CW-30 VTOL UAV Surveillance Solution

Contents

Section A：CW-30 UAV System

1.1 CW-30 UAV Overview

CW-30 is hybrid UAV between fixed wing airplane and multi-copter, able to take off and land vertically like a quadcopter and transition to efficient and fast forward flight like fixed wing UAV. CW-30 combines the advantages from fixed wing, such as high speed, long endurance and distance, as well as VTOL features from multi-copters. CW-30 requires no special launch equipment and do not require runways for launch or landing. Transition to winged flight and VTOL are fully autonomous controlled through autopilot system with JOUAV property.

CW-30 is widely applied for aerial mapping, aerial surveying, aerial surveillance and inspection under extreme terrain, such as between mountain areas, hills, forestry and buildings, which would be ideal choice for professional and industrial aerial UAS service.

Figure.1

1.2 Composition

CW30 UAV system consists of aircraft, ground control station, EOT video camera and video transmission link as shown in Figure 2

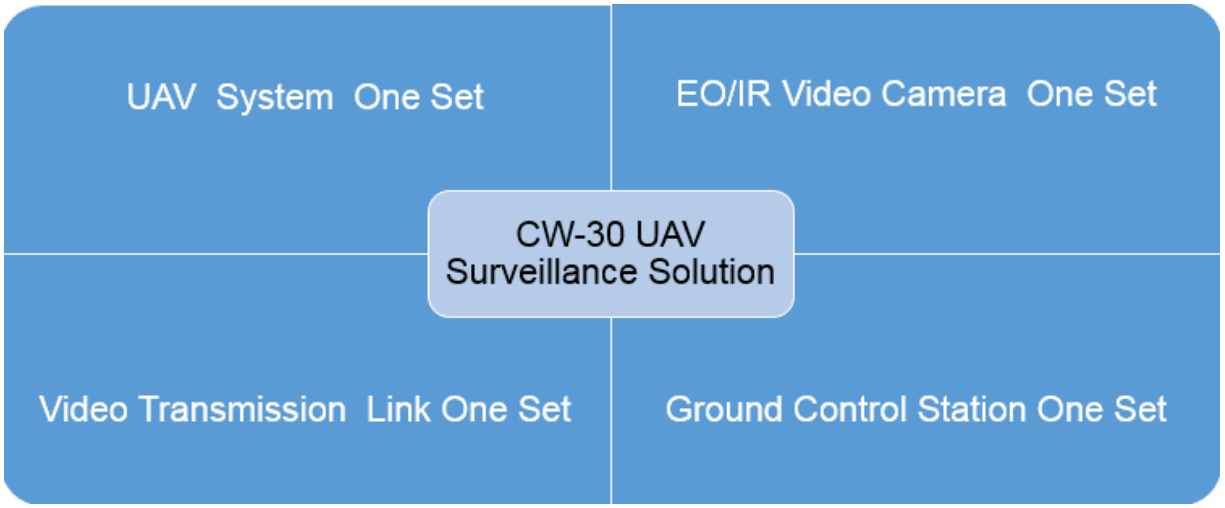

Figure 2: CW30 UAV System Composition

1.3 Configuration

1.3.1 Baseline System:

1) Aircraft 1 set

2) Ground Control Station (GCS) 1 set

1.3.2 Mission Payload：

1) EO/IR Video Camera 1 set

2) Video Transmission Link 1set

1.3.3 Accessories

1) Tool Kits 1 set

2) Aviation Packing Case 1set

3) Remote Control 1 set

4) Battery Recharger 1set

5) Gasoline Matching Container 1pc

6) Convertor Cables 3pc

1.4 Key Features

- ✓ Hybrid configuration design of fixed wing and rotors UAV
- ✓ Featuring long endurance & range, high speed, high payload
- ✓ Vertical takeoff and landing requires no runway to take off

- ✓ RTK GPS module for high accuracy vertical and horizontal positioning
- ✓ Fully autonomously flight controlled through professional flight control and GCS system from JOUAV
- ✓ Easy to operate by two to three technicians in one team and fast to assembly and disassembly within 15 mins.

