



BELLEROPHON

FLIGHT TEST DATA PLATFORM

Decode, search and analyze IRIG 106 Chapter 10 flight test recordings on servers your organization controls. MIL-STD-1553, PCM, ARINC 429, discretes, analog and Ethernet on one time axis, at the full recorded rate.

67 of 67

INDEPENDENT READER
CHECKS

57 MB/s

CHAPTER 10 PROCESSING

379 MB

PEAK MEMORY, 2.6 GB FILE

Air-Gapped

NETWORK READY

BELLEROPHON ENTERPRISE

WHY BELLEROPHON

Bellerophon Enterprise installs on servers your organization controls and decodes your Chapter 10 recordings with your parameter dictionaries, so every engineer works from one validated, audited flight library.

YOUR DATA STAYS ON YOUR NETWORK

Installs on customer-controlled servers, makes no outbound connections and loads no external resources, so it runs on closed networks. Recordings and decoded data are never sent to LNB Federal.

INDEPENDENTLY VALIDATED READER

The Chapter 10 reader passes 67 of 67 validation checks on published sample recordings, with results compared against two independent open-source readers, pychapter10 and irig106lib. Sync patterns and header checksums are verified on every packet.

PROVEN ON FULL-SIZE RECORDINGS

A 2.6 GB recording with 13.7 million 1553 messages and 45.6 million PCM frames processed at 57 MB/s with 379 MB peak memory.

EVERY MAJOR DATA TYPE, ONE TIME AXIS

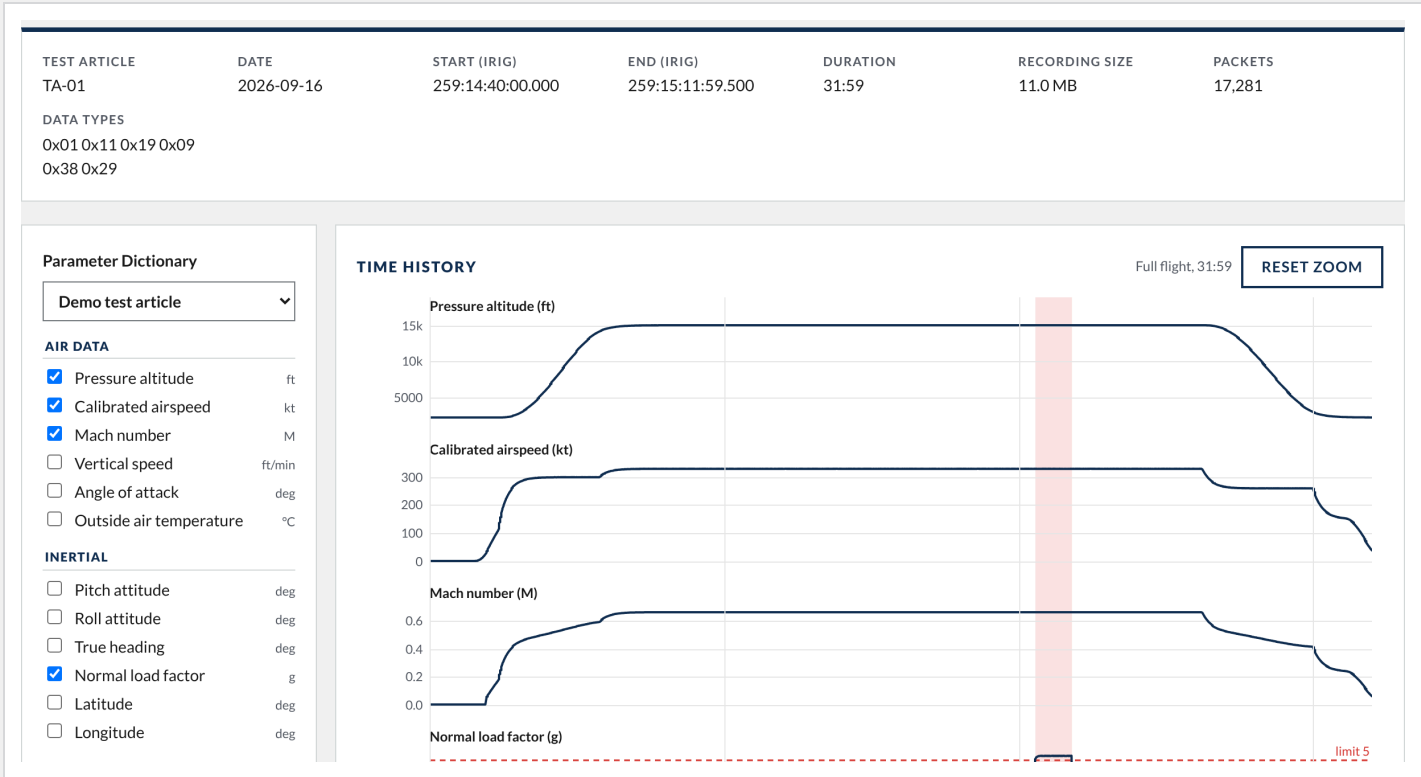
MIL-STD-1553, PCM, ARINC 429, discretes, analog and Ethernet (IENA and iNET-X), decoded to engineering units and plotted together on IRIG time at the full recorded rate.

