Avid®
iNEWS ControlAir™
Louth VDCP Device Manager Guide
1.1.0

This Device Manager Guide provides certain technical requirements and considerations that will affect your use of the Louth VDCP Device Manager with Avid's iNEWS ControlAir system.

It covers the following general areas:

- **Installation**: the hardware and software needed to control a Louth VDCP-compatible device with the ControlAir system
- **Configuration**: the configuration options needed to control how the Louth VDCP Device Manager and a VDCP-compatible device behave, including specific instructions for setting up and controlling the Avid AirSPACE series and the Grass Valley Profile™ series
- **Operations**: notes on using the Louth VDCP Device Manager in a news production environment

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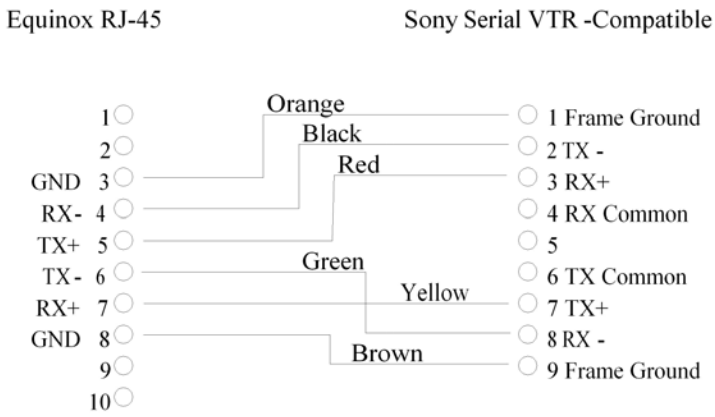
Installation

Hardware

In a typical setup, the Louth VDCP Device Manager (Louth DM) runs on the same computer as the ControlAir Server program. It can also run on a separate computer if necessary. Therefore, hardware requirements are identical to those used for the ControlAir Server. Refer to the *iNEWS ControlAir Installation and Operations Manual* for further details.

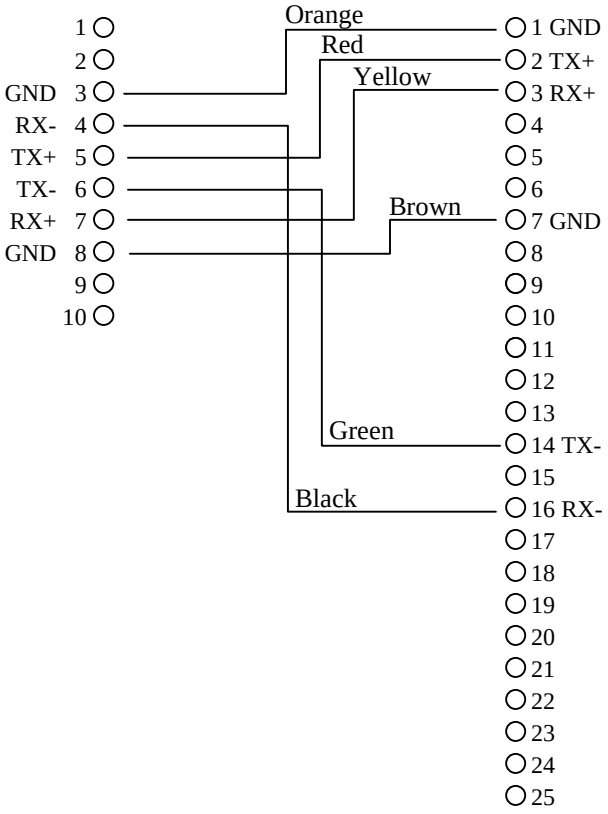
Cabling

The Louth DM requires one serial RS-422 connection to a VDCP-compatible device for each channel that it controlx. The following diagram is for Sony® Serial VTR-compatible devices, such as the Avid AirSPACE series, the Grass Valley Profile PDR and PVS series, and Leitch® ASC VR300™ (using Inmac RJ-45 modular adapters).



The following diagram is for Sony Serial VTR-compatible devices, such as Avid AirSPACE, the Grass Valley Profile, and Leitch ASC VR300 (using Inmac RJ-45 modular adapters).

