Oculus Airband

Aviation band monitoring and recording system

Oculus Airband watches the 108–138 MHz VHF aviation band continuously and records what it receives. Its SDR receiver sees the whole band at once with 30 MHz of instantaneous bandwidth, behind a band-pass filter that keeps out transmissions from outside the band. The recording software detects every signal above the noise floor and channelises several at the same time. Operators define a watch list of the channels they follow, and the system also catches transmissions outside that list, such as FM broadcasts spilling into the band. Spectrum and waterfall views, live AM/FM listening and a searchable detection history support interference investigation, with WAV audio and timestamped RAW records kept for later review. RDS decoding helps identify interfering FM broadcasts, while Morse decoding records three-letter ILS identifiers. The client-server design allows local or remote operation over Gigabit Ethernet.

AT A GLANCE

FREQUENCY BAND
108–138 MHz (VHF aviation band)

RECEIVER
Software-defined radio (SDR), 30 MHz instantaneous bandwidth

RECEIVER GAIN
Adjustable, 0–50 dB

RF INPUTS
2: aviation band (through an aviation-band band-pass filter) and general purpose

ANTENNA
Omnidirectional VHF antenna

APPLICATIONS

- Airport air-ground communications monitoring
- Investigation of interference affecting aviation radio
- Detection of broadcasts spilling into the aviation band
- Recording and review of monitored transmissions
- ILS identifier monitoring



Figure 1. Oculus Airband rack-mounted recording unit

Key Features

- Watch list and automatic detection
- Several signals at the same time
- Audio and raw recording
- Live listening
- Detection list and history
- Continuous, unattended operation

Capabilities

Watch list and automatic detection

Operators enter up to 16 frequencies to follow, each with a bandwidth of 10–50 kHz, and mark any of them for Morse decoding. Every other signal that rises above the noise floor by the set SNR threshold, adjustable from 5 to 20 dB, is detected automatically.

Several signals at the same time

The SDR receiver delivers 30 MHz of instantaneous bandwidth with gain adjustable from 0 to 50 dB. FFT-based scanning finds the signals, and multichannel digital down-conversion filters each one to its estimated bandwidth, so up to 32 channels are demodulated and recorded at the same time: 16 from the watch list and 16 detected interference signals.

Audio and raw recording

AM and FM signals are demodulated automatically and saved as compressed WAV files, with centre frequency, bandwidth and SNR stored alongside each one. Timestamped RAW records keep the signal for later analysis. RDS decoding names interfering FM broadcasts, and Morse decoding logs three-letter ILS identifiers.

Live listening

Operators listen live by selecting a band on the spectrum or by double-clicking a peak, a detection or a point on the waterfall. Squelch keeps noise out of live audio and recordings.

Detection list and history

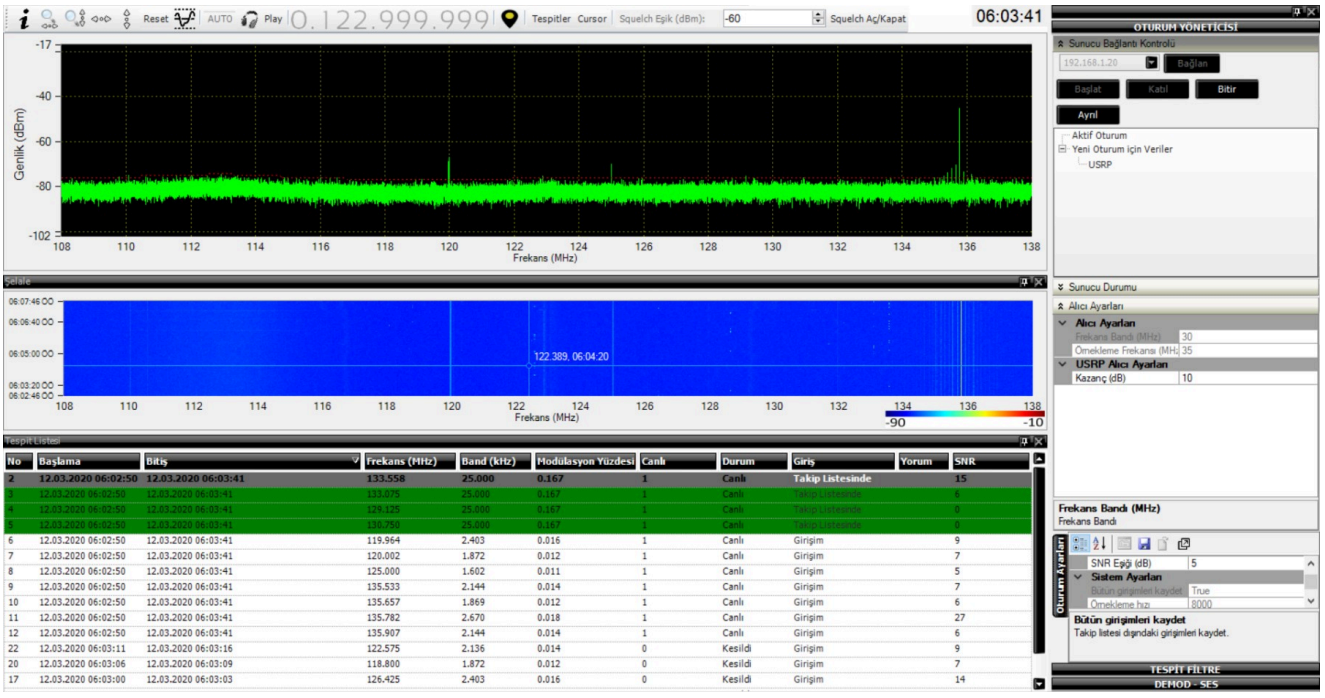
Every detection is listed with start and end time, bandwidth, modulation percentage, SNR and status: live, ended, bandwidth outside the expected value, blacklisted and others. Operators add comments and a two-level threat flag, and the detection filter queries the history by status, signal type and minimum SNR.

