INFINITION

JB-6e Junction Box

Ethernet Data Acquisition for Infinition Doppler Radar Systems

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1. Introduction

The JB-6e junction box is the data-acquisition heart of Infinition radar systems. Installed next to the acquisition computer, it conditions and digitizes the Doppler signal of up to two radars and streams it to TestCenter 7 over a standard Ethernet link.

Keeping the acquisition outside the radar head is a deliberate design choice. The radar remains a simple, sealed and rugged unit in the field, while the acquisition electronics stay in the controlled environment of the control room, close to the operator. This architecture maximizes the operational availability of the system, in contrast with designs that integrate the acquisition inside the radar head.

> 16-bit acquisition, two radar inputs, standard Ethernet and virtually unlimited recording time on a high-performance network: one compact unit connects the Infinition radars to TestCenter 7.

2. How the JB-6e Works

At the heart of the JB-6e is an MCU-FPGA system combined with a two-channel, 16-bit analog-to-digital converter. The JB-6e conditions and filters the radar signals, samples them and transfers the data over a 100 Mb/s Ethernet link. An internal FIFO memory protects data integrity during long acquisitions; the recording time depends on the network transmission speed, the sampling frequency and the internal FIFO memory, and is virtually unlimited on a high-performance network.

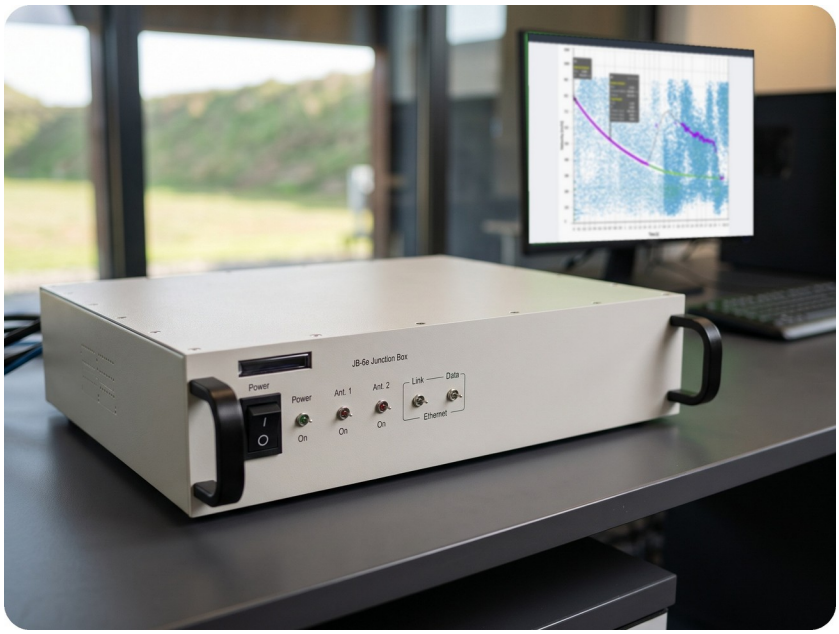

Figure 1 – The JB-6e junction box: power switch, power and antenna indicators, and Ethernet link and data indicators on the front panel.

- **16-bit acquisition with integral filtering** – the full dynamic range of the Doppler signal is preserved.
- **Two antenna inputs** – two radars are acquired by the same unit, on the same time base.
- **Standard Ethernet** – 100 Mb/s link to the computer, with no dedicated acquisition board in the PC.
- **Trigger input and output** – trigger input for the AT-01, the OT-01, the AT-02 or, with the optional BNC adapter, a TTL signal, and a TTL trigger output to synchronize other range instrumentation.
- **Programmable** – the MCU-FPGA system can be adapted on request to specific processing needs.

2.1 Two radars, one workstation

The second acquisition channel is delivered with every JB-6e and simply remains unused until a second radar is connected. Two radars are then acquired together, on the same time base, under a single TestCenter 7 workstation – for example a second radar covering another part of the trajectory, or two radars comparing their velocities at the same distances.

3. Connections and Installation

The JB-6e is installed in the control room or at the operator station, next to the acquisition computer. The radar cables and the trigger cable run from the firing area to the JB-6e, and a single Ethernet cable connects it to the computer (Figure 2).



Figure 2 – JB-6e connections: up to two radars and one trigger sensor at the inputs, the acquisition PC over Ethernet, and a TTL trigger output for other range instrumentation.

TestCenter 7 selects the JB-6e as its data-acquisition device and controls it over the network: arming, acquisition and data transfer are fully managed from the software, and the front-panel indicators show the antenna and Ethernet status at a glance.

For transport and storage, the JB-6e is supplied in a sealed Storm Case iM2720 rolling case (64 cm × 50 cm × 30 cm) with custom-cut foam (Figure 3).



Figure 3 – The JB-6e transport and storage case.

4. Velocity Acquisition Coverage

Every Infinition radar can measure up to 10 km/s; the velocity covered by the measurement chain is set by the sampling bandwidth of the JB-6e. Because the Doppler shift is proportional to the radar frequency, the same JB-6e covers a different maximum velocity with each radar family:

Radar family	Radars	JB-6e velocity coverage
X band (10.525 GHz)	BR-1001, BR-1022, BR-29015, BR-33030	Up to 10 000 m/s
Ka band (35 GHz)	BR-3502, BR-3503	Up to 5 000 m/s
122.5 GHz	BR-12201 (in-bore)	Up to 1 550 m/s

The standard configuration is optimized for the 30 – 3 000 m/s band, which covers the full range of gun-launched ordnance; higher velocities are covered by the acquisition configuration in TestCenter 7. The BR-2401 has its acquisition integrated in the radar and does not use a JB-6e.

5. Technical Specifications

A/D conversion	16-bit, two channels, integral filtering
Antenna inputs	2, differential analog (±10 Vpp max)
Trigger input	1, analog standard (±10 Vpp max) – AT-01, OT-01, AT-02, or TTL signal through the optional BNC adapter
Trigger output	1, TTL
Buffer memory	30 MB
Data link	Ethernet 100 Mb/s
Recording time	Virtually unlimited on a high-performance network (depends on network speed, sampling frequency and internal FIFO memory)
Velocity acquisition coverage	Up to 10 000 m/s (X band), 5 000 m/s (Ka band), 1 550 m/s (122.5 GHz)
Software	TestCenter 7, Windows 10 and 11
Operating temperature	+10 °C to +40 °C (indoor use)
Power supply	115 VAC 60 Hz 1.0 A or 230 VAC 50 Hz 0.5 A
Dimensions	10 cm × 37 cm × 32 cm
Weight	5.2 kg

6. Availability and Support

The JB-6e is supplied with every Infinition radar system that uses separate acquisition. It is also available on its own – as a spare, to add an acquisition station, or to replace an older junction box.

Infinition designs and manufactures its radars, acquisition hardware and software in-house, and provides installation, on-site training and calibration services worldwide.

7. Contact

Request a quotation, a demonstration or technical information

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