



See the possibilities

Installation Manual

IIT Camera Systems

In Image Triggering Cameras

VIS-CAM 350 IIT

VIS-CAM 400 IIT

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Immunity: EN 55024: 1998 + A1: 2001 + A2: 2003

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WARNING

Changes or modifications to this unit not expressly approved by the party responsible for FCC compliance could void the user's authority to operate the equipment.

VIS-CAM System Installation Manual

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1. In Image Triggering System

1 Introduction

For a Quick Start Guide, please refer to appendix G at the end of this manual.

1.1 Document Overview

This manual is a supplement to the Vehicle Imaging Subsystem 300/350/400 (VIS-CAM 300/350/400) manual. References are made to this manual wherever applicable. This manual can be downloaded from the JAI website.

1.2 IIT Overview.

The IIT camera is an all-in-one Intelligent Traffic Surveillance camera. The functionalities include:

- Automatic detection of vehicles
- Measuring the scene light condition
- Setting up camera gain, pedestal and exposure time based on scene light condition
- Grabbing the picture
- Reading the license plate
- Transmitting the data via Ethernet or optional wireless interface

The IIT camera IR Illuminator provides sufficient illumination to produce pictures of license plates at night time. Output for controlling an external flash is provided if total vehicle illumination is required.

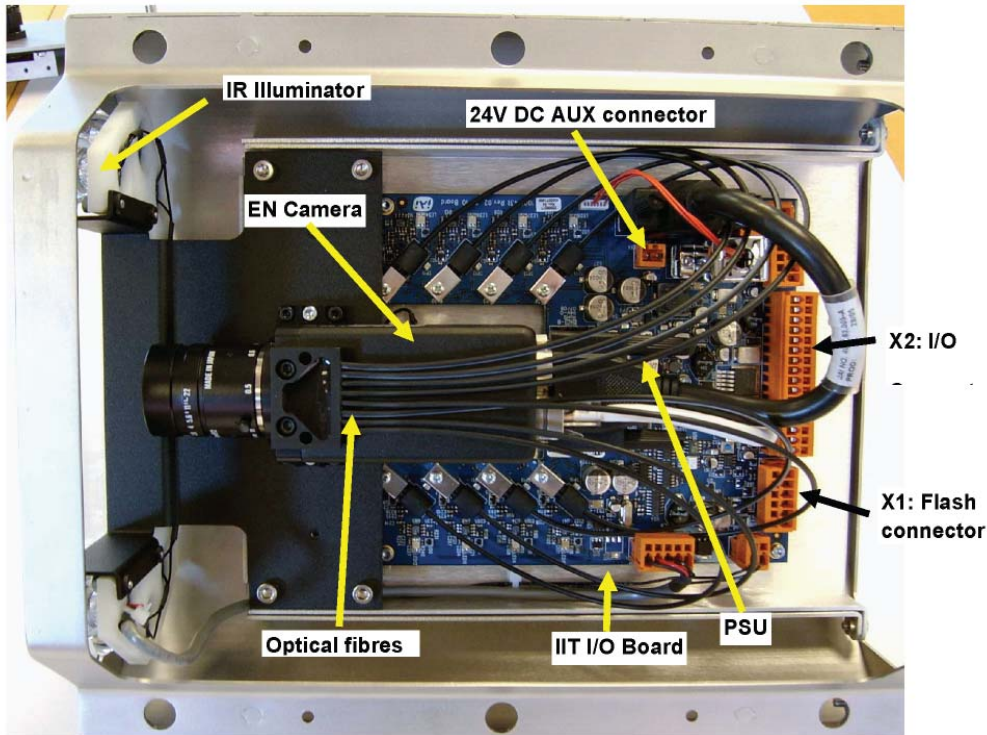
The IIT camera is based on the standard JAI Traffic Solutions EN camera platform and includes a variety of picture formats:

- 1392 (H) x 1040 (V) (VIS-CAM 350 IIT)
- 1920 (H) x 512 (V) (VIS-CAM 400 IIT-2030)
- 1920 (H) x 768 (V) (VIS-CAM 400 IIT-2076)

The standard cameras are combined with an optical fiber front end for vehicle detection and light measurement as well as a dedicated IIT I/O Board and an IR Illuminator.

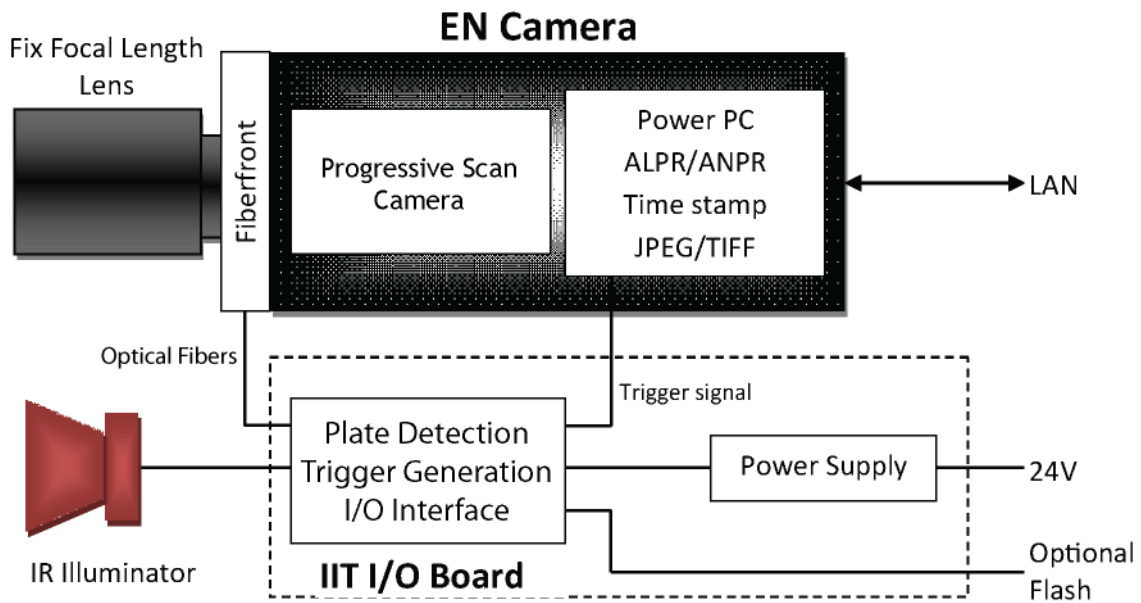
1.3 IIT Camera Overview

Figure 1. VIS-CAM 350 IIT overview



1.4 Principle of Operation

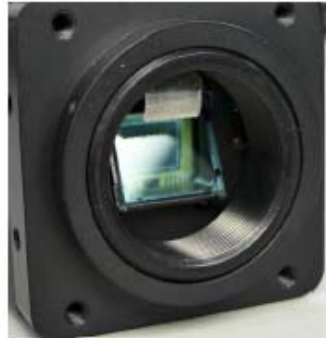
Figure 2. Block Diagram of the IIT Camera



The concept of the IIT Camera is to exploit the retro-reflective properties of the vehicle license plates. A retro-reflective surface returns the incoming light in the same direction it comes from.

The IIT camera is equipped with a number of emitting infrared diodes that are positioned evenly across the camera lens. The light is frequency modulated. A beamsplitter is mounted in front of the CCD for distribution of the incoming light to both the CCD and an array of optical fibers. The optical fibers are connected to photodiodes on the I/O board.

Figure 3. Camera front with beamsplitter and fibers



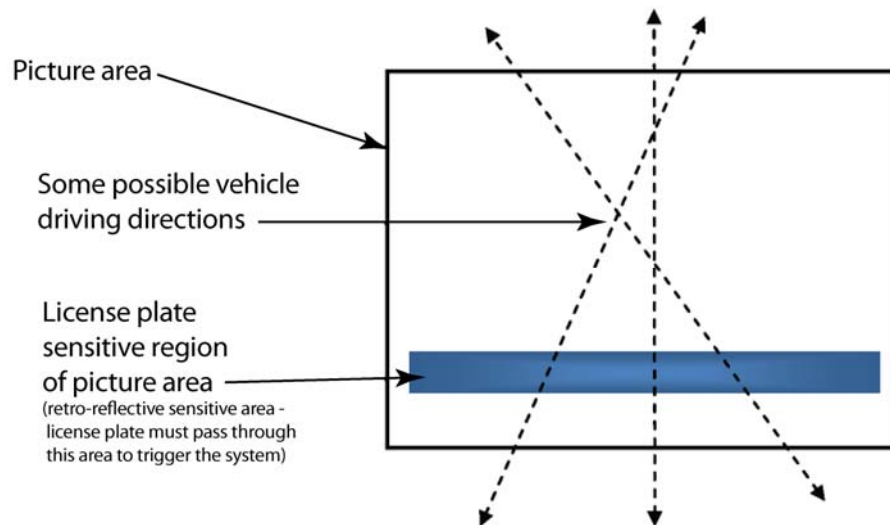
Infrared modulated light is continuously transmitted from the camera's IR illuminator. The reflected signal caused by a license plate on a passing vehicle is correlated for correct modulation frequency, phase, amplitude and the number of high samples. If the trigger criteria are validated as correct, a trigger is generated and an image is grabbed.

The light sensor values - shutter, gain and pedestal that ensure optimal image acquisition properties - are sampled from the reflected signal simultaneously.

Due to the optical inverting properties of the lens, the retro-reflective sensitive part of the picture is positioned in front of the lower part of the CCD even though the fiber array is located in the top.

Figure 4. The sensitive region of the picture area

This illustration shows the sensitive region and the way the vehicles must pass it to make the system function.



Vehicles are detected from both driving directions (front or rear shots). The system will only work if the license plate is moving through the retro-reflective sensitive region of the picture area.

Other parts of the vehicle being retro-reflective can cause generation of triggers. These parts can be the tail light or stickers of different kinds.

Besides the special IIT functions, many of the I/O Board functionalities from VIS-CAM 300/350/400 are available. This includes output for camera heater, output for external flash and 24V auxiliary output.

If only the IIT trigger functionality is used (excluding the internal light sensing feature), the camera can be mounted together with an external light sensor. For details regarding Light Sensor positioning and configuration, please refer to VIS-CAM System Installation manual.

The J-Panel (Junction Panel) described in the VIS-CAM System Installation manual is also applicable in conjunction with the IIT camera.

2 Preparing for installation

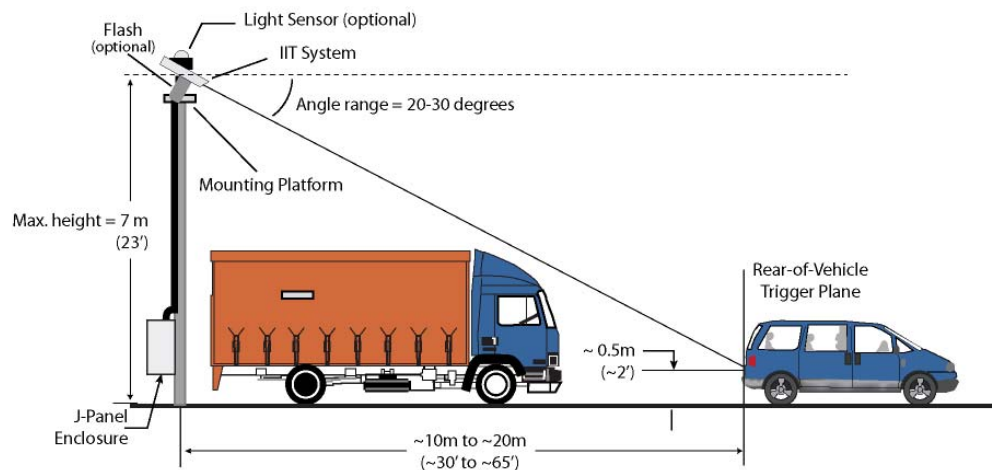
2.1 Preparation for installation

As mentioned in the previous section it is essential for the function of the IIT Camera that the license plate moves through the sensitive region when the vehicle passes the camera.

