

# **WSI Student Guide: System Maintenance for Media Applications**

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# Preface

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## The corporation

Weather Services International (WSI) leads the global weather services industry with the most comprehensive

- high quality weather and weather-related solutions
- live, local, and interactive traffic reporting
- mission-critical systems
- integration services
- presentation services

WSI serves customers in media, aviation, industry, government, utilities, educational institutions, emergency management agencies, and consumer markets with the best-of-breed solutions.

## Product offerings

WSI product lines include:

- Energycast, Internet-based, “all-in-one” weather source for the energy market
- FlightExplorer™ weather-enhanced Aircraft Situation Display application combining in-flight aircraft data with up-to-date weather information.
- Intellicast® on-line weather information service
- MapMaker<sup>SM</sup> tool to create detailed maps and map textures for a variety of WSI applications
- Mediacast® comprehensive ready-to-air weather programming and briefing service
- Showfx® 3D animation tool to generate captivating weather animations
- SkyAlert™ on-air severe weather warning system
- TrueView™ Interactive severe weather broadcasting system to display and interact with live, local weather data on-air
- TrueView Traffic™ reporting solution to display and interact with live, customized, local traffic information on-air
- WeatherNOW™ fully-automated system for playing broadcast-ready weather presentations utilizing WSI multimedia products
- Weathercast<sup>SM</sup> family of automated on-air forecasting products
- WeatherProducer® distributed multi-user weather system for the broadcast media market
- WeatherWorkstation® distributed multi-user weather system for non-media markets
- WSI InFlight™ satellite-based cockpit aviation weather
- WSI Pilotbrief Online® Internet-based aviation weather

- WSI Pilotbrief® weather briefing and flight planning systems

Clients can select from a suite of raw, unaltered data as well as WSI's exclusive enhanced data and imagery products designed for easy interpretation and analysis. Offerings include NOWrad® mosaic radar imagery, worldwide satellite imagery, lightning graphics, DIFAX weather charts, NEXRAD images, gridded computer model data, and alphanumeric text data.

## Sources of data

WSI collects real-time weather data from an extensive network of sources around the world including the National Oceanic and Atmospheric Administration (NOAA), the National Weather Service (NWS), the National Center for Environmental Prediction (NCEP), the Federal Aviation Administration (FAA), and the Department of Defense (DOD).

# Welcome

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This student guide is one component of WSI's WeatherPRO training program.

## The training program

The WeatherPRO training program provides the core instruction for successful implementation of a WeatherProducer system. Each module is divided into instructor-led lectures, demonstrations, and hands-on exercises.

## Goals

Upon successful completion of this particular course, participants will be able to manage system maintenance activities with confidence.

## Audience

This course was designed for users of WSI's WeatherProducer offering. The offering may include optional applications such as Showfx, MapMaker, and Trueview Interactive.

## Prerequisites

This course requires a working knowledge of a graphical, computer environment and the ability to use a computer mouse.

## The instructors

Your WeatherProducer instructors are certified for training by WSI. This means they know the system, graphics, data — and what you need to get the job done. Their mission is to ensure that *you* have the tools to get your job done. WSI values your input and suggestions to make this training the best possible. At the conclusion of this course, please help us to better serve you by taking a few moments to complete a questionnaire and wish list.

## Customer support

In addition to this guide, support for this product includes:

**Customer support.** WSI Customer Support Services provides software and hardware support 24 hours a day, 7 days a week. To talk to a customer service representative call 978-983-6350 and select "1" at the prompt. To send a fax call 978.983.6402.

The standard support plan includes free phone support Monday through Friday from 6 a.m. - 2 a.m. ET (excluding WSI-recognized holidays). Standard support outside these hours is limited to critical situations with a guaranteed half hour response time from on-call personnel. All other calls are billable. Support calls from clients without a support plan are contracted on a per call basis. For more information concerning support services contact your sales representative or the customer service manager.

**WSI Customer Support Services email:** customersupport@wsi.com.

Contact WSI Customer Support Services by email for non-critical issues.

## Documentation

Hardcopy documentation and release notes were delivered with your software.

### Online documentation

To access online documentation for this product:

- From the top menu bar of your application select *Help -> Online documentation*
- Browse the WSI Media Client website at <http://www.wsi.com/docs/customer/> (login: wsic, password: needinfo)

### Comments

Questions and comments concerning hardcopy or online documentation can be forwarded to WSI Technical Documentation via:

**Mail:**

Attn: Technical Documentation  
WSI Corporation  
400 Minuteman Road  
Andover, MA 01810

**E-mail:** techdoc@wsi.com

**Phone:** 978.983.6300

**Fax:** 978.983.6400



# Module 1

## System Overview

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### ***Learning Goals***

In this module, you be introduced to your WSI system. By the end of this module, you will:

- Have a good sense of the various components which make up your system
- Be introduced to the applications available on your system
- Appreciate the purpose of system alerts and how to utilize them
- Be aware of security issues and measures affecting your system
- Become familiar with the concept and implementation of a Quick Desk
- Understand how to use and adjust video timing

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TIP: **When system trouble occurs contact WSI Customer Support Services as soon as possible.** WSI's trained staff will assist and guide the user in determining the exact nature of the problem. In many instances, it is possible for WSI to log into a client's system and diagnose a problem remotely. Refer to (page 6) for contact information.

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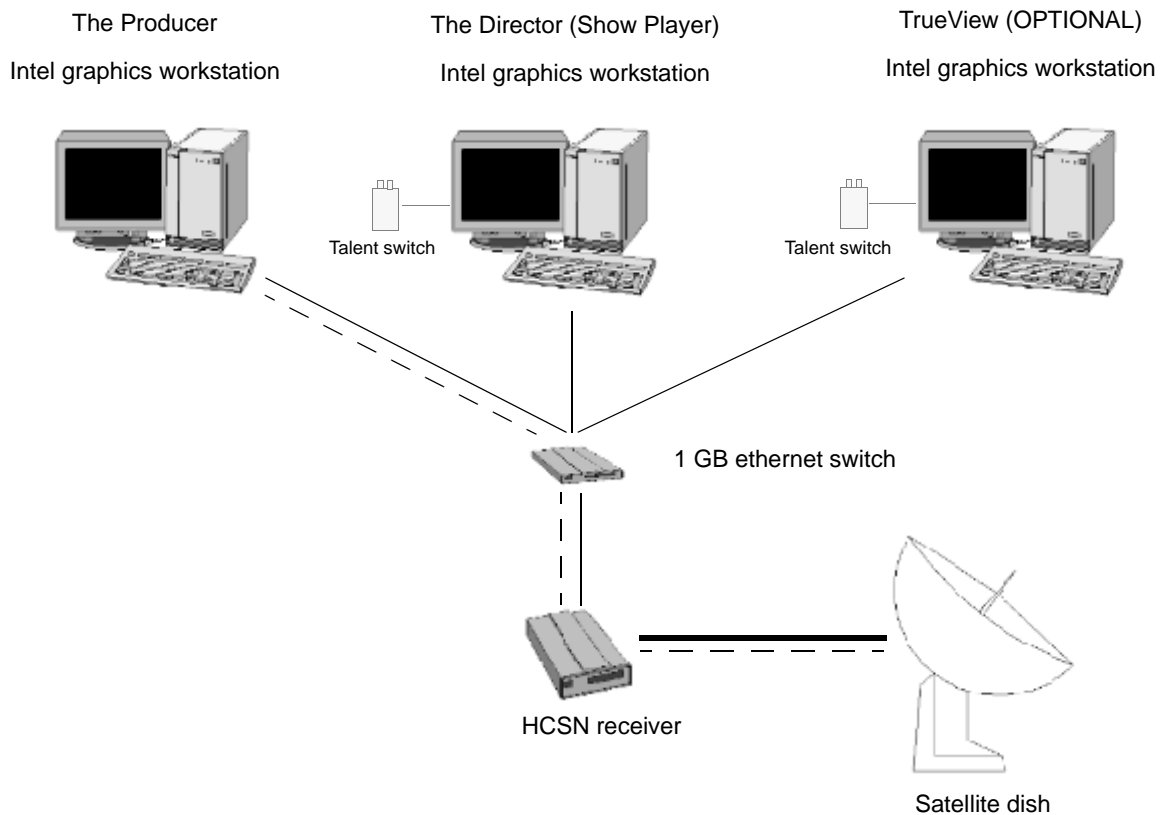
### **Time**

Module 1: 20 minutes

## System components

As discussed briefly in Module 1 (WeatherProducer Overview) the WeatherProducer is a system. Weather data is received via WSI's High Capacity Satellite Network (HCSN). The data then passes through the HCSN receiver and into the WeatherProducer's Producer box. Data is processed as soon as it arrives and is sorted and stored in libraries known as *datastores*.

**Figure 1: WeatherProducer system**



The system includes a minimum of two Linux workstations which are named to distinguish between their respective functions. They are known as:

- *The Producer* — a dedicated product generator for the WeatherProducer application
- *The Director* — dedicated to creating and playing shows

The Producer is known as a dedicated product generator because it contains the datastore libraries, and it automatically processes the data delivered to it, marrying the data to custom basemaps and processing the raw data into finished products for on-air use or off-air analysis.

The Director is the workstation used to interact with the system. The user constructs and plays back all shows with the Director, and, in standard system configurations, the Director is also the workstation that is used to build and render Showfx animations.

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The Director provides a variety of display options for the user to view the weather data. Typically the Director is the only system with video-out capabilities. The Director is usually responsible for printing text information, although, in some instances, the printer can be attached to the Producer.

Additional Linux workstations may be added to the system to host other WSI applications (e.g. TrueView, Showfx, MapMaker). A common configuration is to include a Linux workstation to host WSI's TrueView applications.

