

TECHNICAL NOTE

Maple Model(s)

Title

TN5101

Graphic HMIs

Video & Audio Features

P/N: 0907-5101

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Summary

Video: Live video can be viewed directly on select Maple Systems Advanced and cMT HMI products. Video input options are analog (composite) input, IP (Ethernet) cameras, and/or USB cameras. Video cannot be recorded, but still images may be captured from the live video. Images are captured via a bit trigger, making this feature ideal for capturing production or security events.

Note: Analog (composite) video input information is included in this tech note for legacy products but is no longer available on current HMI models.

Audio: Most Maple Systems HMI units have a transducer capable of sounding beeps. Select models have standard *line-level* output for driving amplified speakers via a standard 1/8-inch mini connector to play .wav files (review product specifications for model compatibility). This is useful for playing alert sounds when an alarm or event is triggered. Audio files are managed with the Sound Library.

Note: The output may drive some non-amplified speakers, but the audio level will be quite low.

Web Streaming: Select models allow users to view a live video web stream on a remote computer from a USB video camera attached to the HMI. This is useful for monitoring a process or area of the manufacturing floor that is difficult to see from the operator's position.

Media Playback: The Media Player object available on select models allows playback of media files on the HMI screen. The media file is stored on a USB flash drive or SD card connected to the HMI. This is ideal for displaying maintenance instruction videos to operators. The media player supports the following formats:

Advanced HMIs: avi, flv, mov, mp3, mp4, mpg/mpeg, wav, wmv

cMT HMIs: avi, flv, mkv, mov, mp3, mp4, mpeg4, wav

Solution

Part 1 – Available Models

The following table illustrates which features each model supports.

HMI Model	Audio Output	IP Camera	USB Camera	Web Streaming	Media Player (Video Playback)
cMT-SVR	Y (Viewer)	N/A	N/A	Y	N/A
cMT3000/FHD	Y	Y	Y	Y	Y
P and XL Series	N/A	Y	Y	Y	Y
RMI5001	Y (HDMI)	N/A	Y	Y	N/A
L Series	N/A	N/A	N/A	N/A	N/A
Basic Series	N/A	N/A	N/A	N/A	N/A


P and XL Series: HMI5070P, HMI5121P, HMI5150P, HMI5097NXL, HMI5097DXL, HMI5121XL, HMI5150XL

L Series: HMI5043L, HMI5043LB, HMI5070NL, HMI5070L, HMI5070LB, HMI5070R, HMI5070DL, HMI5100L, HMI5102L, HMI5103L

Basic Series: HMI5040BN, HMI5040B, HMI5070BN, HMI5070B, HMI5100BN, HMI5100B

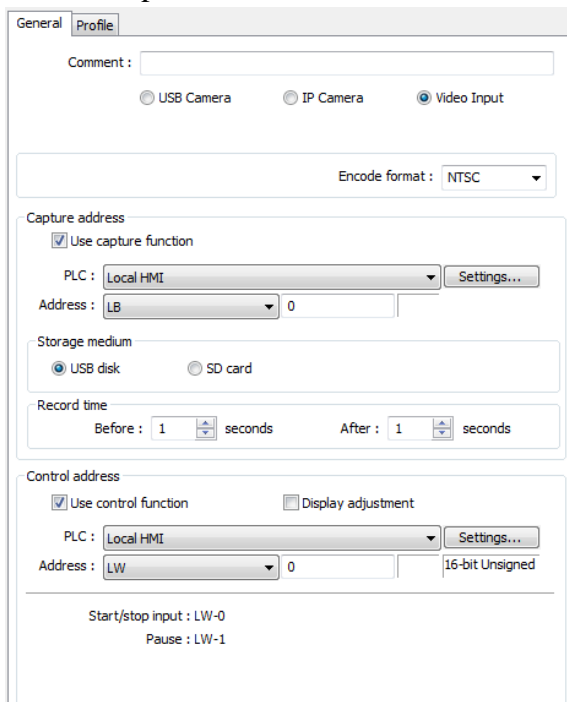
cMT Series: cMT3071, cMT3072, cMT3090, CMT3103, cMT3151, cMT-HDM, cMT-FHD

Part 2 – Creating the Video In Object

Analog, USB, and IP video have similar configurations. From the Objects menu, select Video In, or click the  icon on the Object2 toolbar. The *Video In* object configuration dialog is displayed.

The *General* tab configures how the object will function.

Note: All options are shown below, but not all options are available for all products.



The screenshot shows the 'General' tab of the 'Video In' object configuration dialog. It includes the following sections:

- General:** A 'Comment' text field and three radio buttons for 'USB Camera', 'IP Camera', and 'Video Input' (which is selected).
- Encode format:** A dropdown menu set to 'NTSC'.
- Capture address:** A checked 'Use capture function' checkbox, a 'PLC' dropdown set to 'Local HMI', an 'Address' dropdown set to 'LB' with a value of '0', and a 'Settings...' button. Below this is a 'Storage medium' section with 'USB disk' selected and 'SD card' as an option.
- Record time:** Two spinners for 'Before' and 'After' times, both set to '1' seconds.
- Control address:** A checked 'Use control function' checkbox, an unchecked 'Display adjustment' checkbox, a 'PLC' dropdown set to 'Local HMI', an 'Address' dropdown set to 'LW' with a value of '0', and a 'Settings...' button. Below this are labels for 'Start/stop input : LW-0' and 'Pause : LW-1'.