Continuous, unattended operation

The system runs 24/7, with time taken from GPS (UTC) or an NTP server. Disk use is monitored: the operator is warned at 80 %, and above 90 % the oldest records are deleted automatically so recording continues. Server and client run on one computer or apart, over Gigabit Ethernet.



Figure 2. Oculus Airband front panel with status indicators, reset and power



No	Başlama	Bitiş	Frekans (MHz)	Band (kHz)	Modülasyon Yüzdesi	Canlı	Durum	Giriş	Yorum	SNR
2	12.03.2020 06:02:50	12.03.2020 06:03:41	133.558	25.000	0.167	1	Canlı	Takip Listesinde		15
3	12.03.2020 06:02:50	12.03.2020 06:03:41	133.075	25.000	0.167	1	Canlı	Takip Listesinde		6
4	12.03.2020 06:02:50	12.03.2020 06:03:41	129.125	25.000	0.167	1	Canlı	Takip Listesinde		0
5	12.03.2020 06:02:50	12.03.2020 06:03:41	130.750	25.000	0.167	1	Canlı	Takip Listesinde		0
6	12.03.2020 06:02:50	12.03.2020 06:03:41	119.964	2.403	0.016	1	Canlı	Girişim		9
7	12.03.2020 06:02:50	12.03.2020 06:03:41	120.002	1.872	0.012	1	Canlı	Girişim		7
8	12.03.2020 06:02:50	12.03.2020 06:03:41	125.000	1.602	0.011	1	Canlı	Girişim		5
9	12.03.2020 06:02:50	12.03.2020 06:03:41	135.533	2.144	0.014	1	Canlı	Girişim		7
10	12.03.2020 06:02:50	12.03.2020 06:03:41	135.657	1.869	0.012	1	Canlı	Girişim		6
11	12.03.2020 06:02:50	12.03.2020 06:03:41	135.782	2.670	0.018	1	Canlı	Girişim		27
12	12.03.2020 06:02:50	12.03.2020 06:03:41	135.907	2.144	0.014	1	Canlı	Girişim		6
22	12.03.2020 06:03:11	12.03.2020 06:03:16	122.575	2.136	0.014	0	Kesildi	Girişim		9
20	12.03.2020 06:03:06	12.03.2020 06:03:09	118.800	1.872	0.012	0	Kesildi	Girişim		7
17	12.03.2020 06:03:00	12.03.2020 06:03:03	126.425	2.403	0.016	0	Kesildi	Girişim		14

Figure 3. Recording software: spectrum, waterfall, detection list and session manager

Specifications

General	
Frequency band	108–138 MHz (VHF aviation band)
Receiver	Software-defined radio (SDR), 30 MHz instantaneous bandwidth
Receiver gain	Adjustable, 0–50 dB
RF inputs	2: aviation band (through an aviation-band band-pass filter) and general purpose
Antenna	Omnidirectional VHF antenna
Watch list	Up to 16 frequencies, 10–50 kHz bandwidth per channel, Morse decoding per channel
Automatic detection	Above the noise floor, SNR threshold 5–20 dB
Signal processing	FFT-based scanning, multichannel digital down-conversion
Simultaneous channels	Up to 32 demodulated and recorded at the same time (16 watch list, 16 interference)
Demodulation	AM / FM
Additional decoding	FM RDS and three-letter ILS Morse identifiers
Recording	Compressed WAV with centre frequency, bandwidth and SNR; timestamped RAW records
Operator displays	Spectrum, waterfall, detection list and detection filter
Time reference	GPS (UTC) or NTP
Storage management	Warning at 80 % disk use; oldest records deleted automatically above 90 %
Operation	Continuous, 24/7; client-server, local or remote over Gigabit Ethernet
Form factor	19-inch rack-mounted unit

Warranty

All hardware and software procured from Zeta is under warranty against manufacturing or design failures for 2 years. Customer-specific warranty terms may be arranged.

Disclaimer

Due to ongoing research and development, Zeta reserves the right to change product specifications without notice.

About Zeta

Zeta Defence develops electronic intelligence (ELINT) and communication intelligence (COMINT) equipment and radar / electronic warfare simulators. Its capabilities include RF transceiver system design, digital design and large-scale software development.

Contact

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