TPCAM-H20

Technical Manual

(Dealers only)



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Version 1.1

ComLASER

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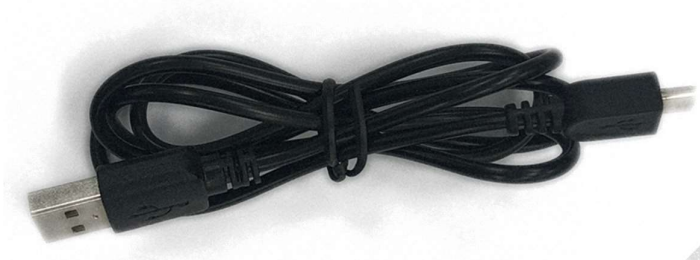
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1. Outlines

A. Dealer-only configuration

Table 1 Dealer-only Configuration

Components	Description
	OTG cable
	Laser board communication cable

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2. UI-based Key Functions

A. Tester Mode

1) **Purpose**

- To create a virtual speed enforcement environment indoors
  - ✓ i.e.) Extreme condition test, Certification test (EMI, EMC etc.)

2) **Key features**

- CS (Capture Speed) packet transmission every 4 seconds from the laser board
- When receiving CS packet, video and various log files are saved

3) **How to use**

- Sign in as "**admin-test**" on the login screen

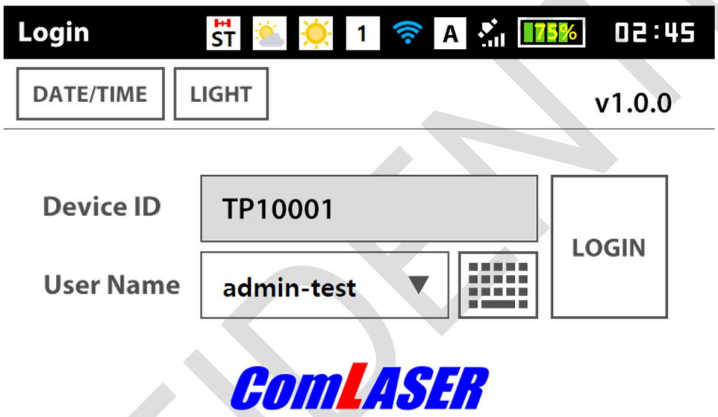


Figure 1 Tester Mode Login

- Entry into enforcement mode
- Pull the hard trigger, or activate the A.T button

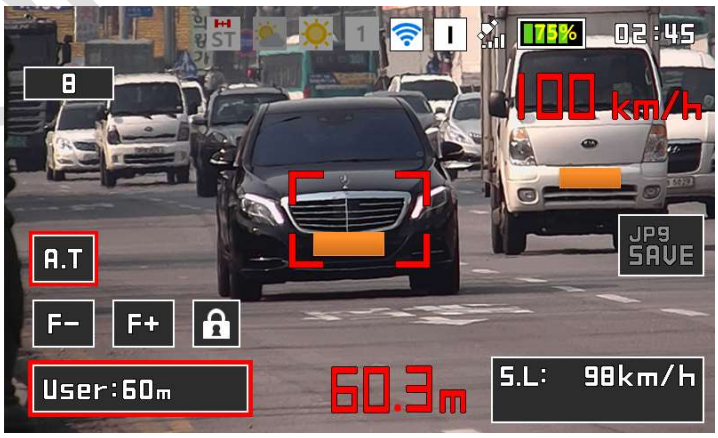


Figure 2 Tester mode enforcement

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B. Admin mode

1) **Purpose**

- To change Device ID
- Mainly used at ComLASER factory for production

2) **Key features**

- Device ID alteration
- Camera center pixel coordinate change
  - ✓ For the alignment between the camera and the laser
  - ✓ Rarely used in general
- HUD center pixel coordinate change
  - ✓ For the alignment between HUD and the laser
  - ✓ Rarely used in general
- Focus setting by distance
  - ✓ Rarely used in general

3) **How to use**

- Login as Admin
  - ✓ Sign in as "**admin-align**" on the login screen

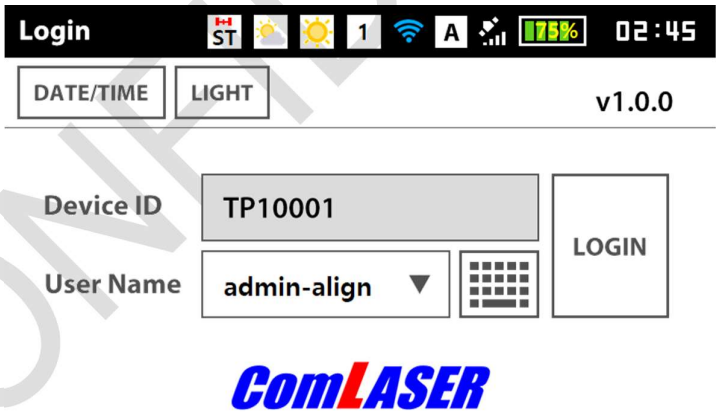


Figure 3 Admin mode login

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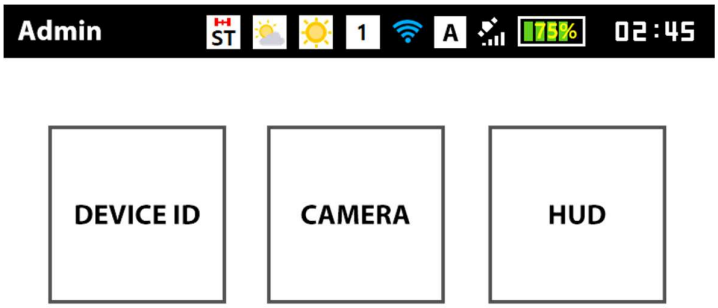


Figure 4 Admin Mode Screen

- Device ID alteration
  - ✓ Touch the DEVICE ID button on the admin screen
  - ✓ Touch the keyboard icon of Device ID
  - ✓ To replace the SSID and FTP ID with the changed Device ID, check the checkbox
  - ✓ Touch the Save Button to change

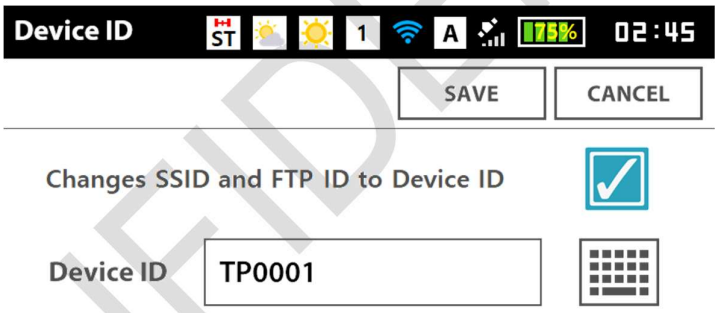


Figure 5 Device ID change

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- Changing the pixel coordinates centered on the Camera

  Instead of changing the physical optical axis of the image sensor and lens, it is used software-wise to move the center of the image that is accepted by the image sensor.

  ✓ CAMERA Button Touch in Administrator Mode



Figure 6 Camera Alignment Mode Initial Screen

Table 2 Camera Pixel Adjustment Hard Keys

Hard Key	Initial Position	Event	Changed Position
Z(+)	(104, 096)	Press 10 times	(094, 096)
Z(-)	(104, 096)	Press 10 times	(104, 106)
REC	(104, 096)	Press 10 times	(104, 086)
MODE	(104, 096)	Press 10 times	(114, 096)

✓ The applied screen is updated only when the SAVE button is touched.

✓ 1920x1080 size is cropped to 1712x888

✓ When cropped with 1712x888, the starting position is from the top left

✓ Initial starting position is 104, 96

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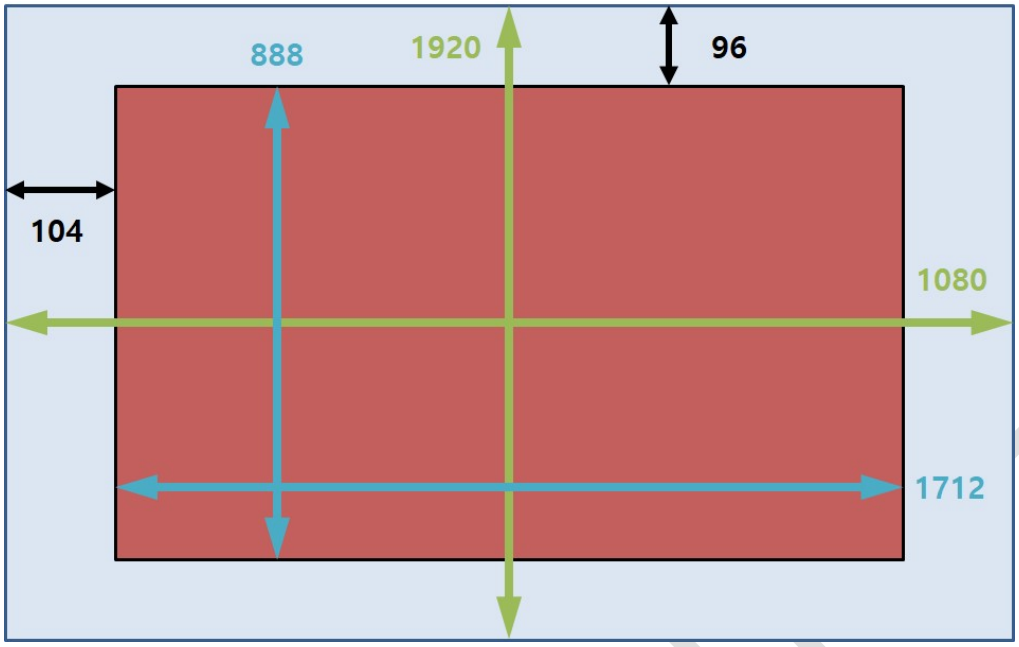


Figure 7 Camera image crop initial position (104, 96)

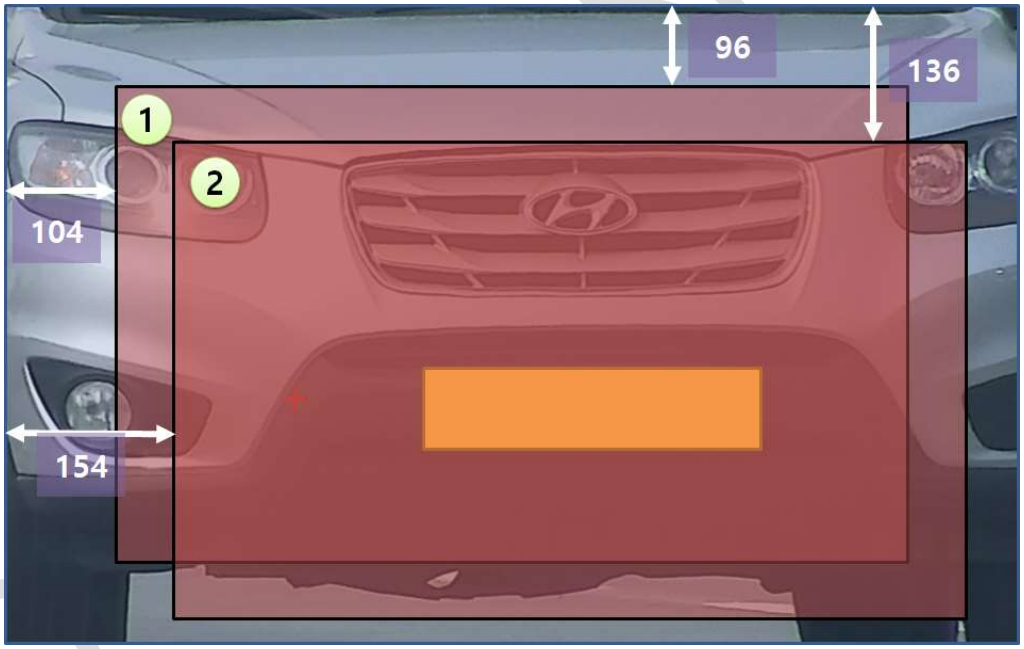


Figure 8 Crop position shift (154, 136)