2.1.1 Over Lane Positioning

Over lane camera mounting is always employed when the road width being monitored contains more than two lanes of traffic, when a convenient overhead is already in place, or when preventing vandalism is a paramount concern.

Figure 5. Typical Over Lane Site Layout



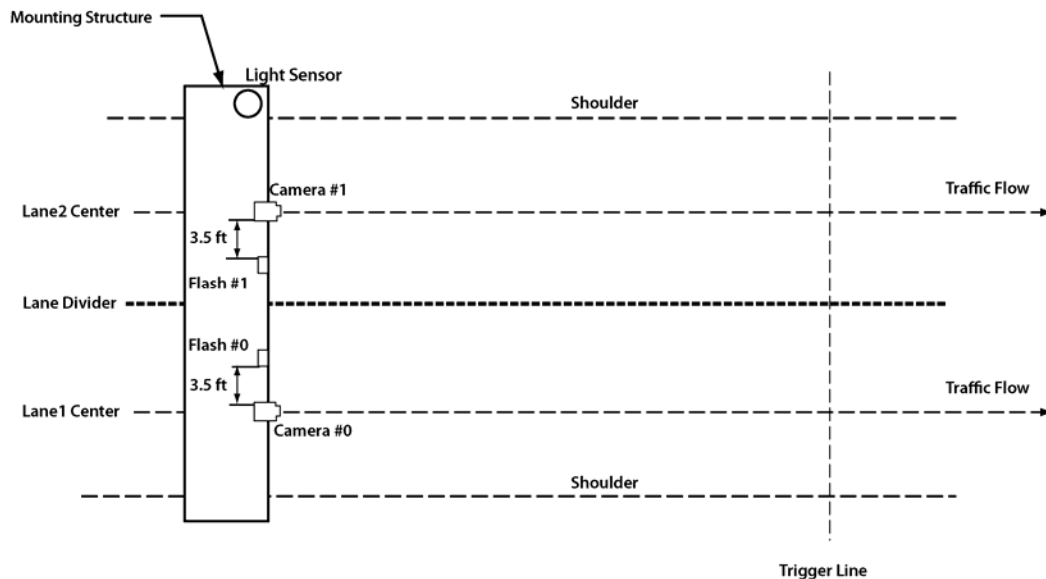
Note: Diagram applies to both front and rear plate geometries. With any configuration, the distance between camera and license plate must be in between 10m and 20m.

2.1.2 Camera tilt considerations

The requirement to freeze the motion of high-speed vehicles limits how steep or shallow the tilt angle of the camera may be. For example, it is important to prevent the horizon from appearing in the image, and thereby allowing the sun to blind the camera. For over lane installations, a camera tilt between 20° to 30° is recommended - with 25° being considered the optimal angle. This angle of tilt is the best compromise between minimizing visibility blockages caused by closely spaced vehicles and maximizing plate visibility for plate mounts that are slightly recessed or tilted downwards.

We strongly recommend not using angles outside this region as the amount of reflectance from the license plates decreases when the angle of incident increases causing reduced performance of the system and license plate image is distorted.

Figure 6. Typical Over Lane Site Layout Plan



The Light Sensor and Flash shown in Figure 6 are optional.

If over lane mounting is not possible the camera can be mounted at the side of the road as close to the road as possible.

2.2 Performance of Trigger and Light Sensor function

As mentioned in section 2.1.1 the performance of the camera is dependent on respecting installation parameters. These performance conditions have influence on both the trigger and the light sensor function.

Various weather caused conditions may also influence the performance. A wet license plate has less retro-reflectance than a dry one and the same applies if it is covered with dirt or snow. Some license plates have reduced retro-reflectance due to wear and tear.

3 Installation

3.1 Camera Dimensions

Figure 7. IIT Camera Housing side view

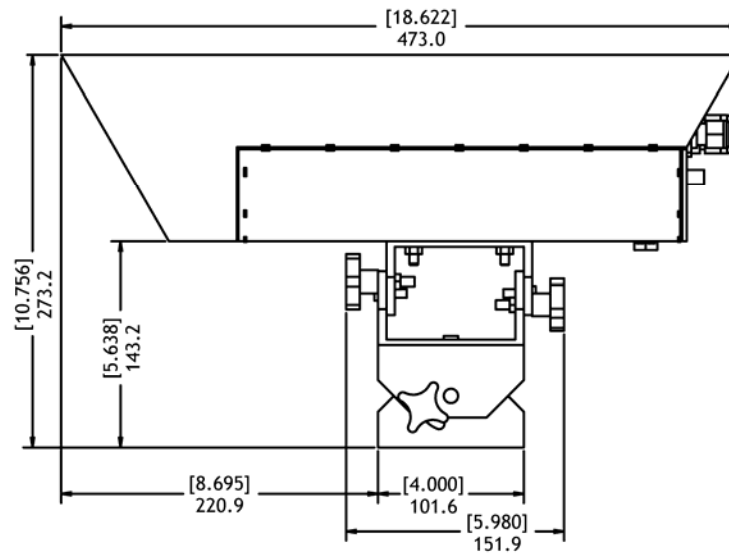
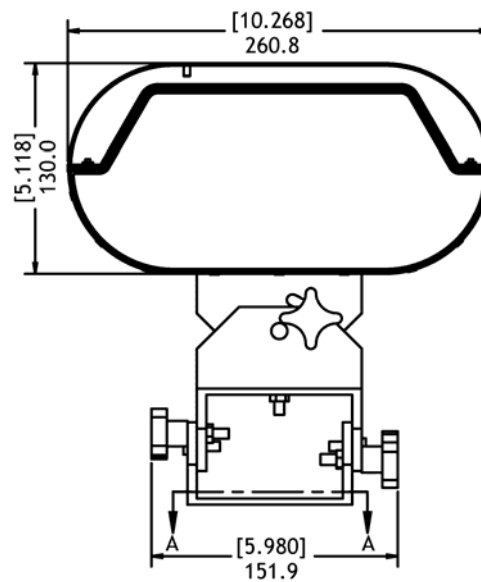


Figure 8. IIT Camera Housing front view



3.2 Installing the Camera

The camera is mounted using the same VIS Mount as VIS-CAM Systems (300/350/400). Please refer to section 3.2 in the VIS-CAM System Installation manual for camera mount template and mounting instructions.

3.2.1 Opening the Camera Housing

The rear plate can be removed by loosening the two screws marked "1" below. Once they are loose they can be turned by fingers. The screws are retained by springs.



Figure A

When the rear plate is removed the drawer holding the electronics can be pulled out after removing the two screws marked "3" in figure B.

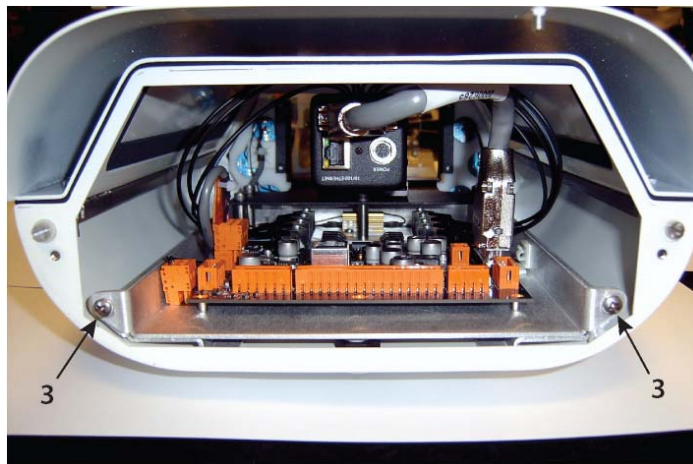


Figure B

The lid is held by a drawbar as shown in figure C (inside view) and figure D of the lid taken off. To take off the lid the two screws marked "2" in figure A are loosened. Start by turning the screws 6-7 turns counterclockwise and then push them gently back in using the screwdriver. Repeat this until the screws cannot be pushed in any more. The lid can then be taken off.



Figure C



Figure D

3.2.2 Attaching the Safety Tether

A coated wire safety tether is provided for use in attaching the removable top lid to the gantry or pole. The tether has a loop at each end.

First you should loop the tether around the gantry and hook one loop through the other as shown in figure A below.

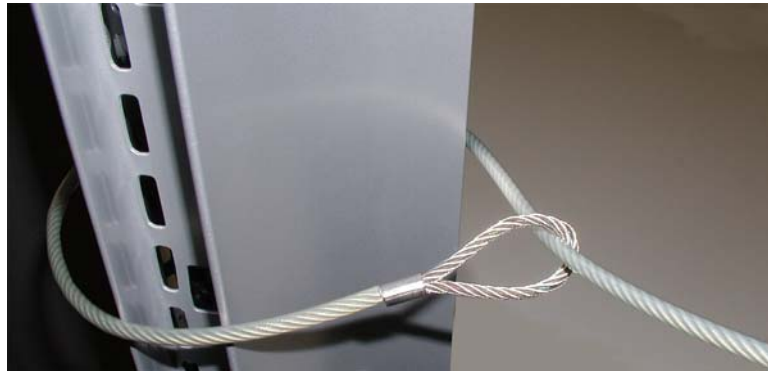


Figure A

Next attach the tether to the lid using the pin on the right rear and the provided hardware as shown in figure B.

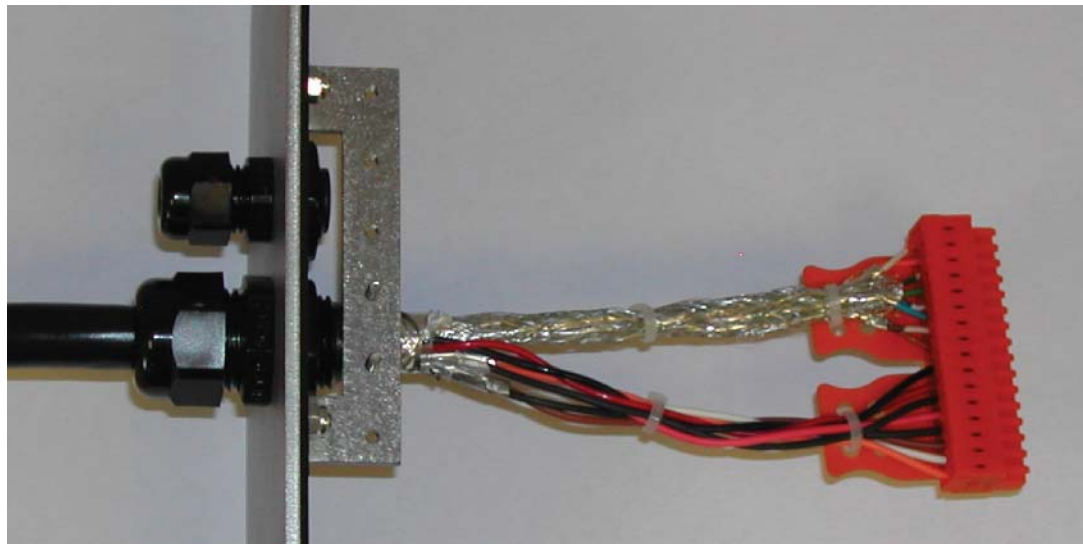


Figure B

3.2.3 Cable Connections

The cable connections are the same as for VIS-CAM Systems (300/350/400) but the cable entry is different as shown in the picture below.

