

Análisis Forense de Drones

DRONESVIP | Centro de Instrucción
de Aeronáutica Civil



Modulo III

CASO DE ESTUDIO

Seguínos en redes sociales

DRONESVIP | Centro de Instrucción
de Aeronáutica Civil

www.dronesvip.com.ar

Objetivos

- Aplicar reglas de buena práctica
- Utilizar herramientas forenses
- Verificar la existencia de diferentes fuentes de evidencia
- Reconocer múltiples artefactos forenses
- Identificar y preservar evidencias digitales
- Analizar e interpretar hallazgos



Identificación externa



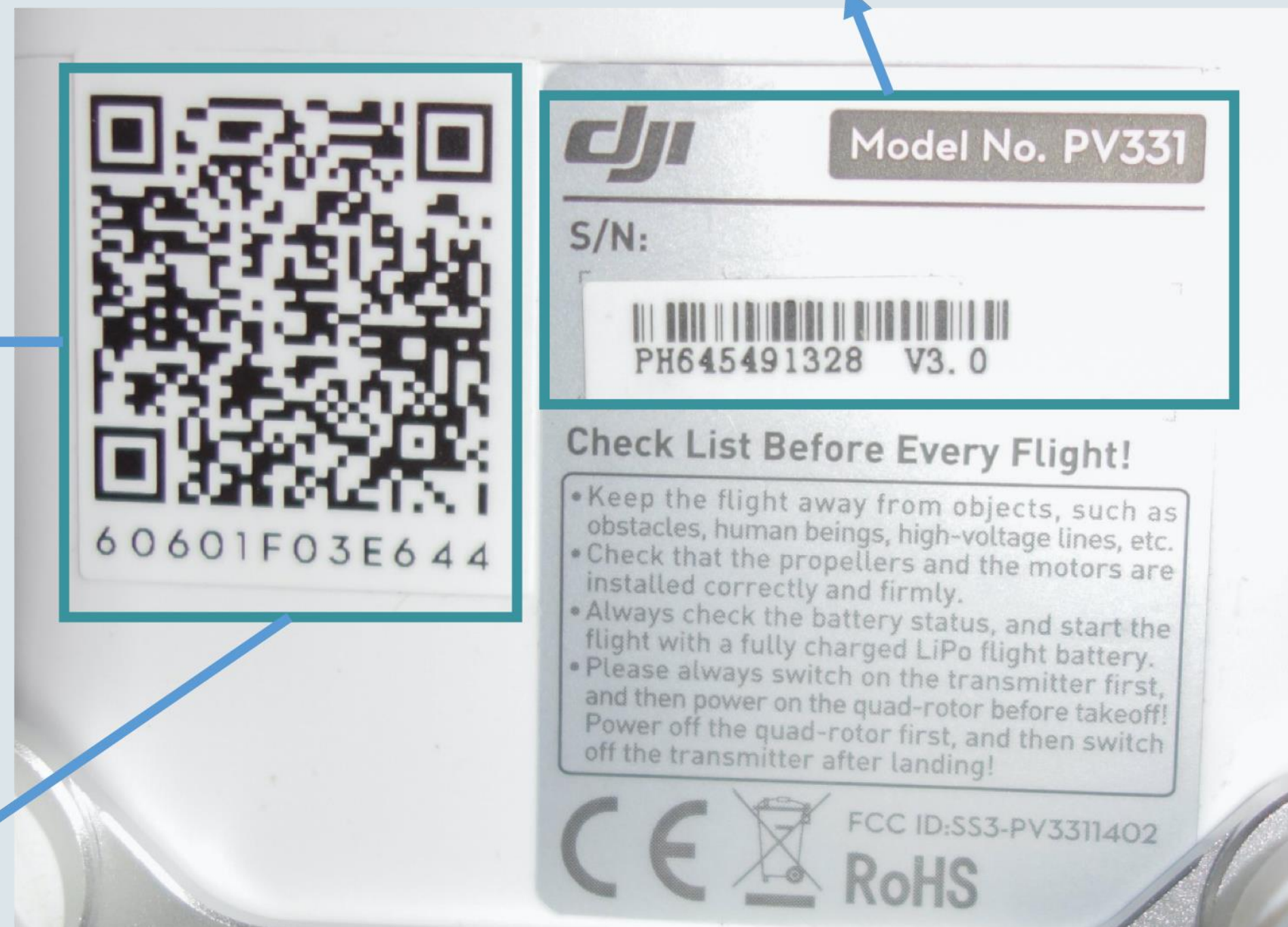
Identificación externa

Número de Serie y Modelo

QR para descargar la aplicación

MAC Address Details

Company	SZ DJI TECHNOLOGY CO.,LTD
Address	shenzhen guangdong 518057 Hi-Tech Park(South),Nanshan District CHINA
Range	60:60:1F:00:00:00 - 60:60:1F:FF:FF:FF
Type	IEEE MA-L



http://m.dji.net/djivision?1=DJI&2=PHANTOM VISION&3=BL252026148842&4=FC200_03e644&5=60601F03E644

<https://www.macvendorlookup.com/>

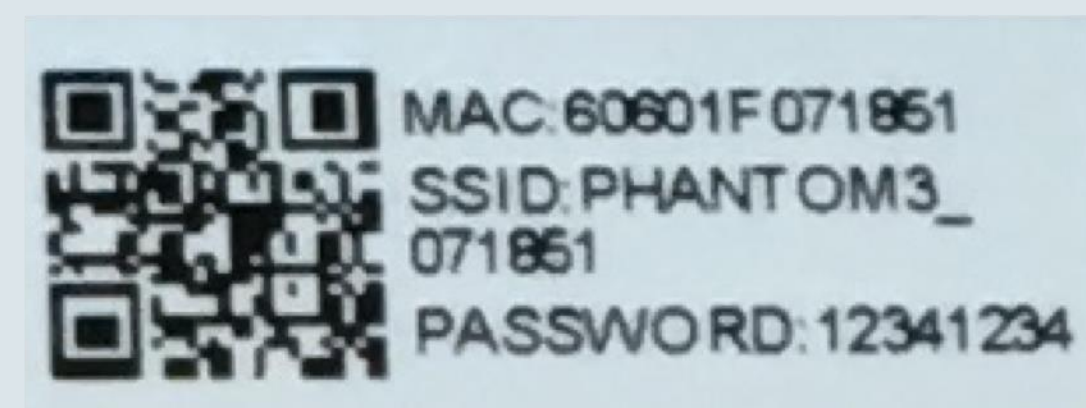
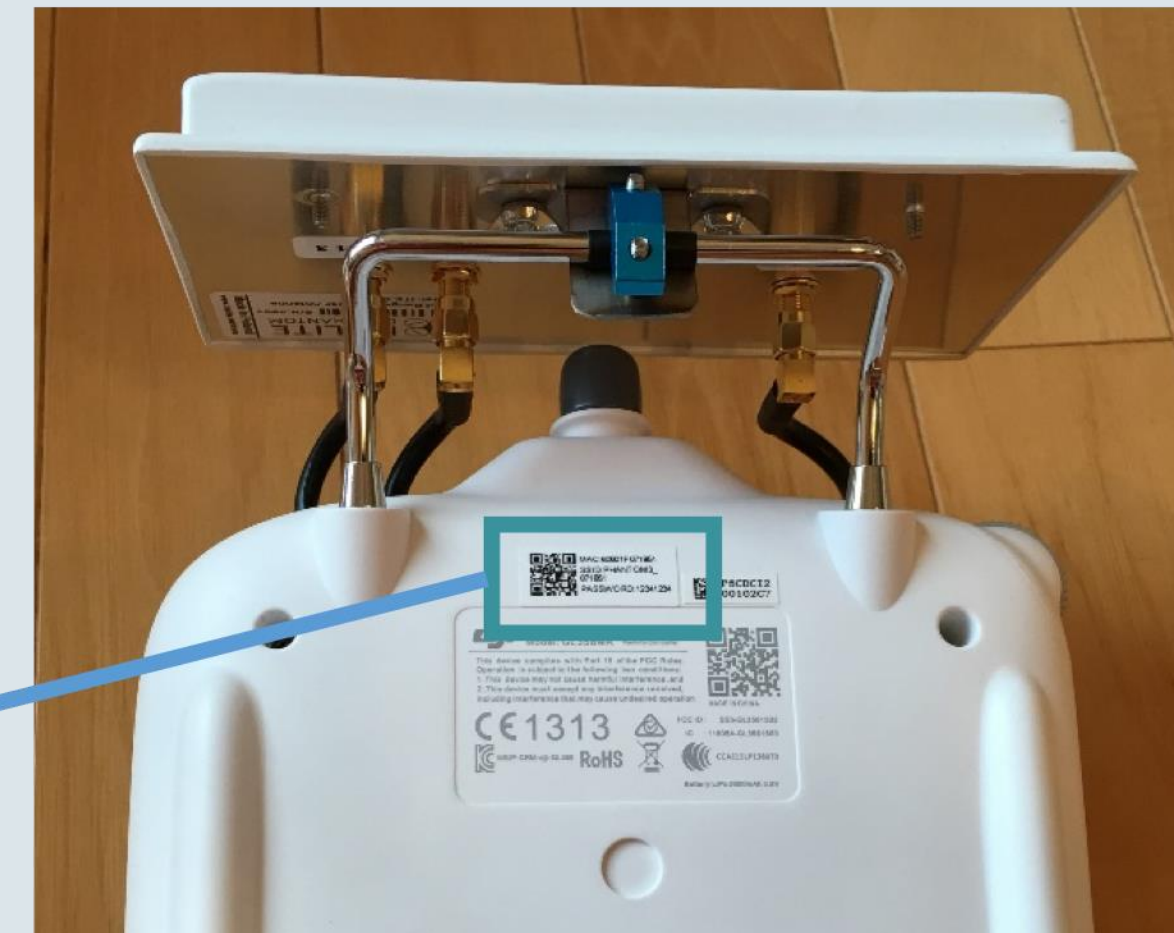
Otros elementos