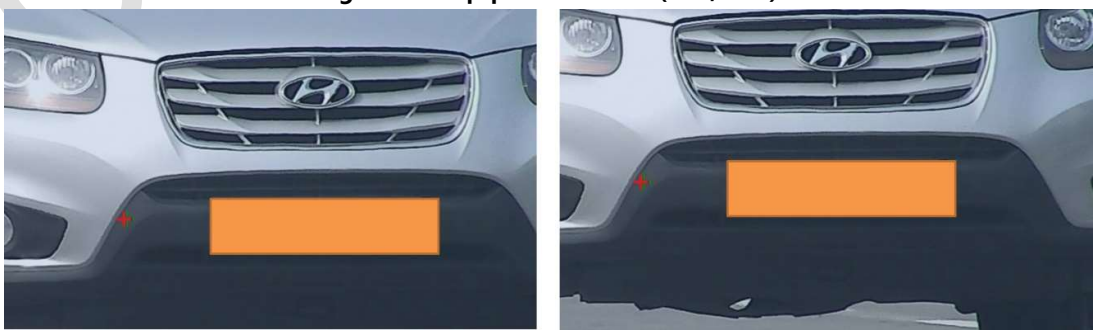


Figure 9 Initial position (left: 104, 96), moving position (right: 154, 136)

- HUD center pixel coordinate change

  Instead of changing the physical position of the HUD, it is used software-wise to change the position of the reticle that the HUD displays.

  ✓ HUD Button Touch in Admin mode

  ✓ By touching **pqrs** button at the bottom left-hand corner, it gets deactivated in HUD mode

  ✓ If the red border of the **pqrs** button disappears, it means "deactivated".

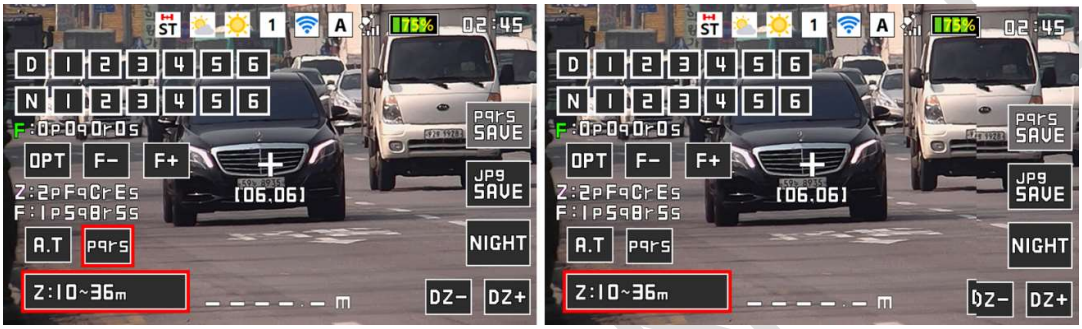


Figure 10 HUD mode - pqrs button enabled (left) and disabled (right)

Table 3 HUD pixel adjustment hard keys

Hard Key	Initial Position	Event	Changed Position
Z(+)	(06, 06)	Press 5 times	(01, 06)
Z(-)	(06, 06)	Press 5 times	(06, 01)
REC	(06, 06)	Press 5 times	(06, 11)
MODE	(06, 06)	Press 5 times	(11, 06)

✓ The initial starting position is (06, 06)

✓ Move range: (0, 0) ~ (12, 12)

✓ The HUD coordinates are only displayed on the LCD and the actual movement is the reticle of the HUD.

✓ Distance, speed and laser sensitivity indicators remain intact.

✓ Movement example

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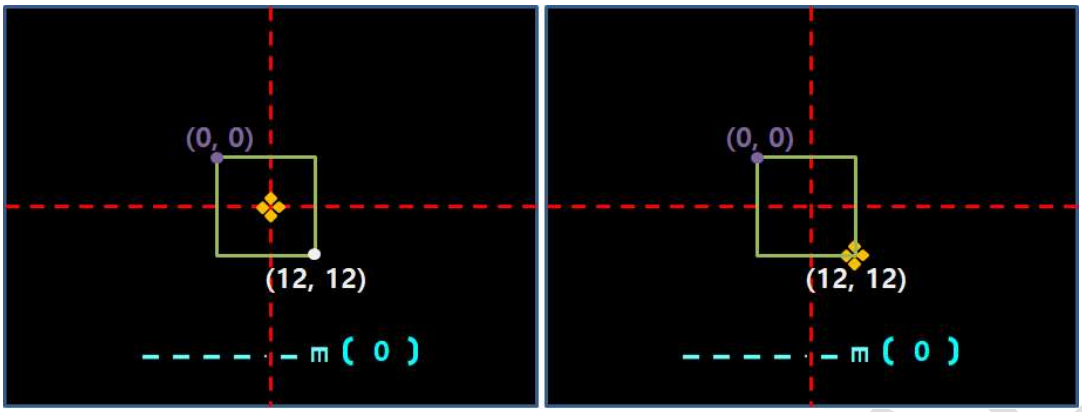


Figure 11 (6, 6) reticle position (left), (12, 12) reticle position (right)

- Camera focus setting by distance to focus the camera by distance
  - ✓ HUD Button Touch in Admin mode
  - ✓ In HUD mode, touch the pqrs button at the bottom left-hand corner to activate it
  - ✓ Targets should be selected with the distinct color
  - ✓ There should be nothing between the target and the camera

Table 4 Target position and optical zoom by distance

SEQ	Distance	Target Position	Optical zoom	Remarks
1	Z : 10~36m	23m ±2m from the camera	x8	
2	Z : 30~60m	45m ±2m from the camera	x18	
3	Z : 60 ~ 100m	80m ±3m from the camera	x23	
4	Z : 100 ~ 160m	130m ±3m from the camera	x30	Compatible with 130m distance
5	Z : 160m	160m ±3m from the camera	x30	Compatible with 130m distance
6	Z : 260m	260m ±5m from the camera	x30	Compatible with 130m distance

- ✓ Zoom and focus in the camera are saved as hexadecimal values

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Figure 12 Focus storage by distance and current focus value display

Table 5 Description of focus storage by distance and current focus value disply

Division	Description
D 1 2 3 4 5 6	Focus values storage by distance in a daytime
N 1 2 3 4 5 6	Focus values storage by distance in a nighttime
F:0p09 0r0s	Focus values currently set for zoom
Detailed Explanation	In Day and Night 1 means the 1st zoom index, 10-36m 2 means the 2nd zoom index, 36-60m 3 means the 3rd zoom index, 60-100m 4 means the 4th zoom index, 100~160m 5 means the 5th zoom index, 160m 6 means the 6th zoom index, 260m



Figure 13 Focus Control Button

Table 6 Focus Control Button Description

Division	Description
OPT	➢ Acronym for One Push Trigger ➢ After A.F is executed once, turning off A.F ➢ Keeping focus until the next OPT is executed
F−	➢ Fine movement of the lens position toward the image sensor
F+	➢ Fine movement of the lens position in the opposite direction of the image sensor

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Figure 14 Display of current zoom and focus values

Table 7 Current zoom and focus value display description

Division	Description
Z:2pFqCrEs	➢ Current camera zoom position ➢ The higher the value, the more telephoto ➢ Pressing the Z(+) hard key changes this value
F:1pSq8rSs	➢ Current lens focus position ➢ The higher the value, the farther away from the image sensor ➢ When the F-, F+ button is touched, fine adjustment is possible in increments of -5, +5

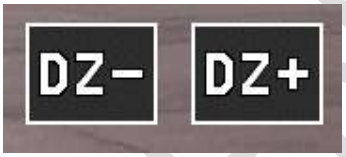


Figure 15 Digital Zoom Button

Table 8 Digital Zoom Button Description

Division	Description
DZ-	Stepwise increment of Digital Zoom function
DZ+	Stepwise decrement of Digital Zoom function



Fi gure 16 Nighttime Mode Change Button

Table 9 Nighttime Mode Button Description

Division	Description
NIGHT	Nighttime Mode off : Focus for day time zoom
NIGHT	Nighttime Mode on : Focus for nightt ime zoom

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Figure 17 Focus Saving Button

Table 10 Focus Saving Button Description

Division	Description
JPG SAVE	➢ Saving currently-displayed zoom & focus values into RAM ➢ Saving camera image as evidence ➢ Example) When touching JPG SAVE Button at 10~36m distance zoom, it changes like D I ⇨ D I ➢ File storage path : SD/factory/YYYYMMDDhh/
pqrs SAVE	➢ Saving focus values by distance stored in RAM into file ➢ Disabled when there is no focus change ➢ Press this button to maintain the focus setting values even when rebooting Example) After touching JPG SAVE Button at 10~36m distance and after touching pqrs Button pqrs SAVE ⇨ pqrs SAVE, it changes like D I ⇨ D I, pqrs SAVE ⇨ pqrs SAVE

✓ Example of focus value changes (sequential pictures listed)



Figure 18 (Example)10~30m Focus Setting Initial Screen

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Figure 19 (Example)10~30m OPT Button Touch



Figure 20 (Example)10~30m F- Button Touch

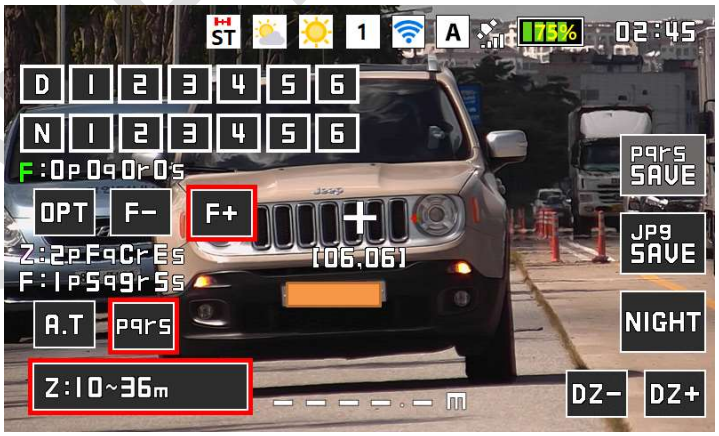


Figure 21 (Example)10~30m F+ Button Touch

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Figure 22 (Example)10~30m JPG SAVE Button Touch



Figure 23 (Example)10~30m pqrs SAVE Button Touch



Figure 24 (Example)36~60m Focus Setting Initial Screen

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Figure 25 (Example)36~60m OPT Button Touch



Figure 26 (Example)36~60m F- Button Touch



Figure 27 (Example)36~60m F+ Button Touch

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Figure 28 (Example)36~60m JPG SAVE Button Touch