Figure 9. IIT Camera Cable Entry



It is very important that the outer cable shield is connected to the rear plate at the cable entry and that the shield around the Ethernet pairs are run to the orange terminal block as shown in the picture.

Figure 10. Cable shield connection to chassis



Figure 11. IIT Camera I/O Board Layout

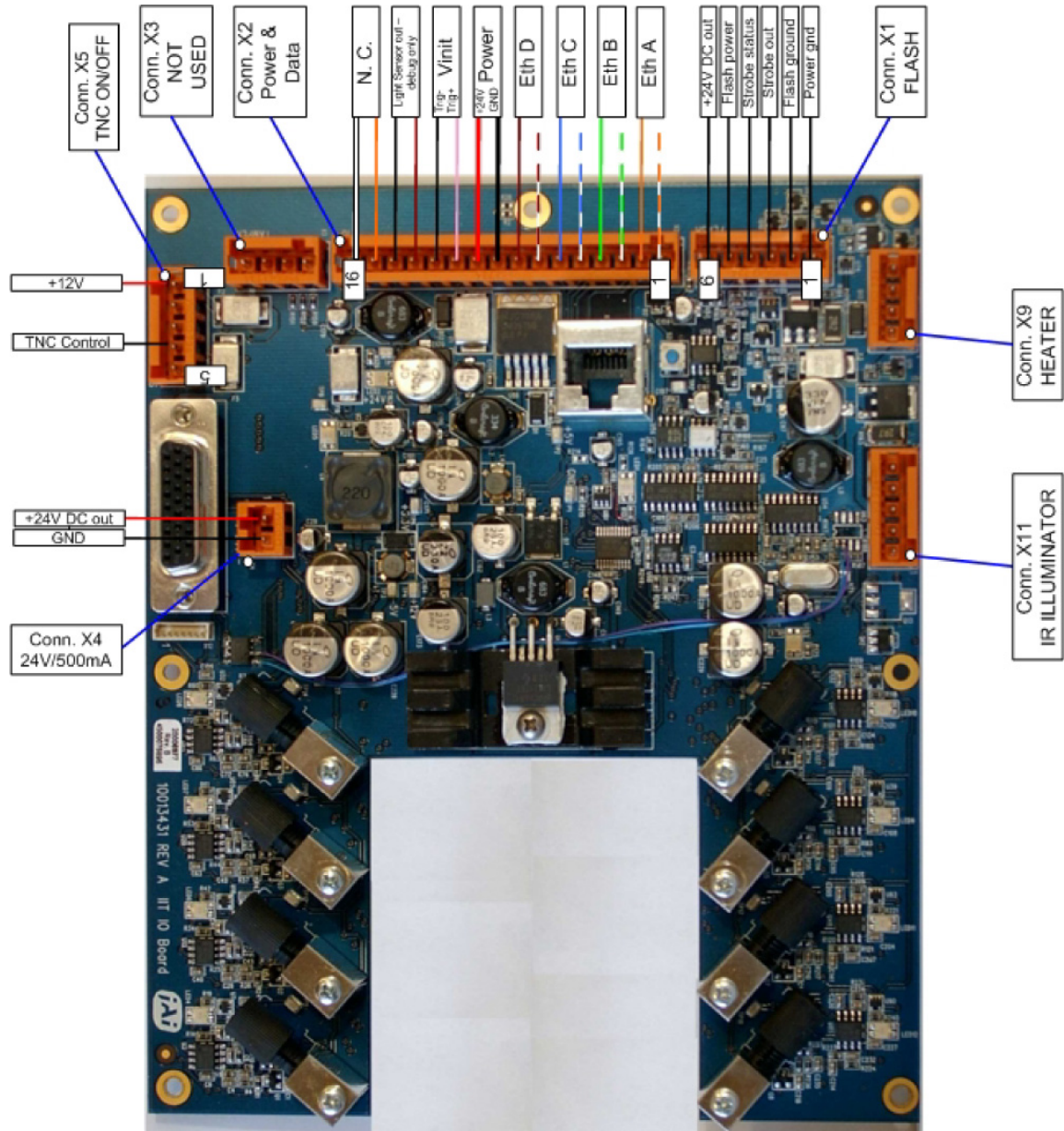


Figure 12. IIT I/O Board Power and Data Connector X2 signals

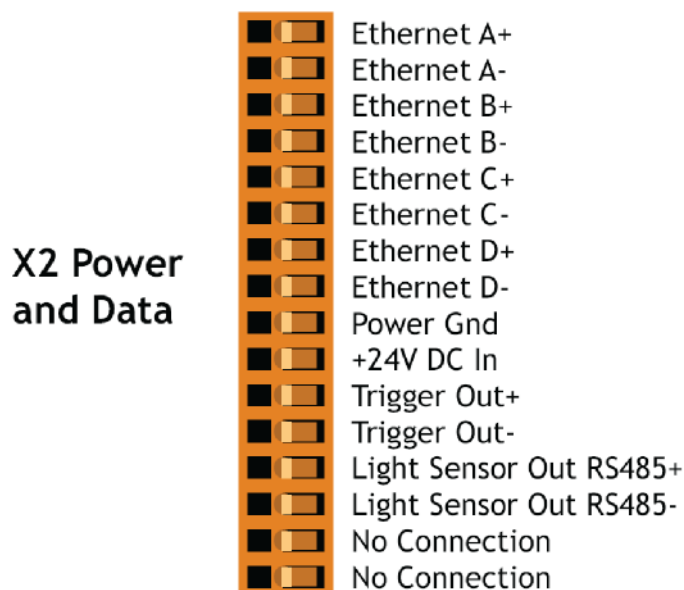


Table 1 Electrical Connections for the IIT Camera X2 connector

X2 Pin #	Wire Color	Signal	Remarks
1	White/Orange in Cat5E/6 cable	Ethernet A+	
2	Orange in Cat5E/6 Cable	Ethernet A-	
3	White/Green in Cat5E/6 Cable	Ethernet B+	
4	Green in Cat5E/6 Cable	Ethernet B-	
5	White/Blue in Cat5E/6 Cable	Ethernet C+	Not Used
6	Brown in Cat5E/6 Cable	Ethernet C-	Not Used
7	White/Brown in Cat5E/6 Cable	Ethernet D+	Not Used
8	Brown in Cat5E/6 Cable	Ethernet D-	Not Used
9	Black (IN RED/BLACK PAIR)	GND	
10	Red (IN RED/BLACK PAIR)	+24V DC	
11	Pink (IN PINK/BLACK PAIR)	Trigger Out+	Balanced Trigger Pulse Output
12	Black (IN PINK/BLACK PAIR)	Trigger Out -	Balanced Trigger Pulse Output
13	Brown (IN BROWN/BLACK PAIR)	LS RS485+	Serial Trigger Command Output
14	Black (IN BROWN/BLACK PAIR)	LS RS485-	Serial Trigger Command Output
15	Orange (IN ORANGE/BLACK PAIR)	No Connection	
16	White (IN ORANGE/BLACK PAIR)	No Connection	

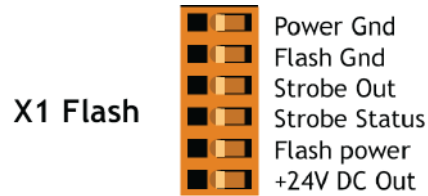
3.3 Connection to J-Panel and Power Supply

For connection to J-Panel please refer to VIS-CAM System Installation manual section 3.3.

3.4 Flash

The flash is optionally used for vehicle illumination at night. The electrical control signal connection to the IIT camera is from X1 on the IIT I/O Board. The signals are:

Figure 13. IIT I/O Board Flash Connector X1 signals



The electrical signals are the same as the VIS-CAM Systems (350/400) flash connector and the connections to the flash is as described in section 3.4 of the VIS-CAM System Installation manual.

4 System Set-Up

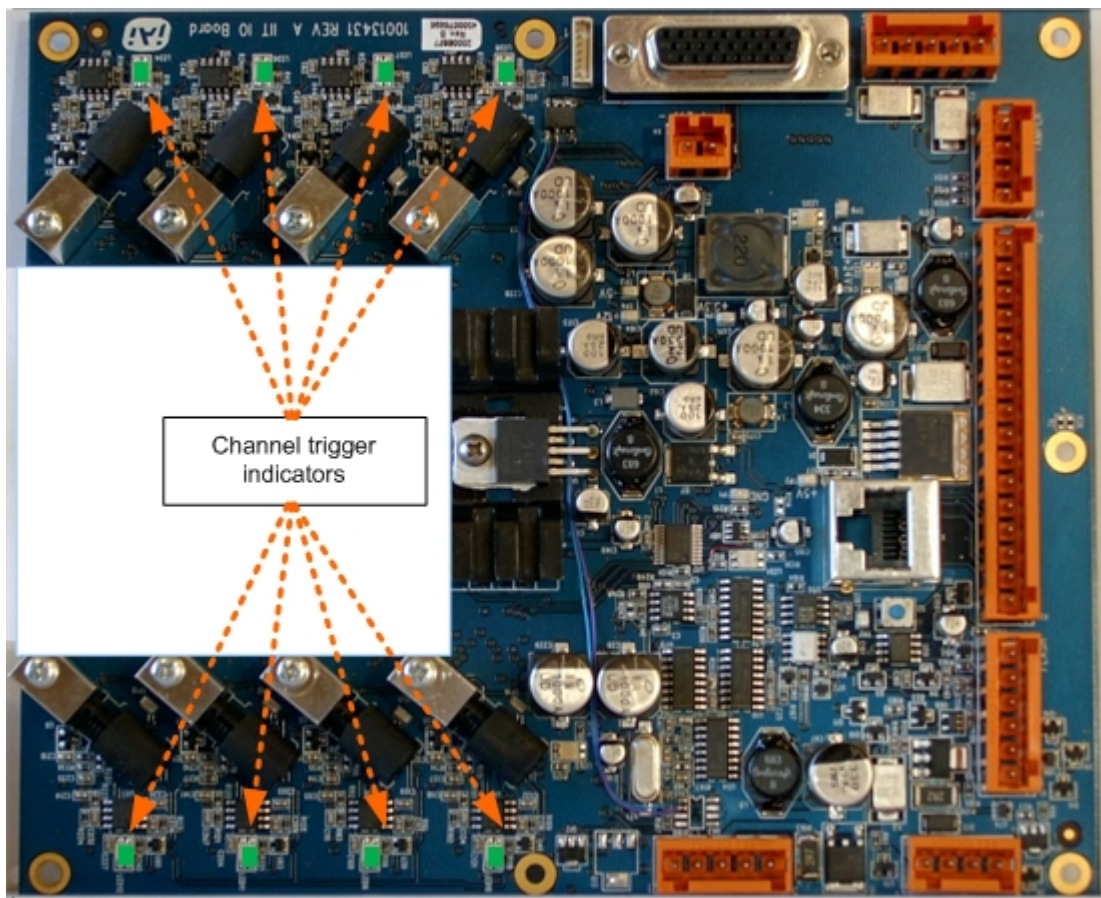
The proper way of deploying the camera, as described in section 4 of the VIS-CAM System Installation manual, also applies to the IIT Camera.

