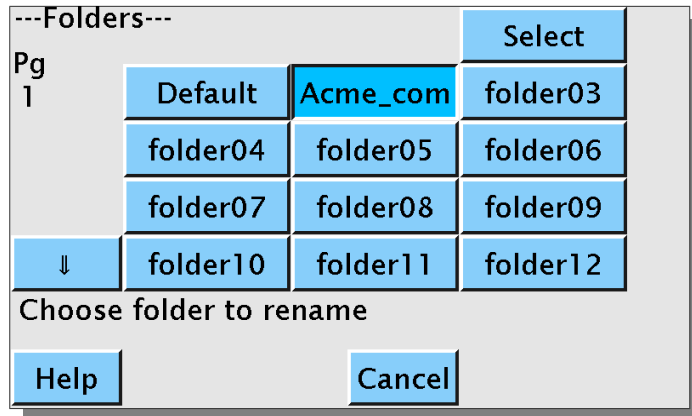


Figure 6: Choose Folder to Rename Screen

Folders are shown on the screen in groups of up to 12. Use the arrows at the left to navigate to all folders. Touch a folder name, then touch “Select” to choose a folder. The window below (Figure 7: Rename Folder Screen) will appear.

2.5.4.2 Rename folder

Touch this button to change the short folder name. Dynaview will display a keyboard where you can enter the new name. Touch “OK” to save the new name.

2.5.4.3 Change folder desc

Touch this button to change the long folder description. Dynaview will display a keyboard where you can enter the new description. Touch “OK” to save the new description.

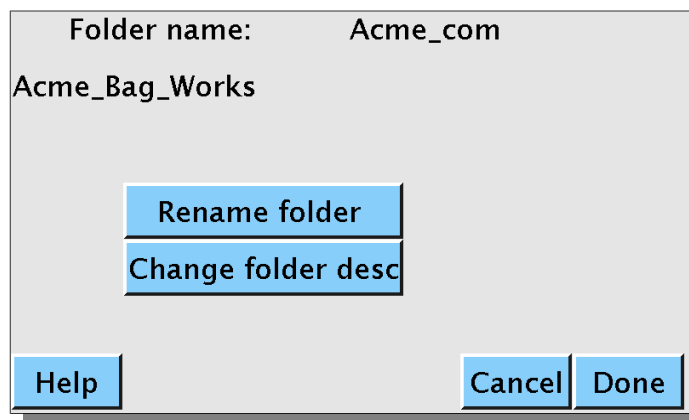


Figure 7: Rename Folder Screen

2.5.5 Set Time, Date

Refer to Figure 3: Manage Dynaview screen on page 10. Touch the "Set Time, Date" button to display the following screen.

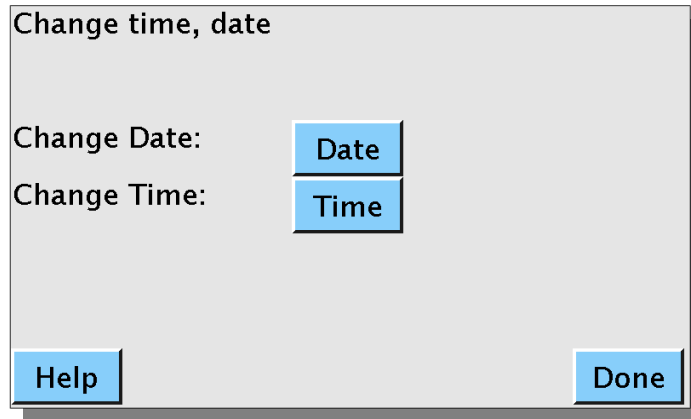


Figure 8: Change time, date screen

This screen allows you to change the time and date that is used on the screen and in reports. Once set, the time and date are retained by a battery whenever the Dynaview is turned off.

2.5.6 Output Span

Refer to Figure 3: Manage Dynaview screen on page 10. Output span is a gain calibration setting for the analog output. If you find that the center value of the output is not exactly 12ma when the repeat length is on target you can calibrate it here. The output value is simply multiplied by the number specified here. It must be in the range of 0.9 to 1.1. Touch the button to bring up a screen to change the value.

2.5.7 Sort Recipes, Folders

Refer to Figure 3: Manage Dynaview screen on page 10. Recipes and folders can be shown in the selection screens sorted by short name. This item is a toggle, if highlighted recipes and folders will be sorted. If not highlighted selected recipes and folders are shown in creation order or last sorted order, whichever is most recent.

2.5.8 Manage Passwords

Refer to Figure 3: Manage Dynaview screen on page 10. Dynaview has an optional two-level password system. These passwords are separate from the username and password system employed by the underlying operating system. Within Dynaview, if you enable passwords, an operator without a password is prevented from reaching certain setup screens. By default, the operator can only set up Dynaview by choosing an existing recipe. Dynaview will prompt for the operator's password to get into the setup menus that allow manual setup or changing recipes. As an option the password barrier can be moved to protect only the Dynaview setup screens. This will let any operator change and store recipes as well as backup and restore the recipe database. A supervisor password is required to change passwords or to enable/disable the password system.

Touch the "Manage Passwords" button to change passwords and enable/disable passwords. The following screen will appear.

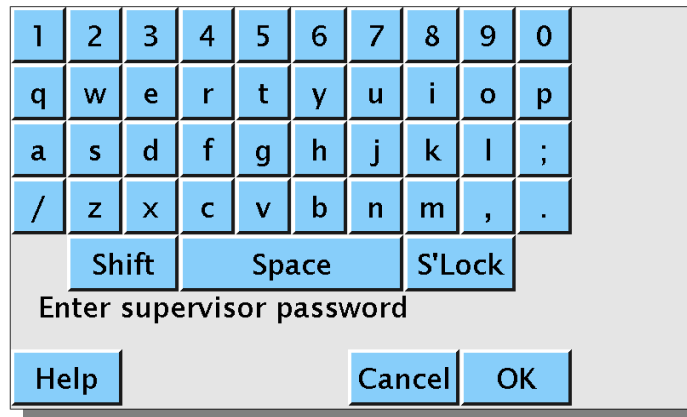


Figure 9: Password entry screen

Enter the supervisor password and touch OK. The following screen will appear.

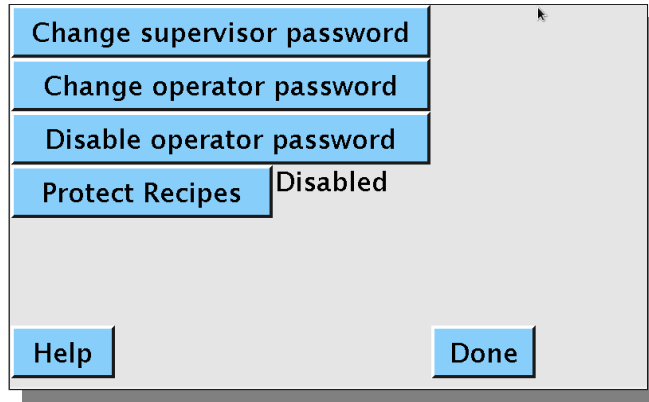


Figure 10: Change Passwords screen

If operator passwords are currently disabled, the third line will read “Enable operator password” and the second line will be missing. Touch the buttons as appropriate to what needs to be done. If you touch one of the *Change password* buttons, you will be prompted to enter the new password twice using a screen similar to Figure 9: Password entry screen above.

The fourth line is a toggle. If *Protect Recipes* is enabled, Dynaview requires the operator to enter a password to reach the Setup screen as shown in Figure 19: Setup Screen on page 23. This means that without a password an operator can only configure the Dynaview by choosing an existing recipe.