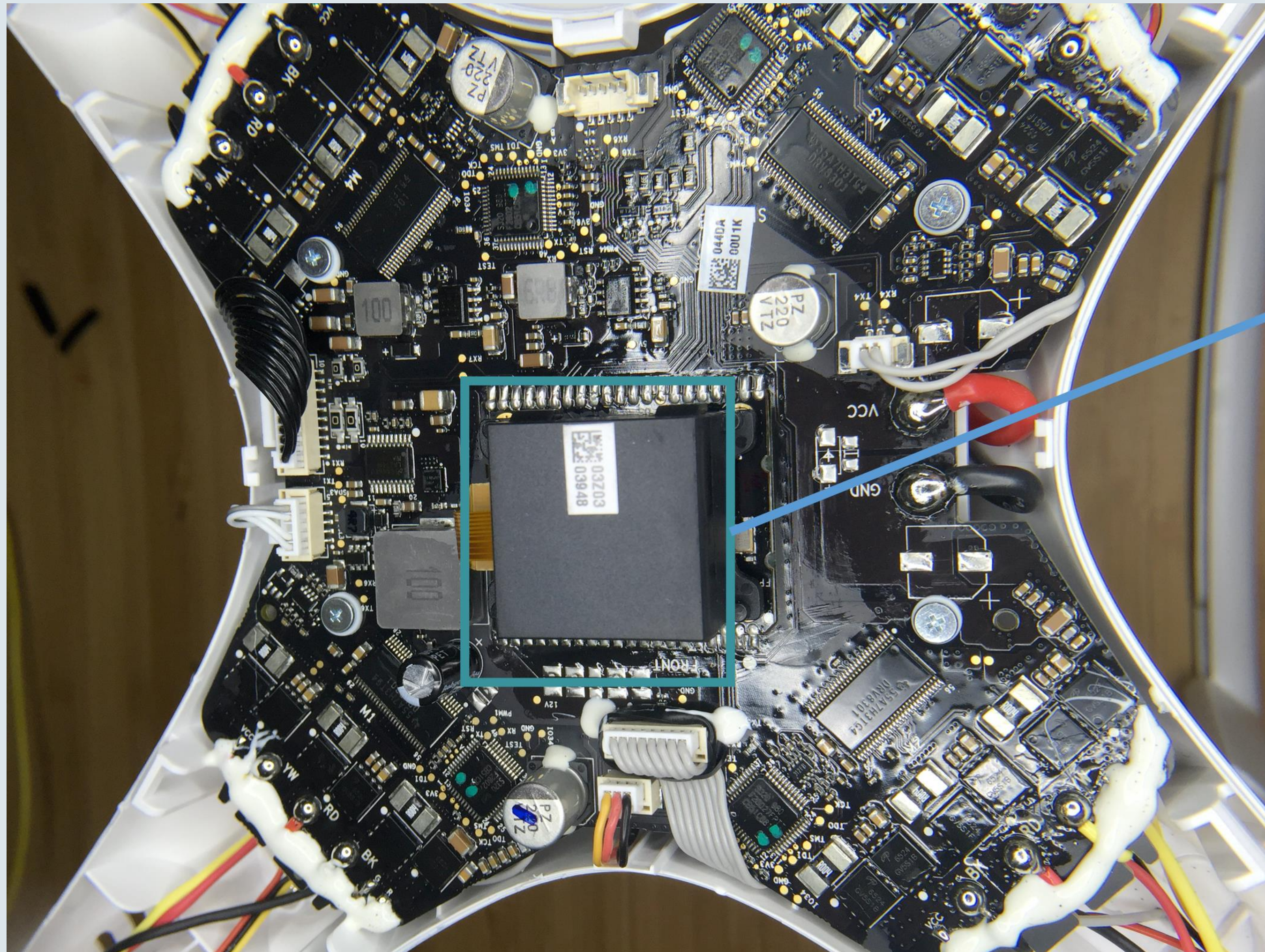
Batería



Control remoto



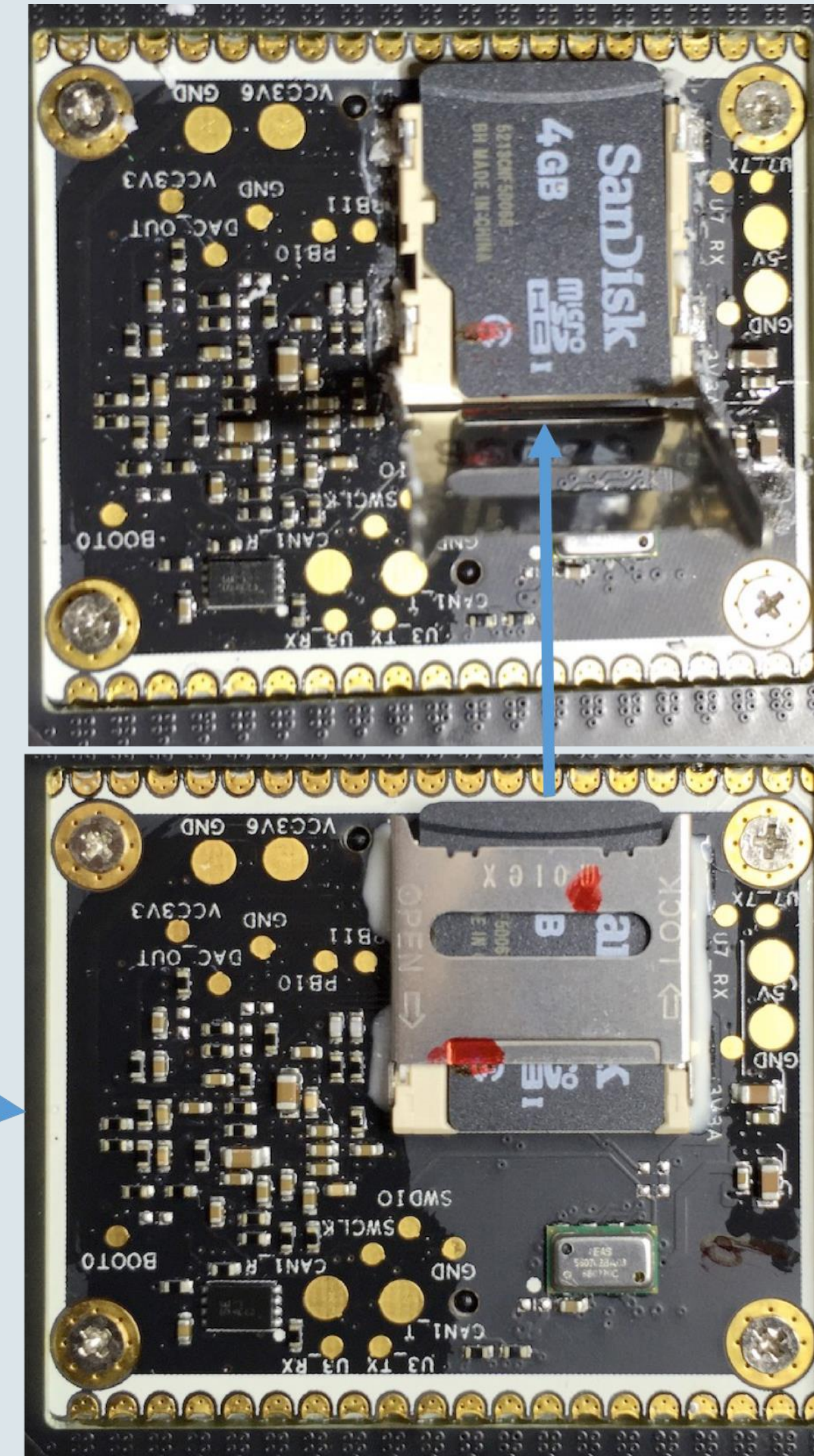
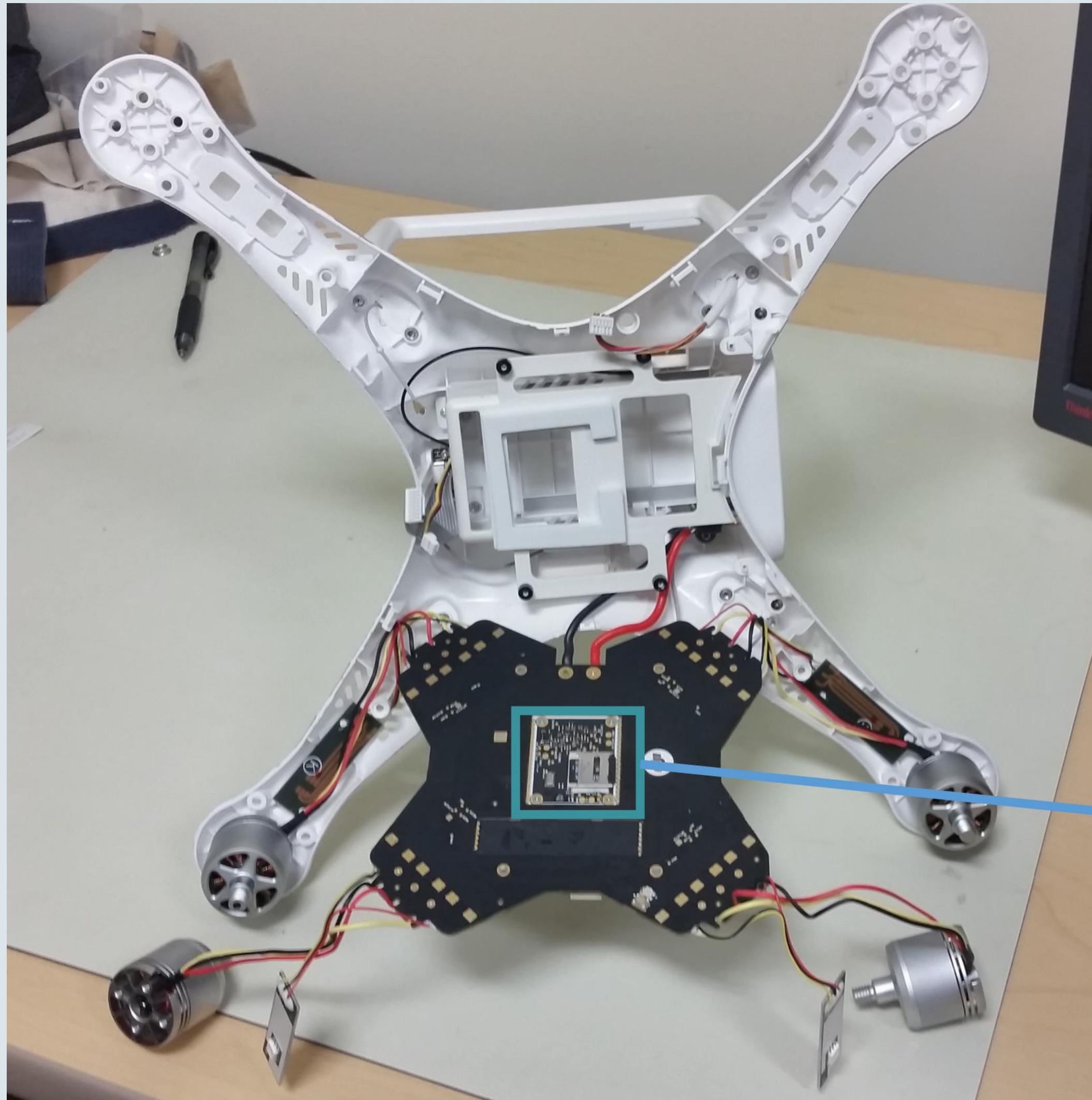
Identificación interna



IMU/UMI

Inertial Measurement Unit /
Unidad de Medición Inercial
(Acelerómetro, giróscopo, etc)