SECURITY CONTROLS FOR ASSESSORS

Smart card (CAC/PIV) sign-in, viewer, engineer and administrator roles, an audit log, a FIPS mode and a security approval package for assessors. Each customer authorizes its own use.

NO THIRD-PARTY CODE

Runs on Node.js 22.5 or later with no third-party packages, which keeps the software supply chain small. Each release includes a software bill of materials.



Flight detail in the Bellerophon Evaluation edition: recording summary, parameter dictionary and stacked time history on IRIG time, with a limit exceedance highlighted. Synthetic demonstration data.

CAPABILITIES

FEATURES: DECODING AND ANALYSIS

From raw recorder packets to engineering units, search, limits and reports in one application.

CHAPTER 10 INGEST

Recordings stream to the server and decode with flat memory use, so recordings of tens of gigabytes process on ordinary hardware. Packet sync and header checksums are verified on every packet; a damaged packet is skipped and reading resumes at the next valid packet.

PCM

Format 1 in packed, unpacked and throughput modes, decoded from the TMATS frame definition, including words of different lengths. Throughput streams are framed by sync pattern search; subcommutated parameters are located through the subframe ID word.

TIME, TMATS AND DISCRETES

Time Format 1 places every packet on the IRIG time line through the 10 MHz relative time counter. TMATS is decoded, including PCM format groups and the recorder channel map. Discretos decode as single bits or multi-bit fields.

TIME HISTORY PLOTS

Stacked charts on a shared time axis with an IRIG time readout and drag to zoom. Min/max rendering keeps single-sample spikes visible, and multi-level summaries keep full-flight views fast.

LIMIT MONITORING

High and low limits per parameter. Samples outside a limit within 3 seconds of each other form one exceedance, reported with start time, duration and peak value.

RECORDER INVENTORY

1553 traffic by RT and subaddress, PCM stream status with sync errors, ARINC 429 labels, discretos, Ethernet flow summaries and the full TMATS text for each recording.

DATA EXPORT

The selected parameters over the current time window, written as CSV at the full recorded rate for MATLAB, Python or Excel. Every export is recorded in the audit log.

FULL-RESOLUTION STATISTICS

Minimum, maximum and mean in flight comparison are computed on the server from every recorded sample in the window, not from the plotted points.

MIL-STD-1553

Format 1 decoded at word level: 16-bit and 32-bit values and bit fields, matched by channel, RT address, T/R bit and subaddress. Block status word errors are counted, and messages flagged with a message error are excluded.

ARINC 429

Labels in octal with bit-reversed transmission handled, BNR and discrete fields, SDI and bus selection. Words the recorder flags with parity or format errors are excluded.

ANALOG AND ETHERNET

Analog Format 1 decoded per subchannel when all subchannels share one sample rate, sample length (up to 32 bits) and packing mode. Parameters in IENA positional and fixed-layout iNET-X packets carried in UDP decoded by key or stream ID and position, as integers or floating point values.

LIBRARY-WIDE SEARCH

Up to four above/below conditions combined with AND and held for a minimum duration, run on full-resolution data across every recording in the library.

FLIGHT COMPARISON

One parameter from up to four sorties overlaid on elapsed time, with minimum, maximum and mean for each.

FLIGHT NOTES

Engineers add time-stamped notes to a flight, such as a test point, an abort or an observation. Notes are drawn on the time history and open the chart at that moment.

EXCEEDANCE REPORT

Every limit exceedance in the library with sortie, parameter, limit, IRIG start time, duration and peak, as a CSV file for test reports.