If *Protect Recipes* is disabled, the password barrier is moved to only protect the Manage Dynaview screen as shown in Figure 3: Manage Dynaview screen on page 10. Anyone can edit and store recipes plus save and restore the recipe database.

2.5.9 Modbus R/W

Refer to Figure 3: Manage Dynaview screen on page 10. The Modbus R/W button only appears if the Modbus TCP option is installed. If this button is not highlighted, the Dynaview Modbus server is read-only. Modbus clients can read data and recipes but cannot make changes to the Dynaview except to acknowledge alarms and signal a new roll.

If this button is highlighted, the Dynaview Modbus server is read/write. All recipe management is relegated to the Modbus client. A local operator cannot change the active recipe from the Dynaview screen. The Choose Recipe and Auto Recipe buttons do not appear on the Job Control Screen (see Figure 12: Job control screen below).

A Modbus client can change the state of this button remotely.

3 Using Dynaview

This section assumes that an appropriate recipe already exists. See the following section (section 4, Job setup (Manage Recipes)) on page 23 for instruction on how to specify recipes.

3.1 Choose a recipe

If the Modbus TCP option is installed and the Modbus R/W toggle is set, all recipe management is relegated to the Modbus client. This section does not apply as recipes are put in place via the Modbus interface. Skip to the next section.

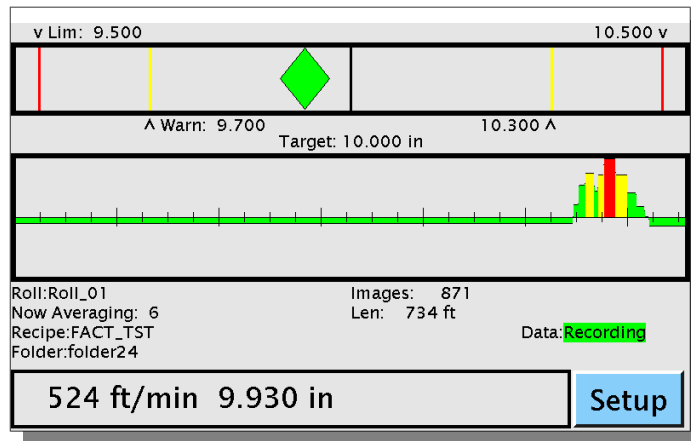


Figure 11: Main screen

Touch “Setup” at the bottom of the main screen. The Job Control Screen will appear. The top line has two buttons, “Choose Recipe” and “Auto Recipe”.

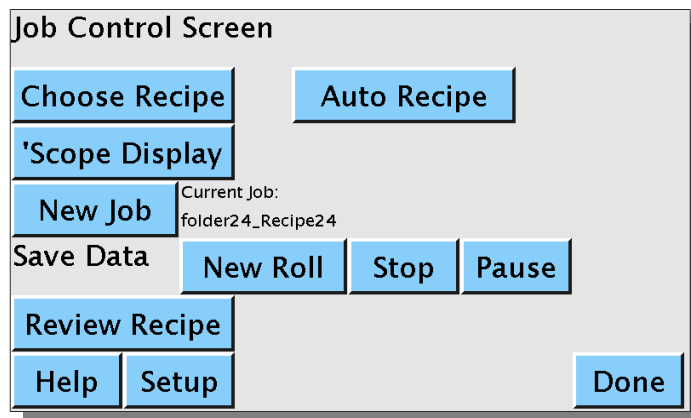


Figure 12: Job control screen

3.1.1 Auto Recipe

This button sizes the chart on the main screen to show the current length. It disables alarms and reports.

3.1.2 Choose Recipe

Touch this button to select an existing recipe. Dynaview will display a screen showing folders.

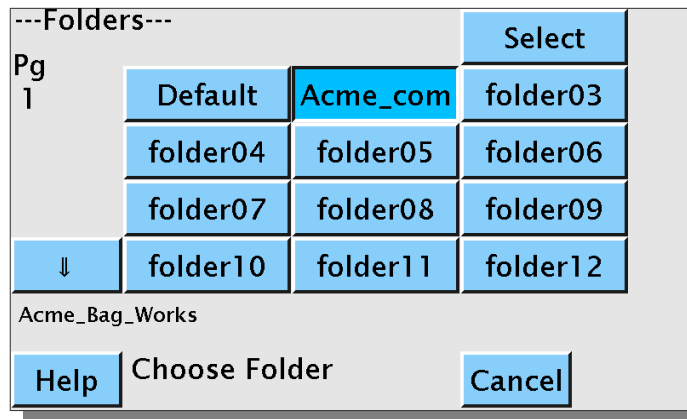


Figure 13: Folder View Screen

Recipes are organized into folders, each of which can hold many recipes. Use the arrow keys at the left of the screen to navigate to all folders. Touch a folder name to highlight it. The default folder names are “~folder01” to “~folder06”. If there are more than 6 folders the additional folders will have names that were assigned during folder creation. There can be up to 99 folders. Note that the long folder description for the highlighted folder is shown at the bottom of the screen. The default folder description is “No description yet”, so this is what you may see.

When you have highlighted a folder, touch “Select” at the top of the screen. Dynaview will now show you the contents of the selected folder as shown below in Figure 14: Recipe Select Screen.

This screen is similar to the folder-select screen except that it displays recipe names within the selected folder instead of folder names. The selected folder name is shown at the top of the screen. Use the arrow keys on the left to navigate to all recipe names. Touch a recipe name to highlight it. Note that the long recipe description for the highlighted recipe is shown on the bottom of the screen. The default recipe description is “Description here”, so that may be what you see. The default recipe names are “~Recipe01” to “~Recipe06”. If there are more recipes they will have names that were assigned when the recipe was created. Each folder can have up to 99 recipes.

Touch the “Back” button at the bottom of the screen to go back to the folder-select screen. When you are happy with a highlighted recipe touch “Select” at the top of the screen. Dynaview now uses this recipe as a template, install all its setup values, and returns to the top screen.

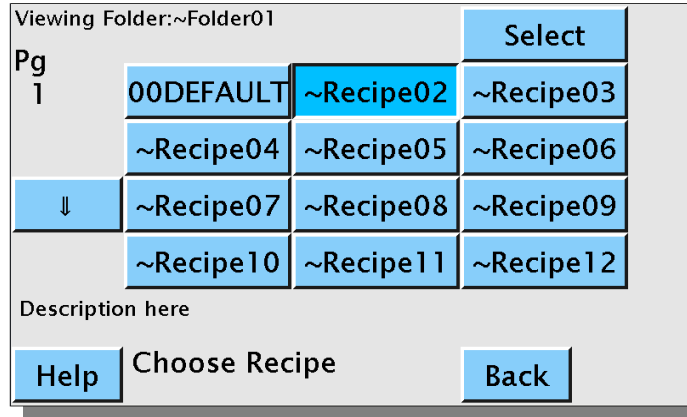


Figure 14: Recipe Select Screen

3.2 Review Recipe

Refer to Figure 12: Job control screen on page 17. Touch “Setup” on the main screen, then “Review Recipe” to display a screen that shows the current recipe settings.

3.3 Set up a Job Name for reports

Refer to Figure 12: Job control screen on page 17. Job names are printed at the top of all reports. The default job name is the folder name followed by an underscore followed by the recipe name. (“~folderxx_~recipexx”). If this is not what is wanted, you can specify another one. Touch “Setup” on the main screen, then “New Job”. Dynaview will display a keyboard (below) where you can enter the new name.

Text reports always include both the long and short names of both the recipe and the folder in any case.