The Intel workstation's operating system is Linux, a popular UNIX clone. The data is transferred between the various boxes via an Ethernet local area network (LAN) using a 10-baseT or 100-baseT switch. (A switch is a network connector that ties the workstations together.)

In addition, the system consists of:

- one USB-based external hard drive per workstation for backing up the system
- a modem provided for remote diagnostic and quality monitoring purposes.

## Application overview

Software applications loaded onto each WeatherProducer system may include:

- the WeatherProducer application consisting of three separate groups of processes: the desk processes, the ingest processes, and the datastore processes
- Showfx, the animation portion of the WeatherProducer software which may include optional features such as TrueView
- MapMaker, WSI's tool to create detailed maps and map textures
- Gimp, a stand-alone paint package

Software applications loaded onto a TrueView system include:

- TrueView Sky, a supplement to the Showfx application used to generate 3D animations for use in WeatherProducer on-air presentations.
- TrueView Interactive, a severe weather tracking system
- MapMaker and Gimp

## Function keys

The WeatherProducer allows a user to update or edit any product that resides on the desk quickly and easily through function keys known as "hot keys". Once a product has been assigned, simply strike its assigned key to update or edit the product.

Refer to the tutorials in the WeatherProducer online documentation for detailed information on how to assign a product to a function key.

## System alerts

The WeatherProducer can alert the user to specific weather occurrences through audible alerts and/or pop-up windows with alert or notification banners.

The WeatherProducer utilizes this same technology to monitor its own system processes. The WeatherProducer will alert the user if:

- data is not received for longer than a specified time (established during configuration)
- data is not stored for longer than a specified time (established during configuration)
- when any background task must be restarted by the system (e.g., datastores or ingestors)
- data cannot be written to the disk
- whenever any of the above conditions have been restarted or corrected

The WeatherProducer performs this function through a single product that resides on the desk. This product has already been created for the user and should remain on the desk AT ALL TIMES. The product name is "System Alert- DO NOT DELETE".

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**WARNING: The product named "System Alert- DO NOT DELETE" is monitoring the system to ensure that vital processes are running and will notify the user if these processes stop. DO NOT REMOVE this product from the desk.**

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The product will display an alert message if any interruption to the data ingest or save process occurs. Similarly, if an interruption occurs, the product will alert again if the process restarts and the problem is cleared.

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**IMPORTANT: If the product displays an alert, allow 20 to 30 minutes for the problem to correct itself. If it has not corrected itself after that amount of time, contact WSI Customer Support Services.**

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**NOTE:** The user or trainer can test the System Alert product by shutting down one or all of the ingest processes on the Producer. This will trigger the alert message on the Producer and Director workstations. This should only be done as a test. The ingest processes will be restarted automatically by the ww\_mon application.

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## Security

WSI ensures that its systems are reasonably secure against the most common desktop attacks. Specifically, WSI provides the following security features for its Intel workstations:

- At the time of manufacture, and at regular intervals as determined by customer-specific maintenance contracts, the base operating system is updated to meet or exceed vendor security recommendations for desktop use.
- Network logins to the WSI Linux systems are, by default, restricted to strongly encrypted, password-authenticated SSH sessions only. The SSH protocol is the recognized industry standard for insuring secure network connections to UNIX-style operating systems.
- WSI customer-care modem dial-up sessions to the WSI Linux systems are, by default,

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authenticated by an encrypted customer-unique password CHAP handshake.

- Filesharing, when enabled, is limited to WSI-specific data directories. Applications and executables are not shared over the network by default.

The above features will keep risk exposure low when used by authorized personnel for purposes to which the system is intended.

## Passwords

Your WSI workstation contains two user accounts, "root" and "wxws". Each of these accounts has its own access password. During the normal course of operation it is not necessary to use passwords. However, you may be requested to input one or more of these passwords when troubleshooting an issue with WSI Customer Support Services. If you need to input a password for either account, WSI Customer Support Services can provide it to you.

## Integration with existing networks

If the customer decides to place one or more of the WSI workstations on a corporate LAN exposed to the Internet, WSI strongly recommends that a firewall be used to prevent potentially sophisticated Internet attacks from damaging or slowing the performance of WSI workstations, or any other of the customer's internal workstations.

## Remote file transfer and remote console access

As described earlier, WSI restricts network logins to authenticated, encrypted SSH sessions. This practice forms an important layer of your WSI workstation's desktop security, and is designed to protect your critical 24x7 media operation.

WSI strongly recommends that customers use this feature when accessing WSI systems remotely over a network. Popular older remote-access protocols such as FTP, telnet, rlogin, and rsh are no longer supported due to widely-publicized intrinsic vulnerabilities that would expose your WSI workstation to critical security risks.

For customers who are unfamiliar with the SSH protocol, user-friendly SSH tools are provided for a wide variety of computer platforms including but not limited to Microsoft Windows(tm), Apple MacOSX(tm), Linux(tm), and other UNIX clones.

While it is beyond the scope of this document to describe the installation and usage of 3rd-party SSH-based solutions, there are a large number of trade publications on this subject, both in book form and electronically available on the Internet.

## Quick Desk

The concept of a Quick Desk is to provide the user with a fast method for getting on-air in the event of an emergency. If a shutdown occurs at showtime, seconds can make the difference in being able to get on-air.


To bring the system up as quickly as possible, an empty Quick Desk has been created. The Quick Desk has no products or folders. This greatly increases the speed with which the application opens. The user can then go to the library, call up just the show that is to be used, and take it on the air.

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**IMPORTANT:** The following steps presume that all of the computers and workstations that make up the WeatherProducer system are up and running.

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To open the Quick Desk and play a show, use the following steps:

1. **From the Director desktop, click the WSI logo  in the upper left corner of the screen.**
2. **Select *WSI Applications* from the drop-down menu.**
3. **Select *Quick Desk*.**

The WeatherProducer application will open, but no folder, products, or shows will be on the desk.

4. **Select *Library* in the main menu of the WeatherProducer desk.**

A drop-down menu will appear.

5. **Select *Show* in the *Library* drop-down menu.**

The show window will open.

6. **Click the scroll bar and scroll through the show names until the desired show is visible in the selection window.**

7. **Click the desired show and select *Load* from the drop-down menu to bring it to the desk.**

The show will appear as an icon on the desk.

8. **Double-click the show icon to open it.**

The show window will open.

9. **Select *Play Forever*.**

The show will begin to play.

## Video timing

Video timing should be established at installation time for each workstation which outputs video for broadcast. These workstations typically include the workstation operating as the weather Director and the workstation running the TrueView Interactive application. Once established, the video timing usually does not need to be adjusted. If necessary, it can be using the steps below.

Video timing settings will vary from one client site to another based on one or more of the following:

- The hardware involved
- Digital to analog converters (Ensemble 5)
- Client preference

## Cable check

Before adjusting the video timing, check the following:

- Verify that the sync source is plugged into “Ref In” on the video card. “Ref In” is the one closest to the terminator switch.

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**IMPORTANT: If the users sync is not plugged into “Ref In”, contact WSI Customer Support Services for assistance.**

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- Verify that the user is not running video through a digital to analog converter as timing adjustments will be made to that device and not the workstation.

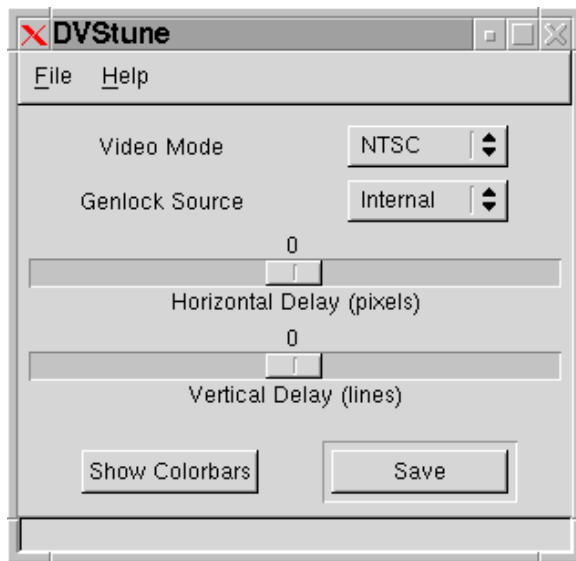
## Tune the video signal

To tune the video timing signal on a workstation:

1. **Close any other applications that are running.**
2. **Open the DVStune controls:**
  - a. **From the Linux desktop, click the WSI logo  in the upper left corner of the screen.**
  - b. **Select *Utilities* from the drop-down menu.**
  - c. **Select *DVStune* from the submenu.**

The DVStune application window opens.

**Figure 2: DVStune main window**



3. Select the desired video sync option from the *Genlock Source* menu.

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NOTE: Depending on the station, either the Digital or Analog sync source must be plugged into the "Ref In" BNC on the DVS board in back of the workstation.

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4. Click the **Show Colorbars** button.

Color bars will appear in the video output.

5. Compare the timing between the video output and the timing of the house.
6. Adjust the horizontal and vertical delay sliders until the color bars best match the station.
7. Click the **Save** button to save the timing settings.
8. Select *File -> Exit*, to exit the DVStune window.
9. To verify that the application is truly in-time, play a show from the WeatherProducer.
  - a. Locate a show icon on the WeatherProducer desktop.
  - b. Double-click the show icon to open it.
  - c. In the show select *Play -> Play Forever*. The show should now be streaming video to air. Note that the keyboard space bar advances the show.
  - d. To quit the show, press **Q** on the keyboard.

10. Repeat video timing process as needed.

If any questions or concerns arise, contact WSI Customer Support Services.

