Basic Overview :: JPG image file from raw HEX data Scott, K4KDR 20-June-2019

This is not a full how-to, but just an overview to illustrate the basic concept of how to create (or repair) a JPG image file from raw satellite telemetry.

Step #1 is to <u>recognize</u> that a data packet contains part of a JPG image. To make this possible, you must be familiar with the HEX "markers" that exist within a JPG file:

https://dev.exiv2.org/projects/exiv2/wiki/The Metadata in JPEG files

For example:

2019-06-20 23:54:03.480 UTC: from %# DSD, &#-8 to %# DSD, !+-8 via USx x1x1 000 > C0 00 4A 47 36 59 42 57 30 4A 47 36 59 4C 46 30 3E F0 FF F0 020 > FF 00 00 01 FF D8 FF E0 00 10 4A 46 49 46 00 01 01 01 00 00 040 > 00 00 00 00 FF DB DD 00 43 00 08 06 06 07 06 05 08 07 07 07 060 > 09 09 08 0A 0C 14 0D 0C 0B 0B 0C 19 12 13 0F 14 1D 1A 1F 1E 080 > 1D 1A 1C 1C 20 24 2E 27 20 22 2C 23 1C 1C 28 37 29 2C 30 31 100 > 34 34 34 1F 27 39 CO |À.JG6YBW0JG6YLF0>ðÿðÿ...ÿØÿà.JFIF.....ÿÛÝ.C....ÿÛÝ.C... 2019-06-20 23:54:03.780 UTC: from \$# DSC, &#-8 to \$# DSC, !+-8 via USx1x1 000 > C0 00 4A 47 36 59 42 57 30 4A 47 36 59 4C 46 30 3E F0 FF F0 020 > FF 00 00 02 3D 38 32 3C 2E 33 34 32 FF DB DD 00 43 01 09 09 040 > 09 0C 0B 0C 18 0D 0D 18 32 21 1C 21 32 32 32 32 32 32 32 32 32 100 > 32 32 FF C4 00 1F C0 2019-06-20 23:54:04.060 UTC: from %# DSD, &#-8 to %# DSD, !+-8 via USx1x1 000 > C0 00 4A 47 36 59 42 57 30 4A 47 36 59 4C 46 30 3E F0 FF F0 020 > FF 00 00 03 00 00 01 05 01 01 01 01 01 01 00 00 00 00 00 00 040 > 00 00 01 02 03 04 05 06 07 08 09 0A 0B FF C4 00 B5 10 00 02 060 > 01 03 03 02 04 03 05 05 04 04 00 00 01 7D 01 02 03 00 04 11 080 > 05 12 21 31 41 06 13 51 61 07 22 71 14 32 81 91 A1 08 23 42 100 > B1 C1 15 52 D1 C0

2019-06-20 23:54:04.350 UTC: from %# DSC,&#-8 to %# DSC,!+-8 via USx[x]

... then, either manually (copy/paste) or by a script if you have programming skills, extract the **JPG image payload bytes** (WITHOUT the packet header info such as Source>Destination) from each packet and use a hex editor to **assemble all the actual valid JPG image file bytes into a single file**:

[E:\#Dropbox\Dropbox\SDR\telemetry decodes\Birds-3\from-ja0caw\image1a.jpg] - frhed [E:\#Dropbox\Dropbox\SDR\telemetry decodes\Birds-3\from-ja0caw\image1a.jpg] - frhed [I]
Eile Edit View Options Registry Bookmarks Help
000000 ff d8 ff e0 00 10 4a 46 49 46 00 01 01 01 00 00 00 00 00 00 01 ff db 00 43 00 08 06 06 07 06 05 08 Øya. JFIFy0.C
Unsigned: 6:255, W:55551, L:3/1480.6015 ANU/ VW/ L Size: 810

NOTE: if any packets are missing, in most cases the file will be useless. The JPG format depends on structure – so if even one packet is missing, you will not have a valid image. However, if the beginning of the file is complete (as above), then sometimes you can create a valid "partial" image:



Different satellites might have different packet formats. So, it is important to learn to recognize which bytes are packet header and which bytes are data (telemetry, parts of an image file, or something else).

73! -Scott, K4KDR