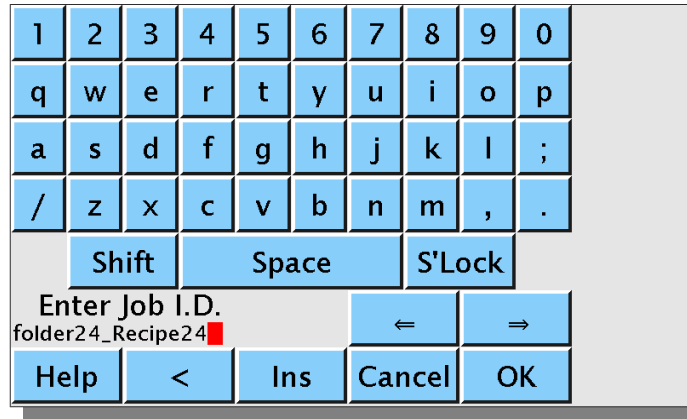


Figure 15: Job name entry screen

3.4 Monitor the screen

Refer to Figure 11: Main screen on page 17 above to see an example of the normal Dynaview display. At the top is a floating diamond that moves left and right to show the current deviation from target length. When the diamond is in the center, the measured image length matches the target image length. Just below the floating diamond is a horizontal strip chart that shows the last few minutes of data. Both the diamond and the chart turn yellow or red to show when the image length is out of limits. Below the strip chart is a text area where the name of the current recipe and other parameters are shown. At the bottom is a banner that shows the current web speed and current image length in an easy-to-read font.

3.5 Respond to alarms

Acknowledge an alarm to silence it. Touch the screen anywhere to acknowledge and silence an alarm. An external pushbutton can be installed to acknowledge alarms as well. Dynaview offers an optional button box on a tether to acknowledge an alarm.

3.6 Start and stop reports

Setting up a data report is a three step process:

1. Enable reports in the recipe that is in use.
2. Start the report data acquisition
3. Generate the report by either stopping data acquisition or signaling a new roll.

As long as there is no data acquisition in progress, the “Data” field on the Main screen (see Figure 11: Main screen above) will say “Data: No record”. If the current recipe does not have reports enabled, the Job control screen looks like Figure 16: Job control reports off screen below. If reports are enabled but data acquisition has not yet been started, the Job control screen looks like Figure 17: Job control reports enabled screen below.

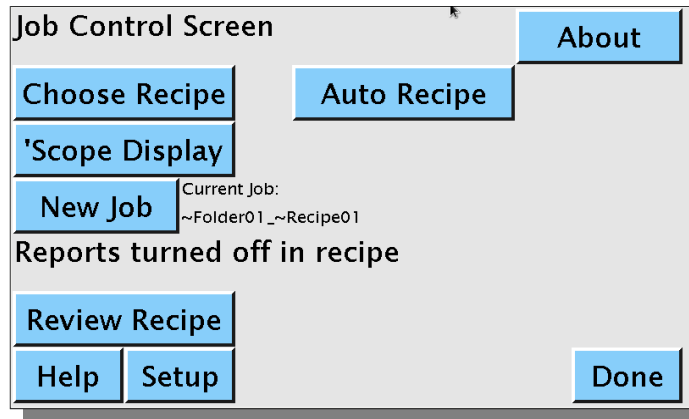


Figure 16: Job control reports off screen

3.6.1 Start data acquisition

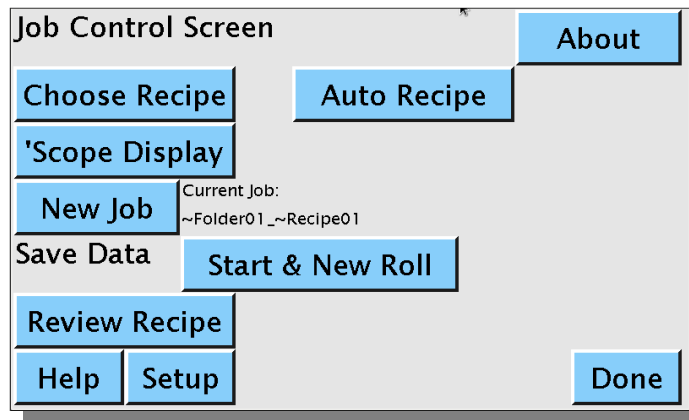


Figure 17: Job control reports enabled screen

Touch “Start & New Roll“ to start data acquisition. The Dynaview puts up a screen so you can change the roll name from the default “Roll_xx” where “xx” is a number. As long as the roll name ends with a number, this number will increment every time you start a new report. Touch OK to accept the name and start data acquisition. The Job control screen will change to Figure 18: Job control reports running screen below.

Once data acquisition is started, a Dynaview acquires and memorizes the report data in a compact but invisible file. The “Data” field on the Main Screen changes to “Data: **Recording**”.

When in this state, the operator can pause and restart data acquisition without triggering a report. When paused, the “Data” field on the Main Screen changes to “Data: **Paused**”

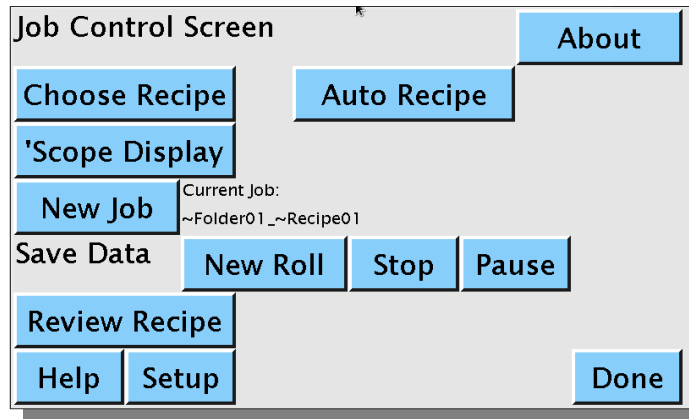


Figure 18: Job control reports running screen

3.6.2 Trigger a report

Trigger a report by touching either the “New Roll” or the “Stop” button. After the report is triggered, the Dynaview translates the compact data file to the text report and prints and/or saves the result. If the operator touched “New Roll” to trigger the report, the roll name is incremented and data acquisition restarts immediately.

Note that there is a roll counter on the main screen in the text area. It is reset to 1 any time a new recipe is selected. Dynaview offers an optional button box on a tether to increment the roll number and trigger a report.

3.6.3 External USB storage

If a USB storage device is plugged into the face of a Dynaview and the current recipe calls for retaining files, reports are copied to the root directory of the USB storage.

3.6.4 Printer

If a printer is installed and the recipe calls for printed reports a report set is printed at the completion of each roll.

3.6.5 Network

If the recipe calls for retaining data files, data for the last 10 rolls is retained within Dynaview on a RAM drive. Older files must be copied to another location otherwise they will be overwritten. The contents of this drive is erased when the Dynaview is turned off. These files are exposed via FTP with address "ftp://<network address>".

There are provisions for installing another USB drive inside the Dynaview case. If this drive is present Dynaview will copy all reports to it as well. These reports are never erased. This drive is also exposed via FTP. Reports are found with the path: “ftp://<network address>/usb/<foldername>/<recipename>/<reportname>”. See section 2.4 Optional internal USB drive on page 8 above.

3.7 'Scope Display

This button opens the mark sensor setup dialog. See section 4.4.3 'Scope on page 30. This dialog allows easy adjustments of the mark sensor and mark sensor gating using an oscilloscope-like display.

4 Job setup (Manage Recipes)

From the main screen, touch "Setup" (see Figure 11: Main screen on page 17), then "Setup" on the Job Control screen (see Figure 12: Job control screen on page 17). The Setup Screen appears (Figure 19: Setup Screen below). If operator passwords are enabled (see section 2.5.8 Manage Passwords on page 15), an intermediate screen will pop up asking for the password.