Figure 29 (Example)36~60m pqrs SAVE Button Touch



Figure 30 (Example)60~100m Nighttime Focus Setting Initial Screen

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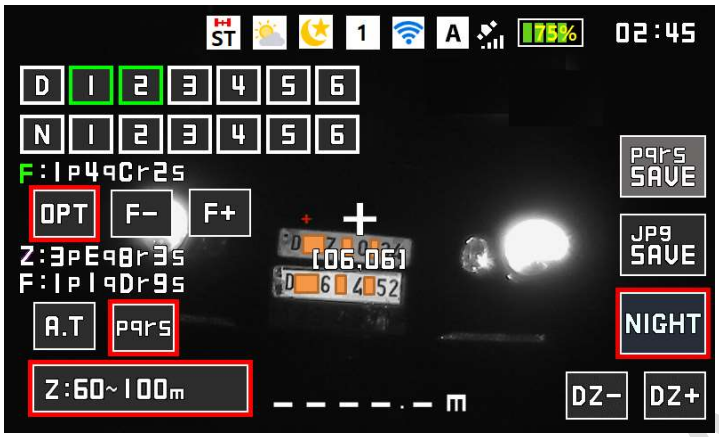


Figure 31 (Example)60~100m Nighttime OPT Button Touch

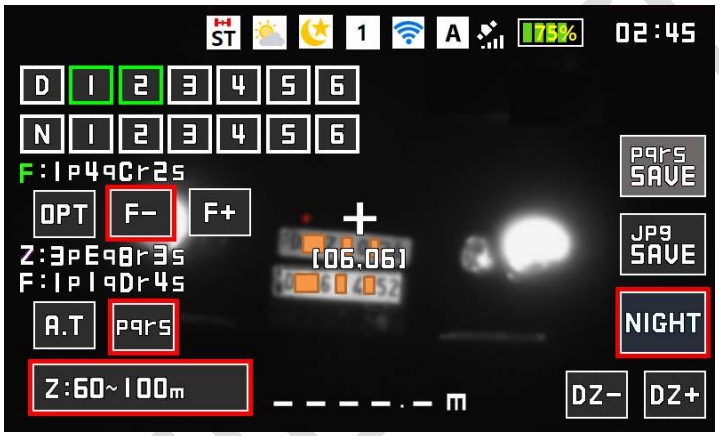


Figure 32 (Example)60~100m Nighttime F- Button Touch

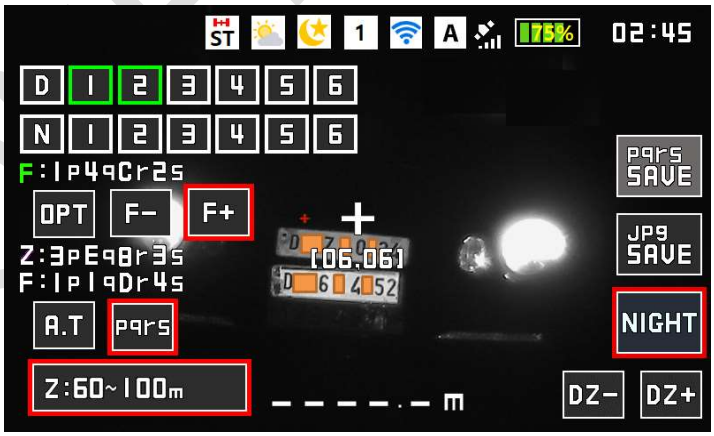


Figure 33 (Example)60~100m Nighttime F+ Button Touch

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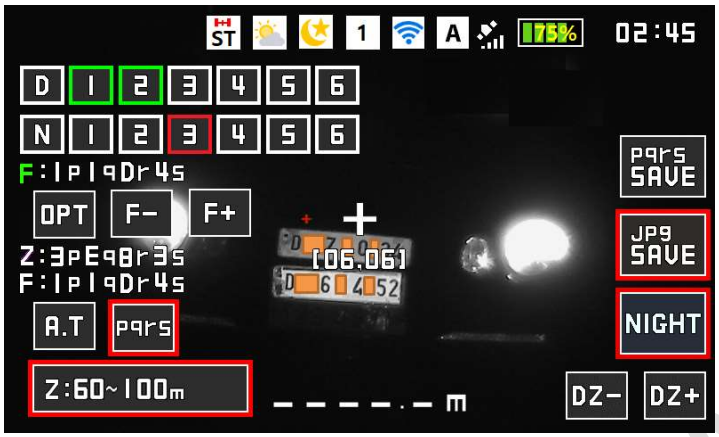


Figure 34 (Example)60~100m Nighttime JPG SAVE Button Touch

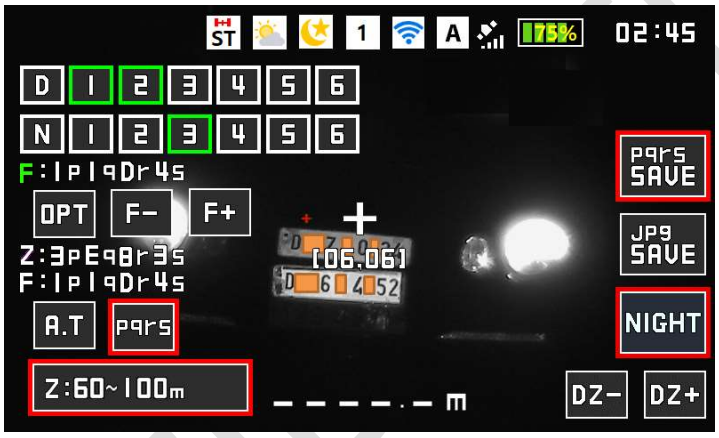


Figure 35 (Example)60~100m Nighttime pqrs SAVE Button Touch

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3. File-based key functions

A. Camera exposure settings

Detailed setup of Image Brightness on Setting 2

1) **File Location**

SD Root Directory/cam_auto_expos_ww.txt

2) **File Contents**

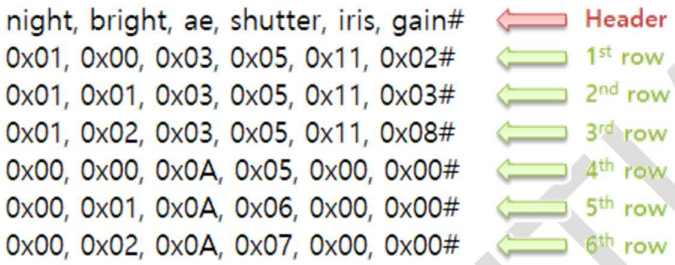


Figure 36 cam_auto_expos_ww.txt file contents

Table 11 cam_auto_expos_ww.txt column description

Row No.	Description
1	Set when Night mode is “on” and image brightness is “Dark”
2	Set when Night mode is “on” and image brightness is “Normal”
3	Set when Night mode is “on” and image brightness is “Bright”
4	Set when Night mode is “off” and image brightness is “Dark”
5	Set when Night mode is “off” and image brightness is “Normal”
6	Set when Night mode is “off” and image brightness is “Dark”

Table 12 cam_auto_expos_ww.txt line Description

Columm Name	Description	Remarks
night	0x01 : Night filter on (Bare filter) 0x00 : Night filter off (IR-cut filter)	Night mode Irrelevant to Settings
bright	0x00 : Image brightness is Dark 0x01 : Image brightness is Normal 0x02 : Image brightness is Bright	Do not change
ae	0x00 : Full auto exposure mode 0x03 : Manual control mode 0x0A : Shutter priority auto exposure mode 0x0B : Iris priority auto exposure mode	
shutter	0x05 : 1/250 sec 0x06 : 1/500 sec	

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	0x07 : 1/700 sec **0x08 : 1/1000 sec** **0x09 : 1/1600 sec** **0x0A : 1/2500 sec** **0x0A : 1/5000 sec**	
iris	**0x09 : F 7.53** **0x0A : F 5.72** **0x0B : F 4.75** **0x0C : F 3.91** **0x0D : F 3.48** **0x0E : F 3.04** **0x0F : F 2.55** **0x10 : F 2.17** **0x11 : F 1.70**	
gain	**Value x 4dB** **Example : If the value is 0x01, 1x4=4dB**	

B. Focus value settings by distance

Apart from setting the focus values by Admin ID,
it can also be done by copying files.

1) **Be ready with the file**
   - The file name must be the same
   - Refer to Table 15 ~ Table 17

2) **Procedures**
   - Power off TPCAM H20 unit
   - Take out a SD card from the unit
   - Insert the SD card into the user's PC
   - Copy focus files to the SD card root directory
     - ✓ Only the relevant one in 6 files is to be modified
   - Take out the SD card and insert it into TPCAM H20 unit
   - Boot up the TPCAM H20 unit

C. Blocking the speed enforcement under 60m distance

This function is to block the speed enforcement function under 60m distance while in use of "User mode off".

1) **File location**

SD card root directory/H20_config.txt

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2) **Options**

- Show 60m : 0
  - ✓ Hidden
- Show 60m : 1
  - ✓ Visible (default)

D. Encryption

When SD card is lost, it is used to protect enforcement information and personal information

1) **File Location**

SD card root directory/H20_config.txt

2) **Options**

- Encryption : 0
  - ✓ Still image and video not encrypted (default)
- Encryption : 1
  - ✓ Still image and video encryption

E. Wi-Fi Settings

1) **File Location**

SD card root directory/H20_config.txt

2) **Options**

- WiFi_Mode : 0
  - ✓ A.P mode operation (default)
  - ✓ Refer to H20_WiFi_Setting_as_AP.pptx file
- WiFi_Mode : 1
  - ✓ STA (Station) mode operation
  - ✓ Refer to H20_WiFi_Setting_as_STA.pptx file

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4. File Structure

A. Basic structure

TPCAM H20 consists of 2 physical storage devices and 4 partitions

Storage	Partition	Foramt	Contents
Nand Flash	nand1	FAT	H20 exe files Visible images on the program Various utility programs
	nand2	FAT	Camera focus setting System setting related files
	nand3	FAT	None
SD card	mmc block	FAT32 or exFAt	Enforcement video and various logs

1) **Nand Flash**

- **Only for developers**
- **Description is excluded in this dealer's manual**

2) **SD card**

B. SD card directory structure

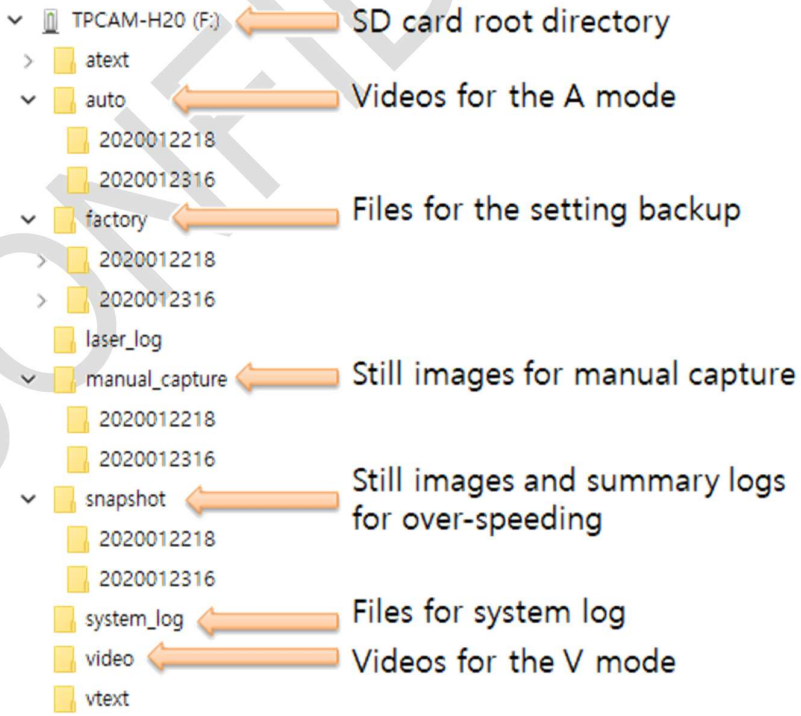


Figure 37 File Structure

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C. atext

1) **Purpose**

- For ComLASER developer's debugging purpose
- RTS information storage for the single enforcement