The Ethernet connection to the setup PC is accessed by removing the cable between the EN Camera and the IIT I/O Board and connecting a RJ45 patch cable between the PC and the EN Camera. If the PC does not have a gigabit Ethernet interface the RJ45 patch cable must be a crossover.

Note: Please do not make any adjustments of the camera mount inside the housing as this has been adjusted from factory to the right position relative to the IR light coverage.

As a supplement the IIT I/O Board is equipped with a light emitting diode (LED) at each of the 8 fiber inputs. The LED is green when the reflected signal is detected from the fiber. When a license plate is passing the reflection sensitive region of the scene one or more LED's will be green. The trigger is generated when the LED is turned off.

Figure 14. Signal Indicator LED positions



4.1 Properties setup when using built-in Light Sensor

The Camera Properties for using the built-in Light Sensor Function is shown below.

Figure 15. Unselect the TTL Trigger input in the Trigger section for the camera.

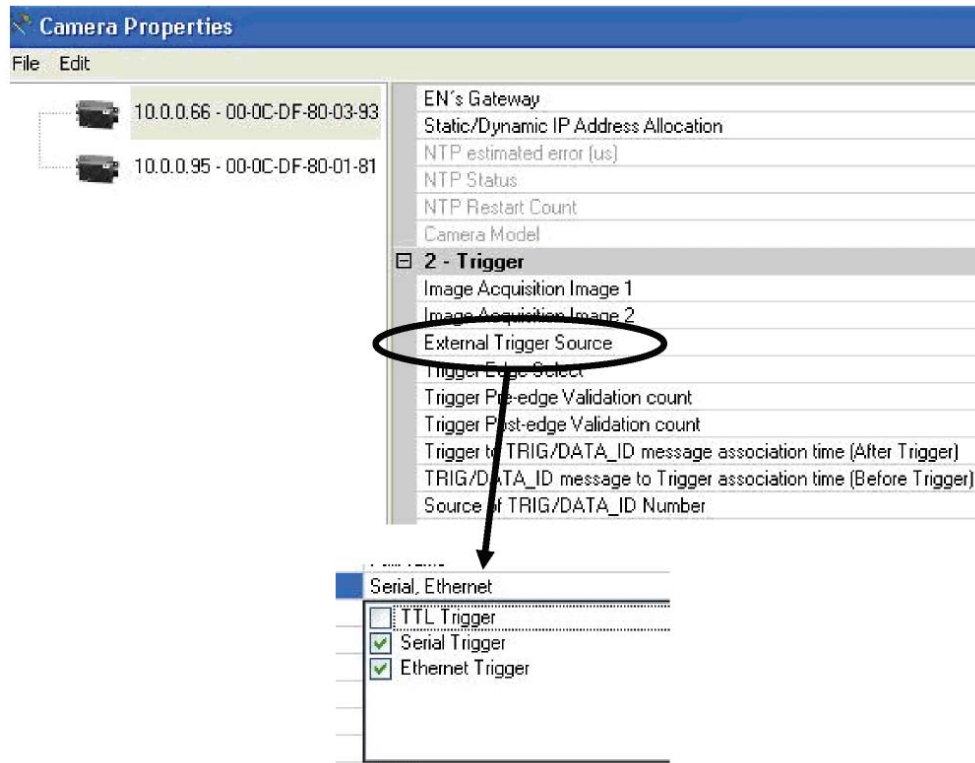


Figure 16. Select Manual Control in the Camera ADR Control

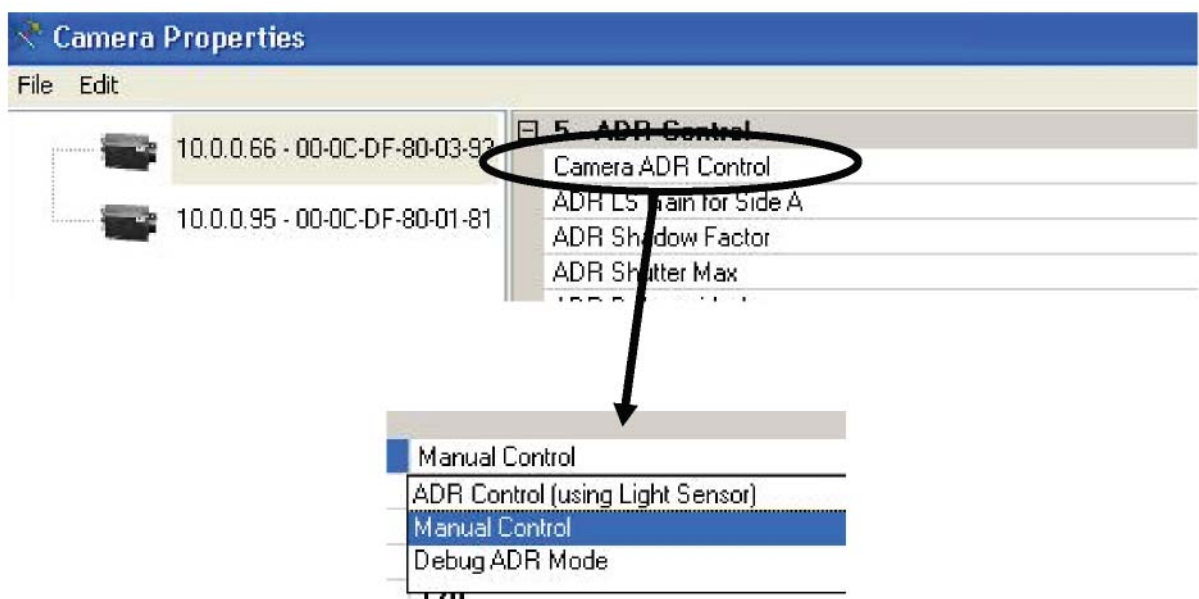
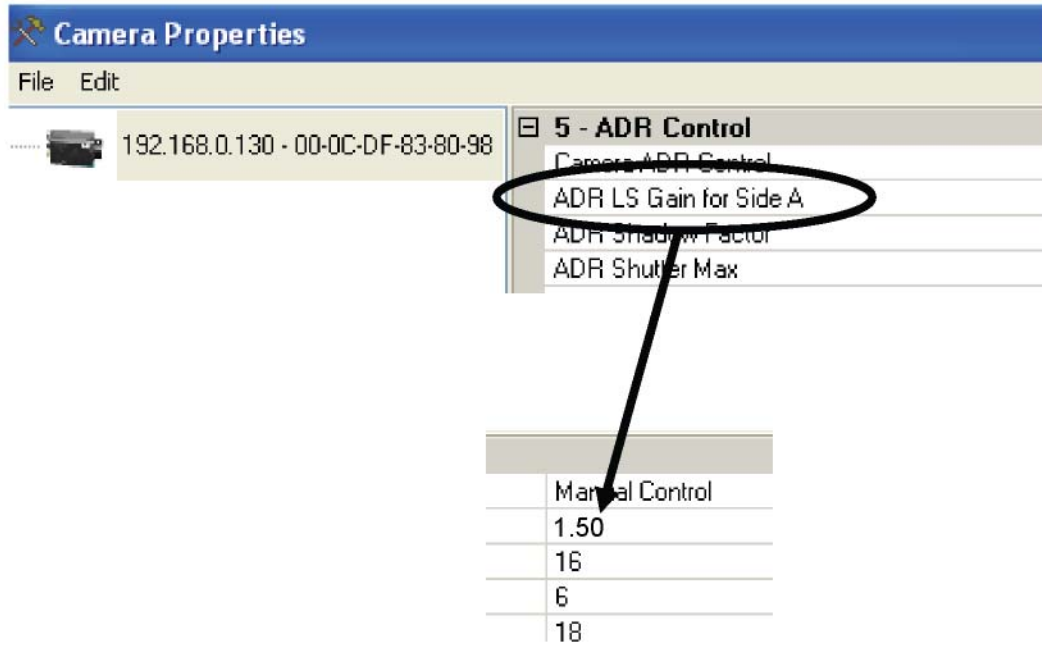


Figure 17. Set the value to 1.50 by manually typing the value



4.2 Properties setup when using External Light Sensor

The Camera Properties for using the external Light Sensor Function is shown below.

Figure 18. Trigger Selection

Unselect the Serial Trigger input and select the TTL Trigger in the Trigger section for the camera.

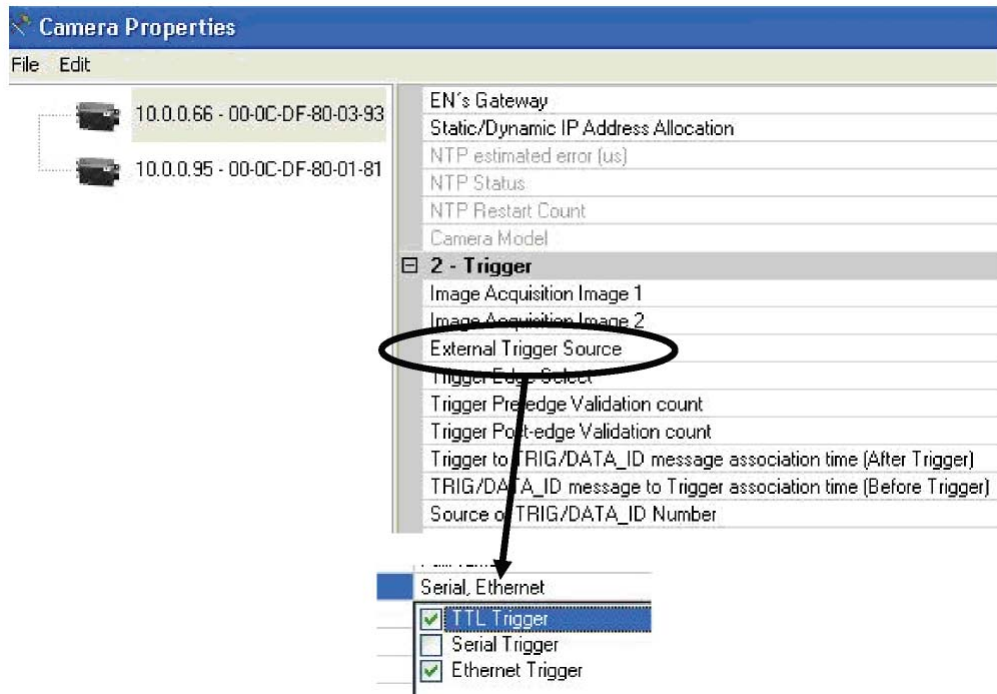


Figure 19. Select Falling Edge in the Trigger Edge Select field

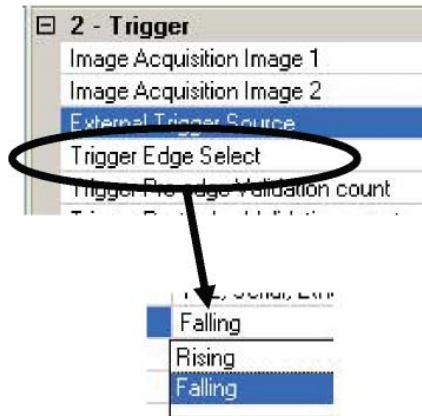


Figure 20. Select Camera "ADR Control (using Light Sensor)" in the Camera ADR Control