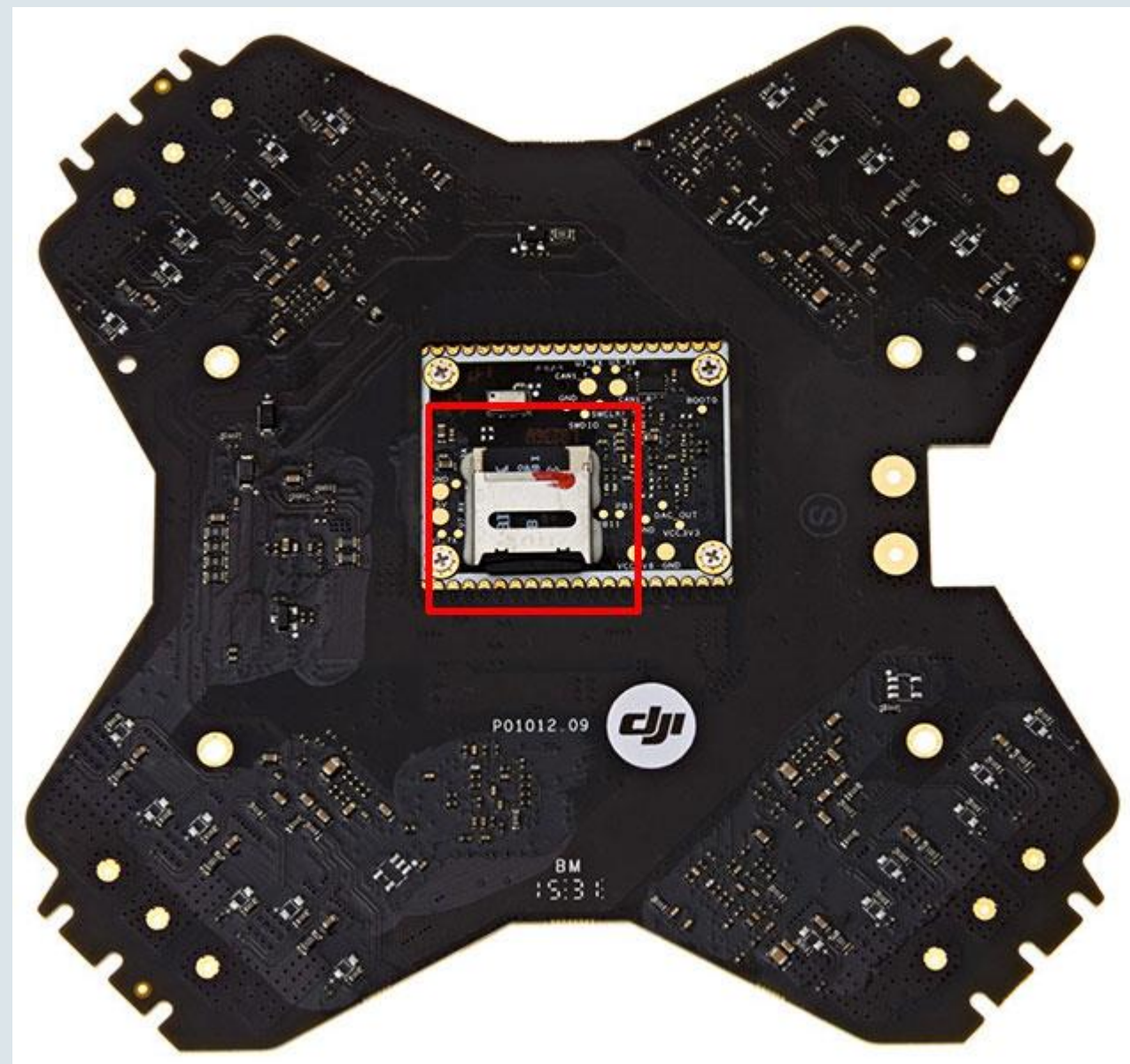
Identificación interna



Preservación

SEGÚN EL TIPO DE ACCESO A LA INFORMACIÓN DEL DRONE

DIRECTA



INDIRECTA



Preservación

Técnica directa: realizar imagen forense de los medios de almacenamiento

TARJETA DE MEMORIA EXTERNA TIPO MICRO-SD

BLOQUEADOR DE ESCRITURA

- Adaptador de tarjetas SD con bloqueo de escritura.
- Software Phrozen USB
(<http://phrozen-safe-usb.findmysoft.com/>)

IMAGEN FORENSE

- Software FTK Imager
(<https://accessdata.com/product-download/ftk-imager-version-4-3-0>)

Preservación

Técnica indirecta: Exportar evidencias lógicas mediante aplicaciones nativas

DESDE EL DRONE ENCENDIDO

BLOQUEADOR DE ESCRITURA

- Software Phrozen USB
(<http://phrozen-safe-usb.findmysoft.com/>)

EXPORTAR REGISTROS

- Software propietario
(<https://www.dji.com/downloads/software/assistant-dji-2>)

Preservación

Resguardar registros en periféricos

DISPOSITIVO MÓVIL

TARJETA DE MEMORIA EXTERNA TIPO MICRO-SD

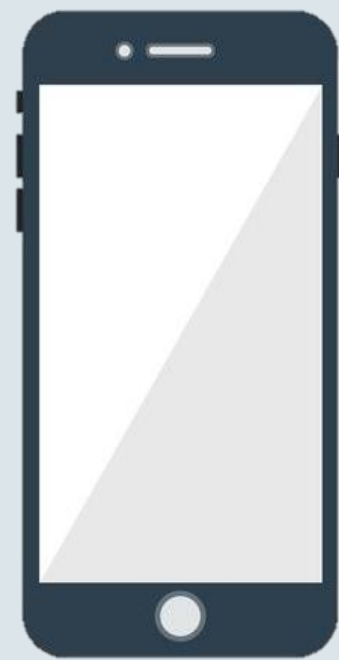
- Adaptador de tarjetas SD con bloqueo de escritura.
- Software Phrozen USB
(<http://phrozen-safe-usb.findmysoft.com/>)
- Software FTK Imager
(<https://accessdata.com/product-download/ftk-imager-version-4-3-0>)

SUITE FORENSE

- UFED 4PC
- Oxygen Forensic
- Magnet Adquire
(<https://www.magnetforensics.com/resources/magnet-acquire/>)

Análisis

Identificación y recolección de evidencias



Dispositivo móvil
(Archivos TXT)



Control remoto



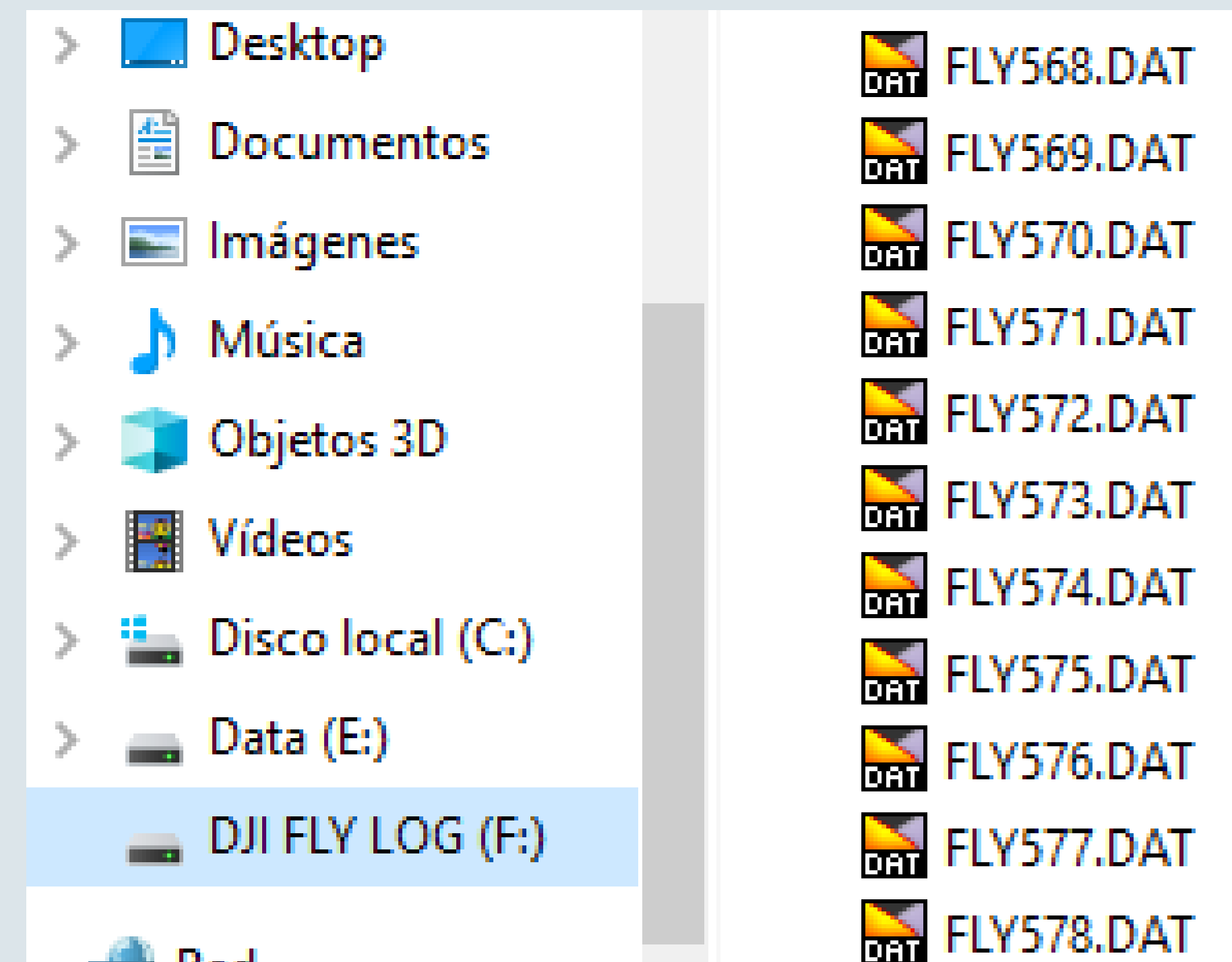
Drone
(Archivos DAT)

Análisis

ARCHIVOS DAT

Identificación y recolección de evidencias:

- Se encuentran almacenados en la memoria externa del Drone.
- Contienen registros de GPS, batería, control remoto, estado de vuelo, motores, etc.
- Un nuevo archivo DAT es creado cada vez que se enciende el Drone y cierra el archivo DAT anterior.

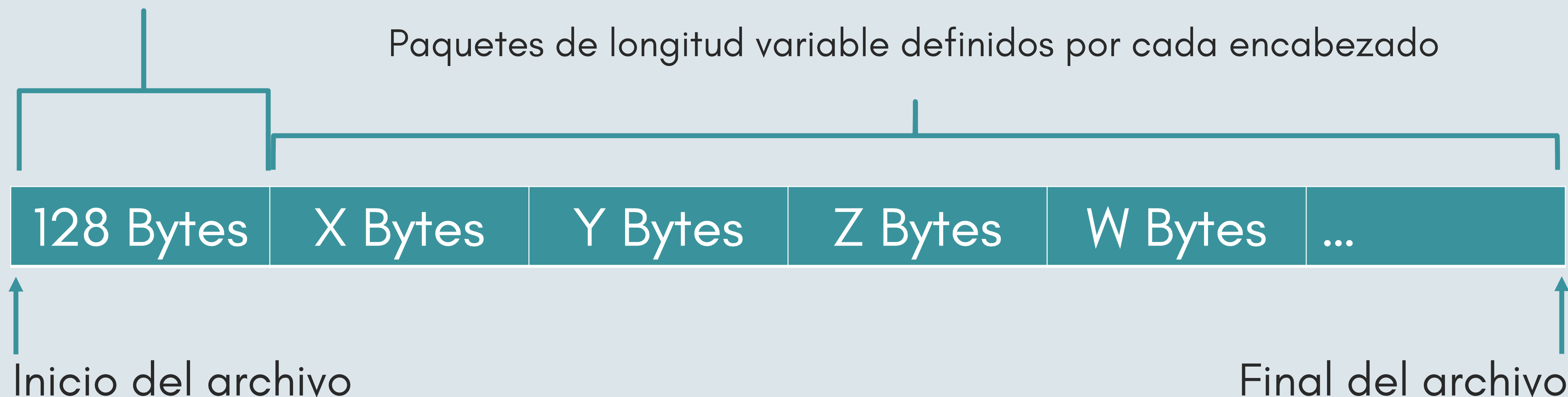


Archivos DAT

ESTRUCTURA INTERNA

Encabezado: Longitud fija de 128 Bytes. Contiene el número de compilación del archivo DAT.

