PRODUCT OVERVIEW

L-3 Datron’s Series 1153 S-/X-Band Autotracking Antenna System combines over 40 years of field-proven Remote Sensing Satellite/Telemetry Tracking & Command (RSS/TT&C) success with state-of-the-art technology to deliver a highly flexible system with improved life-cycle costs. Significant cost savings is realized through high-COTS content and reduced use of proprietary control hardware.

Our Series 1153 S-/X-Band Autotracking Antenna System is a highly flexible, low-maintenance, open-architecture design providing our worldwide users years of reliable, high-performance service.

Downlink connectivity for both Low Earth Orbit (LEO) satellites and other sources in the 8 to 8.4 GHz and 2.2 to 2.4 GHz bands are provided with standard feeds. Support for other frequencies and/or multi-band operations are available with our proven line of RF assemblies. With standard reflector sizes ranging from 4.3 to 6.1 meters in diameter, the Series 1153 can easily be configured to meet your specific RF requirements.

Greater system utilization and value is realized with the Series 1153 open control scheme. Control and monitoring of the Series 1153 Antenna Control Assembly (ACA) is accessible via Ethernet connection, eliminating costly proprietary control hardware. The ACA provides control and status via any network accessible JAVA-enabled browser or readily accepts command strings from customer furnished electronics (CFE) control systems.

KEY FEATURES
- Long life
- Easily maintained
- High-performance
- Modular design
- Ruggedized
- COTS drives
- Low life-cycle costs
ADVANCED X-BAND AUTOTRACK FEED

L-3 Datron’s advanced TE_{21} mode coupler technology provides superior tracking performance and high efficiencies in both the data and tracking channels. The symmetry of the mode coupler design, along with phase compensation across the frequency band results in high-accuracy autotracking, regardless of the axial ratio of the satellite downlink. The mode coupler feed is mounted in a Cassegrain configuration and provides superior wideband performance compared to multi-element designs. The X-Band autotrack feed assembly can be configured to meet either simultaneous or selectable Right and Left Hand Circular Polarization (RHCP/LHCP) requirements.

S-BAND OPTIONS

Optional simultaneous S- and X-Band operations is provided by locating a prime focus S-Band tracking feed behind a low-loss, dichroic Frequency Selective Surface (FSS) subreflector. The S-Band feed supports simultaneous or selectable reception RHCP/LHCP operation and is available configured as: transmit only, transmit/receive, receive only and autotracking.

ALTERNATE OPERATIONS

L-3 Datron’s Series 1153 may be configured for specialized missions in extended frequencies, such as C-, Ku- and Ka-Bands. Through use of advanced RF optics, we have successfully combined several feeds on a single antenna to achieve optimal performance across desired frequencies.

HIGH-PERFORMANCE REFLECTORS

Our reflector design is optimized for multi-band operations. The main reflector is a shaped precision surface, quasi-paraboloid constructed of aluminum panels, radial trusses and intercostals supports for simultaneous X-Band and S-Band operations. Our system is optimized for high X-Band performance while maintaining high S-Band efficiency. Quadrapod struts attached to the main reflector support the subreflector and optional S-Band feed assembly.
DICHROIC SUBREFLECTOR
The system utilizes a high-performance dichroic subreflector for dual-band operation. This allows for simultaneous operation of both X-Band and S-Band reception.

FREQUENCY CONVERSION
The single-step frequency conversion architecture used in the L-3 Datron RSS system provides flexibility, economy and enhanced performance. The X-Band spectrum of interest is down converted at the antenna to a 720 MHz IF using a low-phase, noise synthesizer as the Local Oscillator (LO). The LO frequency tuning is controlled through the embedded Graphical User Interface (GUI) or command strings.

MODEL 8153 ANTENNA POSITIONER
L-3 Datron’s Series 1153 features our fully positional, three-axis Model 8153 positioner. The 7º tilt of the third-axis assembly allows full hemispherical tracking of satellites with altitudes as low as 370 km with no data loss. Our third-axis increases satellite pass capabilities and service life while reducing the demands on mechanical, servo and primary power systems. The positioner was designed to operate in harsh environmental conditions ranging from the Arctic Circle to the equatorial tropics and desert regions. The unique modular design utilizes identical COTS drive packages in all axes for ease of assembly, maintenance and reduced operational costs. Each axis drive package consists of: a high-precision Cycloidal gearbox with virtually no backlash (1 Arc Minute), a brushless servo motor with integral fail-safe brake and 17-bit absolute encoder for position feedback.

MODEL 6150 SERVO CONTROL ENCLOSURE
Our Model 6150 Servo Control Enclosure (SCE) is an environmentally protected enclosure housing the following COTS components: PWM servo power amplifiers, power supplies, relays, breakers, power contactor, Ethernet hub and ACA. The PWM (sinusoidal commutation) power amplifiers are multi-channel brushless drive systems for precise motor control. In the standard configuration the 6150 SCE is collocated with the positioner. As an option the SCE can be remotely located.