**Module 1****System Overview****Summary**

Your WSI installation is comprised of various pieces of hardware and software which must be installed, configured, implemented, and maintained with care. Familiarize yourself with the various discussions and exercises in this module to ensure that you are comfortable with your installation and can keep your operations running smoothly at all times.



## Module 2

# Startup and Shutdown

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### **Learning Goals**

In this module, you are introduced to your WSI system. By the end of this module, you will:

- Know how and when to reboot your system.
- Understand the procedure to shutdown your system and its various components
- Be aware of the difference between a warm and a cold boot and the circumstances in which to use them.
- Understand the procedure to startup your system.

### Time

Module 2: 20 minutes

### Rebooting



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**DO NOT REBOOT ANY OF YOUR WORKSTATIONS unless instructed to do so by WSI personnel. Continuous rebooting a system can be dangerous.**

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Rebooting the system to compensate for a problem usually only makes the problem worse and can cause unnecessary downtime.

### Shutdown the system

Accidental shutdowns of the WeatherProducer system are unavoidable, however, to minimize their frequency, WSI strongly recommends the use of an Uninterruptable Power Supply (UPS - minimum 500W per attached workstation) and surge protector to guard against damage to the system.

Intentionally shutting down the WeatherProducer system requires a series of steps on each computer that are detailed shortly. In general, the user must:

- Save and quit from all other open applications (e.g. Showfx, MapMaker, Gimp) on each workstation.
- Save and quit the WeatherProducer desk on each workstation
- Shutdown the datastores and ingestors on the Producer
- Shutdown and power off the workstations

## Save the desk

The term desk is used frequently in WSI applications. The desk refers to the WeatherProducer application.

Any work (the creation of folders, products, shows, etc.) is “written to the desk.” If the desk, or system, were to go down, the next time it came back up it would default to the last version of the desk that was saved.

If the desk or the system were to go down and the desk had not been saved recently, any products, shows, and folders that were not saved to the most recent version of the desk would NOT be lost. However, they would have to be retrieved manually from the library. Therefore, save the desk periodically.

Saving the desk on each workstation is simple. On the Director:

1. **Select *Desktop* from the main window top menu bar.**
2. **Select *Save Desk* from the *Desktop* drop-down menu.**

This particular desk’s current configuration is now saved.

3. **Repeat this step on other workstations.**

## Quit the desk

Quitting the desk stops any process (including product and show updates) running on that desk but does not stop the ingestion of data, or the updating of movies if the desk is on a Director box.

On the Director:

1. **Select *Desktop* from the main window top menu bar.**
2. **Select *Quit* from the *Desktop* drop-down menu.**

A prompt-box appears.

3. **Click **Save**.**
4. **Repeat this procedure on other workstations.**

Selecting the Save option saves all of the products, folders, and shows on the desk in their current locations. The next time the desk is started everything will appear on the desk in the locations where they were saved.

If the desk has recently been saved and the user wants the quit process to occur more quickly, choose Do Not Save when prompted. The next time the desk is started, all products, folders and shows will be loaded to the desk in the positions where they were last saved.

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NOTE: Even when the desk is not running, the datastores are still gathering data. However, on the Producer, products that are set to auto-update will not do so until the desk is restarted.

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## Shutdown the datastores


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**IMPORTANT:** Shutting down the datastores stops ALL data processes and disables the desk. No data will be sorted, processed, or stored if the datastores are shutdown.

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The last set of programs to quit before system shutdown are the datastores and ingestors running on the Producer.

From the Producer box:

1. From the workstation desktop, click the WSI logo  in the upper left corner of the screen.
2. Select *WSI Applications* from the drop-down menu.
3. Select *Datastores*.
4. Select *Stop Datastores*.
5. Click the **Yes** button in the prompt box to disable the storing of data.

The datastore and ingestor icons will disappear from the taskbar.

## Boot the WeatherProducer workstation(s)

As with a personal computer, the WeatherProducer workstations can be restarted (warm booted) or powered off and turned back on again (cold booted). See the following sections to:

- "Restart the WeatherProducer workstation (warm boot)"
- "Power off the WeatherProducer workstation (cold boot)"

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**IMPORTANT:** If more than one of the WeatherProducer workstations is powered off, it's best if they are powered up in a specific order. See *Startup the system* (page 23) for details.

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## Restart the WeatherProducer workstation (warm boot)

Restarting the WeatherProducer workstation is the equivalent of "warm booting" a personal computer (i.e.- Ctrl-Alt-Del). That is, all the applications are shutdown and the system is rebooted, but the power is NOT turned off.

Any of the computers that make up the WeatherProducer can be rebooted individually, but, if all of the systems are turned off, **the Director should be restarted FIRST.** (See *Startup the system* (page 23).)

The procedure to restart the WeatherProducer workstation should only be performed after the user has done the following as needed on each machine:

- Save the desk (page 20)

- Quit the desk (page 20)
- Save and quit all other open applications
- Shutdown the datastores (page 21)

From the Director workstation:

1. **From the Linux desktop, click the WSI logo  in the upper left corner of the screen.**

2. **Select *Reboot* from the drop-down menu.**

A System Restart prompt-box appears.

3. **Click  **Yes** in the system restart prompt-box.**

The system will shutdown then immediately restart itself.

4. **Repeat steps 1 to 4 for each workstation saving the Producer workstation for last.**

The datastores on the Producer are reactivated automatically, and the WeatherProducer main window (desk) opens.

### **Power off the WeatherProducer workstation (cold boot)**

Power cycling the WeatherProducer workstation is the equivalent of “cold-booting” a personal computer.

The procedure to restart the WeatherProducer workstation should only be performed after the user has done the following:

- Save the desk (page 20)
- Quit the desk (page 20)
- Save and quit all other open applications
- Shutdown the datastores (page 21)

From the Director workstation:

1. **From the workstation desktop, click the WSI logo  in the upper left corner of the screen.**

2. **Select *Shutdown* from the drop-down menu.**

A System Shutdown prompt-box appears.

3. **Click the  **Yes** button in the system shutdown prompt-box.**

4. **The system will shutdown and prompt you to power off (physically shut off the system).**

5. **Repeat steps 1 to 4 for each workstation. Save the Producer for last.**

## Startup the system

If more than one of the workstations are powered off, it is best if they are turned on in the following order:

1. **Director**
2. **Showfx**
3. **Producer**
4. **All other systems**

Be sure to give each system a little time before powering up the next.

All system functions will be restarted on the Producer workstation (desk, datastores, etc.).

If they are needed for immediate use, the various WeatherProducer products and shows should be updated manually; otherwise, normal system updates will resume. If there are any questions call WSI Customer Support Services (see page 7).

## Module 2

### Summary

# Startup and Shutdown

System shutdown and startup are necessary activities in any installation. Become familiar with the steps discussed in this module so you are prepared in the event you need to shutdown or reboot. Remember: **DO NOT REBOOT ANY OF YOUR WORKSTATIONS unless instructed to do so by WSI personnel.**

## Module 3

# Backup and Recovery

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### **Learning Goals**

In this module, you be introduced to your WSI system. By the end of this module, you will:

- Have some guidelines to follow in the event of a system disaster
- Understand the automated backup feature and what it involves
- Know how and when to use interactive backups
- Know how to restore files

### Time

Module 3: 10 minutes

### Disaster recovery

Your WSI solution is designed to be recoverable in the event of a disaster. The following list describes different components of your WSI solution, and how they can be recovered in the event of an emergency.

**Physical hardware (computers, monitors, satellite receivers).** All hardware associated with your WSI system is fully replaceable per the provisions of your WSI support agreement. In addition, some specific hardware items may include redundancy features to reduce the impact of common types of hardware failure. For example, WSI workstations include two mirrored internal hard drives to reduce the risk incurred by a single disk failure.

**WSI workstation operating system.** The WSI workstation operating system is fully replaceable with the “WSI Rescue & Recovery CD” delivered with your system. For a fast recovery keep this CD in a known location near the WSI workstations.

**WSI applications.** WSI software applications (TrueView, WeatherProducer, Showfx, Map-Maker) are fully replaceable either via the WSI installation CDs, or by re-installation from other WSI systems on your local network.

**Custom generated content.** Client’s custom generated content is recoverable from regular automated backups to external USB drives. More information about the backup process can be found below.

## Automated backup overview

Each WSI workstation comes with one (1) external USB drive to be used for backup purposes. Automatic backups will happen as long as the USB drive is attached to its workstation.

### What specific data will be backed up?

The automated backup process will create archives of your application-specific preferences, as well as your custom-generated graphics. The automated backup does **not** make copies of WSI system files or applications. These files can only be reinstalled from WSI CDs, or other WSI systems on your network. Speak to WSI Customer Support Services for more detail.

### Backup schedule

The automated backup process will run weekly on each WSI workstation that has at least one external USB drive attached to it.

### Off-site data protection

WSI recommends that the USB backup drives be periodically rotated off-site to reduce the risk posed by a disaster localized to the room where the WSI workstations are housed. To perform this procedure, periodically disconnect one of the USB drives from your WSI workstation and move it to a safe location.

It is safe to disconnect an external USB drive from the WSI workstation while the system is on, as long as the disk-activity light is in its normal non-blinking state.

Always remember to leave at least one USB drive attached to the WSI workstation at all times, so that local backups can continue.

## Interactive backups

You may at any time, choose to manually initiate a backup to the attached USB drive of each system. To do this:

1. **Click the WSI system menu** .
2. **Select *WSI Application* -> *WSI Backups* from the drop-down menus.**

From here you may select which particular types of backups to perform and initiate them immediately. If you do not know what kind of backup is best for your need, choose "Complete Backup (everything)" from the list.