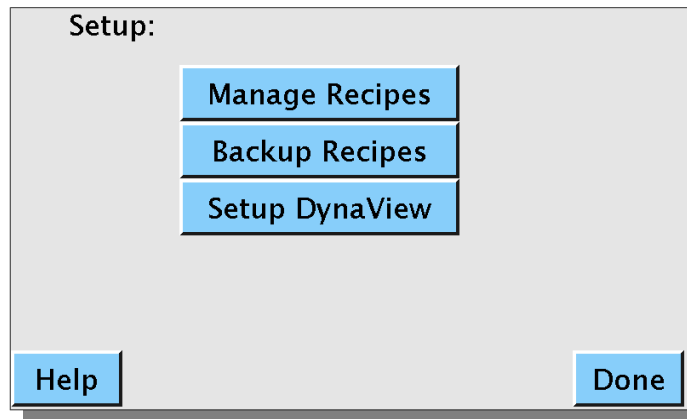


Figure 19: Setup Screen

The "Setup Dynaview" button was discussed in section 2.5 *Dynaview configuration* above. Touch the "Manage Recipes" button. Dynaview now displays the Manage Recipe Screen below.



Figure 20: Manage Recipe Screen

Here is where you set the desired target length and several other parameters. When finished, you can simply return to the main screen with the new setup in place, or you can store the setup as a named recipe and then return to the main screen. Each button on the screen is explained in an item below.

4.1 Target length

Refer to Figure 20: Manage Recipe Screen above. The "Target Length" button opens a new screen with several selections on it pertaining to target length, smoothing and averaging.

Target: 10.000	Len. Units: in
Range: 0.500	Smoothing: 1
Min. Resolution: 0.0100	Now
Averaging:	Make Fixed Auto
Wheel Factor: 1.0000	
Help	Done

Figure 21: Target Length Screen

4.1.1 Target length and units

Touch these buttons to specify the target length and the unit of measurement. Any time Dynaview needs a number from the operator it will display a numerical keypad similar to Figure 22: Enter Target Length Screen below.

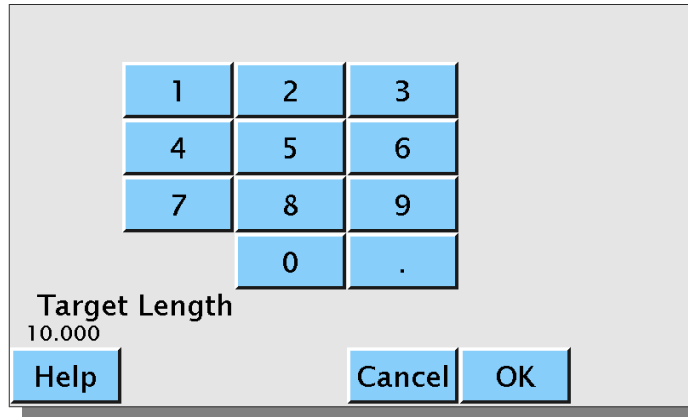


Figure 22: Enter Target Length Screen

Whenever Dynaview needs the operator to choose an item from a list it will display a screen similar to Figure 23: Pick Units Screen below.

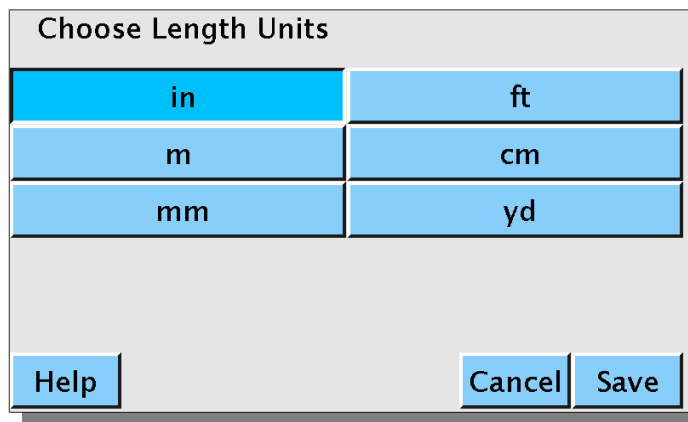


Figure 23: Pick Units Screen

4.1.2 Range

Refer to Figure 21: Target Length Screen. Touch the *Range* button to specify range. Range is the width of the chart that is shown on the screen. As an example, if you have a 10" repeat you may want to show the range of 9.5" to 10.5" on the screen for the operator. In this case the range is $\pm 0.5"$ or 0.5.

4.1.3 Smoothing

Refer to Figure 21: Target Length Screen. Values from the hardware can be smoothed in software using a simple boxcar average. Touch the "Smoothing" button, then enter the number of values to smooth. As an example, if you enter 20, for each new sample the last twenty samples are added together and then the result divided by 20 and shown as a result. The smoothing entry screen is very similar to Figure 22: Enter Target Length Screen above.

4.1.4 Min. Resolution and Averaging

These settings affect the way the data is transferred between the real-time processor on the I/O board and the processor that manages the display and reports. Recall that data is moved between the I/O processor and the display processor once every 500ms.

With the default setting (min. resolution 0.01" (0.254mm) and Averaging Auto), the I/O processor accumulates the total length of all images that run under the mark sensor in each 500ms period, divides by the number of images, and reports this to the display processor. As the web speeds up the number of images that flow under the mark sensor in 500ms will increase. This number (the number of images that pass under the mark sensor in 500ms) is shown on the main screen as "Now Averaging: xx". Note that with this method, resolution is dynamic. If the web is moving slowly so that only one image passes the mark sensor in 500ms, the resolution will be 0.01". As the web speeds up and more than one image moves under the mark sensor in 500ms, the resolution will be multiplied by this number of images. For example, if two images move by in 500ms, the I/O processor will measure over the two images with 0.01" accuracy. It then divides this number by two, yielding an accuracy of 0.005".

You can change this default method. There are two reasons that you might want to do this. The first is that you want to force a minimum resolution no matter how slowly the web is moving. The second is that you always want to average over some number of images. This is common with a central impression press where you want to average over one revolution of the press.

4.1.4.1 Force a minimum resolution

If you want to always force a higher resolution than 0.01" (0.254mm) you can tell the I/O processor to always average over some number of images, no matter how slowly the web is moving. You do this by specifying a min. resolution. Dynaview divides the native resolution (0.01") by the resolution you specify to find the minimum number of images that it needs to average. If images are short and/or web speed is high, the number of images that pass the mark sensor in 500ms may be greater than the minimum, so the I/O processor reverts to the default of averaging over all images for 500ms.

This is OK for short images or high web speeds, but if the web is moving slowly and/or the images are long the sampling rate can increase dramatically over the normal 500ms. As an example consider that you are moving at one foot per minute, your image is one foot long, and you ask for 0.001" resolution. Here the I/O board will average over ten images which will take ten minutes. The image processor will get a new sample only every ten minutes. Admittedly this is an extreme example, but you get the idea - it will look like the Dynaview is broken.

To change the minimum resolution touch the "Min. Resolution" button to enter a manual value. Dynaview will display a data entry screen very similar to Figure 22: Enter Target Length Screen above.

4.1.4.2 Average over a fixed number of images

There is another scenario where you might want to change the default setting. If you have a central impression press and you want to always sample over one complete revolution of the press. This is a way that you can avoid any plate-to-plate distance irregularities. As an example, if you have a five plate press, you can tell the I/O processor to always average over a multiple of five images. As the web speeds up it will average over 5, then 10, then 15, etc.