RJ-45 to ControlAir Device DigiBoard DB25 on ControlAir Server



Software

The Louth VDCP Device Manager uses the following Louth VDCP commands, as specified in the 10/19/99 revision of the Video Disk Communications Protocol white paper:

Command	Description
1X.00	Stop
1X.01	Play
1X.04	Still
1X.06	Continue
2X.21	Close Port
2X.22	Select Port
2X.24	Play Cue
3X.01	Open Port
3X.05	Port Status Request
3X.06	Position Request
3X.08	Device Type Request
3X.11	ID List
3X.14	ID Size Request
3X.16	ID Request
3X.18	IDs Added List
3X.19	IDs Deleted List

Any video server controlled by the device manager must support these commands. In addition, there are requirements specific to each device. See the *iNEWS ControlAir 1.1 Release Notes* for qualified video server versions.

Configuration

This section describes how to configure the Louth DM, the Avid AirSPACE and the Grass Valley Profile.

Configuration File

All device manager configuration files are called Device Manager Profile (DMP) files, and have a `.dmp` file extension. There are four sections to a Louth DM configuration file:

- `[Configuration]`
- `[Communications]`
- `[Channels]`
- `[VideoServers]`

Each section starts with its name in square brackets and contains lines of the form *Keyword=Value*. The following sections describe the keywords available in each section, with a description following it.

`[Configuration]`

The `[Configuration]` section contains general configuration for the Louth DM. There are four required keywords:

- `DeviceName`
- `SvrHostName`
- `NumberOfChannels`
- `LogFileDirectory`

All other keywords are optional, with default values if they are not specified.

`DeviceName=`**`DEVICE_NAME`**
This keyword is required. The `DeviceName` keyword specifies the name that the Louth DM reports to ControlAir Server. It appears in ControlAir Workstation and must match the name of the video device used in production cues. Replace **`DEVICE_NAME`** with the iNEWS device name.

`SvrHostName=`**`SERVER_HOST_NAME`**
This keyword is required. The `SvrHostName` keyword specifies the host name of the computer running the ControlAir Server. This is the server that the Louth DM connects to when it is started.

`NumberOfChannels=`**`CHANNEL_COUNT`**
This keyword is required. The `NumberOfChannels` keyword specifies the total number of channels the Louth DM controls. Replace **`CHANNEL_COUNT`** with a number between 1 and 16.

`FrameRate=`**`FRAME_RATE`**

The `FrameRate` keyword specifies the frame rate of the VDCP-compatible device. Replace **`FRAME_RATE`** with one of the words "NTSC," "PAL," and "NTSC_DROPFRAME." If the keyword is not specified, the DM uses a default value of NTSC. For details about the different television standards, refer to the "Television Video Standards" section.

`DisableAutoCue=`**`Yes_No`**
The `DisableAutoCue` keyword specifies whether the Louth DM auto-cues the next video clip on a channel when the playing clip on that channel ends or is stopped. If **`Yes_No`** is set to Yes, then the Louth DM does not auto-cue clips. If **`Yes_No`** is set to No, the Louth DM will auto-cue clips. If the keyword is not specified, the default value is No.

`AutoCueDelay=`**`HOW_MANY_SECONDS`**
The `AutoCueDelay` keyword specifies how many seconds the Louth DM will wait after the end of a playing clip before it auto-cues the next clip on that channel. Replace **`HOW_MANY_SECONDS`** with the number of seconds it should wait. If `DisableAutoCue` is set to Yes, this keyword is ignored. If the keyword is not specified, the default value is 0, which means that the next clip will be cued immediately.

`AutocueOtherChannelsOnPlay=`**`Yes_No`**
The `AutocueOtherChannelsOnPlay` keyword specifies whether the GVG DM auto-cues the next clip on every channel when a clip is played on one channel. If **`Yes_No`** is set to Yes, then the GVG DM un-cues any auto-cued clips above the played clip, and auto-cues the next clip on each channel below the played clip. If **`Yes_No`** is set to No, the GVG DM only auto-cues the next clip on the playing channel, leaving auto-cued clips on other channels unaffected. If the keyword is not specified, the default value is Yes.