After initiating a backup, the status bar in the backup window will tell you when it is complete. The backup process may take several minutes.

3. **Repeat for each workstation.**

## Restoring files

Restoring files is not always a straightforward process, because there is often the danger of overwriting newer files that could be vitally important. In the event that you need to restore files from a backup on your external USB drive, contact WSI Customer Support Services to insure that the process proceeds smoothly and safely.

**Module 3****Backup and Recovery****Summary**

Every installation should be backed up on a regular basis. Backups are critical in the event of unforeseen data loss. Review this module carefully so you are comfortable with both the backup and restore routines. Call WSI Customer Support Services for additional assistance.

## Module 4

# System Failure

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### **Learning Goals**

By the end of this module, you will:

- Understand when troubleshooting for system failure is necessary
- Know how to restart your WSI application(s)
- Know how to restart the ICE window manager
- Know how to perform a system reboot
- Understand when to resort to an “unclean” reboot

### Time

Module 4: 10 minutes

### Analysis

The following steps should be taken if your WSI application displays one or more of the following detrimental behaviors: unusual slowness, corrupted graphics on screen, unresponsive keyboard or mouse input, sudden loss of weather data, sudden loss of graphic material, or other erratic application behavior.


#### STEP 1 Restart the application

*This procedure assumes you have control of the mouse.*

The first and fastest step that can be performed is to restart the WSI application. Quit the application from its pulldown menu, then start it up again from the WSI system menu or taskbar. This will repair most common kinds of application errors.

If restarting the application does not clear up the symptoms you are experiencing, proceed to the next step.

If the application will not quit by itself, you may be able to force the application to quit by performing the following steps:

- From the workstation desktop, click the WSI logo  in the upper left corner of the screen.**
- Select *Utilities* -> *xkill* from the drop-down menu.**  
The cursor will change to a square icon.
- Click in the WSI application window that will not close.**

This action should force the WSI application to quit.

---

## STEP 2 Restart the window manager

*This procedure assumes you have control of either the keyboard or the mouse.*

The second step you can take to clear up a large number of common unwanted behaviors is to restart the WSI workstation graphical display.

**Mouse control.** If you have control of your mouse, perform this action as follows:

- a. **Close your main WSI applications.**
- b. **Select *Logout* from the WSI desktop system menu.**
- c. **Confirm your choice.**
- d. **Wait for 10 seconds while the graphical display resets and logs you back in.**

**Keyboard control.** If you do not have control of your mouse, but can use your keyboard:

- a. **Enter the `Control` `Alt` `Backspace` key sequence to restart the graphical display.**
- b. **Wait approximately 10 seconds for your display to reset and log you back in.**
- c. **Once you are logged in restart your WSI applications.**

If restarting the graphical display does not fix the problem, proceed to the next step.

## STEP 3 Perform a system reboot



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**Rebooting a system can be dangerous.**

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- Rebooting a system is slow, and if a system is rebooted incorrectly it can cause additional problems, from running additional repair tasks that will may degrade the performance of your WSI applications, to loss of data and additional downtime.
- ALWAYS reboot as a last resort, only after following steps 1 and 2 (discussed earlier).
- ALWAYS follow the reboot procedure detailed here, to insure that your reboot procedes as cleanly as possible.
- NEVER reboot a system that is in the process of running "fsck" to repair damaged filesystems unless directed to by WSI personnel.
- NEVER answer yes to a question that may appear during bootup, "Filesystem errors detected: Do you wish to force a filesystem integrity check?"
- NEVER reboot a system repeatedly again and again in quick succession without calling WSI Customer Support Services. Doing so will exacerbate any filesystem errors that may

exist and prevent them from being repaired properly.

## Reboot procedure

To reboot your system:

- First try and reboot cleanly by selecting the **Reboot** on the WSI desktop system menu. Wait approximately 20 seconds for the reboot to take place. If this step fails or cannot be performed, proceed to the next step.
- Second, try rebooting cleanly by using another WSI workstation at your site. Using another WSI workstation, you may be able to log in to the troubled system and tell it to reboot. Here is a walkthrough of the process:

From the Producer system, or any other Dell system:

- a. From the Linux desktop, click the WSI logo  in the upper left corner of the screen.
- b. Select **System** from the drop-down menu.
- c. Select **Terminal** from the drop-down submenu.

A command terminal window should appear.

- d. At the command prompt (**>**) enter `ssh root@director`.
- e. Replace `director` with the name of the system that needs to be rebooted.
- f. When prompted for a password enter "weather".

If this command is successful, you should see the new prompt `[wxws@director ~]>`.

- g. At that prompt, enter `reboot`.
- h. Wait for the troubled system to reboot.

## Last resort

If the reboot procedure fails, then perform the following as a last resort:

- a. Try rebooting uncleanly by holding down the power button on the WSI workstation you wish to reboot until the screen goes blank.
- b. If necessary, remove the power cord from the system as well.
- c. Waiting 20 seconds before plugging it back in.
- d. Push the power button again to initiate a "cold reboot".

You may see a message saying that filesystem errors have been detected, and asking if you wish to force a filesystem integrity check. **NEVER answer "y" unless directed to by WSI personnel.**

Your WSI workstation may start checking filesystems for possible damage after a hard reboot. Always allow this check to finish. You should be able to see the the filesystem check is in progress by noticing that the Dell disk activity light, located to the upper-right of the power button, is either blinking or solid green.

When your WSI workstations comes back up to its desktop after a hard reboot, you may see a message explaining that your custom data on the the internal hard drive mirror needs to resynchronize. It is important that the system not be rebooted again for at least two hours to allow the synchronization to complete. You may, however, use the system as you would normally during this time.

You may wish to report any hard-reboots to WSI Customer Support Services, so that symptoms of defective hardware can be detected early, and also in case there is a software workaround or solution that may resolve the original issue that led to a reboot taking place.

If a hard-reboot still fails to bring the system back into a usable state, contact WSI Customer Support Services for further emergency instructions.

## **Data problems**

If you suspect data problems refer to Module 5, Data Reception.

**Module 4****System Failure****Summary**

In the event of system trouble follow the steps outlined in this module. If you require more assistance call WSI Customer Support Services.



# Module 5

## Data Reception

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### **Learning Goals**

By the end of this module, you will:

- Know what steps to take to verify whether data is coming into the system and being stored properly.

### Time

Module 5: 10 minutes

### Checking data

Data is fed to WeatherProducer clients via the AMC-1 satellite (formerly GE-1). The satellite is located at 103W, and WSI utilizes transponder 22 (vertical polarity). Data is received on a dish (configured at installation time), then fed to a receiver via a coax cable. The receiver in turn broadcasts the data over a cat-5 network where it is then stored on the Producer system.


There are a variety of ways to determine if data is flowing into the WeatherProducer.

#### **Step 1: Check system clock**

Check to see if your system clock is off. Occasionally system times drift, and as a result can give the appearance that data is being lost. To check your system time, simply note the time on the clock in the upper right corner of the screen. If it appears that your system time is off (by more than 5 minutes), contact WSI Customer Support Services for assistance.

#### **Step 2: Check datastores**

Check to see if data is being stored on the Producer workstation:

1. **From the workstation desktop, click the WSI logo  in the upper left corner of the screen.**
2. **Select *Windows* from the drop-down menu.**  
The active programs list opens.
3. **Locate the Text Time Based Datastore (or the Nexrad Time Based Datastore) and double-click on it.**


The datastore opens, and you should see text scrolling through the window. As text messages scroll by, be on the look out for lines that say "Saved". Saved messages indicate that data is being saved on the system. Though the saved messages may not always be free-flowing, at least one message should be seen every ten seconds or so.

If you suspect there is a problem, do the following to manually restart the data storage process:

**Quit the datastores.**

- a. From the workstation desktop, click the WSI logo  in the upper left corner of the screen.
- b. Select *WSI Applications -> Datastores -> Stop Datastores* from the drop-down menus.
- c. Click YES to disable the storing of data.

**Restart the datastores.**

- a. From the workstation desktop, click the WSI logo  in the upper left corner of the screen.
- b. Select *WSI Applications -> Datastores -> Start Datastores* from the drop-down menus.

4. Once finished, minimize the time based datastore window.

### Step 3: Check the receiver's status lights

Check the status lights on the HCSN receiver: The LOCK, SIGNAL, & LNB lights should be steady green. If any of one of the lights are not steady green, a problem exists which requires the attention of WSI Customer Support Services.

### Step 4: Check satellite signal strength

Signal loss can be caused by any number of things:


- Rain fade
- Ice/snow accumulation on the dish
- Dish becoming blocked or misaligned
- A break in the cable between the dish and receiver

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NOTE: Users must have an ethernet connection to their receiver for these instructions to work.

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To check satellite signal strength

1. From the Linux desktop, click the WSI logo  in the upper left corner of the screen.
2. Select *Other Applications -> Internet -> Netscape*.

The web browser opens.

**3. Enter in the following URL:**

`http://hcsn/log1.txt`

A log opens in the browser, providing a minute by minute log of the receivers statistics.

**4. Verify that the values in the EsNo column are above 10.**

**5. Verify that the values in the BED column are lower than 25.**

Additional websites provide other information about the data signal. These include:

- `http://hcsn/hcsn.txt`
- `http://hcsn/stats.txt`
- `http://hcsn/log15.txt`

Contact WSI Customer Support Services for more information and additional assistance.

## **WSI's HCSNsured data backup service**

Some clients have purchased HCSNsured, WSI's automatic-dial data backup system. HCSNsured uses a WSI-provided modem and a phone line provided by the client. When the satellite receiver detects a drop in signal quality, it triggers the modem to call back (long distance) to WSI and initiate the backup data stream. The switch to the backup feed will typically take between 30 and 45 seconds. When the receiver detects that the satellite signal has been restored, the modem automatically disconnects.