To do this choose “Make Fixed” for averaging. Dynaview changes the display slightly as shown below in Figure 24: Image Length, Fixed Avg. Screen.

The screenshot shows a control panel with several fields and buttons. The fields are: 'Target: 10.000', 'Len. Units: in', 'Range: 0.500', 'Smoothing: 1', 'Display 1 repeats', 'Averaging: Make Auto', and 'Wheel Factor: 1.0000'. There are also 'Now' and 'Fixed' options for averaging, and 'Help' and 'Done' buttons at the bottom.

Target: 10.000	Len. Units: in
Range: 0.500	Smoothing: 1
Display 1 repeats	Now
Averaging: Make Auto	Fixed
Wheel Factor: 1.0000	
Help	Done

Figure 24: Image Length, Fixed Avg. Screen

Now touch the *Display xx repeats* button and enter the actual number of images over which to sum. When you have this option in effect, the bottom banner of the top-level window alternates between showing the length and the number of images that are summed.

Note that the Min. Resolution option and the Averaging option are mutually exclusive.

4.1.5 Wheel factor

Refer to Figure 21: Target Length Screen above. Here you can supply a fudge factor for the length. This is typically used to compensate for wheel tire wear (changing the circumference) or slip between the wheel and the web. All lengths are multiplied by the wheel factor. It is always very close to 1.00. Touch the "Wheel Factor" button to change the value. Dynaview will display a screen very similar to that in Figure 22: Enter Target Length Screen.

4.2 Reports

Refer to Figure 20: Manage Recipe Screen on page 23 above. The "Reports" button opens the screen in Figure 25: Manage Reports Screen below where you can specify to Dynaview which reports to generate and how much data to include in a report.

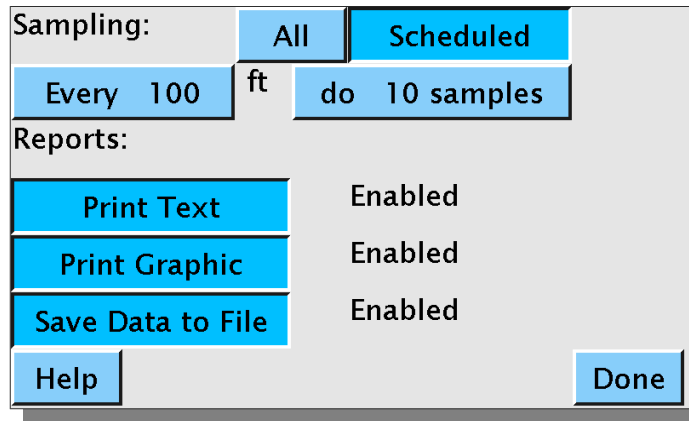


Figure 25: Manage Reports Screen

4.2.1 Sampling

You can choose to include every hardware acquisition in a report or to sample the data on a footage basis. Choose “All” to include all acquisition samples in your reports. In this case the report will contain every ½ second sample for the entire roll.

Choose “Scheduled” to sample the incoming data at regular intervals. If you choose “Scheduled”, an additional selection bar appears where you instruct Dynaview to collect some number of samples every so many feet (or other length unit as specified in the target length screen).

4.2.2 Print Text

This is a toggle. If you have a printer installed and you enable “Print Text”, the data report will print at the end of each roll. The report includes all the recipe parameters as a header followed by one line of data for each sample.

4.2.3 Print Graphic

This is also a toggle. If you have a printer installed and you enable “Print Graphic”, a one-sheet graph of deviation from target length will print at the completion of every roll processed. The graph has footage for the horizontal axis and deviation from target value for the vertical. Both axes are scaled automatically.

4.2.4 Save Data to File

This is a toggle as well. If you enable “Save Data to File”, the data for the last 10 rolls processed are retained in a temporary directory that is available to external FTP clients. This directory is actually in a RAM disk, so the contents are erased if the power fails.

If you have a USB storage device plugged into the face of the Dynaview, the data file is copied to this USB drive. The data file format is exactly the same as the printed report. Reports are copied to the root directory of the drive.

If you have an internal USB drive installed, reports are copied to it as well. See section 2.4.2 *Accessing the report files* on page 9 for details of accessing these reports.

4.3 Alarms

Refer to Figure 20: Manage Recipe Screen on page 23 above. Touch the button "Alarms" to display Figure 26: Manage Alarms Screen as shown below.

Dynaview allows you to set warning and limit alarms for both too long and too short images. All four values are specified independently. Additionally you can enable or disable warning alarms or limit alarms as a group. This screen has buttons to specify all alarms and to enable/disable them.

Many times as the press speed increases after a roll change the tensions are not stable and the image length is also not stable. You can tell Dynaview to ignore length limits for some length after a roll change. Touch the "Ignore for xxx" button to change this length.

High Lim: 10.500	Limits	
High Warn: 10.300	On	Off
Low Warn: 9.700	Warnings	
Low Lim: 9.500	On	Off
Ignore alarms after new roll		
Ignore for 100	ft	
Help	Enable, Set Alarms	Cancel Done

Figure 26: Manage Alarms Screen

4.4 Mark Sensor (Eye) Settings

Refer to Figure 20: Manage Recipe Screen on page 23 above. The *Eye Settings* button opens a screen with options for setting the mark sensor as shown in Figure 27: Eye Setup Screen below.

4.4.1 Light or dark background

Some eyes have a toggle for light on dark images vs. dark on light. Specify which to use here. Note that the eye supplied as standard equipment with the Dynaview does not support this signal.

4.4.2 Gating

Dynaview supports gating the mark sensor. If gating is enabled, Dynaview will ignore the mark sensor for some length after an mark sensor transition. Enable gating by touching the “Change” after the “Eye not gated” message. The message will change to “Eye Gated” and an additional selection “Gate Offset:” will appear. See Figure 28: Eye Setup (Gated) Screen below. Touch “Change” on the line with “Gate Offset:” to specify the length of the gate.

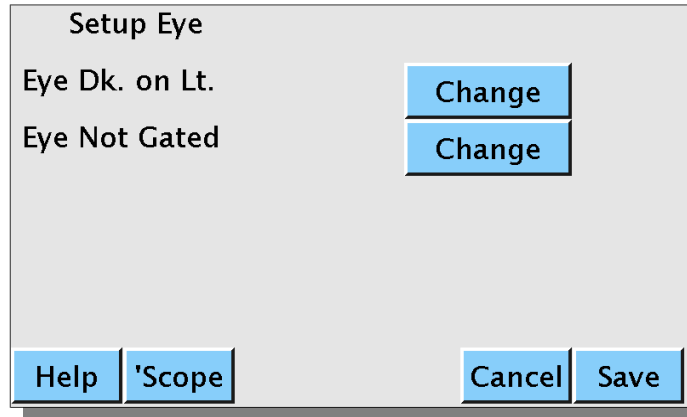


Figure 27: Eye Setup Screen

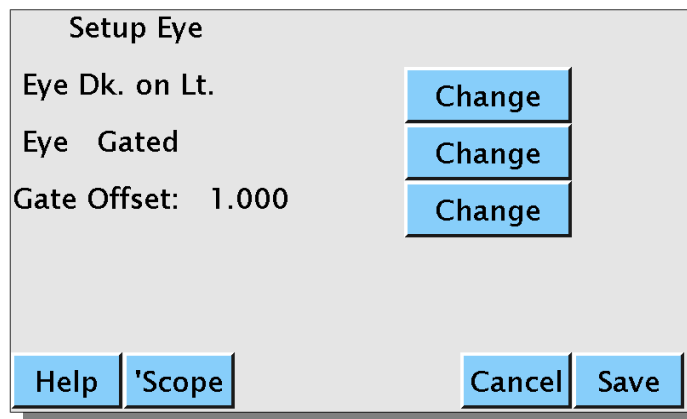


Figure 28: Eye Setup (Gated) Screen

4.4.3 'Scope

This button is on the bottom line of the Eye Setup screen (Figure 28: Eye Setup (Gated) Screen). This button also appears on the Job Control screen (See Figure 12: Job control screen). It opens an oscilloscope-like display window that offers an alternate method of specifying the mark sensor setup. See Figure 29: 'Scope Window (Gated) below.