Logging
`LogFileDirectory=`**`DIRECTORY_NAME`**
This keyword is required. The `LogFileDirectory` keyword specifies the directory in which log files are created. Replace **`DIRECTORY_NAME`** with a path to the directory. An example is `C:\LouthDMLogs`.

WARNING: If more than one instance of the Louth DM is running on the same computer, they must use different log file directories.

`NumberOfLogFiles=`**`FILE_COUNT`**

The `NumberOfLogFiles` keyword specifies the maximum number of log files that will be created. Replace **`FILE_COUNT`** with a number between 1 and 999. The default number of log files is 10.

`StartLoggingOnProgramStart=`**`Yes_No`**
The `StartLoggingOnProgramStart` keyword specifies whether the Louth DM starts logging immediately at startup, or waits until the user explicitly starts logging using the Logging / Start Logging menu option. Replace **`Yes_No`** with Yes or No. The default is Yes, which starts logging immediately.

Diagnostic Messages
The following keywords determine which types of diagnostice messages the Louth DM reports, and at what level of detail. The diagnostic message keywords come in pairs: Report*messagetype* and Report*messagetype*Details, each requiring a Yes or No. The first keyword specifies that the Louth DM report general messages of the chosen type. The second keyword specifies that the Louth DM report more detailed messages in addition to the general messages of the chosen type. To specify Yes on a “details" keyword, you must also specify Yes on the "general" keyword for that message type. If none of the keywords is specified, the defaults are as follows:

```
ReportOnAirControl=Yes
ReportPlaylistManagement=Yes
ReportErrors=Yes
All others=No
```

```
ReportOnAirControl=Yes
ReportOnAirControlDetails=Yes
```

OnAirControl messages occur whenever a Play, Stop, Cue, Pause, or Channel Change command is received from ControlAir Workstation.

```
ReportPlaylistManagement=Yes
ReportPlaylistManagementDetails=No
```

PlaylistManagement messages occur whenever an event or story is added to, deleted from, or moved in the playlist.

```
ReportEventStatusChange=No
ReportEventStatusChangeDetails=No
```

EventStatusChange messages describe changes in the status of individual events.

```
ReportDeviceStatusChange=No
ReportDeviceStatusChangeDetails=No
```

DeviceStatusChange messages describe changes in the status of the VDCP-compatible device being controlled by the device manager.

```
ReportErrors=Yes
ReportErrorDetails=No
```

Error messages describe situations where the device manager could not perform an action or a status changed unpredictably.

Miscellaneous

`CueReplacesPlayingEvent=`**`Yes_No`**

The `CueReplacesPlayingEvent` keyword specifies whether the DM will stop any playing event on a channel when the user makes a Cue request on that channel. If the keyword is set to Yes, a Cue request stops the currently playing event on that channel and cue the new event. If the keyword is set to No, a Cue request puts the new event into Standby status until the playing event ends, at which point the new event is cued. If the keyword is not specified, the default value is No.

`ChannelPollInterval=`**`HOW_MANY_SECONDS`**

The `ChannelPollInterval` keyword specifies how often the Louth DM checks to see if any channels that are offline can be brought back online. If the keyword is not specified, the default is 10 seconds.

`ConnectServerInterval=`**`HOW_MANY_SECONDS`**

If the Louth DM starts before CASvr does, it will retry the connection at regular intervals. The `ConnectServerInterval` keyword specifies how long the interval is. If the keyword is not specified, the default is 5 seconds.

`CanPlayTransferringMedia=`**`Yes_No`**

The `CanPlayTransferringMedia` keyword specifies whether or not the DM allows a transferring clip to be played before the transfer completes. The default value is No, in which case a transferring clip cannot be played until the clip is wholly available on the VDCP-compatible device. If you specify Yes, the DM allows a transferring clip to be played after enough media has been recorded. The amount depends on the video server, but is generally between 5 and 10 seconds.