ANTENNA CONTROL
Our control system features the L-3 Datron Antenna Control Assembly (ACA), an industrial PC housed in the SCE collocated with the Model 8153 positioner. The QNX operating system is a true ‘real-time’ operating system that provides precision axis control, system status and time-critical functions that are to be performed and monitored.

Local or remote interface to the ACA is available via a standard Ethernet connection provided at the SCE. Embedded into the ACA is our Virtual Antenna Controller (VAC) Graphical User Interface (GUI). The VAC provides system status, control, Built-In-Test (BIT) for automated test and health monitoring, pass management, satellite acquisition and tracking. Platform independent, the VAC can be accessed by direct Ethernet connection with any JAVA-enabled browser or multiple work stations when connected to a Local Area Network (LAN).

Several quick-erect mobile configurations of this system are available for specialized missions.
**SERIES 1153 PERFORMANCE CHARACTERISTICS**

<table>
<thead>
<tr>
<th>Typical Reflector Sizes</th>
<th>4.3 m (14 ft.)</th>
<th>5.0 m (16.4 ft.)</th>
<th>5.5 m (18 ft.)</th>
<th>6.1 m (20 ft.)</th>
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</thead>
<tbody>
<tr>
<td>Frequency Range</td>
<td>X-Band 8025 - 8400 and S-Band 2200 - 2400</td>
<td></td>
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<tr>
<td>G/T¹</td>
<td>@ 8200 MHz 28.5 dB/K</td>
<td>29.8 dB/K</td>
<td>30.7 dB/K</td>
<td>31.6 dB/K</td>
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<tr>
<td></td>
<td>@ 2300 MHz 16.3 dB/K</td>
<td>17.6 dB/K</td>
<td>18.4 dB/K</td>
<td>19.3 dB/K</td>
</tr>
<tr>
<td>Sidelobes (dB peak)</td>
<td>0.52°</td>
<td>0.44°</td>
<td>0.40°</td>
<td>0.38°</td>
</tr>
<tr>
<td></td>
<td>@ 8200 MHz 2.1°</td>
<td>1.8°</td>
<td>1.6°</td>
<td>1.5°</td>
</tr>
<tr>
<td>System Weight (nom.)</td>
<td>2,231 kg (4,918 lbs.)</td>
<td>2,351 kg (5,182 lbs.)</td>
<td>2,421 kg (5,336 lbs.)</td>
<td>3,418 kg (7,520 lbs.)</td>
</tr>
<tr>
<td>Velocity</td>
<td>Elevation = 10°/sec., Azimuth = 15°/sec.</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>Acceleration²</td>
<td>Elevation = 10°/sec.², Azimuth = 10°/sec.²</td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Output Torque (max. intermittent)</td>
<td>8,775 N • m (6,500 ft. lbs.)</td>
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<tr>
<td>Rated Gear Strength</td>
<td>15,703 N • m (11,572 ft. lbs.)</td>
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<tr>
<td>Brake Rating</td>
<td>10,904 N • m (8,035 ft. lbs.)</td>
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<tr>
<td>Elevation Travel</td>
<td>-8° to +188°</td>
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<td></td>
<td></td>
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<tr>
<td>Azimuth Travel</td>
<td>±410°</td>
<td></td>
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<tr>
<td>Power Requirements (max.)</td>
<td>120/208 3ø, 50/60 Hz (8.5 KVA)</td>
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<tr>
<td>Temperature - Indoor equipment</td>
<td>0°C to +50°C</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>Temperature - Outdoor equipment</td>
<td>-40°C to +57°C</td>
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<td></td>
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<tr>
<td>Temperature - Storage</td>
<td>-40°C to +70°C</td>
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<tr>
<td>Humidity - Indoor equipment</td>
<td>0 to 100% R. H.</td>
<td></td>
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</tr>
<tr>
<td>Humidity - Outdoor equipment</td>
<td>0 to 100% R. H.</td>
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<tr>
<td>Rain</td>
<td>Up to 13 cm (5.0 in.) per hour</td>
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<tr>
<td>Ice (survival)</td>
<td>Up to 13 mm (0.5 in.) radial</td>
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</tbody>
</table>

1. Per EIA-411-A, 10° E, 17°C, shaped optics with cassegrain X-Band and prime focus S-Band SCM feed with coax dipoles, measurements for data channels each frequency band. Contact factory for alternate configurations and associated performance details.

2. Active acceleration limiting for improved control and extended geartrain life.

**AVAILABLE SYSTEM OPTIONS**

- X-Band up/downlink with autotracking
- X-Band program track feed
- S-Band up/downlink with autotracking
- S-Band program track feed
- Fiber optic control interface
- Extended frequency bands
- Automatic data switching
- Automatic BER testing
- Automated RF/IF switching
- Dual data channel (selectable or simultaneous)
- Video monitoring systems
- Reflector de-icing
- Radome
- Transportable configurations
- Installation
- Training

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