In the 'scope window you can specify eye light/dark, enable/disable gating, and gate length. At the top of the window is the 'scope display that shows the result of the changes in real time. These mark sensor setting are retained when you return from the 'scope window.

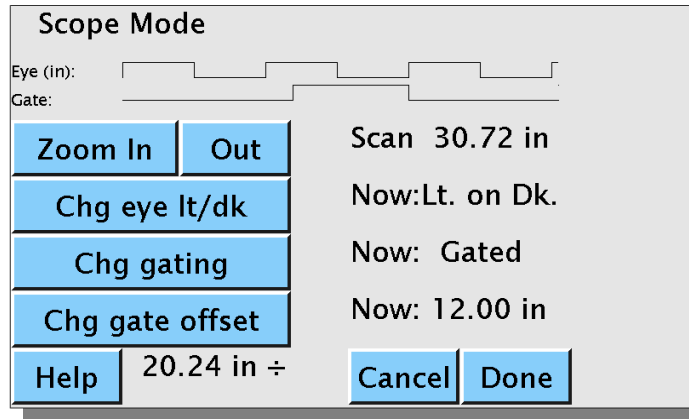


Figure 29: 'Scope Window (Gated)

Refer to Figure 29: 'Scope Window (Gated) above. The two lines labeled “Eye (in):” and “Gate:” contain data from the mark sensor and the gate signal. TRUE is represented by a high level and FALSE is represented by a low level. In the example the mark sensor toggles from dark to light about 3.5 times across the screen. Without the gate, the Dynaview would use every rising edge to indicate the edge of an image. In the example, gating is turned on and the gate is set to 12". This means that Dynaview will ignore the mark sensor for 12" after a qualified edge. You can see this by examining the Gate: line. As long as the gate is FALSE, it suppresses the mark sensor, Dynaview sees the first transition (the one at the extreme left of the chart). The gate immediately goes false for 12". The next low-to-high mark sensor transition takes place when the gate is FALSE, so it is ignored. Some time later the gate goes high, then some time after that we get another low-to-high transition from the mark sensor. This time Dynaview uses the transition to signal the edge of an image. Now the gate goes FALSE again for another 12".

You can use the Zoom buttons to see more and less length in the 'scope display. The actual width of the current display is shown on the same line as the Zoom buttons – in the example it is 30.72". At the bottom between the Help and Cancel buttons Dynaview displays the current image length. Note that in the example shown, without the gate the image length would be about ½ of the 20.24" shown.

4.5 Ext. Span (Span of analog output)

Look at Figure 20: Manage Recipe Screen on page 23 above. The value that you can specify here is similar to the “Range” selection in the Target Length window above. Instead of specifying the width of the display you are specifying the values represented by full scale of the analog output signal. As in the previous example, if you have a 10" repeat and you want the range to be 9.5" to 10.5" specify 0.5 as a value. In this case the analog output in 4–20ma mode will be 4ma = 9.5", 12ma = 10", 20ma = 10.5". If you touch the "Ext. Span" button Dynaview will display a window similar to the one show in Figure 22: Enter Target Length Screen.

4.6 Speed Units:

Look at Figure 20: Manage Recipe Screen on page 23 above. Touch the button with *Speed Units:* displayed to select the desired units for speed: ft/min, m/sec, etc. If you touch the "Speed Units" button, Dynaview will display a pick–list similar to the one shown in Figure 23: Pick Units Screen.

4.7 Storing Recipes

Look at Figure 20: Manage Recipe Screen on page 23 above. When you have completed all the setup changes needed from the Manage Recipes screen, you have the option of saving your changes as a recipe before returning to the top–level screen. An easy method of creating a new recipe is to choose an old one that is close to the new one needed, then make the changes and save with a new name.

4.7.1 Store

The *Store* button is found at the bottom of Figure 20: Manage Recipe Screen. Touch it to start the dialog for saving a recipe.

4.7.2 Choose a folder

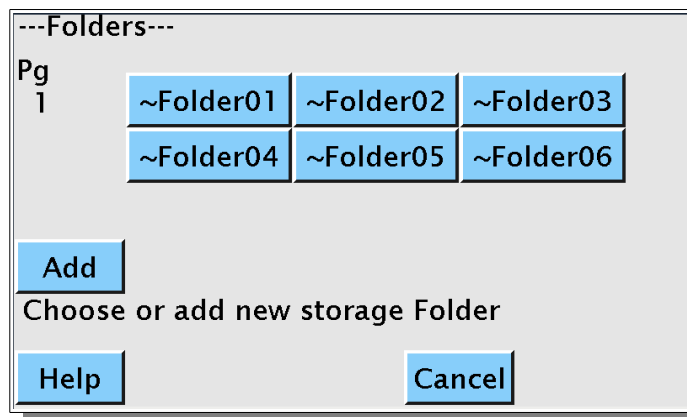


Figure 30: Select storage folder

Immediately after touching “Store”, Dynaview shows a screen so that you can select a folder into which to store the new recipe. This screen is very similar to the one shown in Figure 13: Folder View Screen on page 18 except that it has an additional “Add” button. See Figure 30: Select storage folder above. If there are more than 12 folders there are arrow keys on the left to navigate to other folders. Add a new folder with the “Add” button. A Dynaview can accommodate up to 99 folders. Remember that folder names can be changed from the “Setup Dynaview” screen. See section 2.5.4 Rename Folder on page 12 above.

If you touch “Add”, Dynaview will put up an intermediate screen to allow you to set the new folder name, then immediately show the contents of the new folder. New folders by default have six empty recipes.

Touch a folder name to highlight it, and then touch “Select” at the top of the screen. Note that when you highlight a folder its long description is shown at the bottom of the screen.

4.7.3 Choose a recipe storage location

Immediately after touching “Select” above, Dynaview shows a screen so that you can select a recipe storage location. This screen is very similar to the one shown in Figure 14: Recipe Select Screen on page 19 except it has an “Add” button. See Figure 31: Store Recipe screen below. If there are more than 12 recipes, use the arrows at the left to navigate to all locations. Touch “Add” to add a new recipe location. Dynaview can accommodate up to 99 recipes in each folder. Not all folders need to have the same number of recipes.

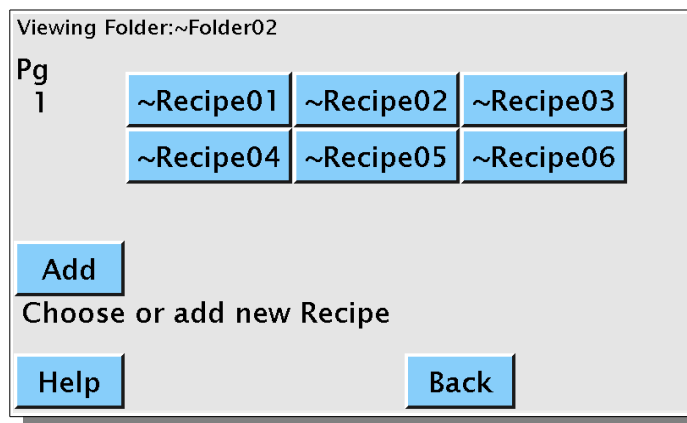


Figure 31: Store Recipe screen

Touch a location to highlight it, then touch “Select” at the top of the screen. Note that when you highlight a recipe its existing long description is shown at the bottom of the screen. You will have an opportunity to rename the recipe and change its description on the next screen. You can touch the “Back” button at the bottom of the screen to return to the folder-select screen at any time before you actually select a recipe location. After touching the *Select* button, Figure 32: Store Recipe Screen below appears.