`SignalStartOfTransfer=`**`Yes_No`**
`SignalEndOfTransfer=`**`Yes_No`**
`SignalStartOfTransfer` and `SignalEndOfTransfer` provide for signalling behavior only if the `CanPlayTransferringMedia` key is set to Yes. `SignalStartOfTransfer` tells the DM to send a message to ControlAir on detection of a clip that is transferring. This gives you feedback that the clip is playable, but it may not be safe to do so.
`SignalEndOfTransfer` tells the DM to send a message to ControlAir on detection that a clip transfer is finished. At this point, the clip is safe to play. The default value for both of these keys is Yes; that is, messages will be sent to ControlAir at both the start and end of each transfer. The messages will appear in the Error Log drop-down list in ControlAir Workstation and in the Message bar in iNEWS Workstation.

`StopPlayingClipAtZeroTime=`**`Yes_No`**
Some still store devices support a Louth VDCP interface, such as the Pinnacle Lightning™. However, since a still has no actual duration, the still store may return zero when asked for the time remaining on a still. The Louth DM will typically take a clip out of Play when zero time remains. This keyword, when set to Yes, directs the Louth DM to leave a clip in Play if zero time remains. In the context of a still store, this means that the still will remain on the air. The Louth DM then acts like a very simple still store device manager.

Note: The Louth DM is a video device manager and must be entered in the `SYSTEM.MAP` story as a cart device, even if it will be used to control a still store.

`[Communications]`

The `[Communications]` section describes the serial communication used by the Louth DM to control a Louth VDCP-compatible device. The section must specify one serial line for each channel to be controlled.
A serial line is specified by a line in the following format:

`Serial`**`INDEX=COM_PORT:SPEED:BITS:PARITY:STOP_BIT`**

- **`INDEX`** is a number 1, 2, 3…
- **`COM_PORT`** is the comm. port on the computer running the Louth DM to be used for this serial line
- **`SPEED`** is the speed of the port
- **`BITS`** is the width of each byte sent
- **`PARITY`** is the parity of the port (o for odd, e for even, n for none)
- **`STOP_BIT`** is the number of stop bits for the port (0 or 1)

Examples:
```
Serial1=com3:38400:8:o:1
Serial2=com4:38400:8:o:1
Serial3=com5:38400:8:o:1
Serial4=com6:38400:8:o:1
```

`SerialOfflineInterval=`**`HOW_MANY_MILLISECONDS`**
If a serial line does not respond to a command within this number of milliseconds, it is assumed to be offline. The default is 2000 milliseconds.

[Channels]

The `[Channels]` section maps each channel controlled by the Louth DM to a serial line. It also maps the channel index used by iNEWS to the channel and allows the user to specify a name that is displayed in ControlAir Workstation.

A channel is specified by a line in the following format:

`Chan`**`iNEWS_Channel`**`=`**`Name`**`:`**`Video_Channel`**`:`**`Serial_Line`**

- **`iNEWS_Channel`** is a number (1, 2, 3...); this is the channel number used by iNEWS.
- **`Name`** is a string containing anything but a colon; this is the name of the channel displayed in ControlAir Workstation.
- **`Video_Channel`** is a number 1, 2, 3…; this is the video port used on the Louth VDCP-compatible device.
- **`Serial_Line`** is one of the names for a serial line in the `[Communications]` section.

Examples:
```
Chan1=A:1:Serial1
Chan2=B:2:Serial2
Chan3=C:1:Serial3
Chan4=D:2:Serial4
```

[VideoServers]

The Louth DM can control multiple video servers simultaneously. The `[VideoServers]` section names the video servers being controlled and specifies which channels are on each video server. Each video server is specified by a line in the following format:

`Server`**`INDEX`**`=`**`NAME`**`:Chan`**`N1`**`:Chan`**`N2`**`:...`

- **`INDEX`** is a number 1, 2, 3….
- **`NAME`** is the name of the video server.
- **`N1`**, **`N2`**, ... are the numbers from the `[Channels]` section that indicate the channels on that machine.

Examples:

```
Server1=PDR001:Chan1:Chan2
Server2=PDR002:Chan3:Chan4
```

Device Setup

Avid AirSPACE

To configure the Avid AirSPACE to be controlled by the LouthDM, you must set up the controllers for each channel. The following steps explain how to do this:

Note: Do not do this while any channel is on-air; you will take it off-air.