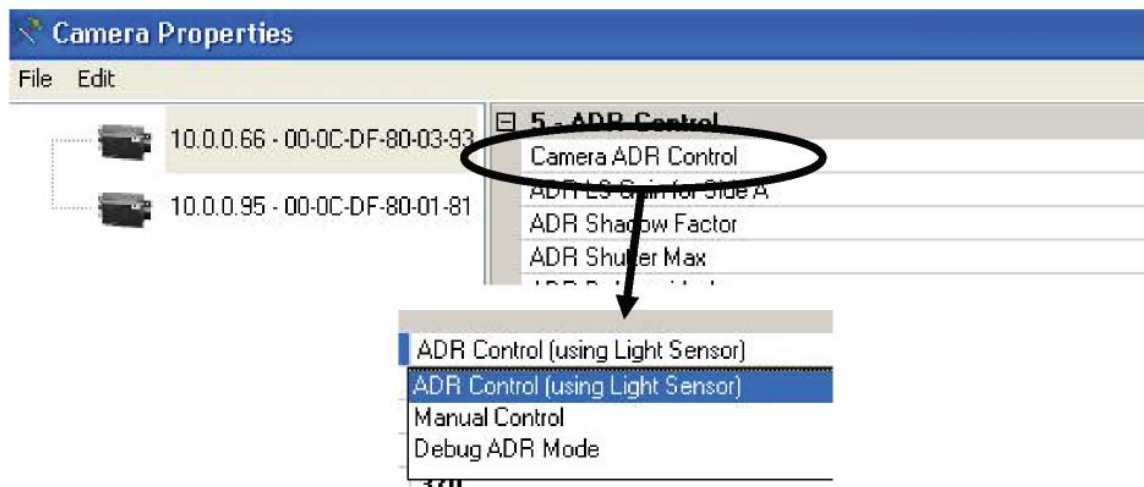


Figure 21. Set the Light Sensor IP address

As described in the VIS-CAM System Installation manual section 4.

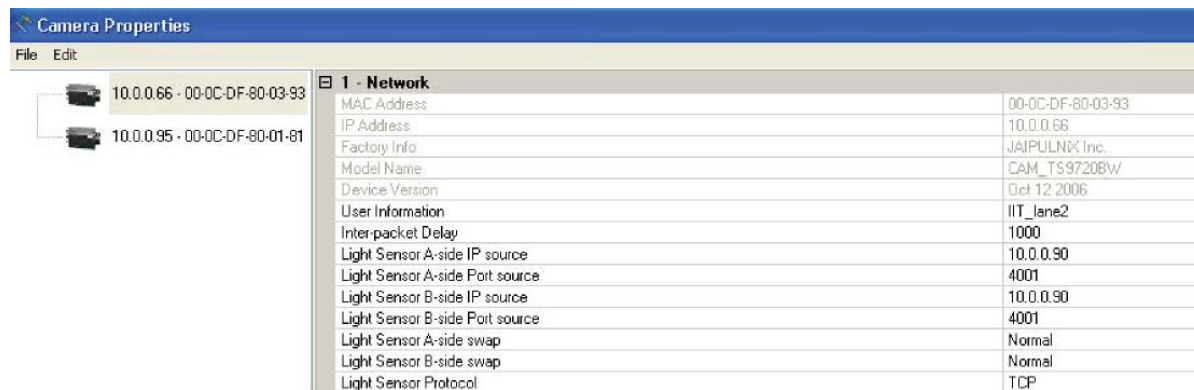
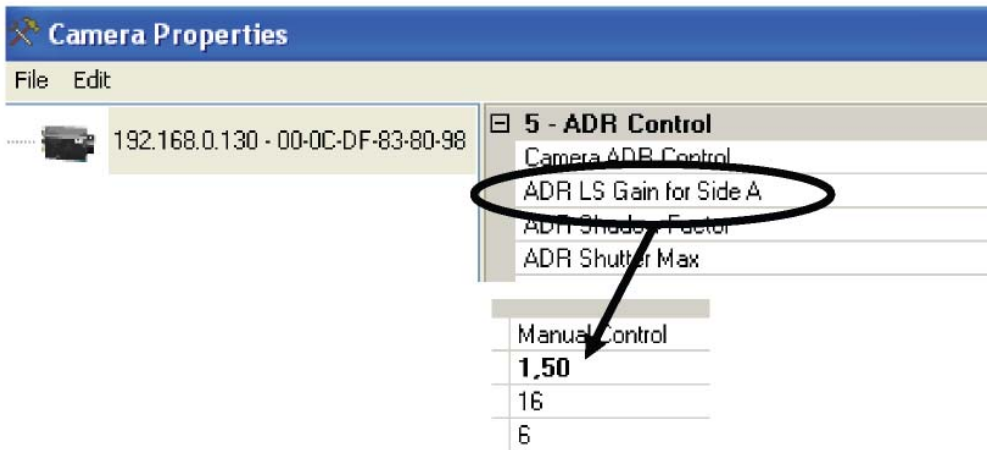


Figure 22. Set the value to 1.50 by manually typing the value

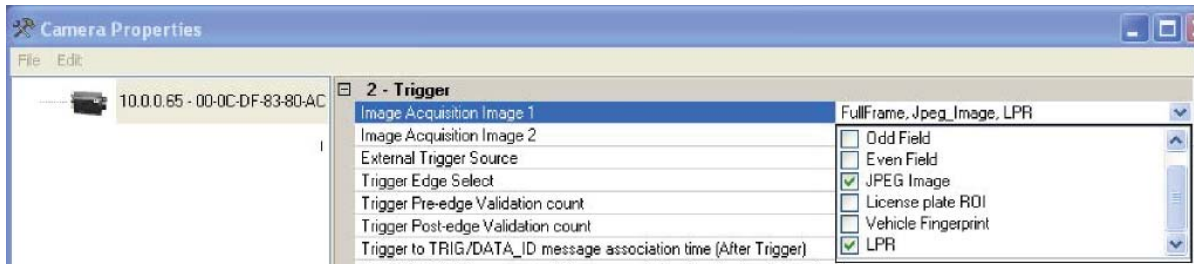


4.3 Settings for built-in Automatic License Plate Reader (ALPR)

4.3.1 ALPR Parameters

If the camera was purchased with built-in ALPR reader, the parameter set up is described below.

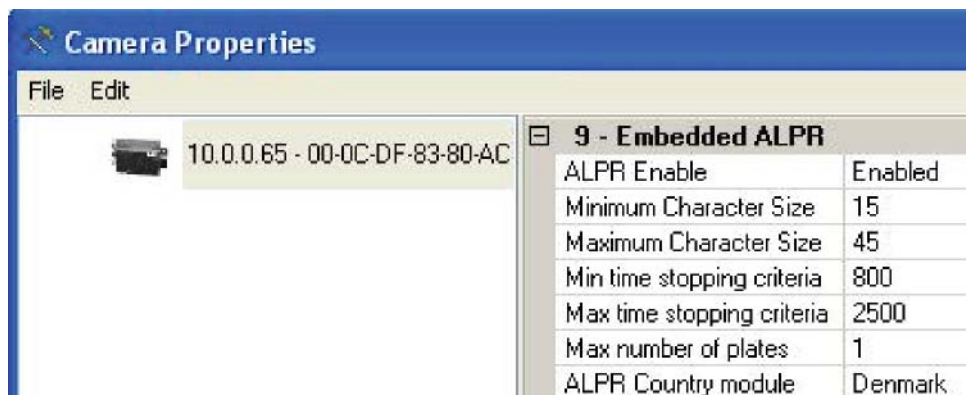
Figure 23. Image Acquisition Image 1



The LPR box is found by scrolling the bar on the right side all the way down.

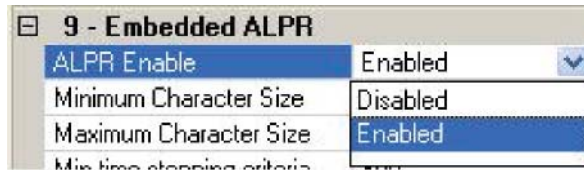
The configuration of the built-in ALPR is found in the Properties section 9.

Figure 24. Embedded ALPR section



The field ALPR Enable must be set to “Enabled”.

Figure 25. ALPR Enabled



The license plate character size must be set in accordance with the actual values. The character size can be found from the EN Setup Video Window by activating the “Freeze” button when a vehicle has been grabbed and then using the Measure Box to measure the height of the license plate characters. For a TS-1335EN camera mounted with a f=25mm or f=35mm lens a suitable range could be Minimum 15 and Maximum 45.

The Max time stopping criteria defines how much time must be used maximum for trying to read the license plate.

The Max number of plates specifies the number of license plates the reader will be looking for. Set to 1.

The ALPR Country Module controls which country module is used by the camera. Select Country Module purchased.

4.3.2 ENSetup Image and LPR output Capture Mode

Select “LPR” in the ENDATA_RDY transmit field (figure 26) in camera properties window and "View->TCP/IP" in Video Window (figure 27). A pop-up window that shows the LPR output will appear after the camera captures images of the passing vehicles.