2) **File Location**

- SD card root directory/atext/YYYYMMDDhh/

3) **File Naming**

- File name : AS_index_YYYYMMDD_hhmmss.txt
- AS : Prefix indicating that it is an atext file
- Index: RTS log file index assigned by the system
- YYYYMMDD : year, month, day
- hhmmss : hour, minute, second

4) **File Contents**

- RTS log before CS packet is received
- CS packet information is not saved

```
[15:05:06.374] 00001, 028, +199km/h, 123m
[15:05:06.677] 00001, 028, +199km/h, 106m
[15:05:06.959] 00001, 028, +199km/h, 90m
[15:05:07.260] 00001, 028, +200km/h, 73m
[15:05:07.573] 00001, 028, +200km/h, 56m
[15:05:07.875] 00001, 028, +200km/h, 40m
```

Figure 38 atext log contents (Example)

Table 13 atext log description (Example)

Seq.	Contents	Description	Remarks
1	[15:05:06.374]	Logged time	
2	00001	Vehicle index assigned by the system	
3	028	Vehicle index given by the laser board	
4	+199km/h	RTS	
5	123m	Distance	

D. auto

1) **Purpose**

- To save video files that are captured in Image+Video mode
- The delimiter is designated as'_' for parsing the file name

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2) **File Location**

- SD card root directory/auto/YYYYMMDDhh/

3) **File Naming**

- File name : omitted
- AV : Prefix indicating that the video is captured in Image+video mode
- 00000 : Vehicle index assigned by the system
- YYYYMMDD : year, month, day
- hhmmss.ms : hour, minute, second and 1/10 second
- Laser Measurement Speed
  - ✓ P : Positive Speed (with plus speed indication)
  - ✓ M : Negative Speed (with minus speed indication)
  - ✓ Speed
- Speed Limit
  - ✓ Legal speed limit marked on the road
- Actual speed limit (Capture Speed Limit)
  - ✓ The speed at which the police actually enforces.
- Distance
  - ✓ Distance between H20 and vehicle at the time of enforcement
  - ✓ Up to 4 digits
- Enforcement Settings
  - ✓ U : Usermode ON, N : Usermode OFF
  - ✓ I : Image only, A : Image + Video, V : Video only
  - ✓ N : Normal vihecle, T : Truck
  - ✓ Zoom level : Currently set zoom level
  - ✓ 5 digits
- Latitude
  - ✓ N : North, S : South
  - ✓ Latitude coordinates (unit: degrees)
- Longitude
  - ✓ W : West, E : East
  - ✓ Longitude coordinates (unit: degrees)
- User input location
- Login ID

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- Device ID
- Unit
  - ✓ S : SI unit, B : Britsh unit

E. factory

1) **Purpose**
   - To check the current settings
   - To save evidence for focus value in Admin mode
   - Even if you change the files in this folder, the system does not change
2) **File Location**
   - SD card root directory/factory/YYYYMMDDhh/
3) **Point of creation**
   - By the time when touching Show Information Button on Setting 3
     - ✓ Comprehensive configuration file creation
     - ✓ Copying files in Nand2
   - By the time when touching JPG SAVE button and pqrs SAVE button in HUD mode
     - ✓ JPG SAVE button : It saves the video as jpg file
     - ✓ pqrs SAVE button : It modifies camera focus values in nand2
4) **File types**

Table 14 factory folder file types

Assortment	Description	File name
Comprehensive configuration file	Values set in the system and laser board	Extension ver
System-related configuration file	Configuration file excluding laser board	Folder name h10
Camera focus setting	Focus value by day/night distance	look_up_table*.txt
Camera focus photo	Photos taken in HUD mode	PQRS_*.jpg
Alignment setting	HUD set in Admin mode, the alignment pixel coordinates of the camera	HUD : olde_focus_pos.txt CAM : align_start_pos.txt

5) **File Contents**
   - Comprehensive configuration file: omitted
   - System-related configuration file: omitted

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- Camera focus setting file description

Table 15 Camera focus setting file description

File Name	Description
look_up_table_hud_day_focus_ww.txt	Focus by distance at daytime in HUD mode
look_up_table_hud_night_focus_ww.txt	Focus by distance at night in HUD mode
look_up_table_night_user_mode_off_focus_ww.txt	Focus in “usermode off” at night
look_up_table_night_user_mode_on_focus_ww.txt	Focus in “usermode on” at night
look_up_table_user_mode_off_focus_ww.txt	Focus in “usermode off” at daytime
look_up_table_user_mode_on_focus_ww.txt	Focus in “usermode on” at daytime

✓ User mode on file contents sescription

Table 16 User mode on Focus File Contents (Example)

열 번호	내용	Description
1	0x01, 0x01, 0x0E, 0x08, @60m#	60m focus value (pqrs = 0x11E8)
2	0x01, 0x01, 0x0E, 0x08, @80m#	80m focus value (pqrs = 0x11E8)
3	0x00, 0x09, 0x08, 0x0A, @100m#	100m focus value (pqrs = 0x098A)
4	0x00, 0x09, 0x08, 0x0A, @120m#	120m focus value (pqrs = 0x098A)
5	0x00, 0x09, 0x08, 0x0A, @140m#	140m focus value (pqrs = 0x098A)
6	0x00, 0x09, 0x08, 0x0A, @160m#	160m focus value (pqrs = 0x098A)
7	0x00, 0x09, 0x08, 0x0A, @180m#	180m focus value (pqrs = 0x098A)
8	0x00, 0x09, 0x08, 0x0A, @200m#	200m focus value (pqrs = 0x098A)
9	0x00, 0x09, 0x08, 0x0A, @220m#	220m focus value (pqrs = 0x098A)
10	0x00, 0x09, 0x08, 0x0A, @240m#	240m focus value (pqrs = 0x098A)
11	0x00, 0x09, 0x08, 0x0A, @260m#	260m focus value (pqrs = 0x098A)

✓ User mode off file contents Description

Table 17 User mode off Focus File Contents (Example)

열 번호	내용	Description
1	0x01, 0x05, 0x09, 0x05, @10~36m#	10~36m focus value (pqrs = 0x1595)
2	0x01, 0x04, 0x0C, 0x02, @36~60m#	36~60m focus value (pqrs = 0x14C2)
3	0x01, 0x01, 0x0E, 0x08, @60~100m#	60~100m focus value (pqrs = 0x11E8)
4	0x00, 0x09, 0x08, 0x0A, @100~160m#	100~160m focus value (pqrs = 0x098A)
5	0x00, 0x09, 0x08, 0x0A, @160m+	160m over focus value (pqrs = 0x098A)

F. laser_log

1) **Purpose**

- For ComLASER developer’s debugging purpose

✓ Checking laser board status

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- ✓ Checking laser board settings

2) **File Location**

- SD card root directory/laser_log /

3) **File Naming**

- File name : laser_log_index_YYYYMMDD_hhmmss.txt
- laser_log : Leading letter indicating that it is a laser log file
- Index : Laser log index assigned by the system
- YYYYMMDD : year, month, day
- hhmmss : hour, minute, second

4) **File Contents**

- Information transmitted and received through serial communication
  - ✓ Laser board setting
  - ✓ C.S

```
[16:42:44] TX_SELF_TEST
[16:42:44] TX_TEST_MODE : 0x00
[16:42:44] RX_SELF_TEST_RESULT : 0x01
[16:42:44] RX_MESSAGE_INFO : TestInLAB_Mode=0
[16:42:45] TX_UNIT_INFO : 0x00
[16:42:45] TX_USER_MODE : 0x01
[16:42:45] TX_WEATHER_MODE : 0x00
[16:42:45] TX_NIGHT_MODE : 0x00
[16:42:45] TX_ANTI_JAMMING_MODE : 0x00
[16:42:45] TX_VERSION_INFO
[16:42:45] RX_MESSAGE_INFO : F/W ver: 1.0.1b
[16:42:45] RX_MESSAGE_INFO : Build: Nov 21 2019
[16:42:45] RX_MESSAGE_INFO : [ComLASER TPCAM-H20]
[16:42:45] RX_MESSAGE_INFO : H/W ver: 0.2
[16:42:45] RX_MESSAGE_INFO : SN: TPCAM-H20-00002
[16:42:45] RX_MESSAGE_INFO : PLD ver: 2.1
[14:00:05] TX_ALL_INFO
```

Figure 39 laser_log contents (Example)

Table 18 laser_log Description (Example)

Seq.	Contents	Description	Remarks
1	[16:42:44]	Logged time	
2	TX_SELF_TEST	SELF_TEST execution command	
3	TX_TEST_MODE : 0x00	TEST 0x00 setting command	

G. manual_capture

1) **Purpose**

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- This is to capture and save the video manually
  - ✓ Capturing time point is whenever the user needs
  - ✓ This is irrelevant to speeding

2) **File Location**
   - SD card root directory/manual_capture/YYYYMMDDhh/

3) **File Naming**
   - File name : Omitted
   - Refer to the auto file name description
     - ✓ Fixed at speed 0km/h, distance 0m

H. snapshot

1) **Purpose**
   - To save still images of over-speeding vehicles
   - To save the comprehensive description file of speed enforcement data captured on a hourly basis

2) **File Location**
   - SD card root directory/snapshot/YYYYMMDDhh/

3) **File Naming**
   - Still Image
     - ✓ File name : Omitted
     - ✓ Refer to the auto file name description
   - Comprehensive Enforcement File Naming
     - ✓ File name : YYYYMMDDhh_summary.txt
     - ✓ Content : Each item is separated by a tab

Seq.	Column	Remarks
1	Time	
2	S/W index	
3	Still image path	
4	Movie path	
5	Real time speed log path	For developer only
6	Measured speed	
7	Speed limit setting	
8	Capture speed limit setting	
9	Measured distance	
10	User mode	
11	Enforcement mode	

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12	Dual speed mode	
13	Distance level setting	
14	GPS latitude	
15	GPS longitude	
16	User input location	
17	User ID	
18	Device ID	
19	Unit	
20	Printed	Thermal printing or not at the enforcement sites
21	Encryption	
22	Night mode	

I. system_log

1) **Purpose**

- To save system information

2) **File Location**

- SD card root directory/system_log/

3) **File Naming**

- File name : system_log_index_YYYYMMDD_hhmmss.txt
- system_log : Leading character indicating that it is a system_log file
- index : System log index assigned by the system
- YYYYMMDD : year, month, day
- hhmmss : hour, minute, second

4) **File Contents**

- S/W version and release date
- S/W setting
- Battery level
- User event
- GPS detection info