1. Start the AirSPACE GUI if it is not already running.
2. Choose Controller Setup from the Menu Select Button (lower left in GUI).
3. Set Controllers to Record/Playlist for the controller that will be driven by The Louth DM.
4. Set Controller Protocol to VDCP.
5. Note the Port number on the Controller bar, which usually corresponds to the physical Slot number in which the video codec card resides in the AirSPACE machine; this is the Louth Video Port ID to be used in the DMP file in the `[Channels]` section.
6. Click OK to save settings.
7. Click Yes when you see the message “Changing Controllers will cause All Streams to Stop!”
8. Choose Controls from the Menu Select Button (lower left in GUI).
9. Set Playlists for our VDCP Video Ports (not to be confused with AirSPACE channels).

Grass Valley Group Profile

The Profile must be running VdrPanel for the Louth DM to connect to it. VdrPanel provides you with a VTR-like interface, complete with transport controls, to directly manage media operations. VdrPanel must have one panel

open for each channel that will be controlled by the DM, with each panel running the Louth Automation protocol.

To set up the Profile for connecting to the Louth DM:

1. Double-click the VdrPanel icon on the Desktop.
2. Select the VdrPanel menu item Window➔Open Panel....
3. Select the menu item Controller➔ Select....
4. Choose Louth Automation and click OK to set the panel's controller.
5. Select Controller➔ Comm Port... to set the COM port for the Louth Automation protocol.
6. Select Video ➔ Video Crosspoint... to set up the output channel associated with each panel.

Operations

The Louth DM can be controlled from ControlAir Workstation in the same way that all other device managers are controlled. Refer to the *iNEWS ControlAir 1.0.5 User Manual* for more details.

Error Handling

This section lists the Louth DM error messages in alphabetical order. Each error message is followed by its location, a category, a description of the problem and, if appropriate, steps to take to resolve it.

The possible categories are:

- Configuration errors - setting up the DMP file correctly
- Run-time errors

Words in *italics* in the error message descriptions below describe the use of the actual value that appears in the actual error message. For example, a screen message "Cue of event 'Fire' failed on channel 'A' " matches the error description "Cue of event '*eventname*' failed on channel '*channelname*'."

Error: <<<Received Msg -- Message Type = *value* - NOT TRAPPED
Location: DM log file or screen
Category: Run-time
Action: The DM received a message from ControlAir Server that it cannot handle. It will ignore it and continue processing. If this happens frequently, it is likely that there is data being lost between the ControlAir Server and the DM.

Error: Can't establish connection to any channel. Good Bye!
Location: DM log file or screen
Category: Configuration
Action: The DM cannot connect to any specified channel. Check the DMP file, the serial connections, and the VDCP-compatible device configuration to ensure everything is correctly configured.

Error: Can't establish connection to the server. Good Bye!
Location: DM log file or screen
Category: Configuration
Action: The DM cannot connect to the ControlAir Server. Check that the correct host name is specified in the DMP file and that the ControlAir Server is running. Then restart the DM.

Error: Cue of event '*eventname*' failed on channel '*channelname*'
Location: DM log file or screen
Category: Run-time
Action: A clip named *eventname* that the user tried to cue could not be cued. Check the VDCP-compatible device to verify that it is in a state that allows cueing by a remote application.

Error: DEVICE: Channel *name* is back online
Location: DM log file or screen
Category: Run-time
Action: The channel named *name* was offline but has been brought back online. No further action is required from the user.

Error: ERROR: At least one thread used for channel control failed to start
Location: DM log file or screen
Category: Run-time
Action: The DM could not start all the threads it needs to control the VDCP-compatible device. This is an engineering issue; contact customer service.

Error: ERROR: Channel #*channelname* is not assigned to any video server in the [VideoServers] section of the profile file.
Location: DM log file or screen
Category: Configuration
Action: Every channel must be assigned to some video server. Modify the DMP file to ensure that each channel in the `[Channels]` section also appears in the `[VideoServers]` section.

Error: Error Connecting to Channel :*channelname*
Location: DM log file or screen
Category: Configuration
Action: The DM could not connect to the specified channel. Check the DMP file, the serial connections, and the VDCP-compatible device to ensure everything is correctly configured.