Figure 26. Ethernet (EN) DATA_RDY Transmit

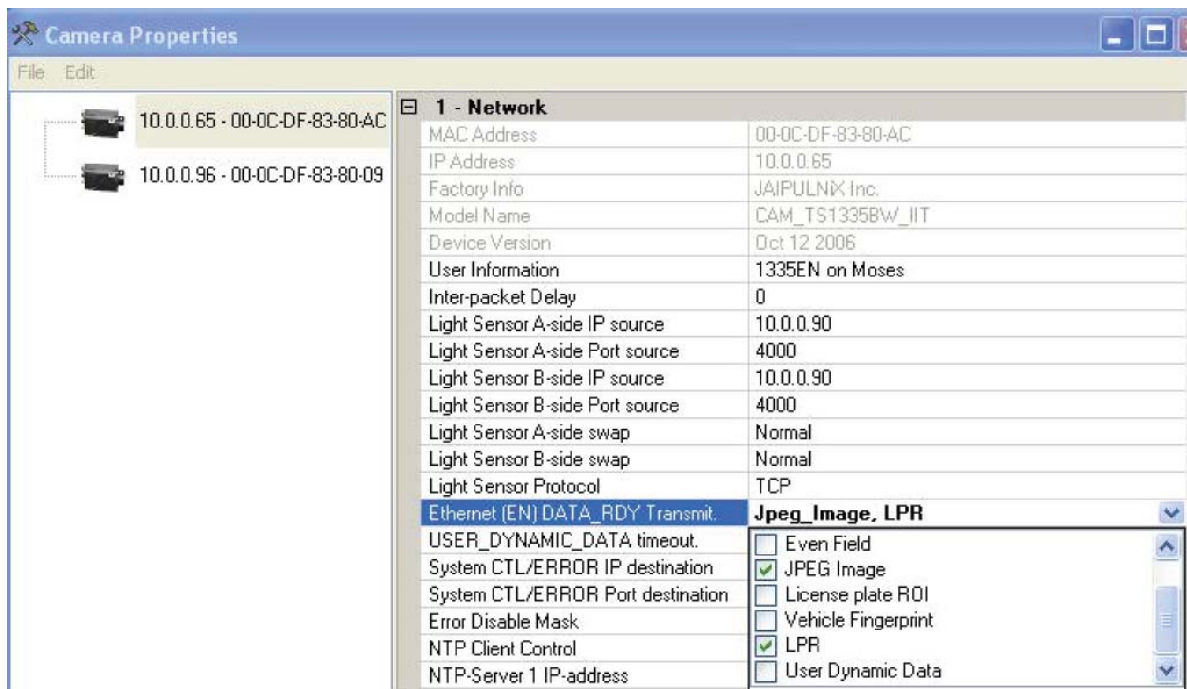
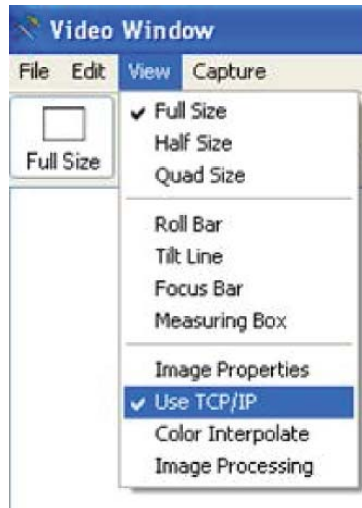
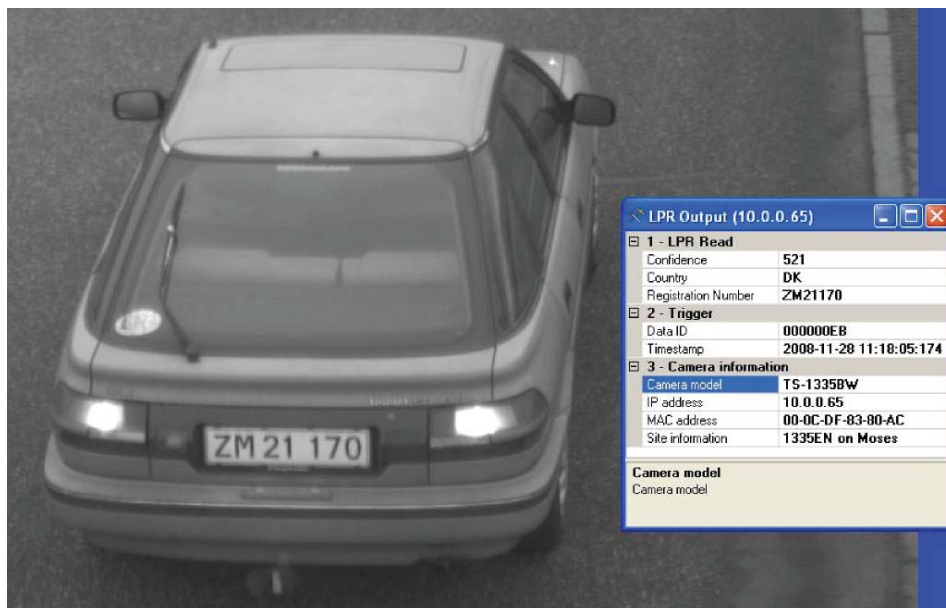
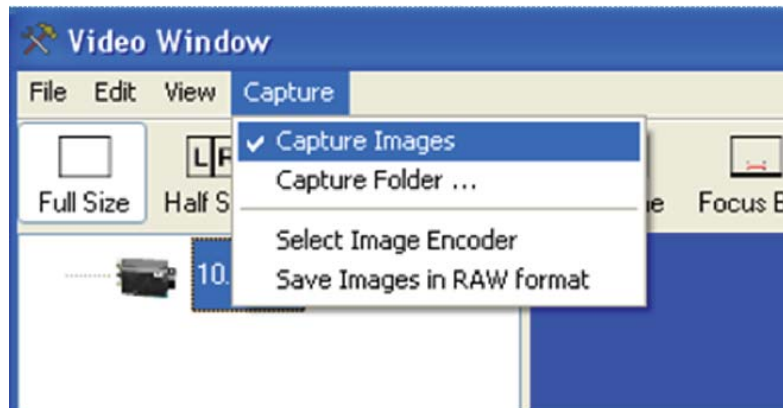


Figure 27. View TCP/IP



In order to capture images, "Capture Images" must be selected as shown below.

Figure 28. Capture Images setting



For more details on FTP image transfer, see section 3.2 of User's Guide EN Camera Series

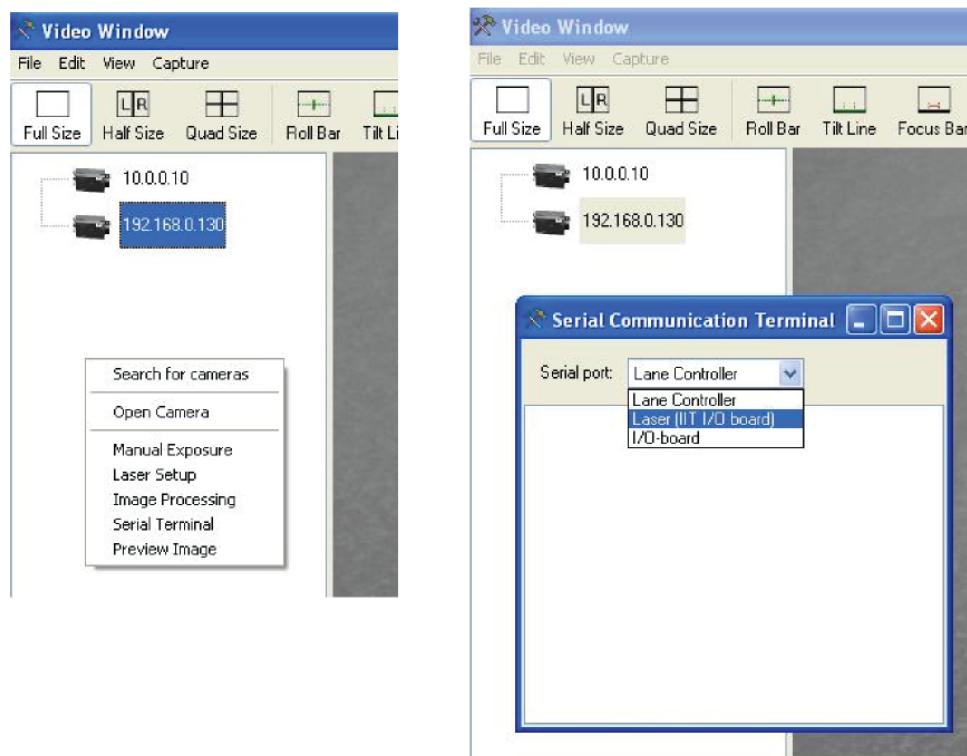
Caution: ENSetup Capture Mode and FTP Transfer Mode are exclusive to each other. Both modes should not be enabled simultaneously in the camera.

4.4 Setting the IIT I/O Board internal trigger parameters

A number of variables can be setup in the IIT I/O Board for optimizing performance. These are illustrated in the block diagram in figure 19: IIT Camera Trigger Generation Principle.

Commands can be launched to the board from the EN Setup application Video window by right clicking the mouse in the left side a selecting Serial Terminal and then Laser Trigger (IIT I/O Board).

Figure 29. Serial Communication Terminal



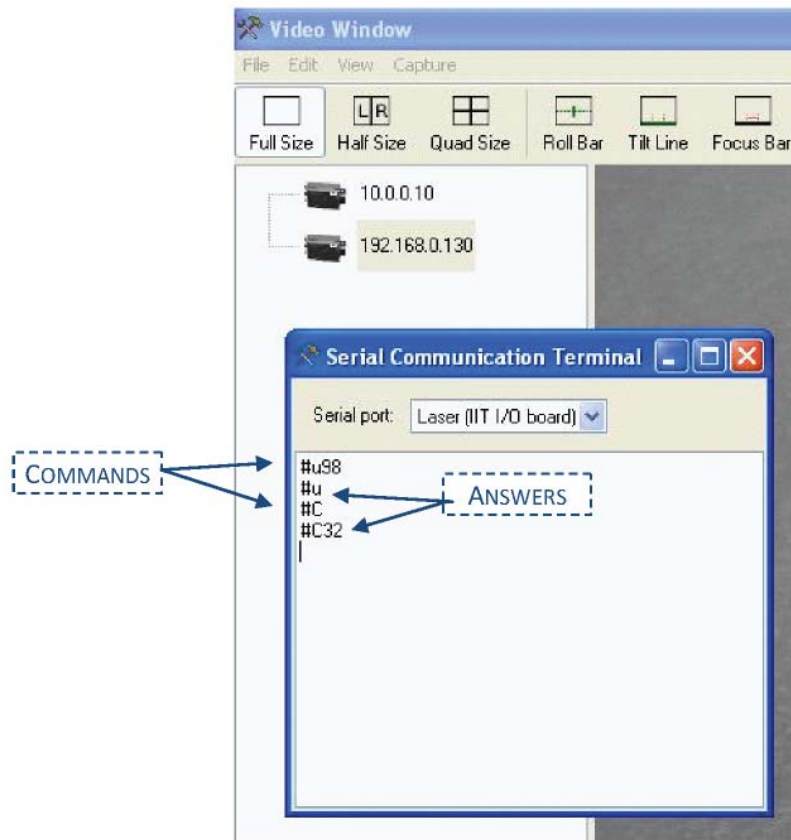
All variables are set as hexadecimal numbers. All commands are terminated by a <CR> (carriage return). Parameters are always two digits (01 to FF).

The commands are normally protected by a checksum that can be disabled by launching the command #u98. The answer will be #u.

All commands are hereafter the pound key (#) followed by a capital command letter. The current value of the variable is returned if the command is without parameter.

Example: Command #C<CR> - Answer #C32. 32hex = 50 decimal.

Figure 30. IIT I/O Board communication



The DAC values in commands C to J are set to 32 from the factory and it is normally not necessary to change these.

The TTL Trigger pulse width is set by command A to a value between 01 and FF (255d) times 0.1 ms. = between 0.1 and 25.5ms. Factory setting is 1ms.