Paquetes de longitud variable definidos por cada encabezado



Archivos DAT

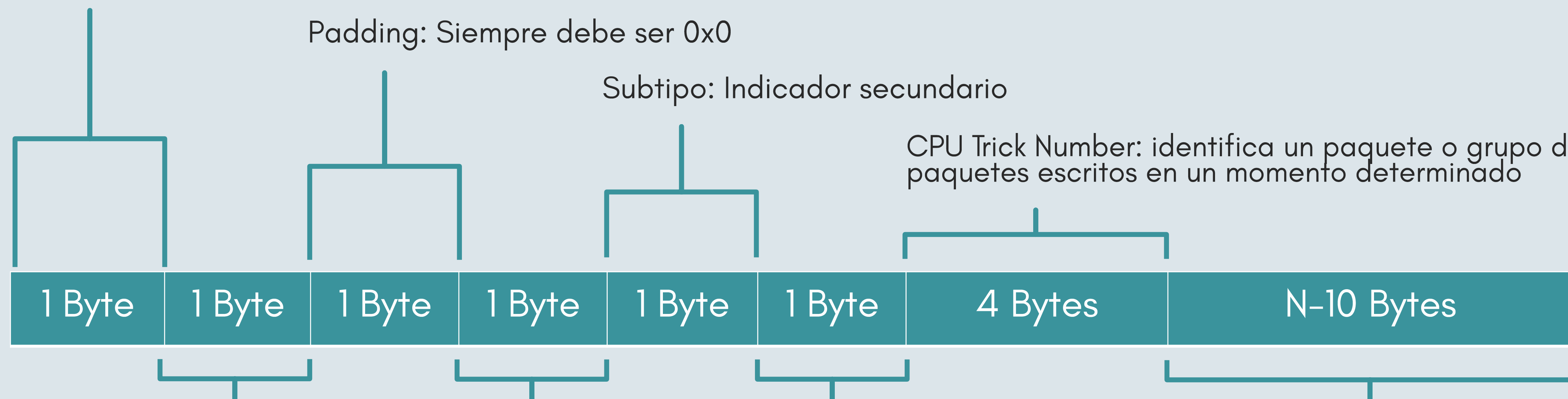
ESTRUCTURA DE LOS PAQUETES

Byte de inicio: Siempre 0x55

Padding: Siempre debe ser 0x0

Subtipo: Indicador secundario

CPU Trick Number: identifica un paquete o grupo de paquetes escritos en un momento determinado



Longitud N: Longitud del paquete en bytes. Incluye los bytes de inicio/fin del payload.

Tipo: Indica el tipo de paquete (GPS, batería, control remoto).

Msg: Usualmente 0x0, dependiendo del tipo y subtipo de paquete.

Payload: Tiene una longitud de N-10 Bytes, siendo N definida por el encabezado. Esta encriptado

Archivos DAT

PREVISUALIZACIÓN Y RECOLECCIÓN CON FTK IMAGER

The screenshot displays the AccessData FTK Imager 4.2.0.13 interface. The 'Evidence Tree' on the left shows a hierarchy: 04122019.001 > Partition 1 [3781MB] > DJI FLY LOG [FAT32] > [root] > System Volume Information. The 'File List' on the right shows a table of files:

Name	Size	Type	Date Modified
System Volume Infor...	32	Directory	6/9/2019 12:49:...
FLY000.DAT	3.456	Regular File	15/12/2016 22:...
FLY001.DAT	20.256	Regular File	30/1/2017 00:4...
FLY002.DAT	15.840	Regular File	29/1/2017 13:4...
FLY003.DAT	29.376	Regular File	29/1/2017 13:4...
FLY004.DAT	13.344	Regular File	29/1/2017 13:4...
FLY005.DAT	50.400	Regular File	29/1/2017 13:4...
FLY006.DAT	117.344	Regular File	29/1/2017 13:5...
FLY007.DAT	146.656	Regular File	15/2/2017 20:2...
FLY008.DAT	460.804	Regular File	15/2/2017 20:3...

The hex view at the bottom shows the following data:

```
000000 0B 00 00 00 03 00 00 00-0E 00 00 00 00 00 00 00 .....
000010 42 55 49 4C 44 20 4A 75-6C 20 20 37 20 32 30 31 BUILD Jul 7 201
000020 36 20 31 36 3A 33 39 3A-34 32 00 00 00 00 00 00 6 16:39:42 .....
000030 20 AA 44 00 07 00 00 00-00 03 65 62 1F 11 11 6C ^D.....eb...1
000040 13 65 65 64 65 64 10 11-55 AA 67 6D 34 66 36 60 -eeded..U^gm4f6`
000050 66 30 33 64 65 66 63 67-6D 62 30 31 31 37 61 33 f03defcgm0117a3
000060 36 31 34 33 64 64 63 30-6D 6D 55 00 00 00 00 00 6143ddc0mmU.....
000070 00 00 00 00 00 00 00 00-00 00 00 00 00 00 00 .....
```

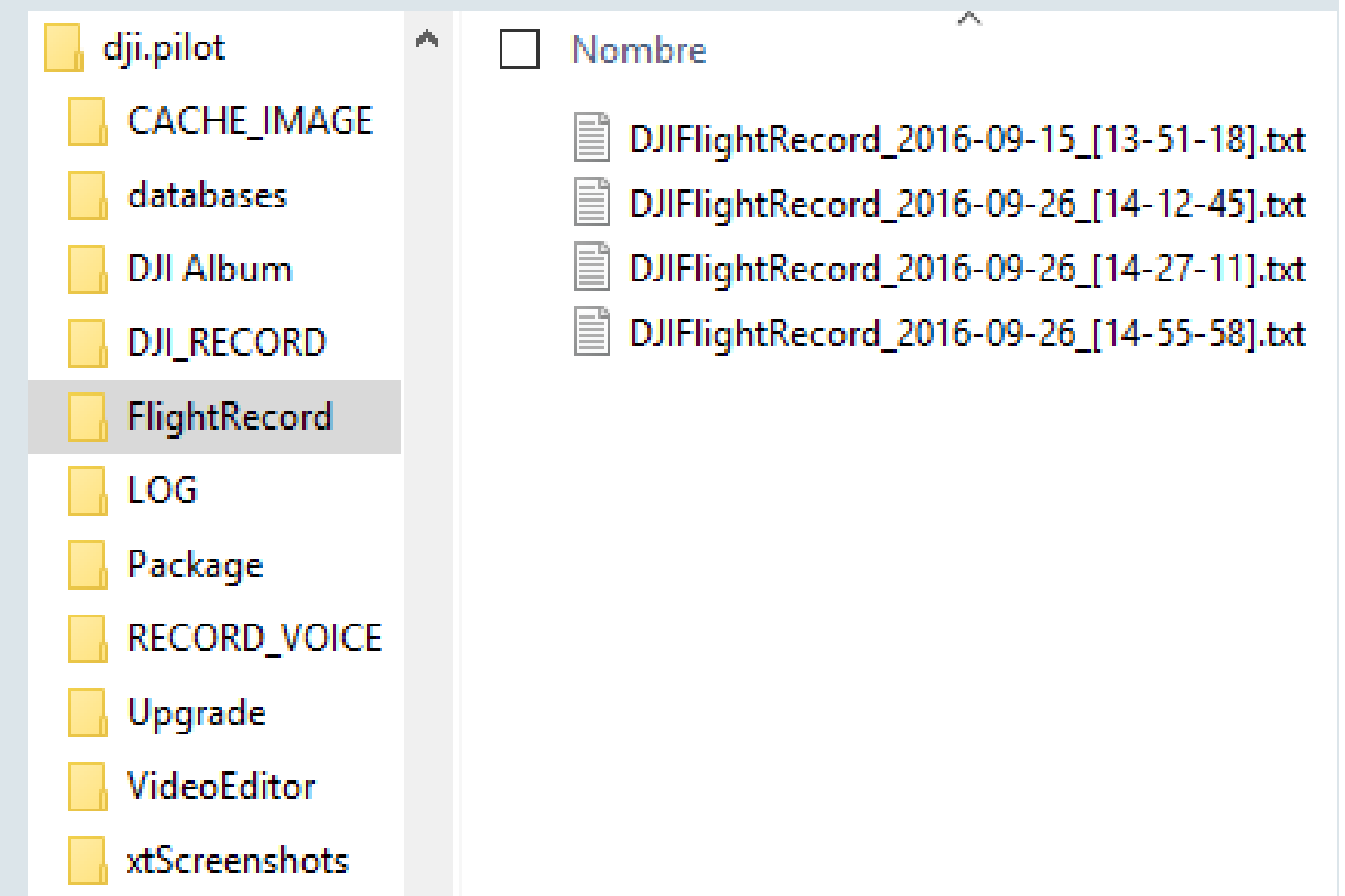
At the bottom, the status bar indicates: Listed: 26 Selected: 1 04122019.001/Partition 1 [3781MB]/DJI FLY LOG [FAT32]/[root]/FLY000.DAT

Análisis

ARCHIVOS TXT

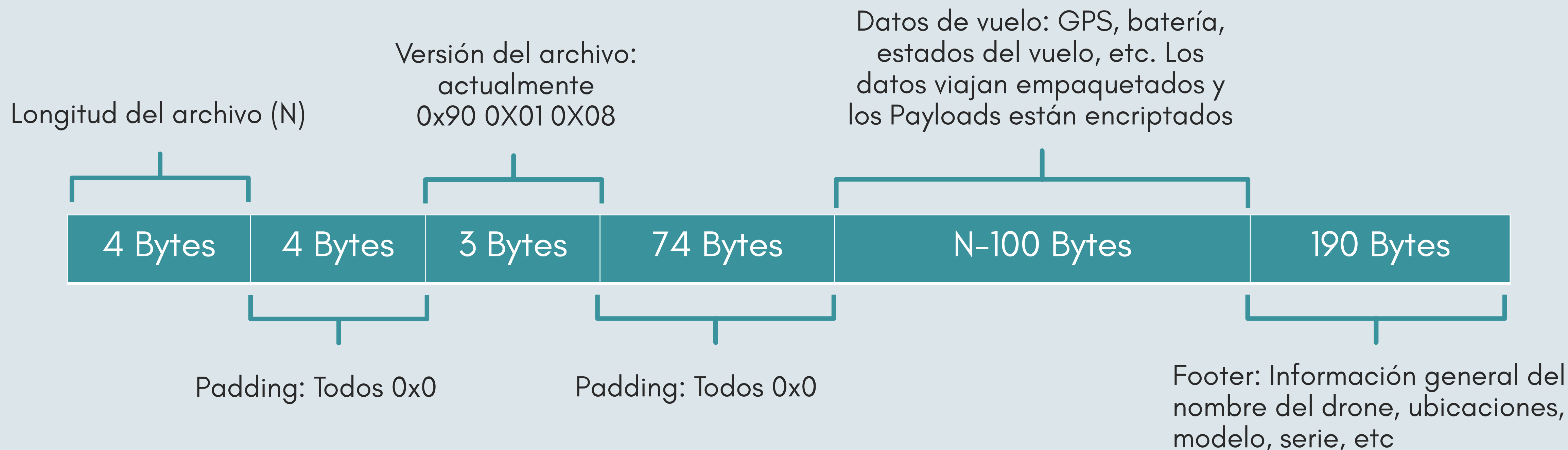
Identificación y recolección de evidencias:

- Se encuentran almacenados en el dispositivo móvil.
- Contiene registros similares a los archivos DAT
- Utiliza un complejo esquema de cifrado.