USB Camera / IP Camera / Video Input

The select HMI will show whichever video input sources are available for that model.

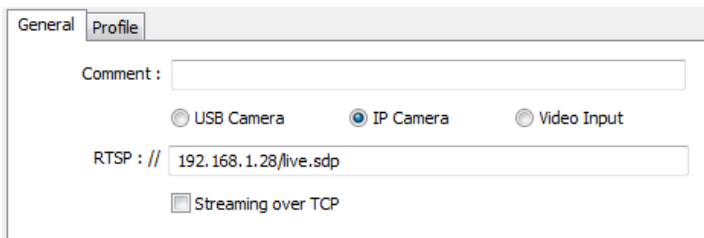
Encode Format (Composite Input Models Only)

The *Video Input* has 2 separate channels. Both channels are set to the same format (*NTSC* or *PAL*). The two channels cannot be displayed simultaneously on the same window, but the display can be switched between channels.

RTSP / Streaming over TCP (IP Camera Input Models Only)

Only IP Cameras that use the ONVIF (Open Network Video Interface Forum) standard and do not require software to be installed are supported.

The *RTSP://* streaming URL is required for the software to display the video stream. Check your camera's user manual to determine the URL format. *Streaming over TCP* – Select this check box to stream video over TCP.



The screenshot shows a software configuration window with two tabs: 'General' and 'Profile'. The 'Profile' tab is active. It contains a 'Comment' text field, three radio buttons for 'USB Camera', 'IP Camera' (which is selected), and 'Video Input'. Below these is an 'RTSP : //' text field containing the URL '192.168.1.28/live.sdp'. At the bottom, there is a checkbox labeled 'Streaming over TCP' which is currently unchecked.

Capture Address

When *Use Capture Function* is checked, the HMI can capture images from the live video. When the specified bit toggles from 0 to 1 (the *trigger event*), an image is saved to the specified *Storage Medium*. This could be used to capture an image when an input to the PLC turns on. Image filenames are based on the current date and time in the HMI clock, and are of the format *yyyymmddhhmmss*. Images captured from the composite video inputs are Jpeg images, and have the extension *JPG*. Images captured from the USB video or IP Camera input are Portable Network Graphics images, and have the extension *PNG*.

Storage Medium

Specify whether images are to be stored to the *SD card* or *USB disk*. If *USB Camera* is selected as the source, only the *SD card* is available. Images from the analog video input are saved to the folder *VIP1* (channel 1) or *VIP2* (channel 2). Images from the USB video input are saved to the folder *USB_CAMERA*. Use the *Picture Viewer* object in the HMI software to display captured images directly on the HMI. An FTP client can be used to retrieve the images from the specified storage medium. Refer to Maple Systems' Technical Note [0907-5090](#) for details.

Record Time (Composite Input Models Only)

With the Composite Input Models, images captured from the analog video (*Video In*, channel 1 or 2) bracket the trigger event. The Graphic HMI retains 10 seconds of prior video, with one image captured per second. The *Record Time* settings specify how many images are captured before and after the trigger event. The *Before* and *After* settings each have a maximum of ten seconds.

Therefore, a maximum of 21 images can be captured:

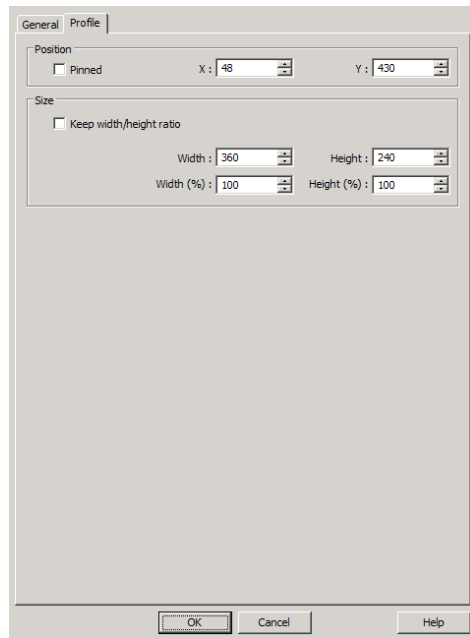
- 10 images before the trigger event occurs
- 1 image when the trigger event occurs
(the filename of this image will contain the @ symbol)
- 10 images after the trigger event occurs

Control Address

If the *Use Control Function* box is checked, a series of registers can control how the video is displayed. The control functions require up to 4 consecutive addresses, starting with the specified address.