Please note that the HCSNsured dial backup service will not replicate the entire HCSN data feed. Due to limited bandwidth on high-speed modems over standard phone lines, only a portion of the normal 1-megabit per second data feed will be available for the compatible system. The system is designed specifically for infrequent emergency use.

## Appendix A

# Hand Tracking

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WSI hand tracking is an optional feature available with TrueView installations. It includes both hardware and software that interfaces only with WSI's TrueView family of products, and is designed for use in chroma key by on-camera talent in a studio location. Hand tracking provides the talent the ability to interface with the TrueView system interactively, live on the air, providing cursor movement as well as macro execution capability through a variety of interfaces.

### System requirements

The computer on which hand tracking operates is a standard, Intel, Windows-based PC with the following requirements:

- Minimum 256 Mb RAM
- Minimum 40 Gb hard drive
- SVGA display
- Analog frame grabbing device
- Serial port parallel port
- (2) Footpad sets (4 pads each for a total of 8 pads)
- Remote button interface (RBI)
- Junction box
- Microsoft Windows operating system
- WSI hand tracking software

The input of the (typical) system is the key video signal (usually a black and white silhouette of the talent that the station's chroma keyer provides). This signal is processed by the WSI hand tracking software to determine the location of the talent's hand. The hand motion is then converted to coordinate data and sent to the TrueView system via a serial port. If the key video signal is not available the hand tracker key is utilized.

Interactive control is accomplished through the use of footpads, a special remote button, and other related hardware. The basic configuration consists of two (2) footpad sets and the remote button. Each footpad is connected to a junction box that is in turn connected to the remote button interface (RBI). The RBI is a 'wedgable' keyboard device. It connects to the TrueView system's keyboard input port and the normal system keyboard is then connected to the RBI (see Figure 4). Using this technology, all footpad input as well as the remote button input appear to the computer as normal keyboard input.

### Setup

To set up your installation using:

- the key video signal refer to the discussion "Key signal" on page 40.
- the hand tracker key refer to "Adjust the hand tracker key" on page 48; be sure to proceed to advanced camera setup mode (discussed on page 52).

## Key signal

A typical installation requires the client to provide a key signal that is generated by the camera that shoots the chroma key wall. This signal, if viewed on a monitor, appears to be a black and white silhouette. In some cases, a suitable key signal may not be available from the house plant. In such cases, an analog signal from the camera may be fed directly into the hand-tracking computer (Figure 4), where an available internal keyer can be utilized to generate the appropriate signal. While not ideal, this configuration usually results in satisfactory results provided that adequate lighting is available. In the event that only a digital camera signal is available, an appropriate digital to analog converter may be purchased from WSI, or obtained locally (Figure 5). It is important to note that this converted digital to analog signal is used only for talent reference, and does not appear directly on-air.

## System placement

*The hand tracking system is designed for **indoor studio use only**, and is not suitable for outdoor use.* The hand tracking PC and related systems should be located on the set near the chroma key wall to give the talent feedback that the system is working properly. It is also strongly recommended that the main TrueView system be located in the same area. Locating these devices in the studio greatly simplifies the installation of the hand tracking system. In the event that full functionality of the TrueView system is also desired in the talent's office, an optional remote terminal device is available from a third party, or directly from WSI.

## System components

Normally, the following are provided with each hand tracking installation:

- two footpad sets (4 pads each for a total of 8 functions)
- one remote button
- one junction box
- one remote button interface (RBI)
- two 25-pin serial cables

It is also possible to interface this same remote button with an existing WeatherProducer system. The RBI on the WeatherProducer may need to be upgraded if this is desired. The footpads and remote button terminate at the junction box. This box provides means to interface up to three footpads, one remote button and a general contact closure. It is also designed to provide an easy interface for both a WeatherProducer system and the TrueView system allowing the talent to access both systems with one remote button. A contact closure is provided for those clients that wish to interface the junction box with a video switcher to allow the talent to switch between the TrueView and WeatherProducer video output at will (WSI does not provide the video switch). The junction box provides visual feedback to the talent to indicate the system currently being controlled (WeatherProducer or TrueView system). Therefore, it is important to have the junction box in a position near the chroma key wall that is visible to the talent. The connection from the junction box to the RBI is a 25-pin cable terminated with DB25M on the junction box end and a DB25F on the RBI end. It is a straight through cable requiring all pins. This cable does not carry any signal level data, only contact closures. WSI provides a 25-foot cable, and does not recommend a cable longer than 150 feet.

## More cabling specifications

There are three primary cables that interface hand tracking and junction box with the TV and WxPro systems. WSI provides basic versions of all of these cables that allow the systems to be fully functional if all systems are located in the same area (near the chroma key wall).

The following cable pinouts and connector requirements are provided for those installations where the TrueView and hand tracking systems **cannot** be co-located near the chroma key area. *It is essential that these cables be **installed prior** to the arrival of the WSI engineer for the balance of the hand-tracking HT installation.*

**1. Serial data cable from hand tracking to TrueView system (serial null modem). Cable pinout specifications:**

- DB9F to DB9F
- 1 – 1
- 2 – 3
- 3 – 2
- 5 – 5

WSI recommends the use of short haul modems for runs of more than 75 feet. WSI can provide these for an additional charge.

**2. Junction box to TrueView system remote button interface (no signal level data – only contact closures). Cable pinout specifications:**

- DB25M to DB25F
- All pins straight through

**Table 1: Junction box to SkyTracker/TrueView RBI pinout**

Pin	Key equivalent or purpose
1	Alt
2	Ctrl
3	Shift
4	Ctrl-F1 (Footpad 1)
5	Ctrl-F2 (Footpad 1)
6	Ctrl-F3 (Footpad 1)
7	Ctrl-F4 (Footpad 1)
8	Ctrl-F5 (Footpad 2)
9	Ctrl-F6 (Footpad 2)
10	Ctrl-F7 (Footpad 2)
11	Ctrl-F8 (Footpad 2)
12	Ctrl-F9 (Footpad 3)
13	Ctrl-F10 (Footpad 3)
14	Ground
15	Ctrl-F11 (Footpad 3)
16	Ctrl-F12 (Footpad 3)

<b>Pin</b>	<b>Key equivalent or purpose</b>
17	Space Bar (advance)
18	a
19	b
20	c
21	d
22	e (left mouse button for TrueView)
23	f
24	g
25	h (UnDo)
<b>Pin</b>	<b>Key equivalent or purpose</b>
1	Alt
2	Ctrl
3	Shift
4	Ctrl-F1 (Footpad 1)
5	Ctrl-F2 (Footpad 1)
6	Ctrl-F3 (Footpad 1)
7	Ctrl-F4 (Footpad 1)
8	Ctrl-F5 (Footpad 2)
9	Ctrl-F6 (Footpad 2)
10	Ctrl-F7 (Footpad 2)
11	Ctrl-F8 (Footpad 2)
12	Ctrl-F9 (Footpad 3)
13	Ctrl-F10 (Footpad 3)
14	Ground
15	Ctrl-F11 (Footpad 3)
16	Ctrl-F12 (Footpad 3)
17	Space Bar (advance)
18	a
19	b
20	c
21	d
22	e (left mouse button for TrueView)
23	f
24	g
25	h (UnDo)

WSI recommends a cable length of not more than 150 feet, unless some form of isolation is provided.

**26. Junction box to WeatherProducer remote button interface (no signal level data – only contact closures). Cable pinout specifications:**

- DB25M to DB25F
- All pins straight through

**Figure 3: Junction box to WeatherProducer RBI pinout**

Pin	Key equivalent or purpose
14	Ground
17	Space Bar
25	Hot Button

WSI recommends a cable length of not more than 150 feet, unless some form of isolation is provided.

**Table 2: Pinouts for 6 pin female multi connector (Philmore No. T616C)**

Pin #	Button
1	C
2	B
3	A
4	D <sup>a</sup>
5	Common for A, B & C
6	D*

a. Wire pin 4 to center common and pin 6 to one side of the switch. This will either complete or open the circuit.

## Junction box pinouts

Junction box pinouts involve pinouts for the remote button and the footpads.

**Table 3: Remote button**

Pin #	Keyboard Equivalent	Function TVI	Function WxPro
1	h	Undo	Hot button <sup>a</sup>
2	e	Left mouse button	NA
3	space	Advance to next	NA
4	NA	TVI slide switch to select TrueView or WeatherProducer	
5	NA	common ground	
6	NA	same as pin 4	

a. The Hot Button allows the user to program a single WeatherProducer show element to be the “go to” show element. In the event that the talent’s time is cut, depressing the Hot Button will force the show to proceed directly to that element (e.g. the Extended Outlook Page).