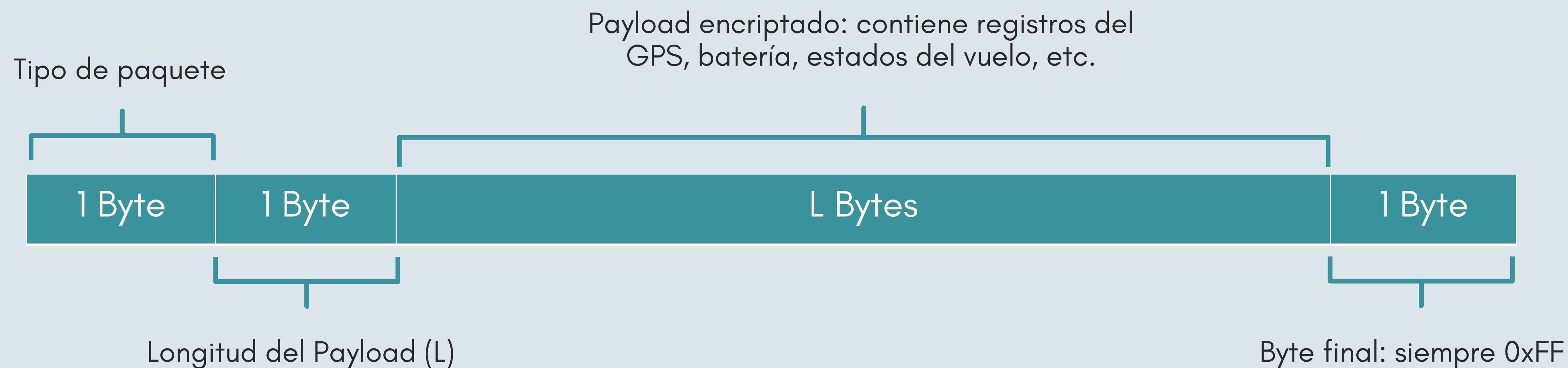
Archivos TXT

ESTRUCTURA INTERNA



Archivos TXT

ESTRUCTURA DE LOS PAQUETES



Archivos TXT

PREVISUALIZACIÓN Y RECOLECCIÓN CON FTK IMAGER

The screenshot displays the AccessData FTK Imager 4.2.0.13 interface. The 'Evidence Tree' on the left shows a directory structure for 'E:\QTH\01 - Workshops\UAV Forensic', with the 'DJI' folder expanded to show subfolders like 'assistant', 'dji.pilot', 'CACHE_IMAGE', 'databases', 'DJI_RECORD', 'DJI_SPALSH', 'editor', and 'FlightRecord'. The 'File List' pane on the right shows a single file: 'DJIflightRecord_2018-06-20_[09-04-19].txt' with a size of 294 bytes and a date modified of 20/6/2018 14:00. The main window displays a hex view of the file's content, with a selection of data from offset 497a0 to 497c0 highlighted in blue. The hex view shows a sequence of bytes, many of which are 00, interspersed with some non-zero values. The ASCII column on the right shows the corresponding text representation of these bytes, which appears to be mostly empty space or non-printable characters.

Offset	Hex	ASCII
496f0	5A 31 33 38 39 36 38 32-00 00 00 00 00 00 00	Z1389682
49700	00 00 00 00 00 00 00 00-00 00 00 00 00 00 00
49710	00 00 00 00 00 00 00 00-00 00 00 00 00 35 3050
49720	36 34 35 30 36 38 33 34-00 00 00 00 00 02 03	64506834
49730	01 26 00 00 00 00 00 00-00 00 00 00 00 00 00	-&
49740	00 00 00 00 00 00 33 36-45 35 34 39 31 41 46 4236E5491AFB
49750	37 39 43 31 30 36 36 30-44 37 32 38 44 46 38 32	79C10660D728DF82
49760	34 36 44 32 35 35 45 31-32 34 31 34 32 37 00 00	46D255E1241427 ..
49770	00 00 00 00 00 00 00 00-00 00 00 00 00 00 00
49780	00 00 00 00 00 00 41 46-34 31 42 37 43 46 46 32AF41B7CFF2
49790	39 41 33 42 34 30 31 42-33 41 30 33 37 42 31 46	9A3B401B3A037B1F
497a0	39 37 32 36 36 44 38 33-32 35 46 39 36 36 00 00	97266D8325F966 ..
497b0	00 00 00 00 00 00 00 00-00 00 00 00 00 00 00
497c0	00 00 00 00 00 00

Análisis

INTERPRETACIÓN DE LAS EVIDENCIAS RECOLECTADAS

ARCHIVOS DAT

- CsvView
(<http://datfile.net/CsvView/downloads.html>)
- DatCon
(<http://datfile.net/DatCon/downloads.html>)

ARCHIVOS TXT

- CsvView
- AirData
(<https://app.airdata.com>)

Archivos DAT

INTERPRETACIÓN CON CSV VIEW

1

The screenshot shows the CsvView application window. The title bar reads "CsvView: E:\QTH\01 - Workshops\UAV Forensic Analysis\Imágenes Forenses\New Haven University\DroneWorkshopFiles-9-2016\Aqui...". The menu bar includes "File", "Edit", "Preferences", "DatCon Categories", "DatCon Parsing Options", "TXTlogToCSVtool Options", "Track", "Export .zip", "Version 3.7.5", and "Help".

1. The file path is highlighted in a red box: ".DAT, .txt, .csv or .tsv" and "QTH\01 - Workshops\UAV Forensic Analysis\Imágenes Forenses\New Haven University\DroneWorkshopFiles-9-2016\Aquired-Data\DAT-Files\FLY003.DAT".

2. The "Source Type" is set to "DATGENERIC". The "SigPlayers" list is highlighted in a red box and includes: "Empty", "Motor Speeds", "LeftFront Motor", "MagMod/Compass Error", and "navHealth".

3. The "GeoPlayer" button is highlighted in a red box.

4. The "EventLogPlayer" button is highlighted in a red box.

The "Log Area" contains the following text:

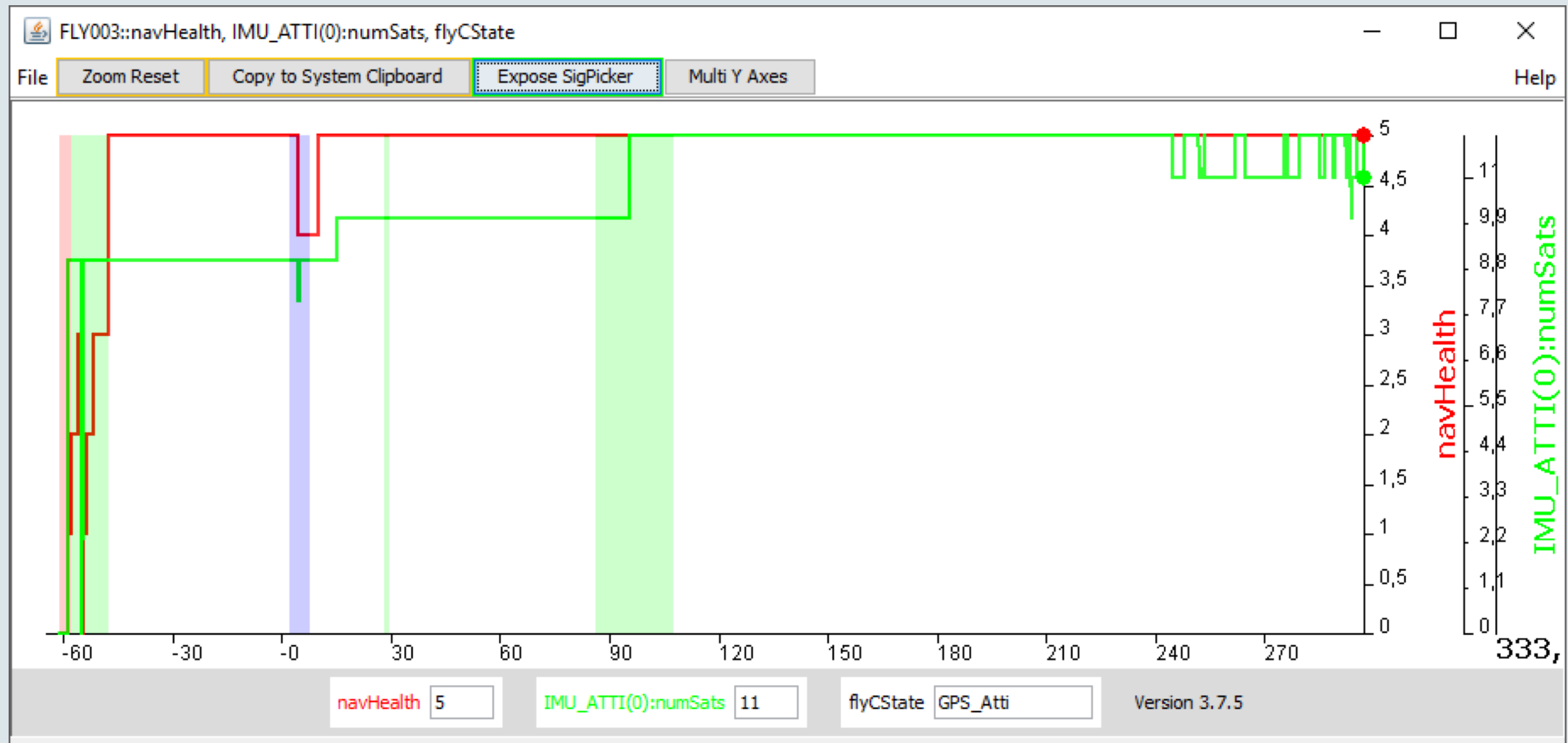
```
GeoPath IMU0 has headingSignal IMU_ATT(0):tiltDirection that isn't defined
GeoPath IMU0 has headingSignal wind:direction that isn't defined
GeoPath IMU1 has signal IMU_ATT(1):Latitude that isn't defined
GeoPath IMUCalcs(0) has signal IMUCalcs(0):Lat that isn't defined
GeoPath IMUCalcs(1) has signal IMUCalcs(1):Lat that isn't defined
```