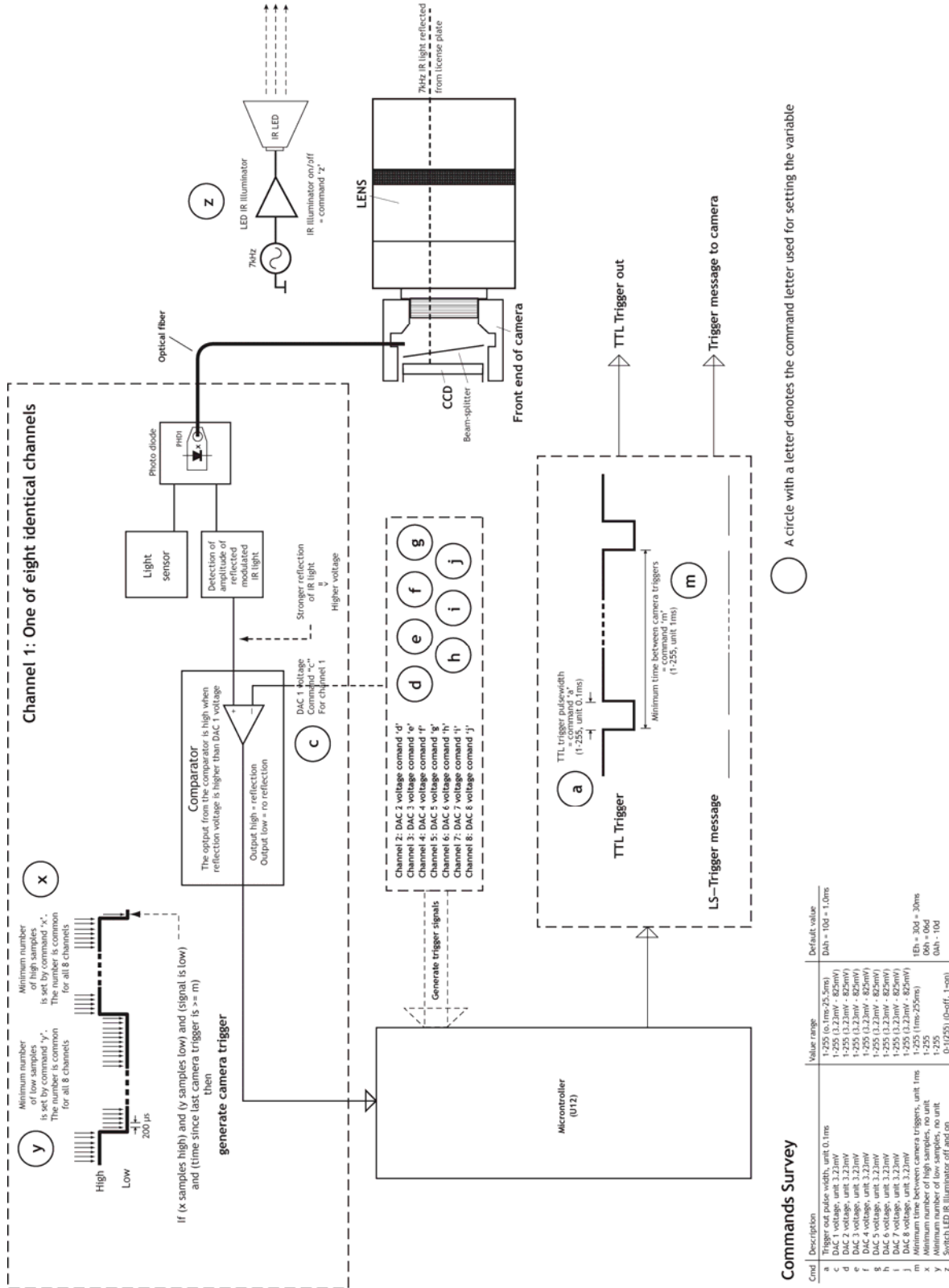
The minimum time between two trigger pulses are set by command M to a value between 01 and FF (1-255ms).

The number of consecutive samples being high from a passing license plate is set by the command X. The factory setting is 06 and the unit is 0.2ms. The setting applies to all 8 fiber channels.

The number of consecutive samples being low between two passing license plates is set by the command Y. Factory setting is 0A and the unit is 0.2ms.

In Appendix F is found a list of all default settings for the IIT I/O Board.

Figure 31. IIT Camera Trigger Generation Principle



○ A circle with a letter denotes the command letter used for setting the variable

Commands Survey

Cmd	Description	Value range	Default value
a	TTL trigger pulsewidth	1-255 (unit: 0.1ms)	100 = 10.0ms
b	Minimum time between camera triggers	1-255 (unit: 0.1ms)	100 = 10.0ms
c	DAC 1 voltage, unit 3.22mV	1-255 (1.22mV - 825mV)	
d	DAC 2 voltage, unit 3.22mV	1-255 (1.22mV - 825mV)	
e	DAC 3 voltage, unit 3.22mV	1-255 (1.22mV - 825mV)	
f	DAC 4 voltage, unit 3.22mV	1-255 (1.22mV - 825mV)	
g	DAC 5 voltage, unit 3.22mV	1-255 (1.22mV - 825mV)	
h	DAC 6 voltage, unit 3.22mV	1-255 (1.22mV - 825mV)	
i	DAC 7 voltage, unit 3.22mV	1-255 (1.22mV - 825mV)	
j	DAC 8 voltage, unit 3.22mV	1-255 (1.22mV - 825mV)	
m	Minimum time between camera triggers, unit 1ms	1-255 (1ms-255ms)	100 = 100ms
n	Minimum number of low samples, no unit	1-255	100
y	Minimum number of low samples, no unit	0-1(255) (0=off, 1=on)	0Ah = 0x0
z	Switch LED IR illuminator off and on		0Ah = 10d

5 Appendix A: Troubleshooting

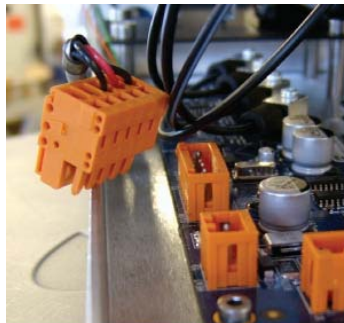
	Fault description	Possible cause	“Remedy”
1.1	Camera does not trigger or has bad trigger performance	Iris is not fully open	Open Iris
1.2		Illuminator is not properly aligned with the camera	See EN Camera/Illuminator alignment procedure in Appendix C
1.3		The supply voltage to the IIT Camera is too low causing weak IR illuminator	Adjust the supply voltage to 24V±10%
1.4		The geometry of the installation is not in correct	See section 2 for site layout
1.5		Plates are not going through reflection sensitive area	See section 1.5
2.1	Noisy pictures	TTL and Serial trigger are both enabled	Disable TTL trigger in Properties in EN Setup Application if IIT Light Sensor is used
2.2		The time between two triggers are set too low	Set the minimum time between triggers (command M) via Serial Terminal in EN Setup application in accordance with camera specific values
3.1	Embedded ALPR does not work	The license file is expired	Contact JAI Inc.
3.2		Wrong country module has been selected in the “ALPR country module” in Properties field	See section 4.3
3.3		The time is not set correctly in the camera	Set the clock in the camera correctly. The clock can be synchronized to PC time or an NTP server. Please refer to EN Setup manual for details.

6 Appendix B: Focus Adjustment of Kowa 35mm

The following describes the adjustment of the 35mm Kowa lens for best day/night performance using IIT IR Illuminator for night illumination.

- 1) Disconnect IR Illuminator from IIT IO Board connector X11:

Figure 32. IR Illuminator connector



- 2) Start EN Setup and select repetitive trigger. Manually adjust the shutter and gain to useable image.

- 3) Adjust the focus on the lens to near position :

Figure 33. Kowa 35mm lens



- 4) Slowly adjust the focus ring from near to far for the best picture. If the best focus position is passed, adjust back to near and adjust towards far position again.

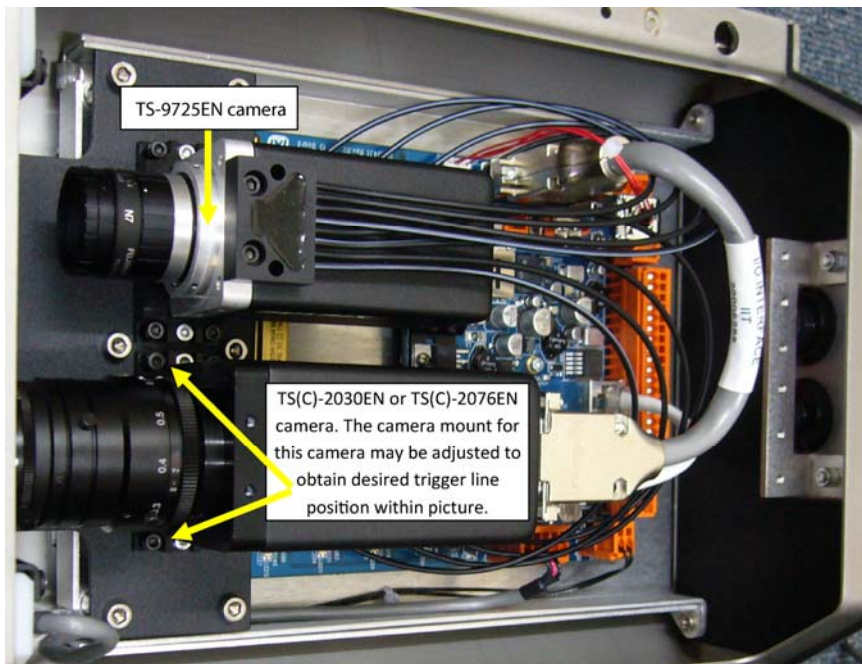
- 5) When the best position is found, secure the focus locking screw on the lens and reconnect the IR Illuminator. Verify that the license plate focus is acceptable. The best way to check this is by mounting an 850nm band pass filter in front of the lens.

(The license plate in the picture can be zoomed-in in the EN Setup application by holding down the "Alt" key while dragging a box around the license plate using the mouse. The zoom mode is left by holding down the "Alt" key and clicking anywhere in the picture)

7 Appendix C: VIS-CAM 400 IIT-2030 and VIS-CAM 400 IIT-2076

The VIS-CAM 400 IIT-2030 and VIS-CAM 400 IIT-2076 are made a little different from the VIS-CAM 350 IIT cameras. The picture below shows the VIS-CAM 400 IIT overview

Figure 34. VIS-CAM400IIT-2030 and VIS-CAM400IIT-2076 overview



Note: The TS-9725EN camera is not powered. Only fiber front is exploited. Do not adjust the mechanical mount for this camera.

The fiber assembly in the IIT cameras is made from 8 x 1mm fibers giving a total width of 8mm. This coverage fits the 2/3" CCD fine in the TS-9725EN and TS-1335EN (VIS-CAM350IIT) cameras having a sensor width of 8.8mm.

The width of the sensors in the TS-2030EN and the TS-2076EN, used in VIS-CAM400, is 14.2mm and the fiber assembly is too small to cover the width of this sensor. A solution using two cameras has therefore been chosen where the trigger unit is a TS-9725EN camera. Only the fiber front of this camera is exploited and the camera does not need to be powered except when alignment is performed at factory. The TS-9725 camera is mounted with a 25mm lens and the TS-2030EN/TS-2076EN with a 35mm lens giving almost the same field-of-view for the two cameras.

Having the camera and trigger unit separated this way, makes it possible to adjust the trigger-line within the picture height, to some degree, by adjusting the camera mount inside the housing. As for the single camera version, the camera with the fiber front, may not be adjusted. This has been done from the factory to cover the IR illuminated area.