1.5 Main Technical Data

1.5.1 Aircraft：

SN	Description	JOUAV CW-30
1	Takeoff & Landing	VTOL
2	Power	Hybrid power
3	Cruise Airspeed	97km/h(TAS)
4	Wind resistant	10 m/s
5	Max. Climb Rate	5m/s (at Sea level altitude 500m)
7	Flight Ceiling	4500 m
8	Endurance	4H（Flight routes at Sea level altitude 1000 m）
10	Empty Weight	25kg
11	Maximum take-off Weight	34 kg
12	Mission Payload	3.7kg
13	Max. Fuel Weight	5.3kg
14	Noise Level	60dba @200mAGL

1.5.2 Telemetry Radio Data Link：

1	Output Power	1W
2	Frequency	902-928Mhz
3	Encrypted Data	128bit AES encryption
4	Spread Spectrum	FHSS
5	Baud Rate	115200
6	Transmission Range	60km
7	Fault Tolerant	32 bit CRC, ARQ

1.5.3 Aircraft Dimension

1	Wingspan	4m
2	Fuselage	2.1m

1.5.4 Engine

1	Displacement	60CC
2	Bore	1.42 in
3	Stroke	1.18 in
4	RPM Range	1,400-8,500
5	Output	7.0 hp @ 8,500 rpm
6	Ignition Battery	4.8V-12V
7	Compression Ratio	7.6:1
8	Gasoline/Oil Mix	30:1

1.6 System Operation Mode

1) GCS Control Mode

Ground control station full auto control aircraft about the flight planning, execute mission flight and emergency return etc. GCS see Figure No.3

Figure No.3

2) RC Control Mode

Pilot control the aircraft flight by remote control device Remote control device see Figure No.4

Figure No. 4 Remote control device

1.7 System Storage and Transportation

CW-30 UAV system is packed with aviation packing case and transportation with SUV car, as Figure No.5 and Figure No.6

Figure 5: CW-30 UAV System Storage

Figure 6 CW-30 System Transportation

1.8 Service Life

1.8.1 Aircraft

1) Service life: 5 years

1.8.2 Engine

1) TBO: 200h

2) Service Life: 400h

Section B: Aircraft Subsystem

2.1 EOT Video Camera

Figure No.7 EOT

2.1.1 Overview of EOT

Electro-optic turret (EOT) is based on the gyro-stabilized platform, integrated with the infrared camera, visual camera and laser range finder. By applying the technology of gyro stabilization, EOT can isolate the angular motion of carrier, and keep the optical axis angular motion stability in inertial space. EOT is widely used in search and rescue, anti-smuggling, security monitoring, environment monitoring and forest fire prevention, and also can be used in reconnaissance, surveillance and other areas of defense.

2.1.2 Specifications of the EOT

- ✓ 2 axis gyro-stabilized
- ✓ Azimuth: n×360°
- ✓ Elevation: -120°～+90°
- ✓ Max slew rate: ≥90º/s
- ✓ Max acceleration: ≥100º/s2
- ✓ Angular report accuracy: ≤0.1°（1σ）;
- ✓ Light of sight stabilization: 50μrad（1σ）（1º/2Hz、2º/1Hz）.
- ✓ Interface: Serial link RS422
- ✓ Video Outputs: PAL(1×),SDI(1×)

2.1.3 Infrared Camera

- ✓ Detector Type: 640×512 uncooled
- ✓ Spectral Range: 8～12μm

- ✓ Pixel Pitch: 17μm
- ✓ NETD: 60mk
- ✓ focal length: 45mm/F1.2
- ✓ FOV: 13.9º×11.2º (H×V)

2.1.4 Visual Camera（Sony FCB-EV7500）

- ✓ Imager: 1/2.8″ type color CCD
- ✓ Active picture elements: 1920×1080p
- ✓ Spectral Range: 0.4～0.9μm
- ✓ SDI
- ✓ Lens:2.3º～63.7ºcontinues;129mm(30x)

2.1.5 Video Tracking System

- ✓ Tracking Type: correlation
- ✓ Output frequency: 50Hz
- ✓ Output Accuracy: 1 pixel
- ✓ Power Requirements
- ✓ Voltage: DC15V,voltage range 12.8V～18V;
- ✓ Power Consumption: normal≤100W，peak≤150W.

2.2 Live Video Transmitter/Receiver

Figure No.8 Live video transmitter/receiver

2.2.1 Overview

“UAV-TX (50)" transmitter is developed new, professional, high-end digital image wireless transmission device, wireless transmission is mainly used in HD images, video equipment software has missing alarm, channel switching, bandwidth selection, stream setting, RF standby, digital encryption function, and convenient operation.

“UAV-TX (50)" equipment using COFDM digital modulation and H.264 advanced compression encoding technology, increase the transmission distance and image

quality; can transmit images, voice and data signals at the same time; suitable for transmission of NLOS and high-speed mobile device; using portable compact structure design, convenient for the individual, radio and television camera, UAV and other applications.

Equipment is mainly used in large-scale real-time broadcast, emergency rescue, field monitoring and other occasions, such as wireless high-definition image transmission.