On the right side, a table displays metadata:

ACType	P3S
dateTime	2016-9-26 18:26:8 GMT
geoDeclin...	-1356 degrees
geoInclin...	6673 degrees
geoInten...	5181654 nanoTesla

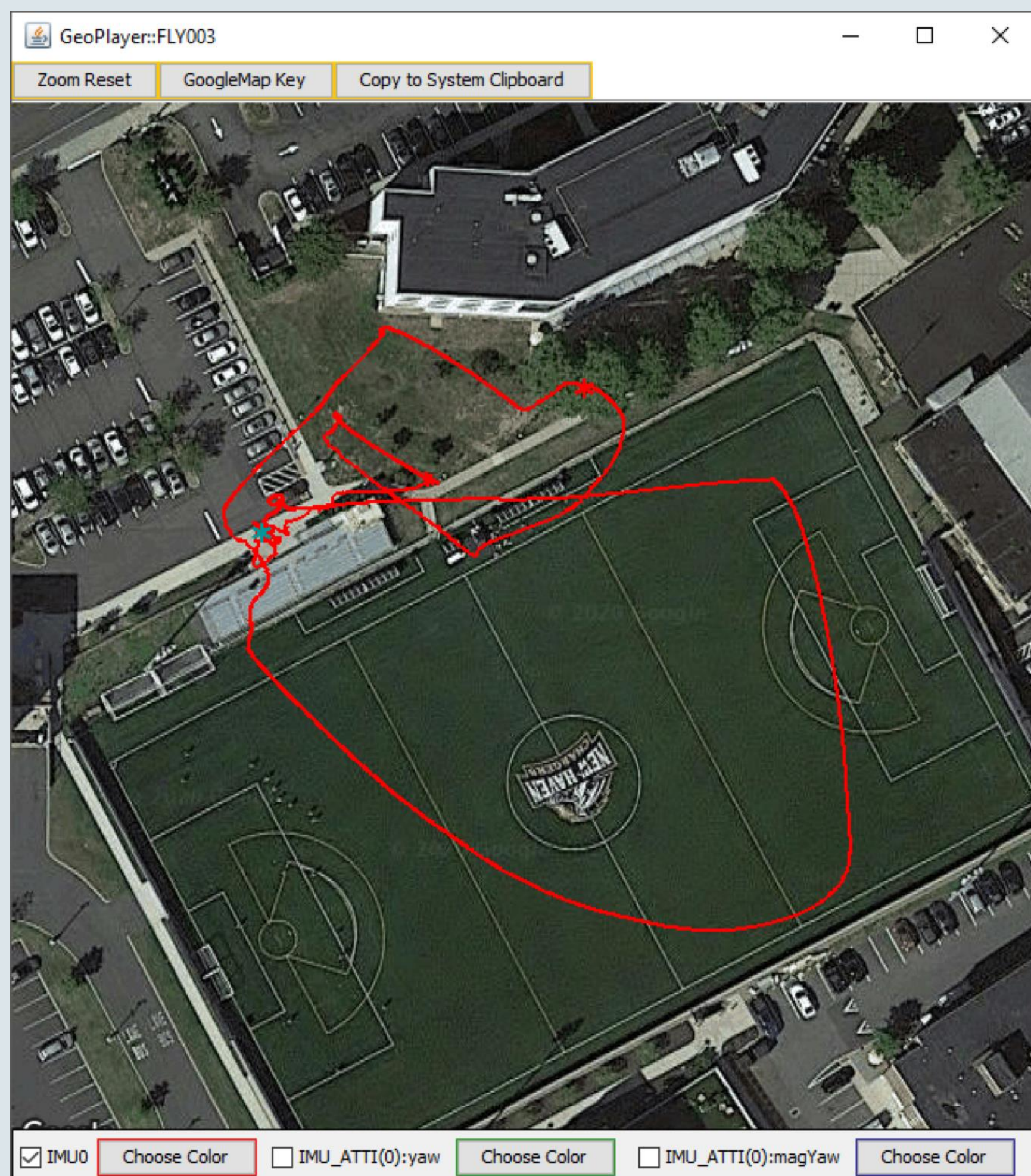
Archivos DAT

INTERPRETACIÓN CON CSV VIEW – SIGPLAYER



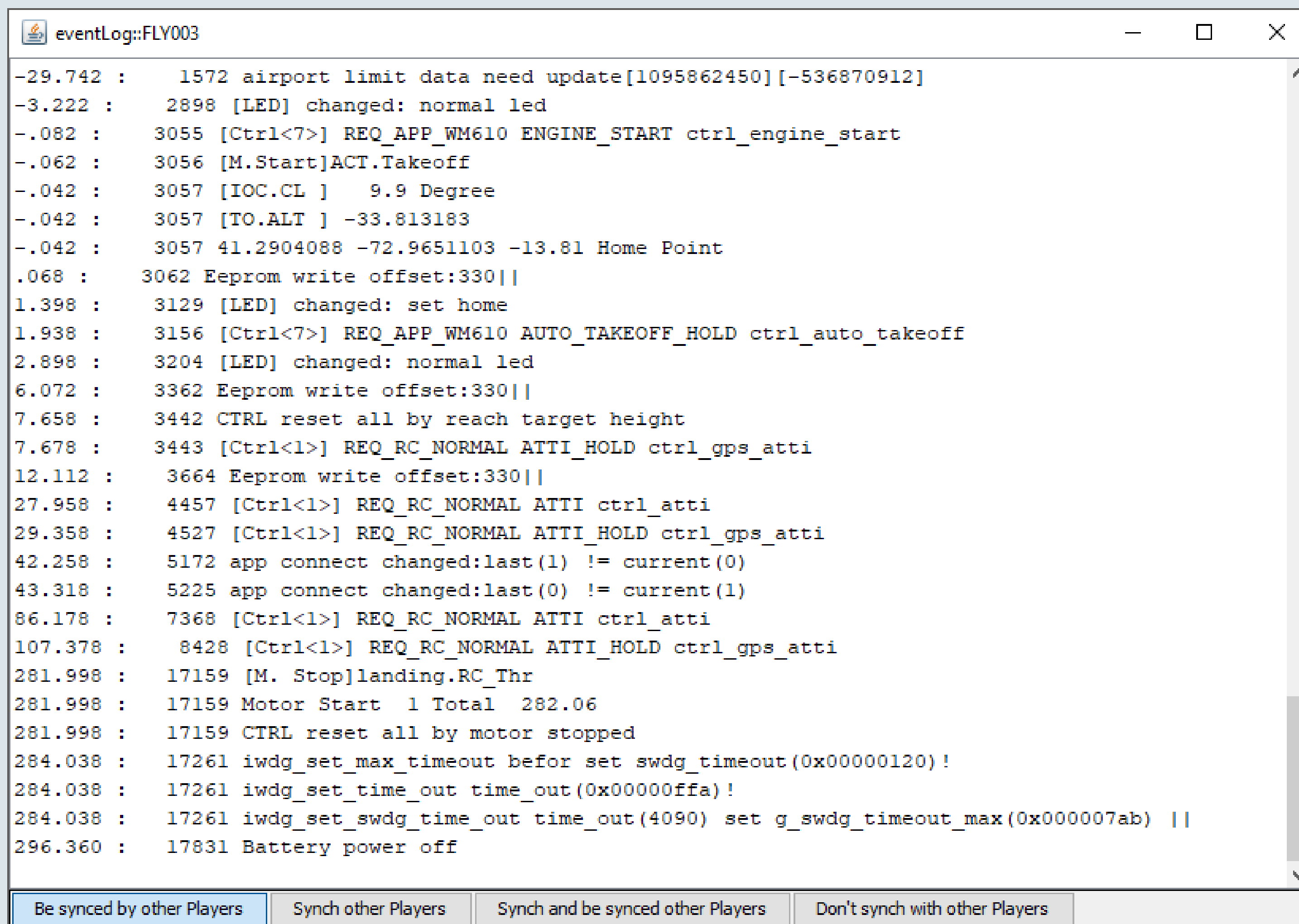
Archivos DAT

INTERPRETACIÓN CON CSV VIEW - GEOPLAYER



Archivos DAT

INTERPRETACIÓN CON CSV VIEW – EVENT LOG PLAYER



```
eventLog::FLY003
-29.742 : 1572 airport limit data need update[1095862450] [-536870912]
-3.222 : 2898 [LED] changed: normal led
-.082 : 3055 [Ctrl<7>] REQ_APP_WM610 ENGINE_START ctrl_engine_start
-.062 : 3056 [M.Start]ACT.Takeoff
-.042 : 3057 [IOC.CL ] 9.9 Degree
-.042 : 3057 [TO.ALT ] -33.813183
-.042 : 3057 41.2904088 -72.9651103 -13.81 Home Point
.068 : 3062 Eeprom write offset:330||
1.398 : 3129 [LED] changed: set home
1.938 : 3156 [Ctrl<7>] REQ_APP_WM610 AUTO_TAKEOFF_HOLD ctrl_auto_takeoff
2.898 : 3204 [LED] changed: normal led
6.072 : 3362 Eeprom write offset:330||
7.658 : 3442 CTRL reset all by reach target height
7.678 : 3443 [Ctrl<1>] REQ_RC_NORMAL ATTI_HOLD ctrl_gps_atti
12.112 : 3664 Eeprom write offset:330||
27.958 : 4457 [Ctrl<1>] REQ_RC_NORMAL ATTI ctrl_atti
29.358 : 4527 [Ctrl<1>] REQ_RC_NORMAL ATTI_HOLD ctrl_gps_atti
42.258 : 5172 app connect changed:last(1) != current(0)
43.318 : 5225 app connect changed:last(0) != current(1)
86.178 : 7368 [Ctrl<1>] REQ_RC_NORMAL ATTI ctrl_atti
107.378 : 8428 [Ctrl<1>] REQ_RC_NORMAL ATTI_HOLD ctrl_gps_atti
281.998 : 17159 [M. Stop]landing.RC_Thr
281.998 : 17159 Motor Start 1 Total 282.06
281.998 : 17159 CTRL reset all by motor stopped
284.038 : 17261 iwdg_set_max_timeout befor set swdg_timeout(0x00000120)!
284.038 : 17261 iwdg_set_time_out time_out(0x00000ffa)!
284.038 : 17261 iwdg_set_swdg_time_out time_out(4090) set g_swdg_timeout_max(0x000007ab) ||
296.360 : 17831 Battery power off
```

Be synced by other Players | Synchronize other Players | Synchronize and be synced other Players | Don't synchronize with other Players

Archivos DAT

INTERPRETACIÓN CON DATCON

The screenshot shows the DatCon software interface with the following components and annotations:

- 1**: Points to the ".DAT file" field containing the path: "D:\1 - Workshops\UAV Forensic Analysis\Imágenes Forenses\New Haven University\DroneWorkshopFiles-9-2016\Aquired-Data\DAT-Files\FLY003.DAT".
- 2**: Points to the "Output Dir" field containing the path: "D:\1 - Workshops\UAV Forensic Analysis\Imágenes Forenses\New Haven University\DroneWorkshopFiles-9-2016\Aquired-Data\DAT-Files" and a "View It" button.
- 3**: Points to the "Time Axis" and "CSV" sections. The "Time Axis" section includes:
 - Offset - time axis 0 point: Recording Start, Motor Start, Flight Start
 - Lower: Time: -55.000, TickNo: 6476
 - Upper: 281.998, 208675
 - Recording Start, Motor Stop, Recording Stop
 - GPS LockThe "CSV" section includes:
 - Sample Rate: 30 Hz
 - .CSV: FLY003.csv (View It)
 - Event Log (column in .csv)
- 4**: Points to the "Log Files" and "KML" sections. The "Log Files" section includes:
 - Event Log File: FLY003.log.txt (View It)
 - Config Log File: FLY003.config.txt (View It)
 - RecDefs File: FLY003.recDefs.txt (View It)The "KML" section includes:
 - KML File: FLY003.kml (View It)
 - Ground Track
 - Profile: Enter HP Elevation [] Meters

At the bottom of the interface is a large grey button labeled "GO!".