4.7.4 Recipe name and description

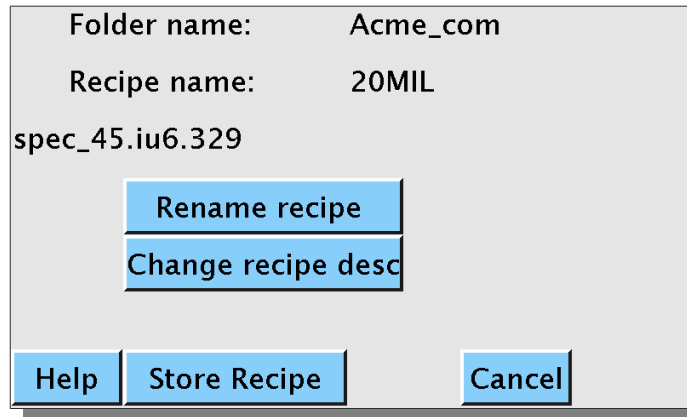


Figure 32: Store Recipe Screen

4.7.4.1 Rename recipe

4.7.4.2 Change recipe desc

4.7.4.3 Store Recipe

These buttons are self-evident. Change the name and/or description as needed. When finished, touch "Store Recipe" and all the setup changes are retained in the new recipe. If you have chosen an existing recipe for storage, the old recipe is overwritten by the new recipe. If you have added a new recipe, it is initialized to the contents of the new recipe.

If *Sort Recipes* is selected on Figure 3: Manage Dynaview screen (see section 2.5.7, Sort Recipes, Folders), the new recipe and/or folder will be shown in alphabetical order the next time a folder or recipe screen is called. Otherwise a new folder or recipe will be show at the bottom of the list.

4.8 Backup Recipes

Touch the Backup Recipes button on the Setup screen (see Figure 19: Setup Screen on page 23 above). The Back up, restore recipes screen appears as shown below.

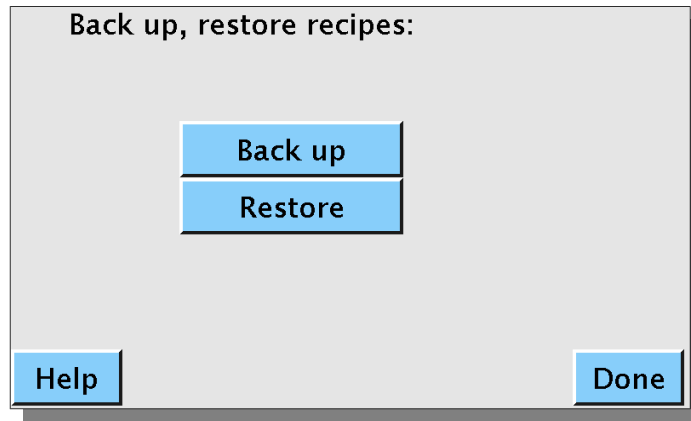


Figure 33: Back up, restore recipes

Dynaview recipes are stored in spreadsheet files, one file per folder. Additionally there is one index file.

To back up the recipe files first insert a USB storage device into the USB connector on the Dynaview. Now touch the Back up button to copy all of Dynaview's recipe files to the storage device. The files will be stored in a folder called "recipes" off of the root directory of the USB drive.

To restore the recipe files insert a USB drive that was previously used to back up, then touch the Restore button.

5 Advanced Installation

5.1 Networking and Linux details

Dynaview III comes set up to communicate with a dedicated network printer. If you want to connect the Dynaview to an existing network you may need to log into the Dynaview to change some of the internal setup files.

Managing the network requires some familiarity with Linux (or Unix) and familiarity with a text editor. There are many fine books on Linux administration at all levels. The VI text editor is installed on the Dynaview III, so one can modify scripts and configuration files as needed. You will need to log into the Dynaview III as root to change most of the files mentioned below. There is a USB – B port (square connector) on the Dynaview that is the console port for Dynaview's internal computer. When connected, this port will show up as a virtual serial port.

As an alternative to the USB console port, once the network is up and running you can use ssh (a secure shell program) to log into the Dynaview III via the network. Again, once the network is up and running remote administration using vi (a text editor), ssh, and scp (a secure copy program) is easy. ssh and scp are available in a Windows environment; search the web for "PuTTY" or try this link:

<http://www.chiark.greenend.org.uk/~sgtatham/putty/>.

You can also get a Linux command prompt on the touch screen. Plug in a USB keyboard, wait 5 or 10 seconds for the keyboard to be recognized, then hold down <CTRL> and <ALT> and press <F1>. This will yield a Linux login prompt. <CTRL> and <ALT> and <F7> will return to the Dynaview display. Unplug the keyboard when finished.

5.1.1 Users and user names

You should set up a user account for anyone who will access the internals of the Dynaview III. Log in as root, and then issue the following command where `user_name` is replaced by the user that you wish to add.

```
(as root)
adduser user_name
```

The program will prompt for a password.

It's a good idea to always log in as an ordinary user, then switch to root only when necessary by using the "su" command. Switch back to an ordinary user with the "exit" command.

5.1.2 Host name

Every node on a subnet must have a unique name. The Dynaview hostname is "DynaviewIII_" followed by the serial number. An example would be "DynaviewIII_910011".

5.1.3 IP address

Dynaview III is set up for a network with a DHCP server, so it will automatically receive its address from the server if one is present. If you prefer to use a static IP address you need to modify the file "/etc/network/interfaces". As the Dynaview III has a built-in web server, you may prefer to use a static IP, depending on the setup (or presence) of your DHCP and/or name server.

5.1.4 Time and time zone

The time zone is set via the file "/etc/localtime". This is a text file with the three letter abbreviation of your time standard time, followed by a space and a number that is the difference in hours between your zone and UTC followed by the abbreviation for daylight time (if required). For Pacific time this is "PST 8 PDT".

The time and date can be changed from within the Dynaview III application via the touch screen. The time and date are battery backed up. The battery is located under the I/O board and should last 10 years or longer. It is a common CR2032 coin cell in a holder.

5.1.5 Printer

The selected printer must support either postscript or PCL-5 printer languages and also be capable of printing ASCII text. Many printers (so-called “WinPrinters”) have no internal intelligence and will not work. From within the Dynaview III application you specify the network name of the printer. There are three options for resolving this name:

1. Specify the IP address of the printer directly in dotted notation as the name. As an example, if your network printer has the network address of 192.168.0.77, you could call the printer “192.168.0.77”.
2. Specify a name that is resolved to an IP address in the file “/etc/hosts”. As an example you could call the printer “DVIII_printer”, then in /etc/hosts insert a line: “192.168.0.77 DVIII_printer”. To use either this option or the one above you need to know the actual network address of the printer.
3. Have a name server on your network that will resolve the name. As an example, you could call the printer “DVIII_printer” as long as the name server knows the actual IP address of the “DVIII_printer”. With a name server, normally the printer name is assigned when the printer is installed and the name server finds the name from the printer. To use the printer you will need to find the name of the printer from your network administrator. Remember that in Linux names are case-sensitive.

