

# 1.3 UAS機材・操作説明

## Reference material

### Civil Aeronautics Act in Japan

(Ministry of Land, Infrastructure, Transport and Tourism  
http://www.mlit.go.jp/common/000993851.pdf)

Carry-on Checked

Examples of Dangerous Goods by Air Tr

Batteries a) Batteries used for a portable electronic device					
Item(s)	Carry-on	Checked	Quantity Per Person	Quantity Per Piece	Notes
UAV body	○	○	1	1	It is required to be prevented from causing short circuits.
Spare batteries	○	○	2	2	It is required to be prevented from causing short circuits.
Lithium Ion Batteries (including lithium ion polymer batteries)	○	○	2	2	It is required to be prevented from causing short circuits.
Portable medical electronic devices (e.g., AED, defibrillator, CPAP, etc.)	○	○	1	1	It is required to be prevented from causing short circuits.
Spare batteries for the above electronic devices	○	○	2	2	It is required to be prevented from causing short circuits.
Installed for electric-powered bicycle and vehicles	○	○	1	1	It is required to be prevented from causing short circuits.

Phantom 2 battery  
A watt-hour rating: 57.72 Wh

## UAV specifications

Product name	DJI PHANTOM® 2
Aircraft class	Quadcopter
Dimensions	350 x 350 x 190 mm
Weight	1000 g
Max flight speed	15 m/s
Max ascent/descent speed	6 m/s
Communication distance	1000 m
Max flight time	25 mins.
Payload	400 g (empirical value)



## Camera specifications

Product name	NIKON COOLPIX A®
Pixels	16.2 million
Image sensor	23.6 x 15.6 mm
Dimensions	111.0 x 64.3 x 40.3 mm
Weight	299 g
Interval shooting	More than 1 second
Maximum number of photos (SDXC64GB)	More than 6,000 photos (SDXC64GB)
Duration of battery	Approx. 70 min.



## GNSS unit specification

Product name	NIKON GP-1A
Tracking channels	18 (SBAS compliant)
Update rate	Once per second
Geodesics	WGS84
Accuracy	Horizontal 10 m RMS
Dimensions	45.5 x 25.5 x 50 mm
Weight	24 g



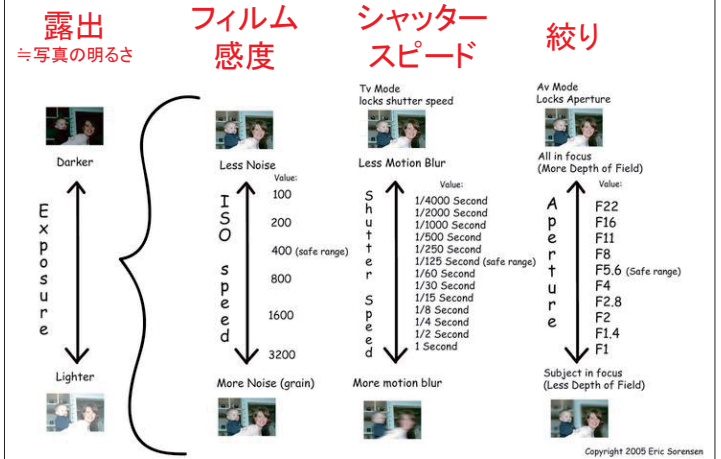
## 資料

飛行高度・速度と撮影間隔(太字), 焦点距離 28 mm (35 mm フィルム換算), 65 % 重複, 縦方向に飛行を仮定  
Shot intervals (bold letters) for various flight heights and flight speeds assuming 28 mm lens (equivalent to 35 mm film size), 65 % overlap, head-forward camera orientation.

(by Inoue et al., 2014)



Flight height (m)		10	20	50	100	150
Left-Right size (m)		12.9	25.9	64.7	129.4	194.1
Front-Back size (m)		8.6	17.1	42.8	85.7	128.5
L-R shot interval (m)		4.5	9.1	22.6	45.3	67.9
F-B shot interval (m)		3	6	15	30	45
Flight Speed (m/s)	2	1.5	3	7.5	15	22.5
	3	1.0	2	5	10	15.0
	4	0.8	1.5	3.8	7.5	11.3
	5	0.6	1.2	3.0	6.0	9.0
	6	0.5	1.0	2.5	5.0	7.5
	7	0.4	0.9	2.1	4.3	6.4
	8	0.4	0.8	1.9	3.8	5.6
	9	0.3	0.7	1.7	3.3	5.0
	10	0.3	0.6	1.5	3.0	4.5
	Ground resolution (cm/px)			0.5	1.3	2.6



## Updating UAV survey system



Up to now

Phantom2 & Coolpix A with GPS unit



Latest

Phantom3

Effective for aerial survey?

	Phantom2 & CoolpixA	Phantom3 (Professional)
Flight time	15 min.	23 min.
GPS mode	GPS	GPS/GLONASS
Communication distance	1000 m	2000 m
FPV	× (additional parts)	○
Auto pilot	× (additional parts)	○
Real time battery monitoring	× (additional parts)	○
Sensor size	23.6 × 15.6 mm (Coolpix A)	6.2 × 4.7 mm (1/2.3")
Pixel number	16.2 M (Coolpix A)	12.4 M
Interval shot	1s- (Coolpix A)	5s-
Gimbal	×	3-axis
Price	130,000 JPY	175,000 JPY

## モード2



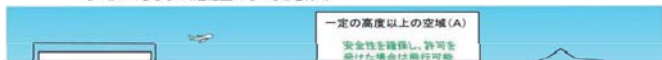
(<http://dration.com/basic07>)



## 航空法の一部を改正する法律の概要

### (1) 無人航空機\*の飛行にあたり許可を必要とする空域

※飛行機、回転翼航空機等であって人が乗ることができないもののうち、遠隔操作又は自動操縦により飛行させることができるもの(超軽量のものを除く)



1. 人口集中地区はダメ
2. 目視範囲外はダメ

※他にも細かいルール多数あり

※安全確保の体制をとる等の場合、より柔軟な飛行を承認

- 目視において飛行させること
- 周囲の状況を目視により常時監視すること
- 人又は物件との間に距離を保って飛行させること 等

## 資料

### UAV下降時の注意

#### 現象名

- Settling with power
- Voltex ring state

#### 解説

- 下降時に、UAV自身が発生する下降気流に巻き込まれて、揚力を失い、減速せずに墜落する現象
- 上昇しようと回転数を上げると、下降気流が増加してさらに悪化
- ペイロードいっぱいのPhantom 2では特に発生しやすい

#### 防止法

- ゆっくり下降(下降気流を弱める)
- 斜めに下降(下降気流から逃げる)
- もし発生したら、上昇しようとせずに、横に逃げる
- できれば、墜落しても被害が少ない場所(草地など)で着陸する



「ドローン 航空局」で検索



## 資料

### Appropriate Capturing scenarios (Agisoft, 2014)