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[16:42:34] POWER_ON : v2.1.2 (2020/02/13)
[16:42:45] JSON_DEVICEID_ON_BOOT : TP10001
[16:42:45] JSON_USERNAME_ON_BOOT : admin-align1, admin-test1, name3, name4, name5
[16:42:45] JSON_DEFAULT_SETTINGS_ON_BOOT : location = loc1, location = loc2, location = loc3, location = loc4, location = loc5, speed_limit_car = 10, speed_limit_truck = 10, dual_speed_index = 0, enforcement_mode_index = 0, user_mode_index = 1,
[16:42:45] JSON_ADVANCED_SETTINGS_ON_BOOT : reticle_shape_index = 1, weather_mode_index = 0, image_brightness_index = 1, night_mode_index = 0, anti_jamming_mode_index = 0, lcd_brightness_index = 1, unit_index = 0, date_format_index = 0, power_save_time_index = 0,
[16:42:45] JSON_ADVANCED_SETTINGS_ON_BOOT : network_ssid = 12345678, network_pw = 12345678, ip_address_1 = 192, ip_address_2 = 168, ip_address_3 = 10, ip_address_4 = 1, subnet_mask_1 = 255, subnet_mask_2 = 255, subnet_mask_3 = 255, subnet_mask_4 = 0,
[16:42:45] CAMERA_ALIGNMENT_POS_ON_BOOT : 70,96
[16:42:45] HUD_FOCUS_POS_ON_BOOT : 6,6
[16:42:45] BATTERY_STATUS : 77.64%(12.046V) / L4 / C
[16:42:48] DISPLAY_FOREGROUND_MENU : DISPLAY_LOGIN
[16:42:54] BATTERY_STATUS : 77.64%(12.050V) / L4 / U

Figure 40 system_log contents (Example)

Table 19 system_log Description (Example)

Seq.	Contents	Description	Remarks
1	[16:42:34]	Logged time	
2	POWER_ON	Name of event	
3	v2.1.2(2020/02/13)	S/W version and release date	

J. video

1) **Purpose**
   - To save over-speeding vehicles' video
2) **File Location**
   - SD card root directory/video/YYYYMMDDhh/
3) **File Naming**
   - File name : Omitted
   - Refer to the auto file name description

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5. S/W Upgrade

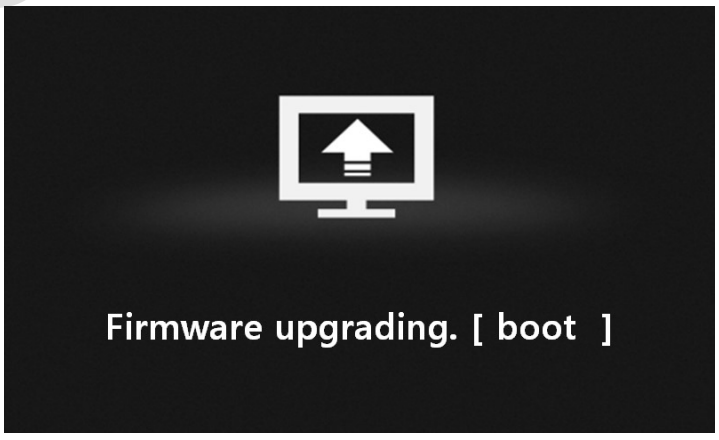
A. Item

1) **Main Board**
2) **Laser Board F/W**
3) **MM308B series camera**

B. Main Board

1) **In case of using SD card**

- Bootloader, mtd, H20 main program upgrades
- SD card format
  - ✓ Supports FAT32 and exFAT (exFAT format is preferably recommended)
  - ✓ NTFS format is not supported
- Required files
  - ✓ Bootloader : bootloader.rom
  - ✓ mtd : mtd.rom
  - ✓ H20 main program : nand1.fai
  - ✓ If any file is missing out of 3 files mentioned above, the rest files will be upgraded.
- Procedures
  - ✓ Turn off the power of H20 unit
  - ✓ SD card removal from IO board
  - ✓ SD card insertion into the PC
  - ✓ Copy bootloader.rom, mtd.rom, nand1.fai files into SD card root directory
  - ✓ SD card removal from the PC
  - ✓ SD card insertion into H20 unit
  - ✓ Turn on the power of H20 unit
  - ✓ Upgrade in progress automatically



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Figure 41 Bootloader Upgrade Screen

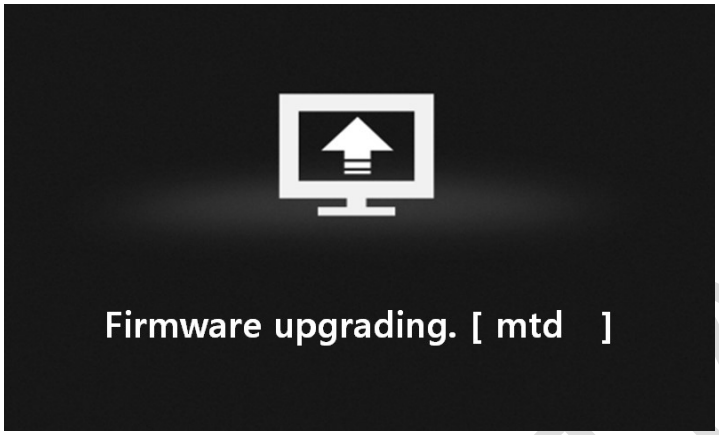


Figure 42 mtd Upgrade Screen

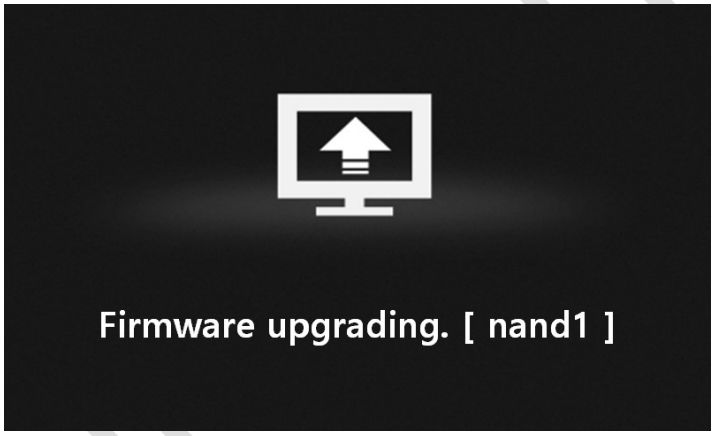


Figure 43 H20 Main Program Upgrade Screen

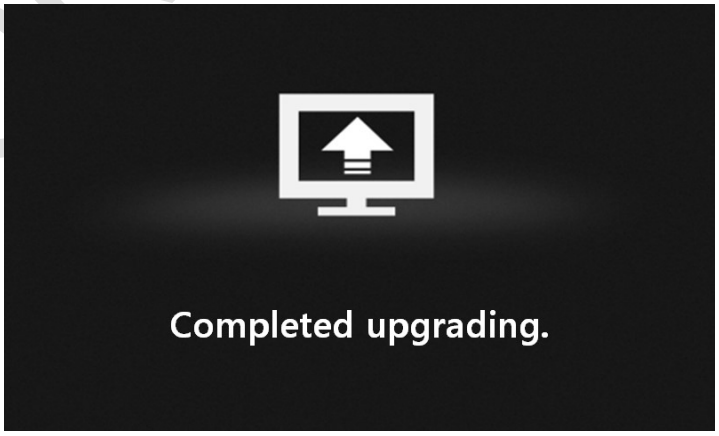


Figure 44 Upgrade Completion Screen

✓ When the upgrade complete screen appears, H20 should be rebooted

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✓ Check the S/W version and the release date from H20 SELF-TEST screen

2) **In case of using OTG cable**

- Bootloader, mtd, H20 main program upgrades
- Required files
  - ✓ Bootloader : bootloader.rom
  - ✓ mtd : mtd.rom
  - ✓ H20 main program : nand1.fai
- Procedures
  - ✓ **Turn on the power of H20 unit**
  - ✓ **Move to Setting 3 Screen**
  - ✓ **Click "Show Information" button**
  - ✓ **Turn off the power of H20 unit**
  - ✓ **Insert the SD card to PC**
  - ✓ **Back up all files of "SD card/factory/Show information button touch time" to PC**
  - ✓ Copy Bootloader.rom, mtd.rom, nand1.fai files provided by ComLASER to PC
  - ✓ Connect to PC with H20 dedicated OTG cable
  - ✓ Turn on the power of H20 unit
  - ✓ FWDN Program execution

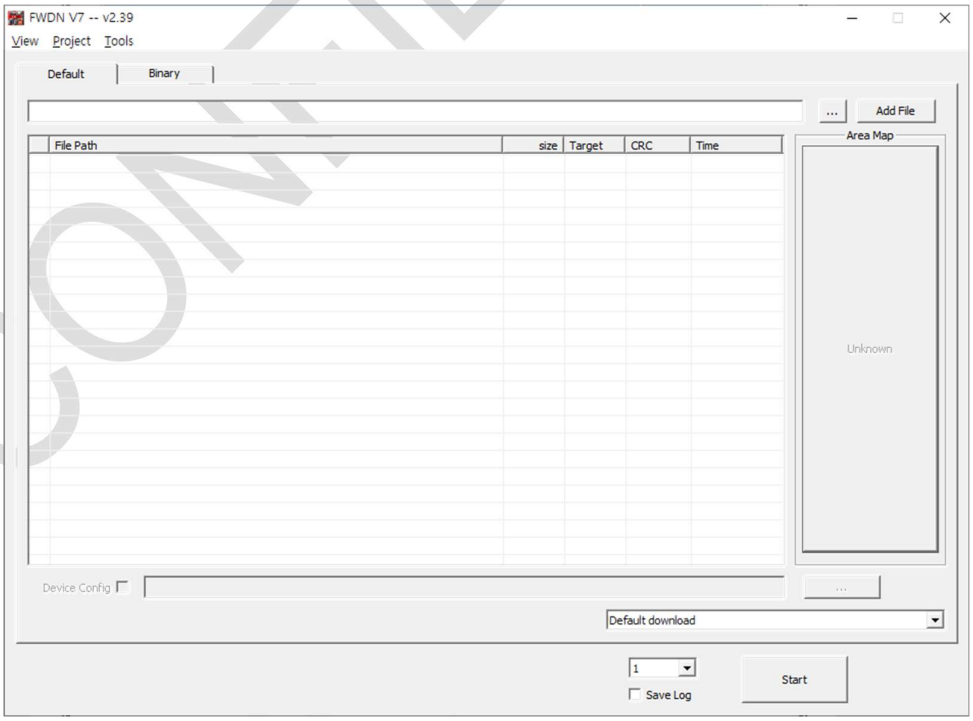


Figure 45 FWDN initial execution screen

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✓ Closing Device Probing Error Window