Register Address	Value	Function
[Control Register Address]	0	Stop displaying the video
	1	Display video from Composite Input #1 or USB or IP Camera Input
	2	Display video from Composite Input #2
	3	Capture video from Composite Input #1, but don't display the video
	4	Capture video from Composite Input #2, but don't display the video
[Control Register Address+1]	1	Toggle between play and pause. After the '1' is received in the register, the HMI will reset it to 0.
[Control Register Address+2]	1-100	Adjust the composite video contrast (Video Input 1 or 2) if the <i>Display Adjustment</i> box is checked. (Composite Input Models)
[Control Register Address+3]	1-100	Adjust the composite video brightness (Video Input 1 or 2) if the <i>Display Adjustment</i> box is checked. (Composite Input Models).

The *Profile* tab configures the object's size and location.



Pinned

Locks the position and size of the object.

X

Sets the Horizontal Coordinate of the part's position, in Pixels.

Y

Sets the Vertical Coordinate of the part's position, in Pixels.³

Keep Width/Height Ratio

When checked, the width and height are kept in the same proportion as the object is resized.

Width

Sets the Width of the part, in Pixels.

Height

Sets the Height of the part, in Pixels.⁴

Width (%)

Change the width of the object quickly by entering a value between 1 and 800 per cent.

If *Keep Width/Height ratio* is checked, the height of the object will be changed by the same amount.

Height (%)

Change the height of the object quickly by entering a value between 1 and 800 per cent.

If *Keep Width/Height ratio* is checked, the width of the object will be changed by the same amount.

Part 3 – Video In Notes

- Composite video will not be displayed over a VNC connection. USB and IP camera video will be slow over a VNC connection.
- If the USB or IP camera is unplugged, the display will go blank. When the camera is re-connected, the display can be restored using the Control Address to stop and start the display, by switching screens, or by restarting the HMI.
- Only IP cameras that comply with the ONVIF standard, and use RTSP for video streaming are supported. The RTSP address format will vary by camera, and can be found in the documentation for the IP camera or on the Internet. The HMI must have OS version 20160205 or later.
- Real-time images can still be captured when Analog Video In is paused. Recommended analog video systems and resolutions:

	1:1	50%
NTSC	720x480	360x240
PAL	720x576	360x288

- The maximum size of the USB camera Video In object for the HMI5070P is 340x240. For all other models, the maximum size is 640x480.
- When using a USB or IP Camera, the display resolution of the run-time video is determined by the resolution supported by the camera that is closest to the size of the object. If the actual video resolution is different from the size of the object, the resolution will be adjusted to fit the object, which may cause distortion of the video image. Therefore, it is good practice to adjust the size of object according to the actual resolution of the video.
- USB Camera can only be used in landscape (horizontal) mode.
- USB Camera input and Web Streaming cannot be used at the same time.
- The OS / Firmware versions that support USB Camera:

HMI Model	OS Version (or later)
HMI5070P	20140116
HMI5121P/5150P	20140701
XL Series	20140624
RMI5001	20140624
cMT3000	All

- You may need to adjust the settings of the IP camera when video lags or high CPU loading is observed (LW-9025 displays CPU loading in percent). As project complexity and hardware specs vary from one case to another, fine-tuning of the video parameters is required to ensure the quality and smoothness of the video.
- Recommended IP Camera video specification:

Resolution	960x544 (max)
Format	H.264, MJPEG
Refresh Rate	15 fps
Transmission Speed	800kbps (max)

- The OS / Firmware versions that support IP Camera:

HMI Model	OS Version (or later)
HMI5070Pv2	20160503
HMI5121P/5150P	20160601
XL Series	20160503
cMT-FHD	20170214
cMT3072/3090/3103	20170214
cMT3151	20171129

Part 4 – Web Streaming

This feature allows video from a USB camera attached to the HMI to be streamed and viewed in a web browser or third party device. Web Streaming does not require any object to be placed onto an HMI screen – it is instead controlled by system registers. The control bit (LB-12356) turns streaming on and off, the status bit (LB-12357) displays whether streaming is active.

Set LB-12356 on to start Web Streaming, and set LB-12356 off to stop Web Streaming. LB-12357 indicates the streaming status. When LB-12357 is on, Web Streaming is enabled and running. When LB-12357 is off, Web Streaming is stopped.

NOTE: Web Streaming cannot start if no USB camera is connected or a Video In object is using the connected USB camera.

Quick Start Web Streaming:

1. Connect a USB video camera to the USB port on the HMI.
2. Create a means of turning On/Off the internal HMI System Tag LB-12356. For example, a Toggle Switch object. Note: LB-12357, which indicates the current status of video stream can also be tagged to a Bit Lamp object.
3. Connect the HMI to a network that is accessible from your PC.
4. Start your PC web browser and enter the IP address of the HMI with port 8080 as the URL (ex. <http://192.168.100.201:8080>)
5. Toggle the switch locally on the HMI to set LB-12356 ON and activate the web stream.
6. Refresh your web browser – the video should appear.

The following is a still image of video stream on iPad’s Safari of a plant monitoring application.