2.2.2 Features

1) Advanced COFDM modulation technology to support high-speed mobile transmission;

2) Efficient H.264 coding technology to support high quality image applications;

3) To support multi path transmission and nonline of sight transmission in complex environment;

4) Output power 32dBm adjustable;

5) Working band optional UHF, L, S band;

6) Narrow band 1.25/2.5MHz bandwidth, high quality, high quality image can be transmitted;

7) Provide HD-SDI/HDMI video input interface, analog audio and video, string data input;

8) Built in digital encryption;

9) Support 16 channel multi user applications;

10) Wide voltage range, support DC+10 ~ 16V power supply;

2.2.3 UAV TX Specifications

RF output		SMA 50Ω
Power input		EGG.0B.302.CLL
HD-SDI input		SMB 75Ω
Control input		USB
RF	Power	1W(30dBm) ±0.5dBm
	Tuning range	330M～470MHz 1.0G～1.5GHz
	Tuning step	250kHz
	Bandwidth	6/7/8MHz

	FEC	1/2、2/3、3/4、5/6、7/8
	Guard Interval:	1/32、1/16、1/8、1/4
	Modulation	QPSK/16QAM/64QAM
	Bit-rates	0.144～32Mbps
Composite Video	Format	HD-SDI、HDMI
	Encoding	MPEG4/H.264
	HD Resolution	1080i/p@30,29.97,25,24,23.97 720p@30,29.97,25,24,23.97
	Delay	＜150ms@Low delay
Encryption	ABS 32bit	
Control	Format	RS232
	Band	9600bps
Power	DC input	9～16V
	consumption	15W@1W
Physical	Dimension	≤L135mm W68mm H29mm
	Weight	＜380g
	Temperature	-20～+70℃
	Humidity	＜95%

2.2.4 UAV RX Specifications

RF input	Band	UHF:TNC 50Ω L：N 50Ω
	Feed	DC +9V
Output	ASI /SDI/Composite	BNC 75Ω
	Audio	RCA 600Ω
	Upgrade	IP
	Control/data	EGG.0B.305.CLL

	Power	EGG.0B.302.CLL
Video	Format	PAL/NTSC
	Transmission rate	0.144Mb/s～32Mb/s
	Horizontal resolution	1080p/i,720p downward compatibility
RF	Bandwidth	2.5/6/7/8MHz
	Frequency band	UHF L S band
	FEC	1/2、2/3、3/4、5/6、7/8
	Guard Interval:	1/32、1/16、1/8、1/4
	Modulation	QPSK/16QAM/64QAM
	Receiving sensitivity	≤-96dBm

2.3 GCS-302 Ground Control Station

Figure No.9 GCS

2.3.1 Overview

GCS-302 ground control station is command control system and video surveillance display built-in one equipment. Built-in radio N920 which can realize CODEC and encryption/decryption of communication protocol, is a hub of AP Commander and aircraft, GCS-302 features portable, good processing ability, abundant external

interfaces and strong reliability.

2.3.2 Specification

Weight	12kg
Dimension	0.99*0.43*0.17m
Display Size	17.3 inch (display #1 and display #2)
Brightness	400cd/㎡ (display #1 and display #2)
Processor	Core i7 (display #1 and display #2)

2.4 CW Commander Software

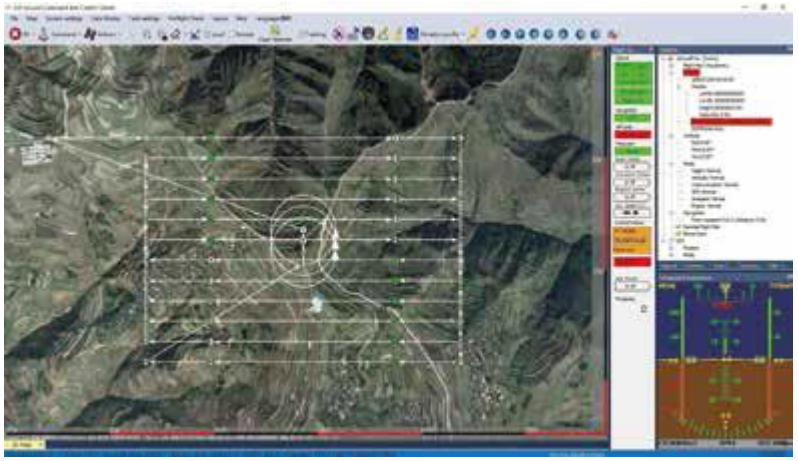

Figure No.10 CW commander software

CW Commander Software is specially designed for auto mode control of CW series VTOL UAV systems, which features functions of flight control command, flight mission planning , flight telemetry monitoring and playback the flight mission