PARAMETER DICTIONARIES

Imported from the recording's TMATS setup record or from CSV, with linear or polynomial conversions, limits and valid ranges. Every row is validated; a TMATS import previews every measurement it could not import, with the reason.

CAPABILITIES

FEATURES: WORKFLOW, ACCESS AND SECURITY

From test card to post-flight report, with data access for analysis tools and the controls a customer assessor expects.

DERIVED PARAMETERS

Calculated parameters such as Mach number, unit conversions and filtered signals, written as expressions with arithmetic, comparison and logic, and functions including a low-pass filter, rate of change, integral and delay. They search, plot and export like recorded parameters.

TEST POINTS

Test points mark a time window of a recording with its test card and pass or fail criteria, evaluated automatically against every recorded sample, shown on the time history and searchable across the library.

GROUND TRACK

Latitude and longitude drawn as a ground track linked to the chart cursor, on a coordinate grid or on offline map tiles the customer supplies. Nothing is loaded from the internet.

SMART CARD SIGN-IN

Sign-in with a Common Access Card or PIV card through the customer's TLS reverse proxy, which validates the certificate. Password sign-in can be turned off.

ACCESS AFTER THE LICENSE TERM

When a license ends, browsing, plots, search and export continue, so a program always keeps access to its own data. Uploads and processing resume when a renewal is installed.

REPORT MARKINGS AND SHARING

Report templates print a security marking at the top and bottom of every page, and a report downloads as one self-contained HTML file.

FIPS MODE

An optional mode in which Bellerophon starts only when Node.js runs with a FIPS provider enabled, for use with the customer's FIPS 140 validated OpenSSL module.

DATA QUALITY REPORT

Every recording receives a data quality rating from checks on time, packets, PCM sync and subframes, 1553 errors and dropouts, and each parameter: no data, stuck values and values outside the valid range. Administrators set the thresholds; findings export as CSV.

POST-FLIGHT REPORT

One click produces a report with plots, statistics, exceedances, data quality and test point results, printable to PDF on Letter or A4 paper. Report templates set the content for each program.

DATA ACCESS FOR ANALYSIS TOOLS

A documented, read-only data access interface with personal access tokens that expire and can be revoked, and a Python client that saves time series as CSV or MATLAB files, and as HDF5 or Parquet files when the standard h5py or pyarrow package is installed. Every data request is audited.

ADMINISTRATION AND AUDIT

Viewer, engineer and administrator roles. Sign-ins, user changes, uploads, dictionary changes, notes, exports, data access and deletions are logged with the client address, and administrators export the full log as CSV for assessors.

DATA INTEGRITY CHECKS

Packet data checksums (8, 16 and 32-bit) and secondary header checksums are verified, and damaged or truncated data is counted in the data quality report.

HARDENED DEPLOYMENT

A hardened system service unit that blocks network traffic except to the local reverse proxy, with reverse proxy and container examples.

SECURITY APPROVAL PACKAGE

Each release includes the system boundary, a hardened deployment guide aligned with the applicable DISA STIG requirement areas, a NIST SP 800-53 Revision 5 control mapping, test evidence and a software bill of materials listing every file.

SPECIFICATIONS

SUPPORTED DATA AND REQUIREMENTS

DATA TYPE	CH 10 TYPE	SUPPORT
TMATS setup record	0x01	Decoded, including PCM format (P) groups and the recorder channel map (R); measurements import into a dictionary
Time Format 1	0x11	Decoded, IRIG day-of-year and month-and-year formats
MIL-STD-1553 Format 1	0x19	Decoded at word level; 16-bit and 32-bit values; bit fields
PCM Format 1	0x09	Decoded in packed and unpacked modes, including words of different lengths; subcommutated parameters by subframe ID word
PCM Format 1, throughput mode	0x09	Decoded; minor frames found by sync pattern search
ARINC 429 Format 0	0x38	Decoded; labels in octal; BNR and discrete fields; SDI and bus selection
Discrete Format 1	0x29	Decoded; individual bits or multi-bit fields
Ethernet Format 0 and 1	0x68, 0x69	Flow summary; parameters decoded from IENA positional and fixed-layout iNET-X packets in UDP
Analog Format 1	0x21	Decoded when all subchannels share one sample rate, sample length (up to 32 bits) and packing mode
Video, image, UART, CAN, other	various	Counted per channel; not decoded