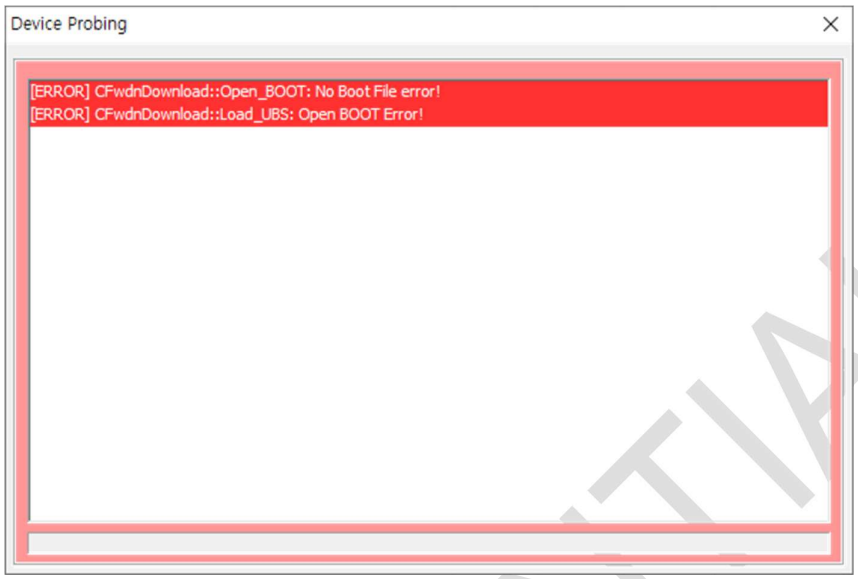


Figure 46 Device Probing Error Window

✓ "..." button click

✓ Select Bootloader.rom, mtd.rom and nand1.fai files copied to PC

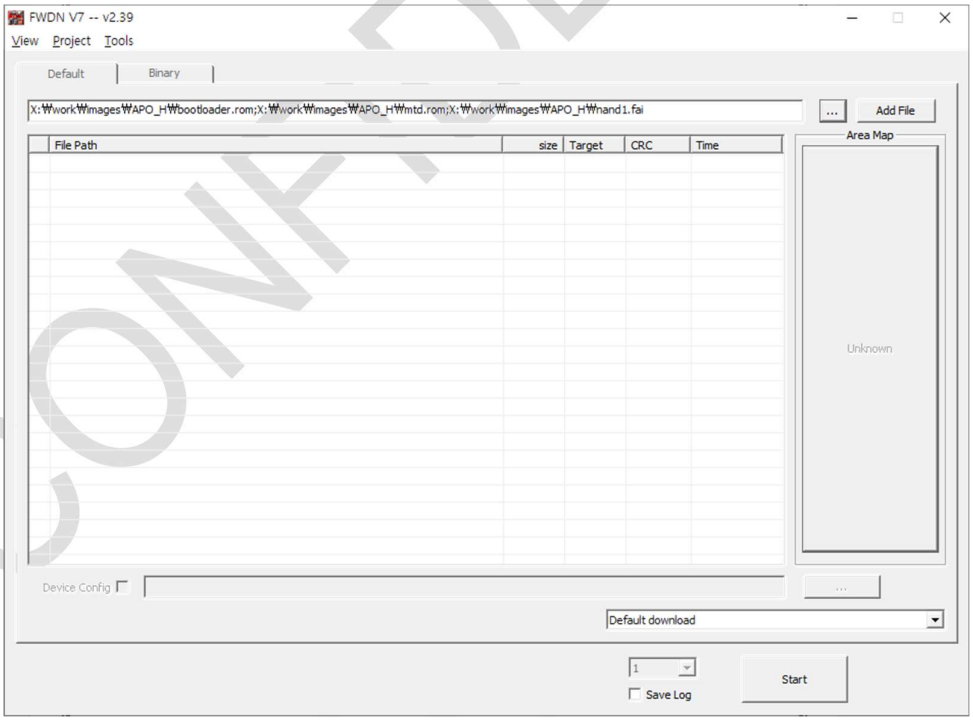


Figure 47 bootloader, mtd and nand1fai files selection

✓ Click "Add File" button

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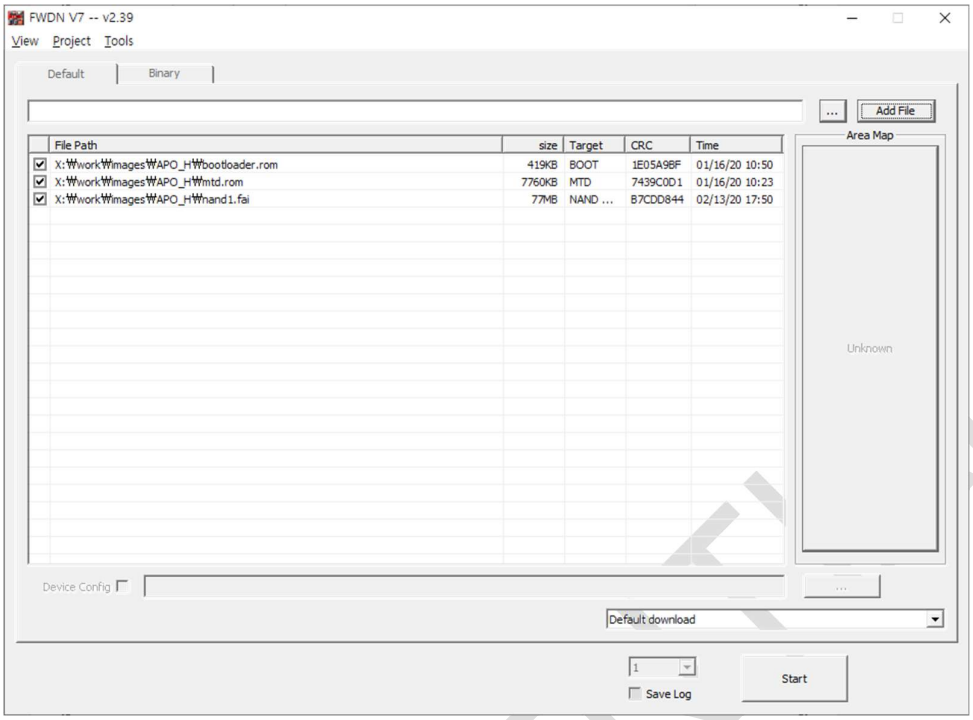


Figure 48 Add to upgrade list with "Add File" button

- ✓ Select items to upgrade (select all for example)
- ✓ Click "Start" button

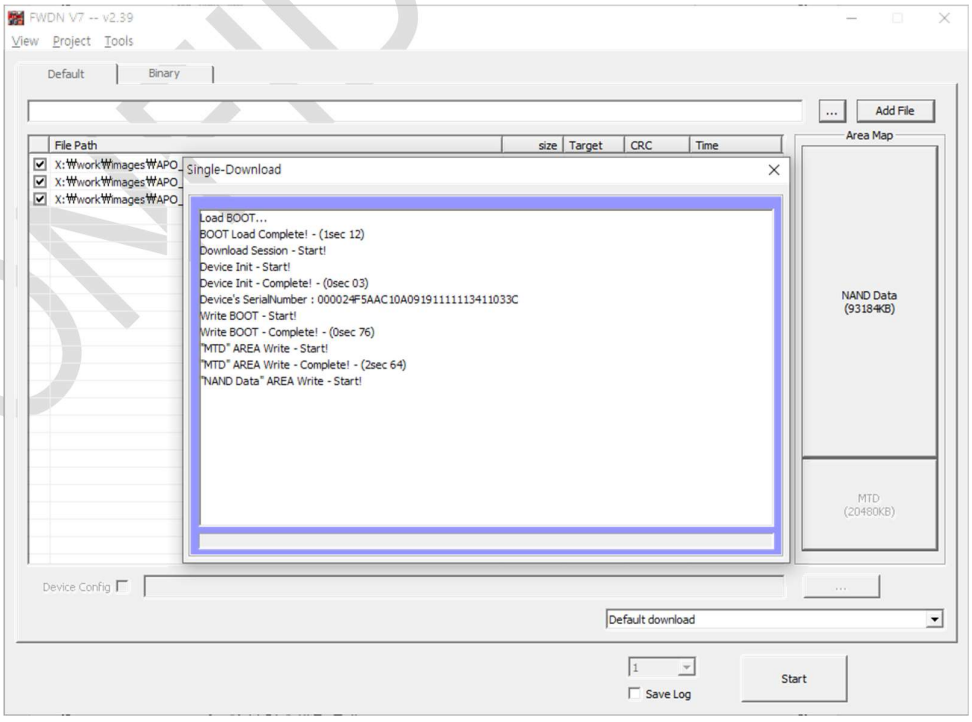


Figure 49 Upgrade proceeds after clicking "Start" button

- ✓ Upgrade completed

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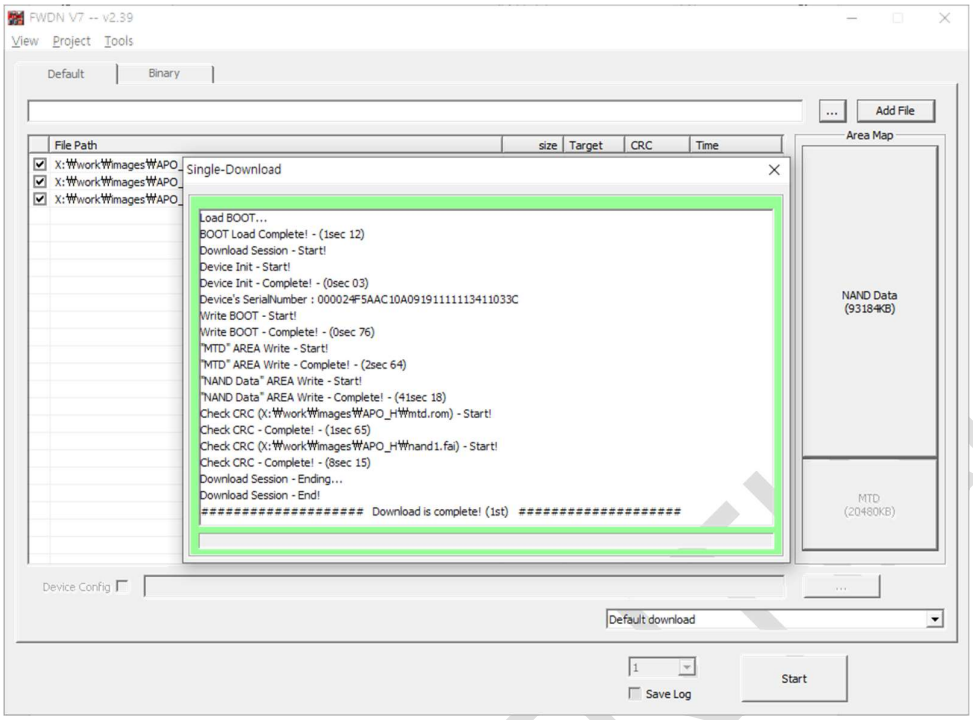


Figure 50 Upgrade complete

- ✓ FWDN Program termination
- ✓ H20 rebooting
- ✓ Check the S/W version and release date from the H20 SELF-TEST screen

- Cautions
  - ✓ **This method initializes all data in nand flash**
  - ✓ **Focus setting values by distance need to be reset**
  - ✓ **Device ID needs to be reset**
  - ✓ **Network needs to be reset**

C. Laser board

1) Laser board F/W Upgrade by using external cable

- For the use of a laser board F/W upgrade only
- Procedures
  - ✓ Connection of H20 external cable for laser board communication

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Figure 51 Connection of H20 external cable for laser board communication

- ✓ Copy the F/W file provided by ComLASER to PC
- ✓ HyperTerminal program execution
- ✓ Enter TEST in the "Name:" field