Archivos DAT

INTERPRETACIÓN CON DATCON – ARCHIVO DE VUELO EN FORMATO CSV

A1	latitude,longitude,altitude(feet),ascent(feet),speed(mph),distance(feet),time(milliseconds),datetime(utc),satellites,voltage(v),max_altitude(feet),max_ascent(feet),max_s																			
A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U
1	latitude,longitude,altitude(feet),ascent(feet),speed(mph),distance(feet),time(milliseconds),datetime(utc),satellites,voltage(v),max_altitude(feet),max_ascent(feet),max_speed(mph),max_distance(feet),compass																			
2	41.2904087520873,-72.9651103103011,123.27288485024,0,0,0,2016-09-26 18:27:12,9,0,123.27288485024,0,0,0,9.8,0,0,1024,1024,1024,1024,9.4,0,67,4.014,4.016,4.013,4.016,0,0,6,GPS_Att																			
3	41.2904087504213,-72.9651103169825,123.27288485024,0,0,0.00192987867068,100,2016-09-26 18:27:12,9,0,123.27288485024,0,0,0.00192987867068,9.8,0,0,1024,1024,1024,1024,9.4,0,67,4.014,4.016,4.013,4.016,0,0,6,GPS																			
4	41.2904087515445,-72.965110415862,123.27288485024,0,0,0.0289390101124,200,2016-09-26 18:27:12,9,0,123.27288485024,0,0,0.0289390101124,9.7,0,0,1024,1024,1024,1024,9.4,0,67,4.014,4.016,4.013,4.016,0,0,6,GPS_Att																			
5	41.2904087525584,-72.9651104145146,123.27288485024,0,0,0.0285694562948,300,2016-09-26 18:27:12,9,0,123.27288485024,0,0,0.0289390101124,9.8,0,0,1024,1024,1024,1024,9.4,0,67,4.014,4.016,4.013,4.016,0,0,6,GPS_A																			
6	41.2904087627385,-72.9651104194819,123.27288485024,0,0,0.0301818907296,400,2016-09-26 18:27:12,9,0,123.27288485024,0,0,0.0301818907296,9.8,0,0,1024,1024,1024,1024,9.4,0,67,4.014,4.016,4.013,4.016,0,0,6,GPS_A																			
7	41.2904087637505,-72.9651104191045,123.27288485024,0,0,0.0301292332476,500,2016-09-26 18:27:12,9,0,123.27288485024,0,0,0.0301818907296,9.8,0,0,1024,1024,1024,1024,9.4,0,67,4.014,4.016,4.013,4.016,0,0,6,GPS_A																			
8	41.2904086649004,-72.965110519489,123.27288485024,0,0,0.065578086088,600,2016-09-26 18:27:13,9,0,123.27288485024,0,0,0.065578086088,9.8,0,0,1024,1024,1024,1024,9.4,0,67,4.014,4.016,4.013,4.016,0,0,6,GPS_Att																			
9	41.2904086564856,-72.9651105093741,123.27288485024,0,0,0.064768046692,700,2016-09-26 18:27:13,9,0,123.27288485024,0,0,0.065578086088,9.8,0,0,1024,1024,1024,1024,9.4,0,67,4.014,4.016,4.013,4.016,0,0,6,GPS_Att																			
10	41.2904086575796,-72.9651105087913,123.27288485024,0,0,0.064418965316,800,2016-09-26 18:27:13,9,0,123.27288485024,0,0,0.065578086088,9.8,0,0,1024,1024,1024,1024,9.4,0,67,4.014,4.016,4.013,4.016,0,0,6,GPS_Att																			
11	41.2904086591549,-72.9651105083416,123.27288485024,0,0,0.064008532232,900,2016-09-26 18:27:13,9,16.059,123.27288485024,0,0,0.065578086088,9.8,0,0,1024,1024,1024,1024,9.4,0,67,4.014,4.016,4.013,4.016,0,0,6,GPS																			
12	41.2904085578418,-72.9651105216727,123.27288485024,0,0,0.0915436381,1000,2016-09-26 18:27:13,9,16.059,123.27288485024,0,0,0.0915436381,9.8,0,0,1024,1024,1024,1024,9.4,0,67,4.014,4.016,4.013,4.016,0,0,6,GPS_At																			
13	41.290408559238,-72.9651105220346,123.27288485024,0,0,0.091212929428,1100,2016-09-26 18:27:13,9,16.059,123.27288485024,0,0,0.0915436381,9.8,0,0,1024,1024,1024,1024,9.4,0,67,4.014,4.016,4.013,4.016,0,0,6,GPS_A																			
14	41.2904085601886,-72.9651106218176,123.27288485024,0,0,0.110430449728,1200,2016-09-26 18:27:13,9,16.059,123.27288485024,0,0,0.110430449728,9.8,0,0,1024,1024,1024,1024,9.4,0,67,4.014,4.016,4.013,4.016,0,0,6,GP																			
15	41.2904085479044,-72.9651106198373,122.94480085024,-0.328084,0,0.11291667028,1400,2016-09-26 18:27:13,9,16.059,123.27288485024,0,0,0.11291667028,9.8,0,0,1024,1024,1024,1024,9.5,0,67,4.014,4.016,4.013,4.016,0,																			
16	41.2904085482491,-72.9651106195736,122.94480085024,-0.328084,0,0.112779203084,1500,2016-09-26 18:27:13,9,16.059,123.27288485024,0,0,0.11291667028,9.9,0,0,1024,1024,1024,1024,9.5,0,67,4.014,4.016,4.013,4.016,0,																			
17	41.290408449339,-72.965110615908,122.94480085024,-0.328084,0,0.13863517504,1600,2016-09-26 18:27:14,9,16.059,123.27288485024,0,0,0.13863517504,9.9,0,0,1024,1024,1024,1024,9.5,0,67,4.014,4.016,4.013,4.016,0,0,6,																			
18	41.2904084525926,-72.9651106155242,122.94480085024,-0.328084,0,0.137627300992,1700,2016-09-26 18:27:14,9,16.059,123.27288485024,0,0,0.13863517504,9.9,0,0,1024,1024,1024,1024,9.5,0,67,4.014,4.016,4.013,4.016,0,																			
19	41.2904084553539,-72.9651107124752,122.61671685024,-0.656168,0,0.1545193619,1800,2016-09-26 18:27:14,9,16.059,123.27288485024,0,0,0.1545193619,9.9,0,0,1024,1024,1024,1024,9.5,0,67,4.014,4.016,4.013,4.016,0,0,6,																			
20	41.2904084510436,-72.9651107172834,122.61671685024,-0.656168,0,0.156562012884,1900,2016-09-26 18:27:14,9,16.059,123.27288485024,0,0,0.156562012884,9.9,0,0,1024,1024,1024,1024,9.5,0,67,4.014,4.016,4.013,4.016,																			
21	41.2904084522675,-72.9651107134709,122.61671685024,-0.656168,0,0.155504270068,2000,2016-09-26 18:27:14,9,16.058,123.27288485024,0,0,0.156562012884,10,0,0,1024,1024,1024,1024,9.5,0,67,4.014,4.016,4.012,4.016,																			
22	41.290408454801,-72.9651107118559,122.28863285024,-0.984252,0,0.154540031192,2100,2016-09-26 18:27:14,9,16.058,123.27288485024,0,0,0.156562012884,10,0,0,1024,1024,1024,1024,9.5,0,67,4.014,4.016,4.012,4.016,0,																			
23	41.2904083612452,-72.9651107175472,122.28863285024,-0.984252,0,0.181102696084,2200,2016-09-26 18:27:14,9,16.058,123.27288485024,0,0,0.181102696084,10,0,0,1024,1024,1024,1024,9.5,0,67,4.014,4.016,4.012,4.016,																			

Archivos TXT

INTERPRETACIÓN CON CSV VIEW

1

The screenshot shows the CsvView application window. The title bar reads "CsvView: E:\QTH\01 - Workshops\UAV Forensic Analysis\Imágenes Forenses\New Haven University\DroneWorkshopFiles-9-2016\Aqui...". The menu bar includes "File", "Edit", "Preferences", "DatCon Categories", "DatCon Parsing Options", "TXTlogToCSVtool Options", "Track", "Export .zip", "Version 3.7.5", and "Help".

Step 1: The file path ".DAT, .txt, .csv or .tsv" and the file name "sic Analysis\Imágenes Forenses\New Haven University\DroneWorkshopFiles-9-2016\Acquired-Data\TXT-Files\DJIFlightRecord_2016-09-26_[14-27-11].txt" are highlighted with a red box.

Step 2: The "Source Type" is set to "TXTTOLOGCSVTOOL". The "SigPlayers" list is expanded, showing options like "Empty", "Battery Temp C vs Consumption", "Battery Voltage and Percent Remaining", "Distance and Speed", "Battery Voltage Per Cell", "Distance Compared to Avail Time", "Forward Thrust Value over Distance", "flyCState:distance", and "navHealth".

Step 3: The "GeoPlayer" button is highlighted with a red box.