**Table 4: Foot pad pinouts**

Pin #	Keyboard equivalent	Function TVI
<b>Foot pad 1</b>		
1	Ctrl-F1	Execute macro Ctrl-F1
2	Ctrl-F2	Execute macro Ctrl-F2
3	Ctrl-F3	Execute macro Ctrl-F3
4	Ctrl-F4	Execute macro Ctrl-F4
5	NA	Common ground
<b>Foot pad 2</b>		
1	Ctrl-F5	Execute macro Ctrl-F5
2	Ctrl-F6	Execute macro Ctrl-F6
3	Ctrl-F7	Execute macro Ctrl-F7
4	Ctrl-F8	Execute macro Ctrl-F8
5	NA	Common ground
<b>Foot pad 3</b>		
1	Ctrl-F9	Execute macro Ctrl-F9
2	Ctrl-F10	Execute macro Ctrl-F10
3	Ctrl-F11	Execute macro Ctrl-F11
4	Ctrl-F12	Execute macro Ctrl-F12
5	NA	Common ground

Figure 4: WSI TrueView hand tracking option (if house key signal available)

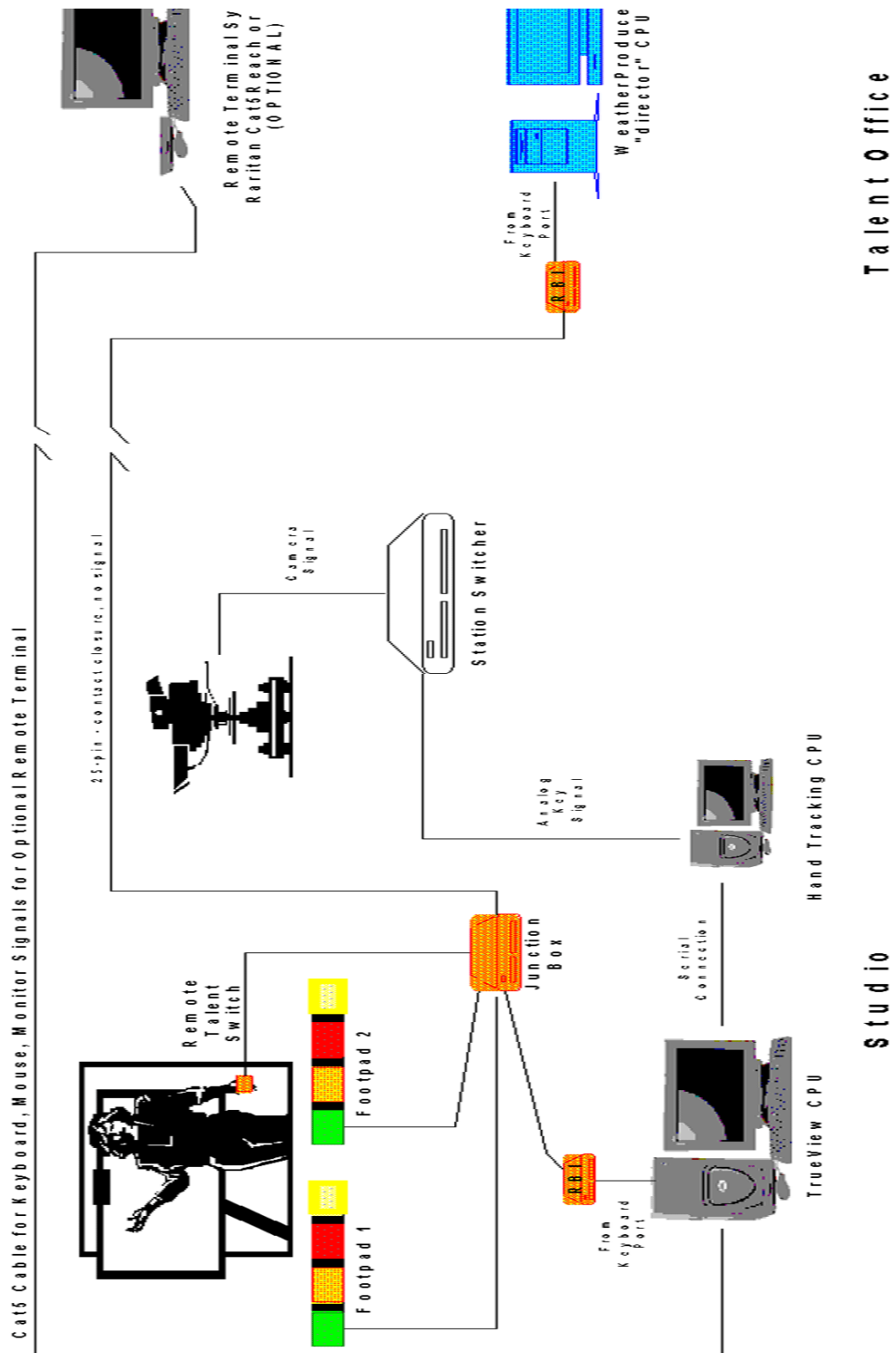
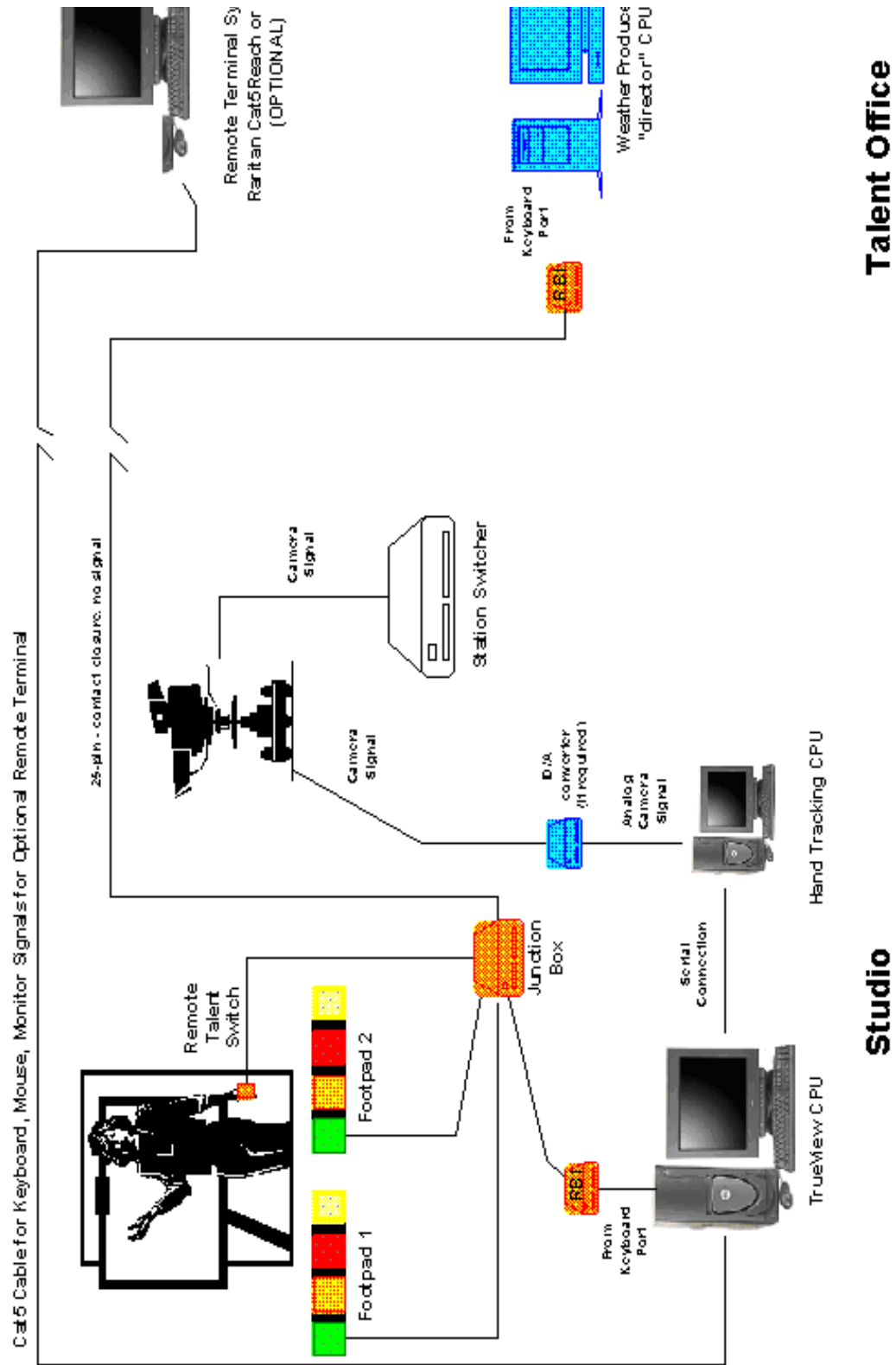
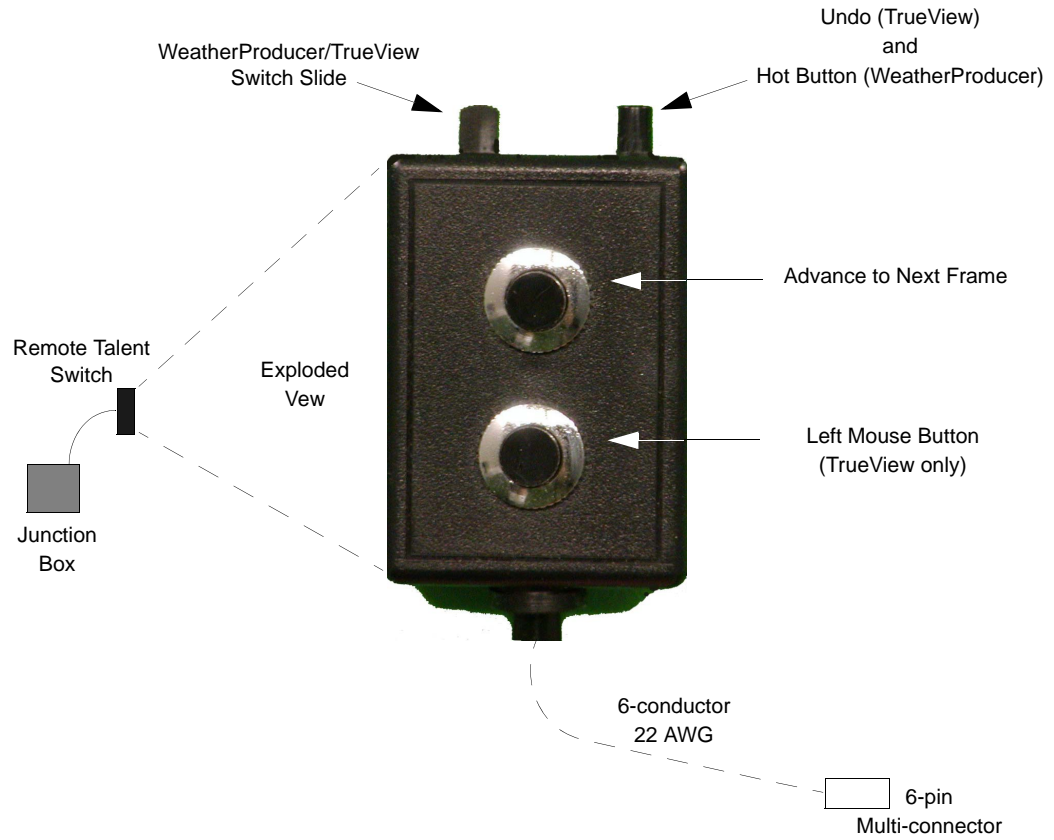