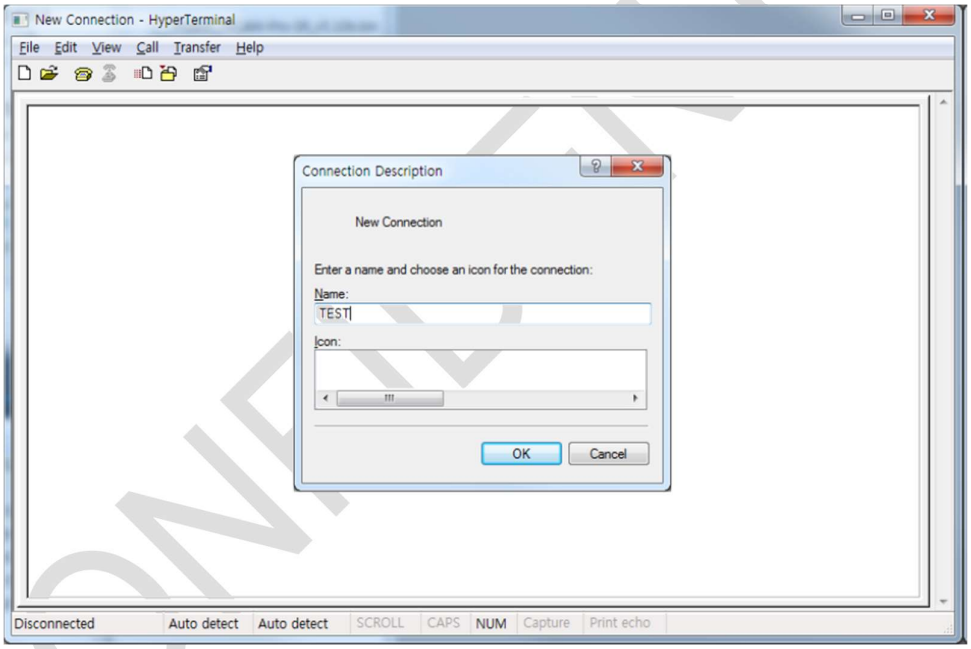


Figure 52 HyperTerminal Program initial Screen

- ✓ Serial port number setting (may differ for each PC)

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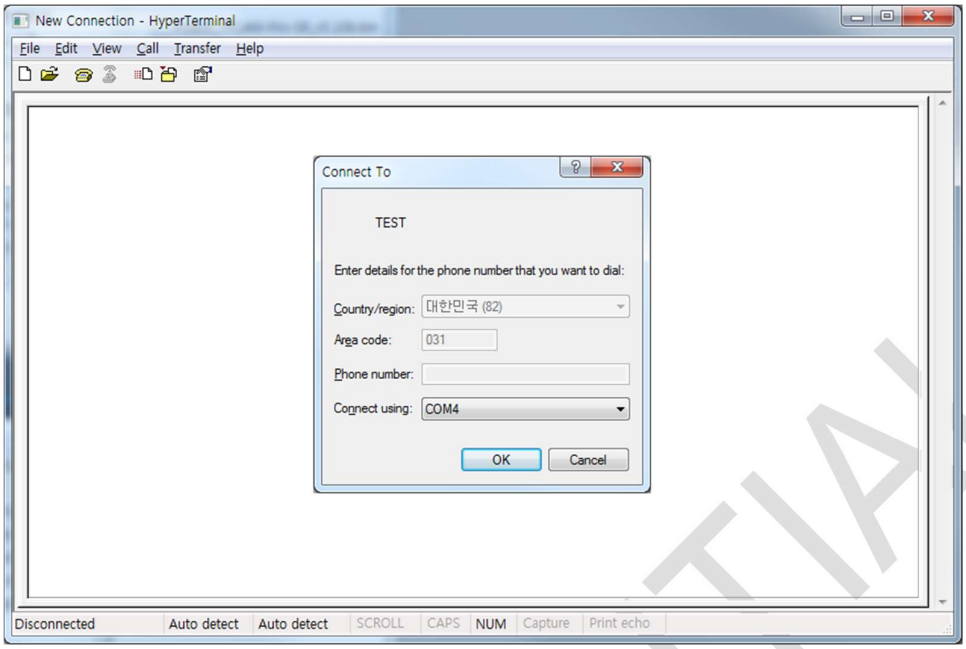


Figure 53 Serial port number setting (No. 4 in this example)