SYSTEM

Runtime	Node.js 22.5 or later. No third-party packages.
Operating System	Linux (recommended), Windows Server or macOS
Server	4 CPU cores and 8 GB of memory are sufficient for most programs
Storage	Original recordings plus about 16 bytes per decoded sample (200 parameters at 50 Hz for 2 hours is about 1.2 GB)
Recording Size	Up to 100 GB per recording by default (configurable)
Deployment	System service or container, behind a TLS reverse proxy such as nginx or Apache
Client	Current web browser; no client installation
Networks	Closed and air-gapped networks; no outbound connections and no external resources
Licensing	Signed license file verified offline; no license server and no usage reporting

SECURITY FEATURES

Sign-In	Smart card (CAC/PIV) through the customer's TLS proxy, or passwords with length rules, salted hashing, throttling and lockout.
Cryptography	Optional FIPS mode that requires a FIPS provider in Node.js.
Sessions	Protected session cookies, ended at once when a user is disabled or a role changes.
Requests	Cross-site request forgery protection and a strict Content Security Policy.
Uploads and Storage	Uploads accepted only when they begin with a valid Chapter 10 packet; on Linux and macOS, data readable only by the service account.
Audit	Security-relevant actions logged with time, user and client address; CSV export for assessors.
Assessment	Security approval package with NIST SP 800-53 mapping, and a software bill of materials.

Validation: the Chapter 10 reader passes all 67 validation checks on published sample recordings. Packet counts, 1553 messages and data words, ARINC 429 words, discrete states, Ethernet frames, UDP payloads and analog samples are compared with pychapter10, and throughput-mode PCM frames with irig106lib. PCM frame sync, timing and frame counters are checked against the TMATS definition. Validation against each program's own data is part of every deployment.

TRY IT, THEN DEPLOY IT

EVALUATION AND ENTERPRISE

	EVALUATION (FREE, ONLINE)	ENTERPRISE (LICENSED, ON YOUR SERVERS)
Recordings	Four synthetic demonstration flights	Your IRIG 106 Chapter 10 recordings, up to 100 GB each by default
Decoding	Pre-decoded demonstration data	Your server: 1553, PCM, ARINC 429, discretes, analog, IENA, iNET-X
Data Resolution	Minimum and maximum of each 0.4 s interval	Every sample at the recorded rate
Parameter Dictionaries	Demonstration dictionary only	Your dictionaries from TMATS or CSV, with derived parameters
Quality and Test Points	Not available	Quality rating per recording; test points evaluated automatically
Users	One browser tab, no accounts	Shared team library with viewer, engineer and administrator roles
Notes and Exports	Not available	Notes, post-flight reports, full-rate CSV, Python client, audit export
Deployment	None; runs in the browser	Your server, as a system service or a container
Warranty and Support	Provided as is	90-day limited warranty and support for the license term

LICENSING

PILOT

UP TO 5 USERS · ONE SERVER · 90 DAYS

Bellerophon Enterprise on your own recordings, to validate results against your current tools.

TEAM

UP TO 10 USERS · ONE SERVER

A shared flight library for a single test team or test article program.

PROGRAM

UP TO 50 USERS · TWO SERVERS

Multiple test teams on one library, plus a second server for test, training or continuity of operations.

ENTERPRISE

51+ USERS · MULTIPLE SERVERS AND SITES

Test wings, ranges and centers on one agreement, with priority support.

Every license includes every capability, updates and support for the term. Annual licenses with option years or multi-year terms. Pricing on Request.

1. REQUEST A QUOTE

Choose a pilot or a tier, users, servers and term.

2. SECURE DELIVERY

Software delivered through a customer-approved file transfer, with a checksum sent separately.

3. INSTALL

On your servers, including isolated and air-gapped networks.

4. ACTIVATE

A signed license file, verified offline. No license server.

5. DURING THE TERM

Renewal notice 90 days ahead (14 days for a pilot) and a 30-day grace period.

6. RENEW OR GROW

Option years, multi-year terms, users in blocks of five and added servers.

REQUEST A QUOTE OR A PILOT

Try the Evaluation edition in your browser with four synthetic demonstration flights, then validate Bellerophon Enterprise on your own recordings with a 90-day pilot.

WEBSITE

<https://lnbfederal.com>

EVALUATION

<https://lnbfederal.com/bellerophon/trial/>

SALES

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