Figure 5: WSI TrueView hand tracking option (using internal key signal)



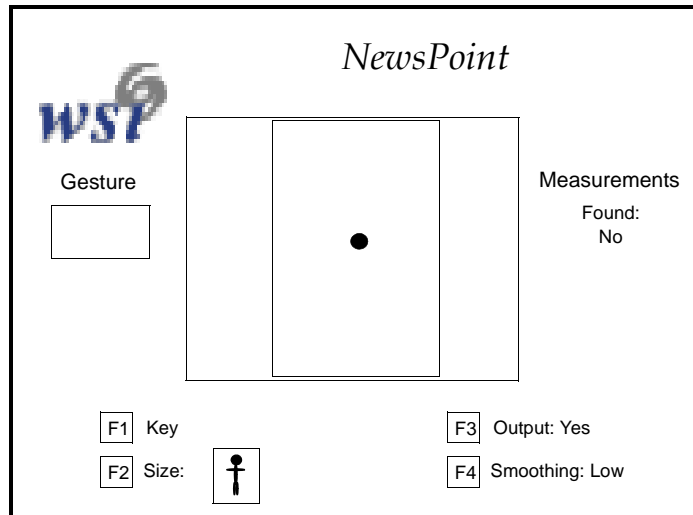
**Figure 6: WSI TrueView remote talent switch layout junction box pinouts**



## Live hand tracking mode

To enter live hand tracking mode click the ● **GO** button on the camera setup screen.

**Figure 7: Camera Setup window Go window**



**F1.** Mode for key/camera signal adjustments.

**F2.** Toggle for configuring hand tracker to match the camera shot of the on-air talent.

**F3.** Turns on/off the mouse coordinate feed out of the hand tracking unit.

**F4.** Cycles through smoothing options. "High", takes fast/jerky hand motions and bends them into curves. A higher the smoothing the greater the delay will be between the talents hand gesture and the accompanying mouse position.

## Adjust the hand tracker key

In most cases, the hand tracker signal will be configured prior to training. Occasionally as set and lighting conditions change, or as station equipment gets upgraded, some adjusting of the key/camera signal may be needed. The process will be slightly different for those using a key signal and those using a camera feed. There is also a standard and advanced adjustment process. The camera setup utility Standard mode allows the operator to set and modify the system "key", effectively teaching the system to recognize (and eliminate) background color.

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**NOTE:** WSI prefers the use of a key signal as it provides the highest quality signal for hand tracking.

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**IMPORTANT:** To ensure that the proper adjustments are made, the user should setup their camera and lighting conditions as though they were on the air. The user will also need a second person to stand in the center of the chroma key wall during this process, again in the same fashion as if they were on the air.

---

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## Hand tracker with a key signal

Clients using a key signal will see a black and white silhouette of the on camera talent. Stations using a key signal with their hand tracker can follow this process to obtain a suitable hand tracking signal:

1. Press **F1** on the keyboard to enter Setup mode.

The user is now in Standard camera setup mode.

---

NOTE: Setup mode has both a Standard and an Advanced mode. If the user does not see a screen similar to Figure , they are not in Standard mode; click the  **Standard** button.

---

2. Click the  **Advanced** button.

The user is now in Advanced camera setup mode.

3. Click the  **Autokey** button.

If a good key is not achieved, follow the camera signal instructions, if this occurs, the background color should be set to white.

## Hand tracker with a camera signal

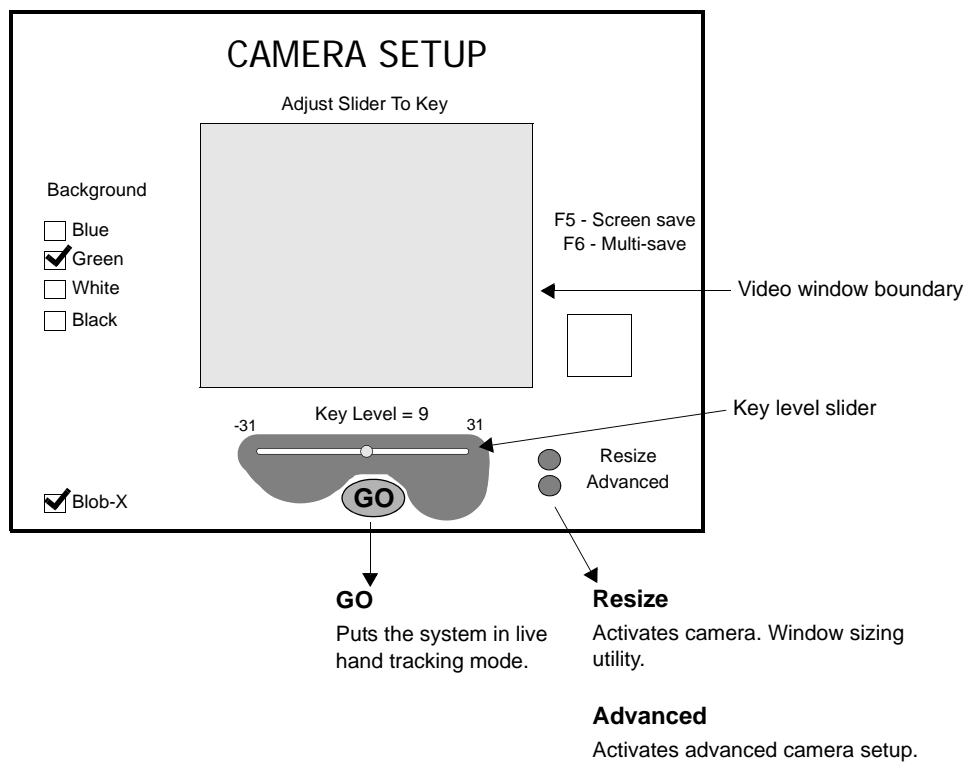
Stations using a camera signal with their hand tracker can follow this process to obtain a suitable signal for on-air hand tracking. It will produce a software generated key within the hand tracker unit. This utility will enable the operator to set and modify the system's "key", effectively teaching the system to recognize (and eliminate) background color.

### Standard camera setup mode

#### 1. Press **F1** on the keyboard to enter Setup mode.

The user is now in Standard camera setup mode.

**Figure 8: Standard Camera Setup window**




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**NOTE:** Setup mode has both a Standard and an Advanced mode. If the user does not see a screen similar to the figure above, they are not in Standard mode; click the **Standard** button.

---

#### 2. Toggle on the appropriate background color.

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**NOTE:** If the site is using a camera signal, then Blue or Green should be selected to match the chroma wall's color.

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- 3. Click and drag the Key Level slider to the right.**  
The video window boundary will display more background color.
- 4. Click and drag the Key Level slider to the left.**  
The video window boundary will clip more of the background color.
- 5. Continue to adjust the Key Level slider until the color clip fits on-camera talent.**
- 6. Click the ● GO to enter into hand tracking mode.**