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✓ Serial properties

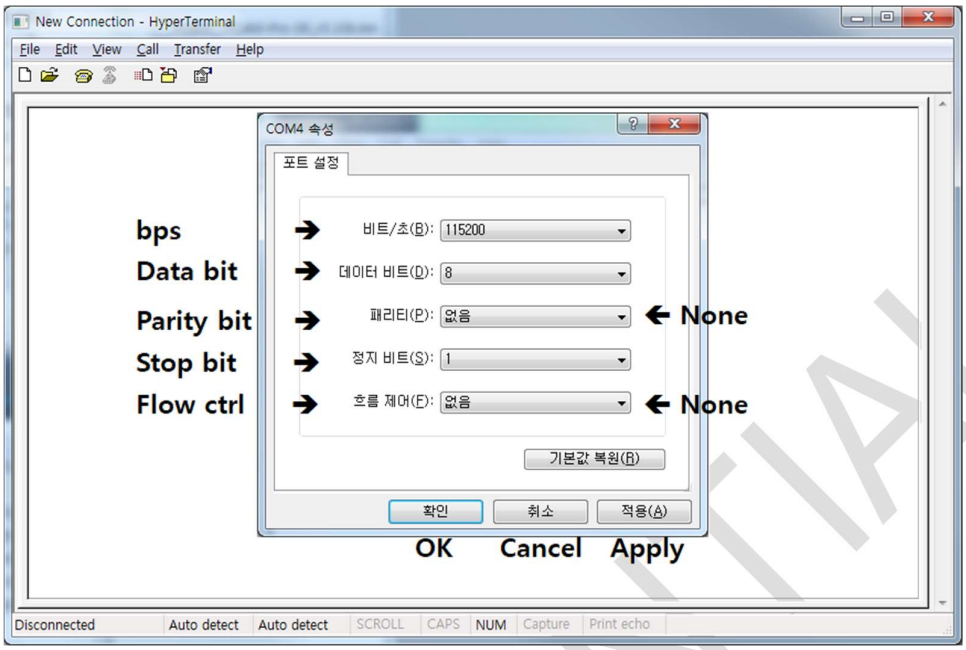


Figure 54 Serial property setting

✓ Click "OK" button

✓ Ctrl+W ➔ W ➔ Enter Key input

✓ You can see that the 'C' character occurs one per second

✓ When 'C' is displayed, quickly click the "Send" icon

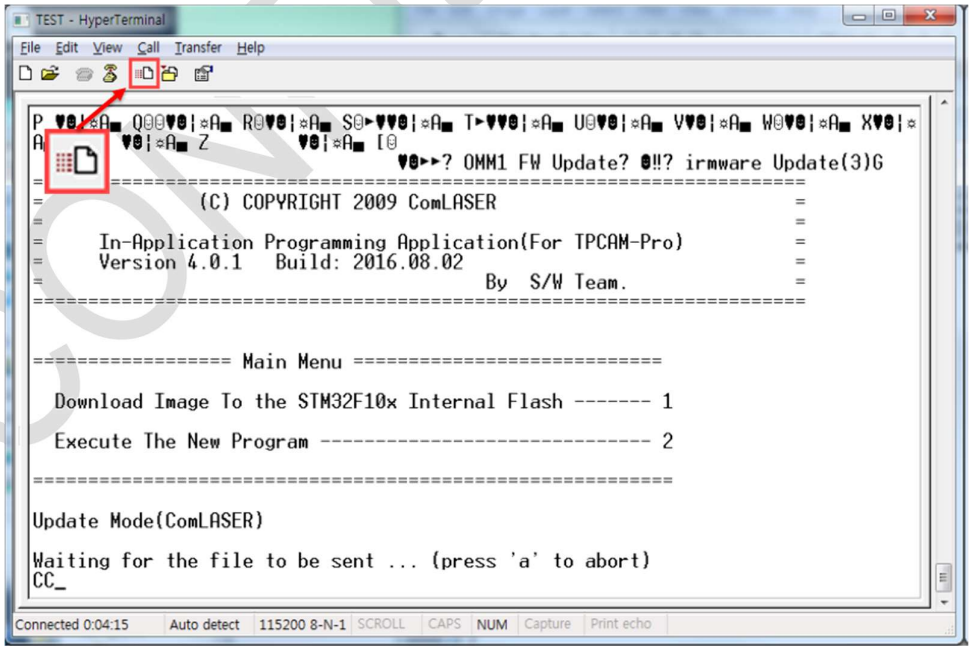


Figure 55 Click "Send" icon

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✓ Click "Browse..." button

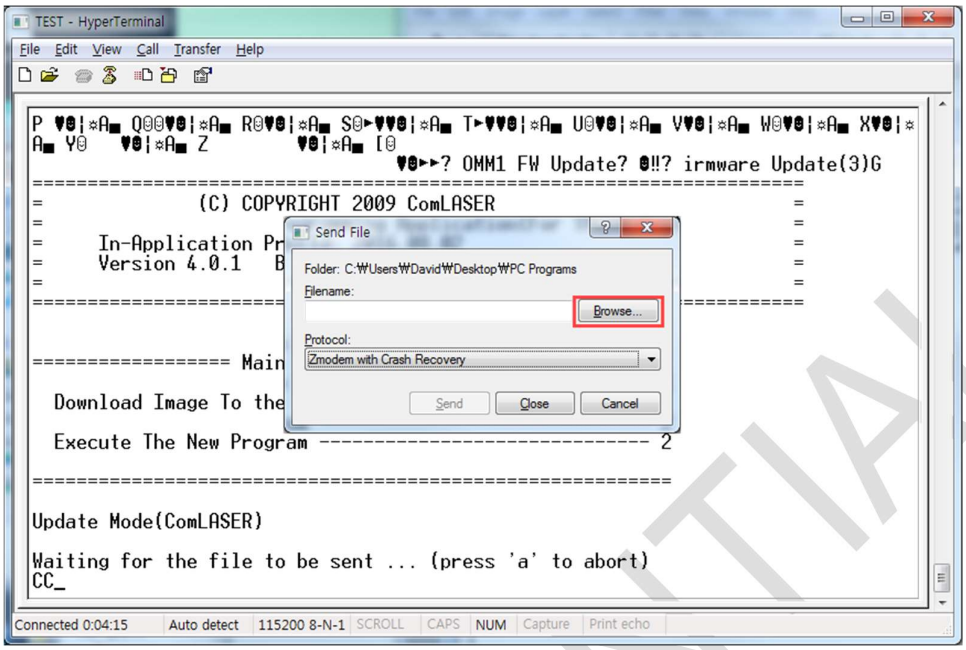


Figure 56 F/W file selection

✓ Select the copied F/W file from the file dialog

✓ Select Protocol as Ymodem

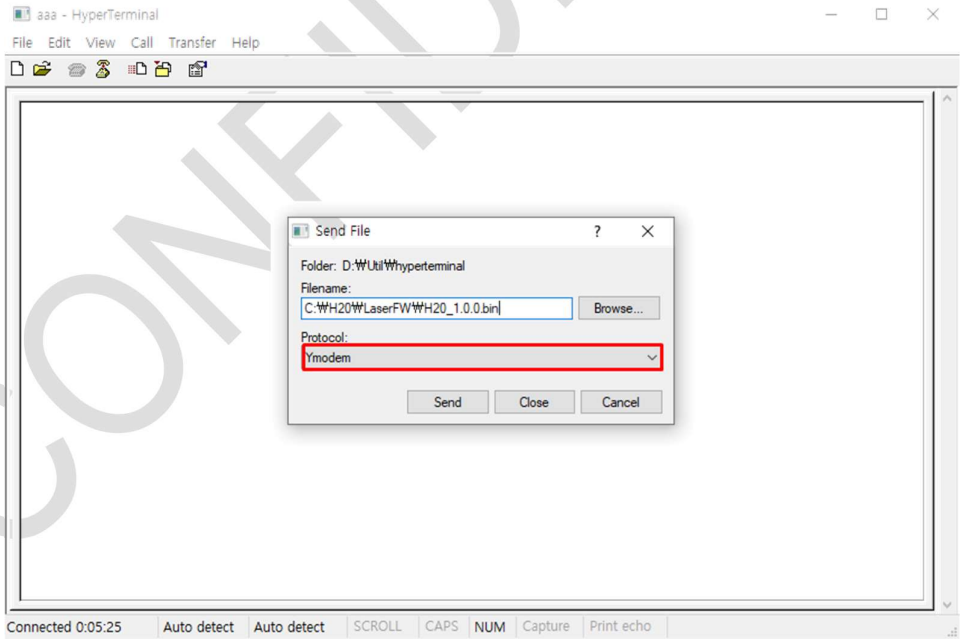
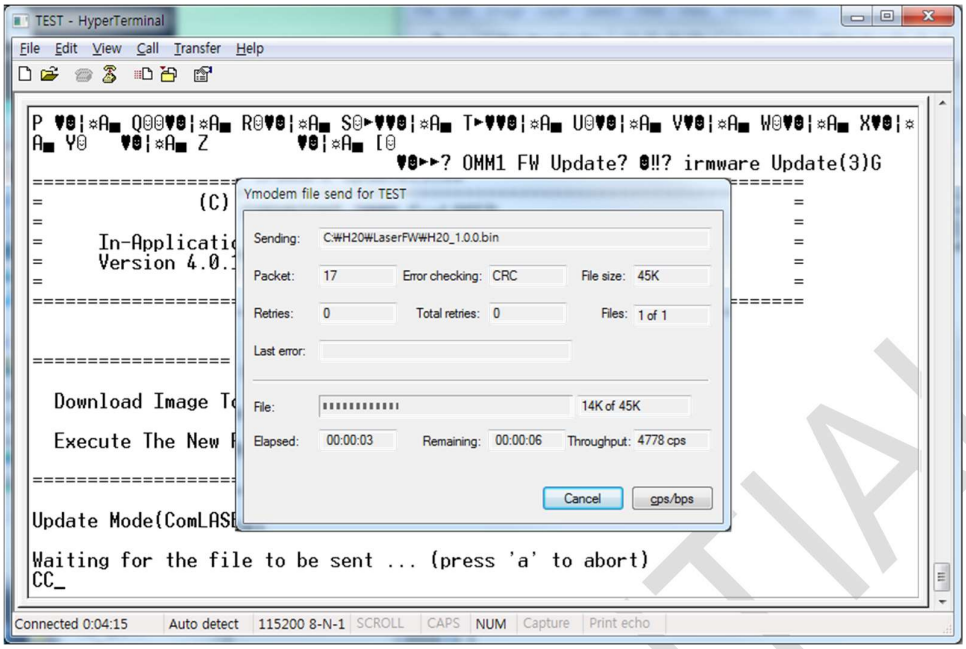


Figure 57 Select Protocol as Ymodem

✓ Click "Send" button

✓ Upgrade proceeds

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D. Camera

1) Camera F/W Upgrade by using SD card

- Remove SD card from H20
- Change the F/W file name provided on the SD card to woonwoo_camera_fw.bin
- Copy the file with its name changed to the SD card root folder
- Insert SD card into H20
- Boot up H20 unit
- Upgrade proceeds automatically
  - ✓ Only ComLASER logo will be displayed on the LCD
  - ✓ Automatic rebooting takes place in about 2 mintues

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6. Specification

A. Specification

Table 20 TPCAM H20 Specification

Division	Specification
Maximum range	1,200m(Reflective target)
Minimum range	5m
Range accuracy	±0.15m
Speed range	±320km/h
Speed accuracy	±2km/h
Measurement time	0.3sec
Capture data storage	64GB SD Card
Display	3.5", 800x480 pixel, Touch-panel LCD
Camera lens	30x optical zoom lens
GPS receiver	20 channels
Communication	Wi-Fi (AP mode, Station mode)
Battery	11.1V Li-Ion, 10 hours of continuous use
Captured image size	1712x888 pixel
Video size	1712x888 pixel, 30fps
Eye safety	Class 1(IEC-601825-1)
Laser wavelength	905nm
Beam divergence	3mrad
Weight	1.6kg
Temperature range	-10~60℃

Above specification is subject to change without any prior notice.

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B. External Dimensions

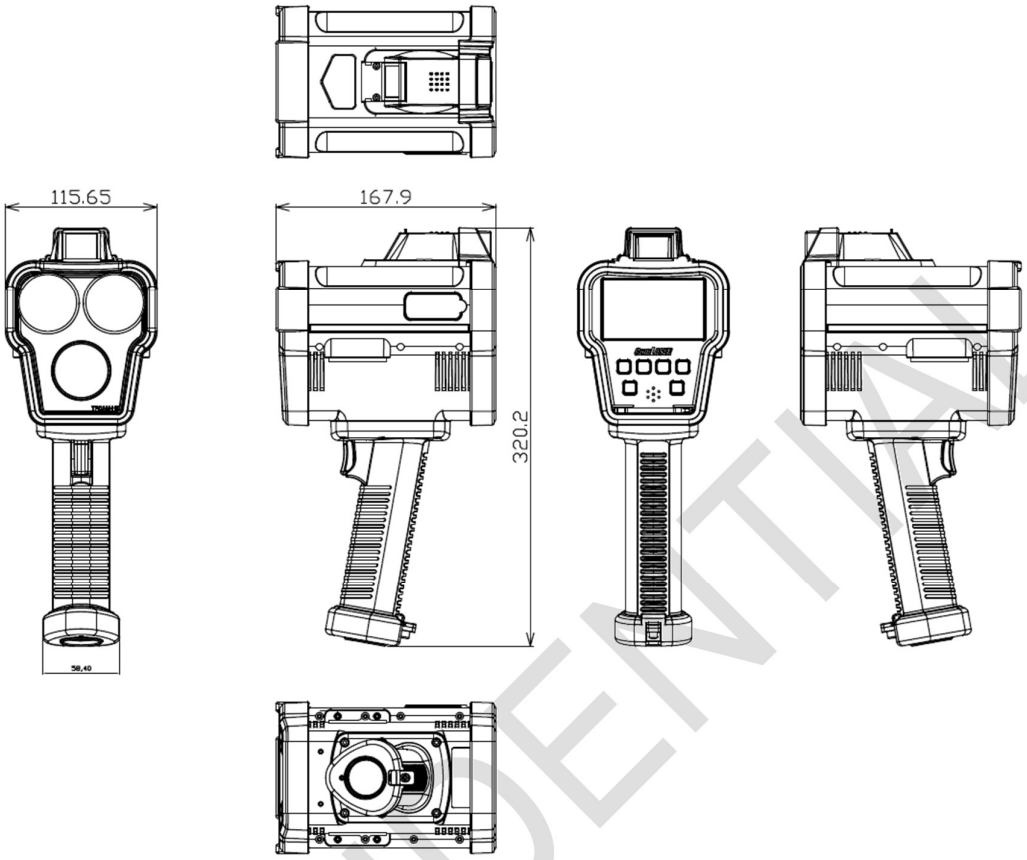


Figure 58 External Dimensions

C. External cable pin assignment

Laser F/W Upgrade serial pin cables are separately provided for dealers only.

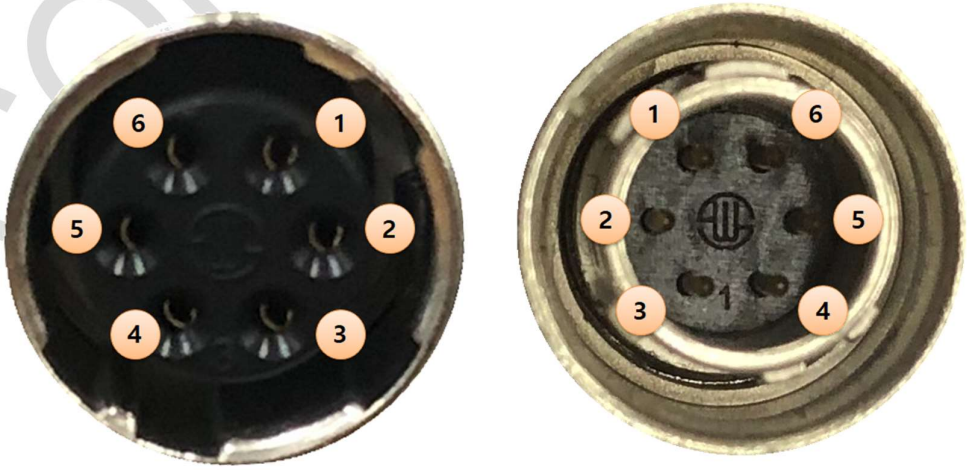


Figure 59 External connector pin assignment (left: IO board, right: cable)

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Table 21 External connector pin assignment

Pin No.	Name	Contents	Remarks
1	Rx	Laser RS232 Rx	For dealer only
2	Tx	Laser RS232 Tx	For dealer only
3	GND	Laser RS232 ground	For dealer only
4	LED Trigger	LED trigger output	For dealer & user
5	GND	LED trigger ground	For dealer & user
6	NC	Not connected	

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7. Trouble Shooting

Table 22 Trouble shooting

Symptoms	Solutions
Why "LASER FAIL" is displayed during SELF-TEST process?	Boot up H20 unit after connecting dealer cable and then collect RS232 log data from PC. Kindly submit RS232 log and laser_log data to ComLASER a.s.a.p.
Why won't H20 unit turn on with battery?	Boot up H20 unit with the provided adapter connected and wait for more than 3 minutes. If it still won't turn on, please submit system_log data to ComLASER a.s.a.p.

8. Contact

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Tel : +82-70 - 7706 – 3982

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9. Caution

① Please make sure to avoid external shock which may damage the device.

② Please be fully aware of how to use User Mode On/Off before using the device.

③ Please keep the changed Admin PW in mind, and if you fail to recall it, please contact your local dealer for assistance.

④ Please contact your authorized distributor, or ComLASER HQ for WiFi setup related inquiries.

⑤ Printers provided by ComLASER only are compatible with TPCAM H20 equipment.

⑥ Please touch the LCD panel softly to avoid any damage.

⑦ Please make sure to check battery charging and workable temperature.

i. Battery usage time decreases while in use of WiFi function.

ii. Battery usage time decreases under low temperature working condition.

iii. Battery charging temperature range : 0℃ ~ 45℃

iv. Battery discharging temperature range : -20℃ ~ 60℃

⑧ Under standby mode, LCD backlight turns off in five minutes, and the power goes off automatically after the set standby mode time.

⑨ Please make sure to use AC/DC adapter provided together for 12VDC input.

⑩ Please be aware that any damages, or deformations caused by user's mis-handlings are subject to repair at cost.

⑪ Please pay attention not to contaminate the optical lens of the equipment.

⑫ When tightening the Nighttime filter, make sure it is in the correct direction.

⑬ If the equipment is dismantled arbitrarily by the user, no after sales service is guaranteed.

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