Error: Error getting duration from device
Location: DM log file or screen
Category: Run-time
Action: The DM could not determine a clip's duration. Check the serial connections and the VDCP-compatible device to ensure that the DM is connected and the device is in a correct state.

Error: Error getting position
Location: DM log file or screen
Category: Run-time
Action: The DM could not determine the amount of time remaining on a playing clip. Check the serial connections and the VDCP-compatible device to ensure that the DM is connected and the device is in a correct state.

Error: ERROR: Invalid channel 'Chan*X*' specified on line '<line>' of the [VideoServers] section of the profile file. There are only *Y* channels.
Location: DM log file or screen
Category: Configuration
Action: The channel number *X* must be between 1 and *Y*, inclusive. Modify the DMP file to ensure that each channel in the `[VideoServers]` section appears in the `[Channels]` section.

Error: ERROR: Line '*line*' in the [VideoServers] section of the profile file contains no video server name.
Location: DM log file or screen
Category: Configuration
Action: Modify the DMP file to ensure that each line in the `[VideoServers]` section contains a video servername.

Error: ERROR: Line '*line*' in the [VideoServers] section of the profile file has a bad channel specification: *channelspec* (should be of the form "ChanX").
Location: DM log file or screen
Category: Configuration
Action: A channel is specified by a string of the form "ChanX", where X is a number. Modify the DMP file to ensure that each channel in the `[VideoServers]` section appears in the `[Channels]` section.

Error: ERROR: Line '*line*' in the [VideoServers] section of the profile file has no channels specified.
Location: DM log file or screen
Category: Configuration
Action: Modify the DMP file to ensure at least one channel is specified for each video server.

Error: Error reading Communications section of profile file
Location: DM log file or screen
Category: Configuration
Action: The DM could not read the `[Communications]` section of the DMP file. Modify the DMP file to ensure that the syntax is correct.

Error: Error reading Configuration section of profile file
Location: DM log file or screen
Category: Configuration
Action: The DM could not read the `[Configuration]` section of the DMP file. Modify the DMP file to ensure the syntax is correct.

Error: Error reading VideoServers section of profile file
Location: DM log file or screen
Category: Configuration
Action: The DM could not read the `[VideoServers]` section of the DMP file. Modify the DMP file to ensure the syntax is correct.

Error: ERROR: The profile file does not contain a [VideoServers] section.
Location: DM log file or screen
Category: Configuration
Action: Modify the DMP file to ensure it contains a `[VideoServers]` section.

Error: Event failed to play.
Location: DM log file or screen
Category: Run-time
Action: The DM was unable to play an event the user tried to play. Check the VDCP-compatible device to verify it is in a state that allows playing by a remote application.

Error: EVT_STATUS: The clip '*clipname*' on the video server '*servername*' is now safe to play.
Location: DM log file or screen
Category: Run-time
Action: The DM has detected that a clip that was transferring to the video server has finished transferring. The user need not take any action.

Error: EVT_STATUS: The clip '*clipname*' on the video server '*servername*' may not be safe to play.
Location: DM log file or screen
Category: Run-time
Action: The DM has detected that the clip is transferring to the video server and is not completely present. Playing it may yield unpredictable results. The user need not take any action.

Error: Invalid channel assignment.
Location: DM log file or screen
Category: Run-time
Action: The DM received a Play command for an event with a bad channel assignment. Correct the channel assignment (either in ControlAir Workstation or in iNEWS) and try again.

Error: Missing channel configuration. Check profile...
Location: DM log file or screen
Category: Configuration
Action: The `[Channels]` section of the DMP file is missing. Modify the DMP file to ensure that it contains a `[Channels]` section.

Error: Missing ControlAir host name. Check profile...
Location: DM log file or screen
Category: Configuration
Action: The `[Configuration]` section of the DMP file does not specify the computer running the ControlAir Server software. Add the line "SvrHostName=*hostname*" to the `[Configuration]` section of the DMP file, where *hostname* is the name of the computer running the ControlAir Server software.