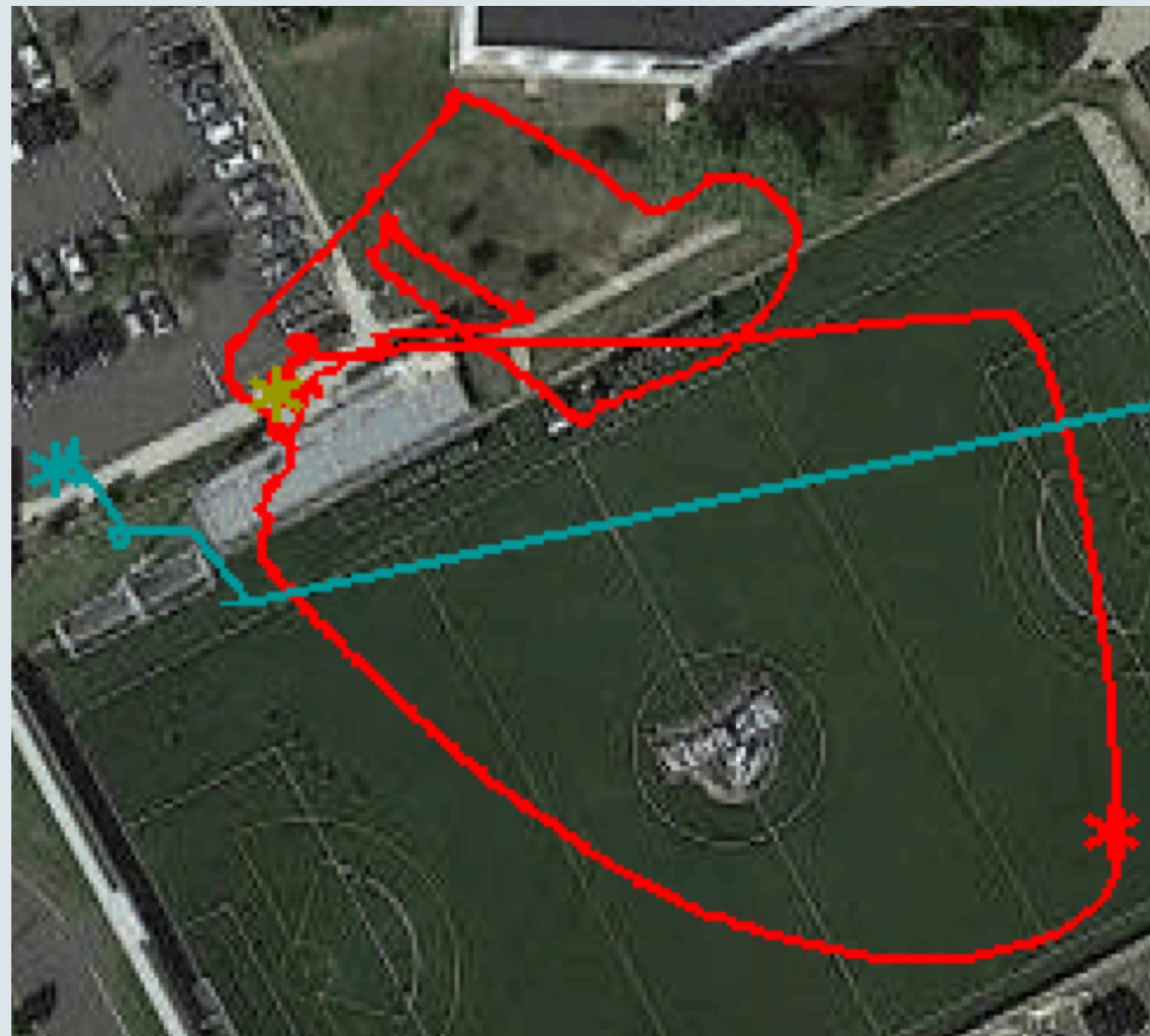
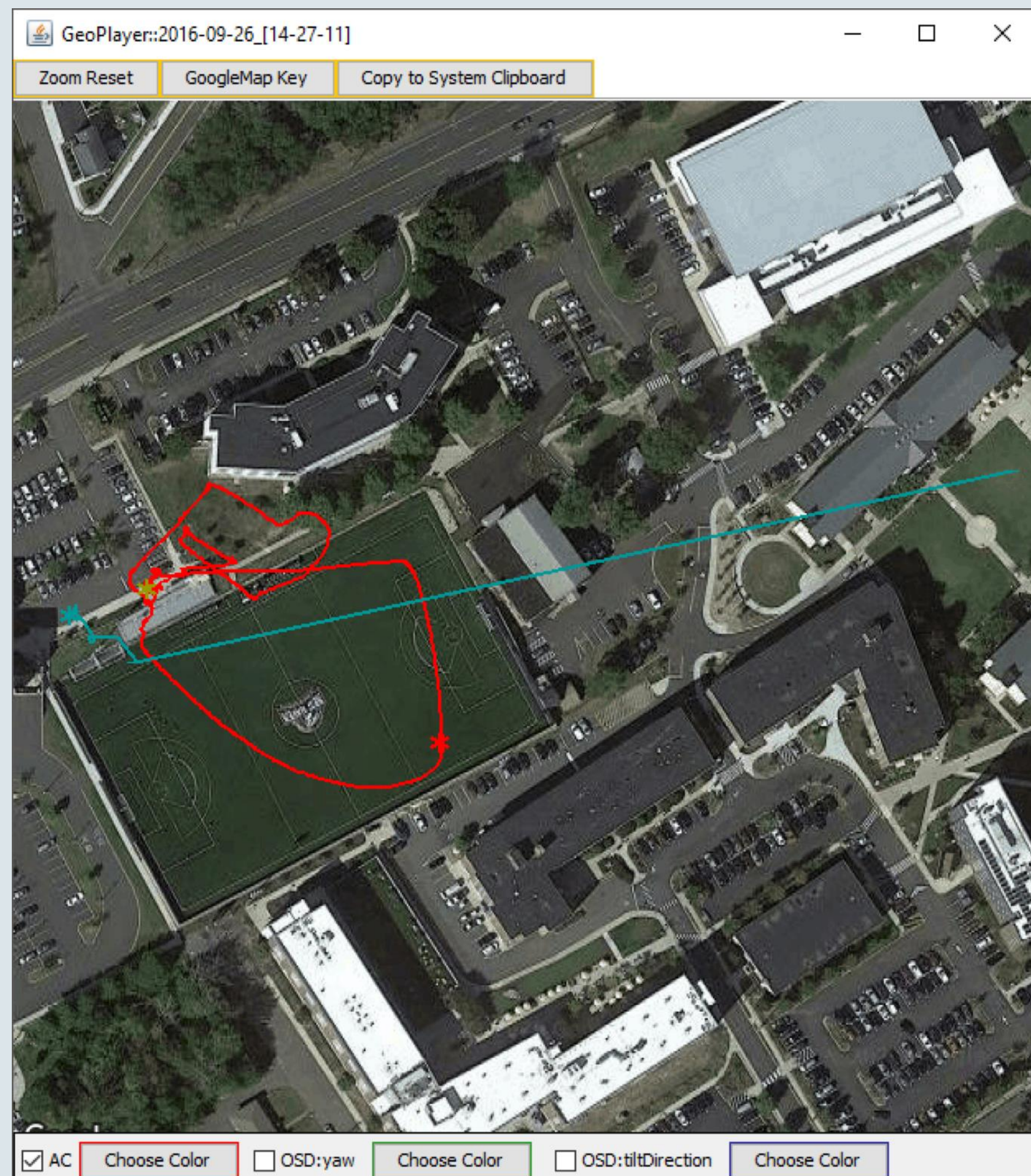
Step 4: The "EventLogPlayer" button is highlighted with a red box.

The "Log Area" contains the text "Using TXTlogToCSVtool".

RECOVE...	P3 Standard
FLYxxx.D...	3
CNTR_BA...	1275
appType	Android
rcSn	05LD102XHR
batteryT...	Smart
batteryL...	12
OSD:dro...	P3 Standard
batteryPr...	2015/09/07
appVersion	2.9.1
RECOVE...	1153516293
cameraSn	CL03021337
aircraftS...	03Z0600080
aircraftN...	Yuhe's Phantom3
GIMBAL:...	1

Archivos TXT

INTERPRETACIÓN CON CSV VIEW - GEOPLAYER



Archivos TXT

INTERPRETACIÓN CON AIRDATA

Metric / Imperial Settings

Overview Details Notifications Large Map

Sep 26th, 2016 02:27PM Edit

Mapa Satélite

GENERAL

POWER

SENSORS

CONTROLS

WEATHER

MEDIA

Sep 26th, 2016 02:27PM (-04:00)

Plane Name **Yuhes Phantom3**

Flight Air Time **04m 37s**

Takeoff Battery **67%** 16.1v

Landing Battery **54%** 14.8v

P3S/Android **DJI 2.9.1**

Total Kilometrage **480 m**

Max Distance **92 m**

Max Altitude **51.0 m**

Max Speed **8.55 m/s**

Max Bat Temp **41.95°C**

Tips: **2**
Warnings: **0**

Google

Datos del mapa Condiciones del Servicio

Download: [KML](#) [GPX \(?\)](#) [CSV](#) [Original](#)

Archivos TXT

INTERPRETACIÓN CON AIRDATA - REPRODUCTOR

Mapa Satélite AIRDATA Close Player Map size: [] [] []

Google

Flight time	Flight mode	GPS Sat	Baro. Alt.	Sonar Alt.	Speed	Home Dist	Bat%	Volts	Cell 1	Cell 2	Cell 3	Cell 4	Deviation	Radio Signal	Notification	Search...	Find
A 00m 00.0s	P-GPS	9	0 m	N/A	0 m/s	0 m	N/A	N/A	N/A	N/A	N/A	N/A	0	100%	Mode changed to P-GPS.		View
00m 00.4s	P-GPS	9	0 m	N/A	0 m/s	0 m	N/A	N/A	N/A	N/A	N/A	N/A	0	100%			
00m 00.8s	P-GPS	9	0 m	N/A	0 m/s	0 m	N/A	N/A	N/A	N/A	N/A	N/A	0	100%			

Archivos TXT

INTERPRETACIÓN CON AIRDATA - MEDIA



Otras evidencias

METADATOS EN ARCHIVOS MULTIMEDIA



- Software ExifDataView
(https://www.nirsoft.net/utils/exif_data_view.html)

Property ID	Property Group	Property Name	Value Type	Value Length	Value
0x010e	Image	ImageDescription	String	27	DCIM\100MEDIA\DJI_0008.JPG
0x010f	Image	EquipMake	String	4	DJI
0x0110	Image	EquipModel	String	7	FC300C
0x011a	Image	XResolution	Rational	8	72
0x011b	Image	YResolution	Rational	8	72
0x0131	Image	SoftwareUsed	String	11	Photos 1.5
0x0132	Image	DateTime	String	20	2016:09:26 14:30:31
0x829a	Camera	ExposureTime	Rational	8	19 / 50000
0x829d	Camera	FNumber	Rational	8	2.80
0x9003	Camera	DTOrig	String	20	2016:09:26 14:30:31
0x9004	Camera	DTDigitized	String	20	2016:09:26 14:30:31

PRESENTACIÓN DE RESULTADOS



- ✓ Portada.
- ✓ Introducción/Antecedentes.
- ✓ Motivación y objeto.
- ✓ Descripción de los elementos aportados.
- ✓ Metodología aplicada y desarrollo.
- ✓ Posible relación de causalidad.
- ✓ Conclusiones.
- ✓ Anexos.
- ✓ Firma.

A drone is shown in flight against a clear blue sky, with its propellers blurred. Below the drone, a semi-transparent white box contains text and logos. The background of the entire image is a sunset over a field of tall grass, with a line of trees on the horizon.

Muchas gracias!

Seguinos en redes sociales



DRONESVIP | Centro de Instrucción
de Aeronáutica Civil