Please see appendix E regarding connection of floodlight for VIS-CAM 400 IIT.

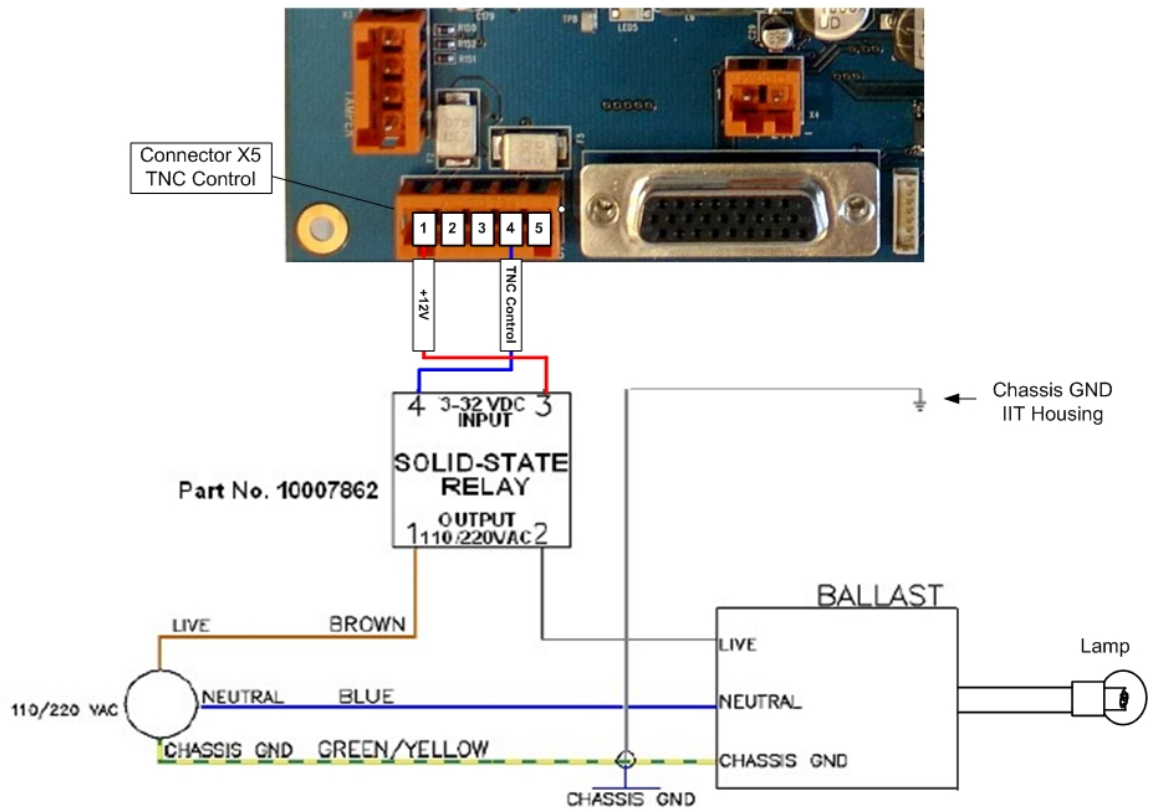
Apart from the described differences, the setup and configuration is the same as the single camera version.

8 Appendix D: Connection to TNC-100 Floodlight

The connection of TNC-100 floodlight for night time visible constant illumination is shown below.

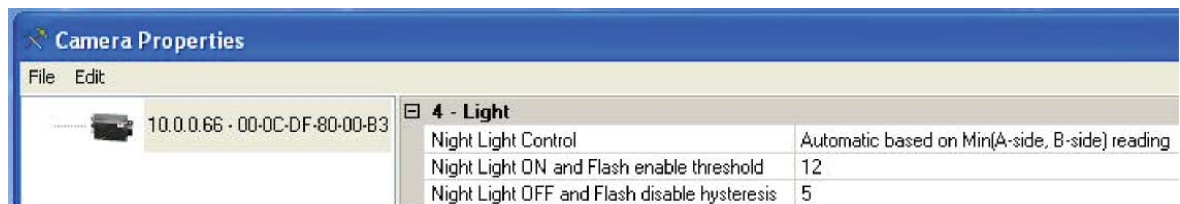
Figure 35. Connection to TNC-100 for VIS-CAM 400 IIT

I/O Board to TNC lamp connection



The on and off switching point are set via the camera properties in the EN Setup. The typical values are shown below.

Figure 36. Night Light Control



9 Appendix E: IIT I/O Board default settings

The table below shows the default settings for microcontroller U12 on the I/O Board. The settings are accessible from the EN Setup via Serial Communication Terminal - Laser (IIT I/O Board).

Inquiry syntax: #<command><CR> Change value syntax: #<command><hex-value><CR>				
Name	CMD	Value		Description
		Hex	Dec	
Trigger pulse width	A	0A	10	Unit 0.1ms. Sets the pulse width of the trigger pulse output
Dac 1 value	C	32	50	Sets comparator level of channel 1
Dac 2 value	D	32	50	Sets comparator level of channel 2
Dac 3 value	E	32	50	Sets comparator level of channel 3
Dac 4 value	F	32	50	Sets comparator level of channel 4
Dac 5 value	G	32	50	Sets comparator level of channel 5
Dac 6 value	H	32	50	Sets comparator level of channel 6
Dac 7 value	I	32	50	Sets comparator level of channel 7
Dac 8 value	J	32	50	Sets comparator level of channel 8
LS multiply factor	K	01	01	Sets the first slope of the light sensor/ADC curve together with LS divide factor up to the LS knee point
LS divide factor	L	01	01	See description Ks
Min time between triggers	M	C8	Depends on model	Unit 1ms. Sets the minimum time between two triggers. No trigger can be generated within this time.
LS knee point	P	3A	58	Sets the point where the lightsensor/ADC curve changes from first slope to second slope.
LS multiply 2 factor	Q	03	03	Multiply factor for second slope. This factor is multiplied by first slope to give second slope.
LS subtract value	T	96	150	Offset for lightsensor/ADC curve. Below this ADC value the light sensor value is zero.
Number of high samples	X	06	06	Minimum number of successive 200µs samples of no reflected signal before a trigger is generated
Number of low samples	Y	10	16	Minimum number of successive 200 µs samples of no reflected signal before X

Besides these constants there are some commands for test purposes. These are:

Name	Cmd	Syntax	Description
Disable checksum	u	#u98<CR>	Disables checksum commands until next power down
Show input vector	O	#O<CR>	Shows the activated fiber channels. If channel 2 and 3 are activated then the answer will be #006<CR>
IR Illuminator off	Z	#Z00<CR>	Switches off the IR Illuminator
IR Illuminator on	Z	#Z01<CR>	Switch on the IR Illuminator. Recycling the power also switches the IR illuminator on.
Firmware version	V	#V<CR>	Shows the installed firmware version for U12

Below are the settings for the microcontroller U1 on the I/O Board. This processor controls the camera heater, fan and power supply for the camera. The settings are accessible from the EN Setup via Serial Communication Terminal - I/O Board.


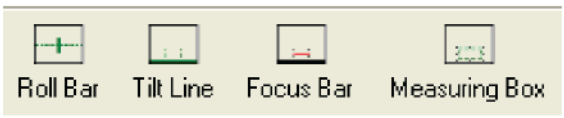





Inquiry syntax: \$<command><CR> Change value syntax: \$<command><hex-value><CR>				
Name	Cmd	Value		Description
		Hex	Dec	
Power up temperature high	Q	41	+65	The high temperature where the power supply for the camera is switched off
Warning temperature high	X	3F	+63	The warning temperature at which the camera will start preparing power down
Fan start temperature	D	2D	+45	The temperature above which the fan is switched on
Fan stop temperature	K	28	+40	The temperature below which the fan is switched off
Camera heater off temperature	O	F6	-10	The temperature above which the camera heater is switched off
Camera heater on temperature	H	F1	-15	The temperature below which the camera heater is switched on
Warning temperature low	W	E4	-28	The warning temperature at which the camera will start preparing power down
Power up temperature low	T	E2	-30	The low temperature where the power supply for the camera is switched on

Besides these constants there are some commands for test purposes. These are:

Name	Cmd	Syntax	Description
Disable checksum	U	\$u99<CR>	Disables checksum commands until next power down
Firmware version	V	\$V<CR>	Shows the installed firmware version for U1
Status request	S	\$\$<CR>	<p>The format of the answer is \$\$<temperature><temperature status><fan status><heater status><CR></p> <p>The temperature is shown in two's complement.</p> <p>Example of an answer: \$\$1A800<CR> "1A" is 26 deg "8" is power ok "0" fan off, no current, no overload "0" heater off, no current, no overload</p> <p><u>Heater and fan status:</u> 0: off, no current, no overload (ok) 1: on, no current, no overload (fault) 2: off, no current, no overload (fault) 3: on, no current, no overload (ok) 4: off, no current, no overload (fault) 5: on, no current, no overload (fault) 6: off, current, overload (fault) 7: on, current, overload (fault)</p>

10 Appendix F: Quick Start Guide

#	Description	Illustration	✓
1	Find a place to mount the camera in a position where the vehicles will be passing through the reflection sensitive part of the picture Sec. 1.5		
2	Make sure that the geometry is correct: <ul style="list-style-type: none"> ➤ Max height 7m ➤ Angle 20° – 30° ➤ Distance from camera to vehicle license plate 10–20m Sec. 2	<p>Note: With any configuration, the distance in between camera and license plate must be 10m and 20m</p>	
3	Mount the camera physically using the VIS Mount (drill template shown) and draw the cables Sec. 3		
4	Connect supply voltage wires and Ethernet to X2 (Ethernet pairs C and D can be omitted) Sec. 3.2		

<p>5</p>	<p>Connect the camera to the Ethernet port of an appropriate test PC. Switch on the camera power. Launch EN Setup application</p> <p>Sec. 4</p>																							
<p>6</p>	<p>Align camera mechanically to correct position by adjusting the VIS Mount and using the tools from EN Setup. Do not adjust the camera mount inside the housing.</p> <p>Sec. 4</p>																							
<p>7</p>	<p>Focus lens and make sure that the lens iris is fully open and no polarizer is mounted. Secure locking screws after adjustment</p> <p>Appendix B</p>																							
<p>8</p>	<p>Properties settings using <u>internal</u> Light Sensor:</p>   <p>Sec. 4.1</p>	<table border="1" style="width: 100%;"> <tr> <th colspan="2" style="background-color: #e0e0e0;">5 - ADR Control</th> </tr> <tr> <td>Camera ADR Control</td> <td>Manual Control</td> </tr> <tr> <td>ADR LS Gain for Side A</td> <td>3.50</td> </tr> <tr> <th colspan="2" style="background-color: #e0e0e0;">2 - Trigger</th> </tr> <tr> <td>External Trigger Source</td> <td>Serial, Ethernet</td> </tr> </table> <p>(IIT IO Board settings: X=05, Y=0A, M=C8, K=01, P=3A, Q=03, T=96)</p>	5 - ADR Control		Camera ADR Control	Manual Control	ADR LS Gain for Side A	3.50	2 - Trigger		External Trigger Source	Serial, Ethernet												
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