Error: Missing device name. Check profile...
Location: DM log file or screen
Category: Configuration
Action: The `[Configuration]` section of the DMP file does not specify the device name. Add the line "DeviceName=*devicename*" to the `[Configuration]` section of the DMP file, where *devicename* is the desired name for the DM.

Error: Missing number of channels. Check profile...
Location: DM log file or screen
Category: Configuration
Action: The DMP file does not specify how many channels the device has. Add the line "NumberOfChannels=*numberofchannels*" to the `[Configuration]` section of the DMP file, where *numberofchannels* is a number.

Error: Missing serial configuration. Check profile...
Location: DM log file or screen
Category: Configuration
Action: The `[Communications]` section of the DMP file is missing a Serial setup that is referenced in the `[Channels]` section. Modify the DMP file to ensure that each Serial setup in the `[Channels]` section also appears in the `[Communications]` section.

Error: The detail diagnostic keyword 'Report*messagetype*Details' cannot be set to Yes unless the general diagnostic keyword 'Report*messagetype*' is also set to Yes.
Location: DM log file or screen
Category: Configuration
Action: In order to have details on a message type reported, the user must tell the program to report the message type, as well as its details. Add the line "Report*messagetype*=Yes" to the DMP file. If the line already exists, check that the value after the equal sign is Yes.

Error: The profile file must specify a log file directory using the LogFileDirectory keyword.
Location: DM log file or screen
Category: Configuration
Action: Add the line "LogFileDirectory=*directory*" to the `[Configuration]` section of the DMP file, where *directory* is a path where the log files will be stored.

Television Video Standards

The values available for the keyword FrameRate in the DMP file (see the FrameRate description in the "Configuration File" section) are based on the television and video standards required for a specific geographic location. The standards refer to frame refresh rates per second. Choices for ControlAir are based on the following standards:

- NTSC
- PAL

NTSC is an abbreviation for the National Television Standards Committee. The NTSC committee is responsible for setting television and video standards in the United States. The NTSC standard for television defines a composite video signal with a refresh rate of 60 half-frames (interlaced) per second. Each frame contains 525 lines and can contain 16 million different colors.

The NTSC standard is incompatible with most computer video standards, which generally use RGB video signals. Special video adapters can be inserted into your computer that convert NTSC signals into computer video signals and vice versa.

NTSC locations include: USA, Antigua, Bahamas, Barbados, Belize, Bermuda, Bolivia, Burma, Canada, Chile, Colombia, Costa Rica, Cuba, Dominican Republic, Ecuador, El Salvador, Greenland, Guam, Guatemala, Guyana, Honduras, Jamaica, Japan, South Korea, Mexico, Netherlands Antilles, Nicaragua, Panama, Peru, Philippines, Puerto Rico, St. Vincent & the Grenadines, St. Kitts, Saipan, Samoa, Surinam, Taiwan, Tobago, Trinidad, Venezuela, and the Virgin Islands.

PAL is an abbreviation for Phase Alternating Line, the dominant television standard in Europe. PAL delivers 625 lines at 50 half-frames per second. Many

video adapters that enable computer monitors to be used as television screens support both NTSC and PAL signals.

PAL locations include: Afghanistan, Algeria, Argentina (PAL-N), Australia, Austria, Bahrain, Bangladesh, Belgium, Brunei, Cameroon, Canary Islands, China, Cyprus, Denmark, Finland, Germany, Ghana, Gibraltar, Greece (also SECAM), Hong Kong, Iceland, India, Indonesia, Ireland, Israel, Italy, Jordan, Kenya, North Korea, Kuwait, Liberia, Luxembourg (also SECAM), Madeira, New Zealand, Nigeria, Norway, Oman, Pakistan, Paraguay (PAL-N), Portugal, Qatar, Saudi Arabia (also SECAM), Sierra Leone, Singapore, South Africa, Spain, Sri Lanka, Sudan, Swaziland, Tanzania, Thailand, Turkey, Uganda, United Arab Emirates, United Kingdom, Uruguay (PAL-N), Yemen (the former Yemen Arab Republic was PAL, and the former People's Democratic Republic of Yemen was NTSC), Yugoslavia, Zambia, and Zimbabwe.

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