## Advanced camera setup mode

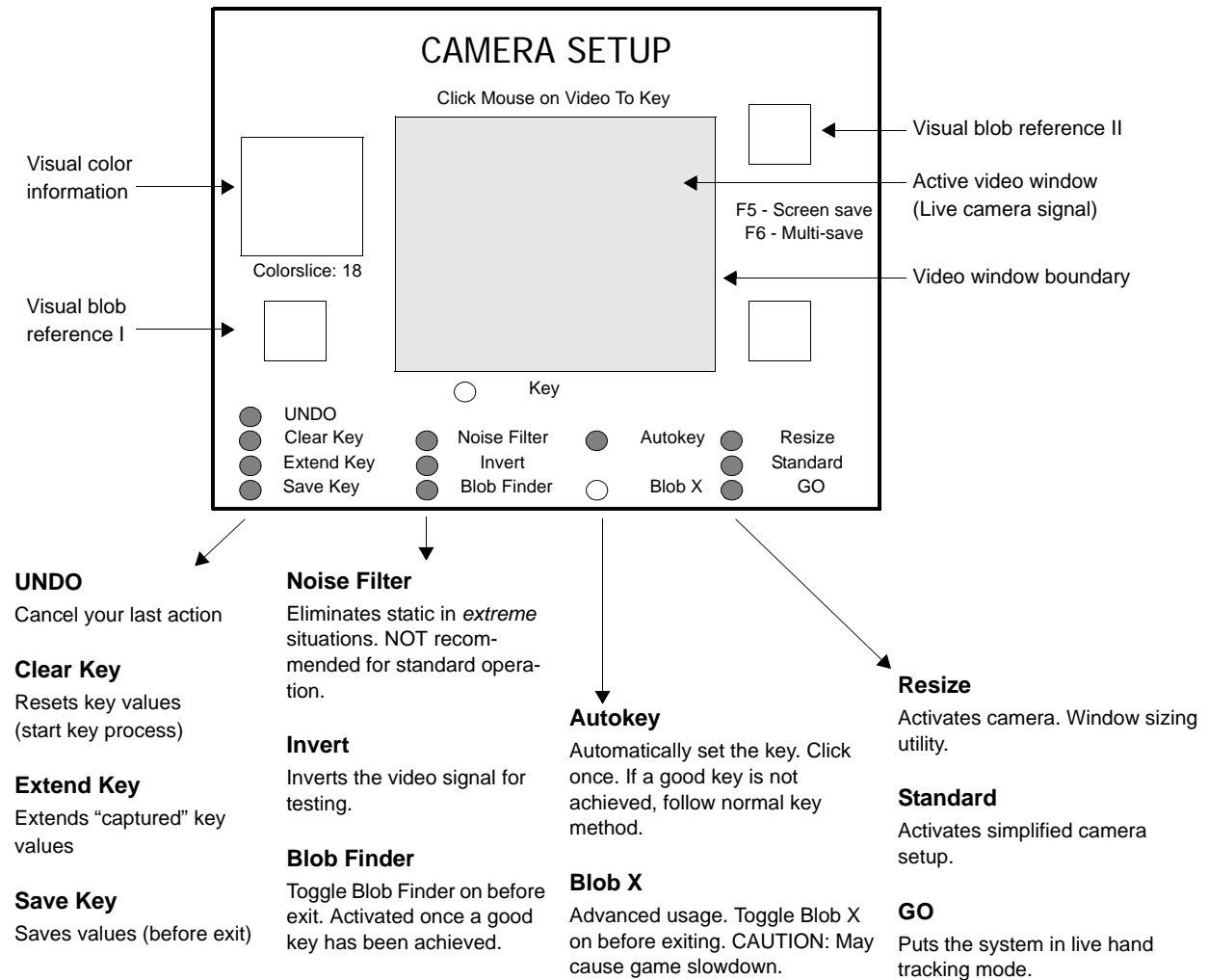
If the user still finds that the software generated key is still not clipped well enough, follow the instructions provided for below for Advanced camera setup:

1. While in Standard mode (see Figure 8), locate the **Advanced** button.

2. Click the ● **Advanced** button.

The user is now in Advanced camera setup mode.

**Figure 9: Advanced Camera Setup window**

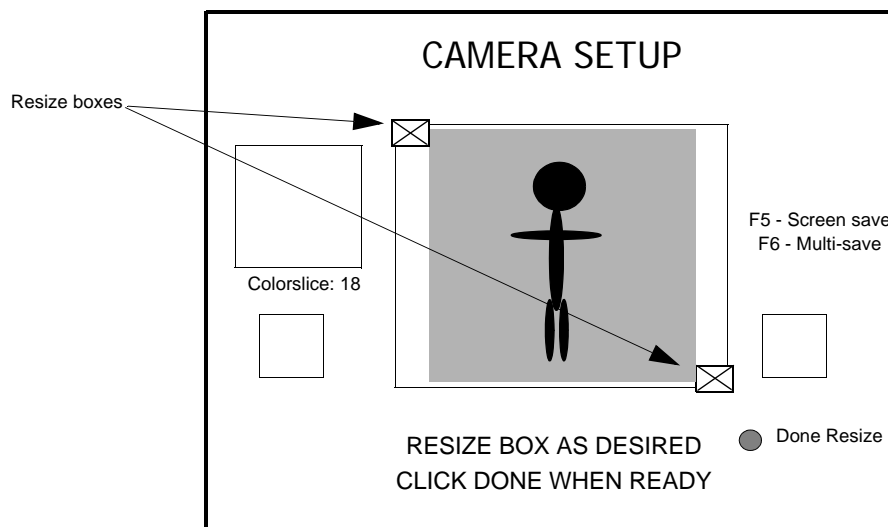


## Resize camera view

Resizing is only necessary if there is a small amount of unkeyed background on the sides, bottom or top of the active video window.

1. Click the  **Resize** button to start the **Resize** utility.
2. Click one of the **resize boxes**  of the active video window.
3. **Hold-and-drag** the mouse to **resize** the video window. Be sure to eliminate any non-blue background or shadows.
4. Click the  **Done Resize** button when finished.

Figure 10: Camera Setup window Resize utility



## Establish a background

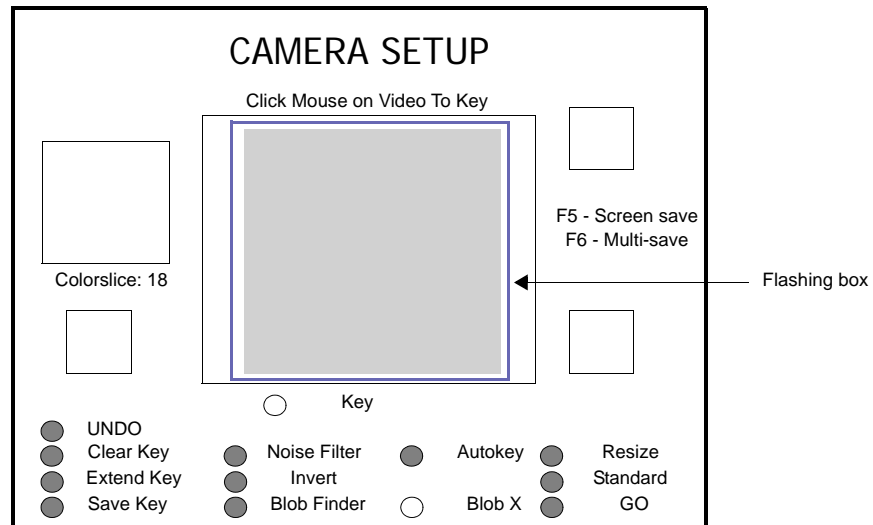
To establish a background for your active video window:

1. **Have someone stand in the chromakey area so they are visible in the center of the active video window.**
2. **Ask the person to walk slowly toward the camera until the view is uncluttered.**
3. **Position the mouse cursor near the upper left corner of the background.**
4. **Click once, release, then drag a box out to the lower right corner of the background.**
5. **Click once more to create the box.**

The box will now flash as the background color is sampled.

6. **After 3-5 seconds, click again anywhere on the screen (but not on a button).**

The sampling will stop and the box will stop flashing.

**Figure 11: Camera Setup window, establish a background**

## Eliminate excess noise

To eliminate excess noise:

1. **Have someone stand in the center of the background.**

The person's image will be keyed against the background with some noise, mainly around the person and sometimes in the corners. Notice the box that appears to jump around the screen, the better the key the less movement of the box.

2. **Select an area of noise, click-and-drag the mouse to create a box around the noise.**

---

TIP: Do not include the person in the viewing area when creating the box.

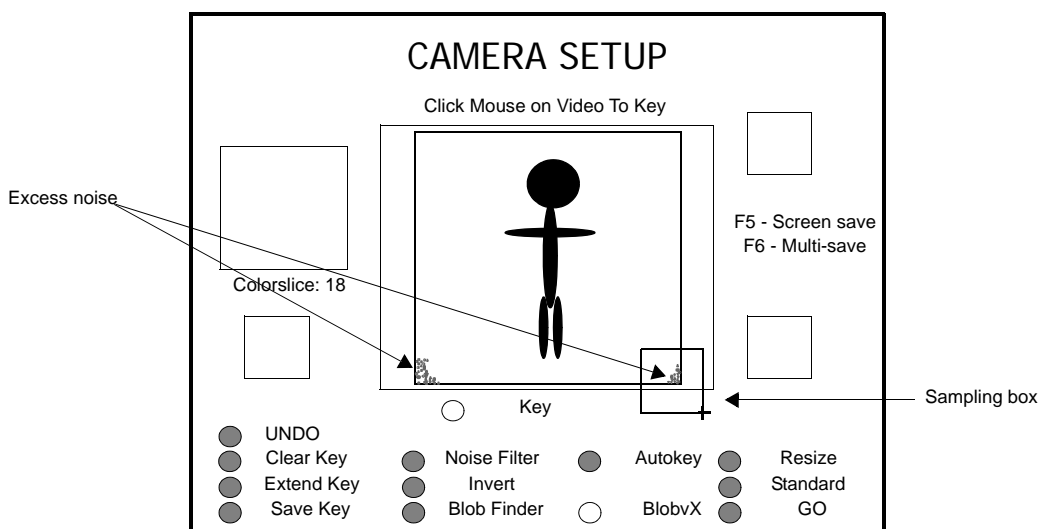
---

3. **Wait several seconds while the area is sampled.**

4. **Click once more to end the sampling.**

5. **Repeat steps 2-4 as necessary.**

Figure 12: Camera Setup window, eliminate noise



## Extend key (subtract colors)

A small amount of noise can usually be eliminated from the active video using the Extend key.

1. **Click the  Extend Key button once or twice only.**
2. **Click the  UNDO button if the human image is too degraded.**

---

TIP: Be careful when subtracting (or adding - see next section) too many colors.

---

## Add colors

To add colors back into the human image:

1. **Right click on the human image where the image appears see through.**

TIP: 

---

Do not include the background while selection the human figure.

---

2. **Click the  Blob X button.**

A bounding box will appear around the assistant and will follow the person's movements.

3. **Click the  Save Key button to save your settings.**
4. **Click the  GO button to go into hand tracking mode.**

***Appendix B*****Hand Tracking****Summary**

hand tracking is an optional feature for any of WSI's TrueView products. If your installation includes hand tracking there are a number of administrative activities that you should become familiar with including system placement, cabling specifications, and camera setup.



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