5.1.6 Data and directories

5.1.6.1 Recipes

Recipes are kept in the directory “/var/opt/DynaviewIII/recipes”. Two types of files are found here. There is one index file that contains the folder names and folder descriptions. This file is managed by the Dynaview III application and is not user changeable. In addition to the index file there are up to 99 folder files. Each folder file has the same name as the folder it represents. Folder files are comma delimited ASCII spreadsheet files, with one row for each recipe. It is possible to maintain recipes via a spreadsheet application such as Excel or LibreOffice. Contact Dynaview for a Windows application that will edit recipes off-line.

5.1.6.2 Other setup data

Changeable data that is not part of a recipe is kept in “/var/opt/DynaviewIII/globals”. Files in this directory are binary and are not editable by users. They are managed via the Dynaview application and the touch-screen.

5.1.6.3 Run Length Data

Run length data files are kept in the directory “/home/ftp/pub” which is a link to the volatile directory “/var/tmp/DynaviewIII”. Data for the last 10 rolls processed are kept in this directory along with any temporary binary files. This directory is physically located in a RAM disk, so contents are lost when the power is removed. This directory is exposed to any FTP clients that are on the network. The ftp address is ftp://<ip address>/pub, where <ip address> is replaced by the hostname or the IP address in dotted notation.

5.1.6.4 USB storage Drive

When a USB storage drive is plugged into a USB port it is automatically mounted at “/mnt/pen”. This means that the root directory of the pen drive can be accessed as “/mnt/pen”. If a recipe calls for data to be saved and a USB drive is present, the run length data files are copied to the root directory of the USB drive. USB drives are unmounted as soon as the reports are copied so can be removed at any time.

5.1.6.5 Dynaview III application files

Executable and reference files are located off the root “/opt/DynaviewIII”. Help text is located in the Dynaview root directory. Executable binary and scripts are located in the “bin/” directory. All of these files are static and never change.

5.2 Web server

Dynaview III has a built-in web server. If your network has a name server, simply enter the host name of the Dynaview III into your web browser. As an example, if the host name is “DynaviewIII_910011”, just enter “http://DynaviewIII_910011” in the browser. If your network does not have a name server you would substitute the IP address in dotted notation for the hostname. An example would be "http://192.168.0.101"

If your network does not have a name server you need to know the network IP address of the Dynaview III that you want to reach. Simply put the address in the browser window prefixed by “http://”, for example “http://192.168.0.103” assuming the IP address of the Dynaview is 192.168.0.103.

In either case the browser will display current data from the Dynaview III, updating every few seconds. Please remember that as long as your browser is displaying the Dynaview III web page it is consuming resources from the Dynaview. Switch to another page or kill your browser when not actively monitoring the Dynaview.

6 Maintenance

The Dynaview has two internal batteries that will eventually need replacement. There is no other routine maintenance. Both batteries should last about 10 years.

6.1 6V VRLA

This battery supplies power to the processor for about 15 seconds after the 24V is shut off in order to allow a normal shutdown. It is attached to the rear wall of the Dynaview enclosure. This is a 6V battery commonly used in standby applications.

6.2 3V CR2032 coin cell

This battery keeps the clock alive when the Dynaview is not powered. It is located on the main processor circuit board.

7 Linux operating system

Linux provides all the services of a modern operating system. These include:

- Full multi-tasking, multi-user environment
- Full access to the network
- Web server
- FTP server
- Access to local and remote storage
- Many more services

This lets Dynaview accommodate any foreseeable customer requirement. As all the time-sensitive processes are done in the I/O processor, we can safely load the Dynaview III application and Linux much more heavily than they are currently.

8 Theory of Operation

8.1 Sensors

A wheel and encoder runs on the web to sense movement. These are typically a wheel with a one-foot circumference and an encoder that generates 1200 pulses per revolution. This yields a pulse from the encoder every 0.010 inch of web travel.

An electronic mark sensor is placed so that it can sense the web image as it passes. In the simplest case there is a special eye mark printed on the web in a clear channel so that the mark sensor has an unambiguous feature to monitor. Dynaview can use a non-clear channel by gating the mark sensor signal. This feature is explained elsewhere.

The Dynaview gets a signal from the mark sensor once per image and gets a signal from the wheel encoder once every 0.010 of an inch when the web moves.

8.2 I/O processor

The sensor signals are monitored by the I/O microprocessor on the I/O board. Every half-second the I/O processor reports to the Dynaview III application running on the main board. We'll call this application the main job. This report includes the current web speed, a length count, the number of images that have passed, and the length of these images.

The main job can set up the I/O processor so that it always reports images in multiples of some number. This way if the relevant measurement is always over, say, 3 images, the I/O processor report is always in multiples of 3.

Dynaview I and Dynaview II both skipped one image between reported groups. Dynaview III does not do this and keeps track of every image on the web.

The I/O processor catches and accounts for every pulse from the wheel encoder. This way one can get to any precision needed simply by averaging over several image lengths. If an image ends on a partial pulse, the unmeasured part is just included in the next image's length. The same thing happens with images. If after one reporting interval $4\frac{1}{2}$ images have passed under the mark sensor, the I/O processor will report on 4, with the extra $\frac{1}{2}$ saved for the next report. If the main job has set up the report so that it is always in multiples of 3, then in the above example the report will be for 3 images with the extra $1\frac{1}{2}$ images saved for the next report.

The I/O processor has a couple of other jobs to do, but at a lower priority than the length measurement. *Scope mode* is one of these other jobs. Scope mode is explained elsewhere, but the main job can ask for a scope snapshot. Here the I/O processor measures and reports the level of the mark sensor input at regular small intervals so that the main job can draw a display similar to an oscilloscope display.

Another lower priority job is managing the analog output. An Analog Devices AD420 digital to analog converter is wired to the I/O processor as a peripheral. About once every two seconds the main job transmits an analog value to the I/O processor. The I/O processor in turn transmits the value to the AD420.

Another job is to keep track of the mode switch on the I/O board. This switch is read by the I/O processor and its value is made available to the main job.

8.3 Main Job

This is a multi-threaded application that runs under Linux. It has two main threads, one manages the display and operator input, and the other manages the communication with the I/O processor. Both of these threads are event-driven.

8.3.1 Communication thread

The communication thread fields events from four sources: messages from the I/O processor via the serial port, messages from the display thread via a pipe, changes in the operator external buttons via the Linux processor's GPIO interface, and time events. As several of these event sources can't directly wake up the thread, the communication thread wakes up on a periodic timer. It then queries the various resources to see if it has anything to do, does what is necessary, and goes back to sleep. If it needs to send information to the display thread it does it by sending an X-event. X-events are managed by the X-window library Xlib.

8.3.2 Display Thread

All events that wake up the display thread come via the X-window event system. Normally there are three sources for these events: a mouse click (touch screen event), an expose event from the screen, and events that are sent by the communication task.

The main job of the display thread is to keep the display up-to-date as messages arrive from the I/O processor. A secondary task is to display and process the screens associated with the menus that allow the operator to change the operating parameters of the Dynaview III.

There is an open pipe from the display thread to the communication thread. If the display task needs to send information to the communication task it uses the pipe. As the communication task owns the serial connection to the I/O processor, I/O processor data is relayed to the communication task via the pipe, then the communication task relays it to the I/O processor via the serial line the next time it wakes up.

The display thread manages several volatile data files. It uses one to keep roll data so that the data can be printed or graphed. It uses two others to post real-time data for the web server.

If the current recipe calls for saving or graphing data, current roll data is accumulated in a temporary file. At the end of the roll another task is spun off to manage this data. After translating the binary file to ASCII, this data management task in turn calls several external shell scripts to do the actual saving, printing or graphing.