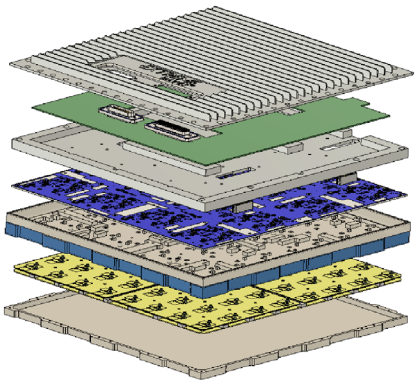
XSTAR – LR MOTR

Long Range Mobile Multiple Object Tracking Radar

STAR Dynamics
Inspiring Innovation

XSTAR-LR **– Precision Multiple Object Tracking Radar for Challenging Flight Test Requirements.** XSTAR-LR is an advanced X-band Space Time Adaptive Radar (XSTAR) system engineered for precision Time Space Position Information (TSPI) tracking. Leveraging proven STAR Dynamics MOTR technology, XSTAR delivers unmatched real-time TSPI accuracy for simultaneous multiple target tracking, with wideband, scalable Active Electronically Scanned Array (AESA) technology within wide Instantaneous Field of Regard (IFOR) of up to ±40°.

XSTAR G2 MX260
Mobile Long Range AESA MOTR



XSTAR AESA Tiles

- **Wide-Ange Beam Steering ±40°**
- **Wideband Waveforms >300 MHz**
- **TTD Beam Controller**
- **High EIRP Low NF**
- **Built-In Test and Diagnostics**
- **NxM Scalable Apertures**

Key Capabilities

- Multiple-Object TSPI tracking radar >50 targets within IFOR
- RF Loop Gain Configurations of 245-260 dB-m (1-Hz ref)
- Maximum Slant Range (0 dBsm, 12 dB SNR) ≥500 km
- Unambiguous Range/Doppler Volume – 1,000 km / ±13 km/s
- Wide-Angle Beam Control ±30° (options for ±40°)
- True Time Delay Beam Controller (TTD)
- High-performance CW and Pulsed Waveforms
- Wideband Waveforms >300 MHz
- Azimuth/Elevation Angular Accuracy <90 µrad
- Range accuracy <10 cm
- Track Update Rates from 10-400 Hz
- Supports >100-g Target Acceleration
- Automatic Tracking-Mode Transitions
- Skin and Transponder Tracking
- Advanced, User-Friendly HMI with Multi-Layer Displays
- Continuous Data Storage up to 12 hours
- Near-Time HMI-based Data Playback and Post-Processing
- Hardware-in-the-Loop Simulation and Mission-Planning Tools

System Design Advantages

Software-Defined Architecture
Ensures long-term upgradeability and lower lifecycle cost

Massively Parallel, High-Performance Signal Processing
Provides precision real-time TSPI tracking

Faster Data Collection
Enabled by modern digital control and real-time signal processing

Improved Accuracy and Repeatability
Greater confidence in system-under-test performance

Flexible, Intuitive User Interface
Efficient test setup and execution

Key Performance Specifications

Operating Frequency Band	9-11 GHz
RF Loop Gain (1 sec reference)	230 dB-m
Slant Range (0 dBsm, 12 dB SNR)	≥500 km
Angle Measurement Accuracy	<90 µrad
Waveform Bandwidth	10-300 MHz
Maximum Range Resolution	0.5 m
Range Measurement Accuracy	<10 cm
Velocity Measurement Accuracy	<10 cm/s
Unambiguous Velocity Window	±12,500 m/s
Range Resolution	<4 m
Range-Rate Resolution	1.5 m/s
Angle Track Rate	>50°/s
Angular Acceleration	>50°/s²
Instantaneous Dynamic Range	90 dB

Processed Dynamic Range	160 dB
Azimuth Mechanical FOV	360° continuous
Elevation mechanical FOV	−5° to +95°
Coherency	Fully Coherent
Coherent Processing Interval	10-250 ms
Target Acquisition Time	<250 ms
Simulation and Training	HWIL
Trailer Self-Leveling	5° slope
Transportability	Sea, Air, Land
Local Moves	1 Prime Mover
Operational Setup Time	<2 hours
MTBF	>2,000 hours
Operational Mission Reliability	99%
System Availability	95%

System Architecture

- AESA Phased-Array Apertures
- Hybrid TTD and Phase-Shifter Beam Steering
- Wide Angle Beam Steering in ±40° IFOR
- Wide RF Bandwidth Waveforms
- Covariance-Matrix Digital Beamforming
- 1,024 Real-Time Receive Beams Overlay Transmit Beams
- Automated Target Acquisition and Track Functions
- Track ID Locked to Specific Targets
- Real-Time Data-Display Products
- Raw-Data Storage (>12 hours at 1 GBps)
- Onboard Raw Data Playback and Data Processing
- Electro-Optics for Calibration and Hybrid Tracking
- Remote Operations over Ethernet
- Available in Fixed Site Configurations

XSTAR G2 MX260E
Expeditionary Long Range AESA MOTR

Applications

- Flight-Test Range TSPI Instrumentation
- Simultaneous Multiple-Target Trajectory Measurements
- High-Dynamic-Range tracking scenarios
- Defense System Development and Evaluation
- Open-Air Test-Range Operations

For more information or to discuss how the XSTAR-LR can enhance your test range capabilities, please contact us today.

STAR Dynamics Corporation
4455 Reynolds Drive, Hilliard, Ohio 43026
Tel: 614-334-8888 | Email: sales@stardynamics.com | Website: www.stardynamics.com

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