

Controller Display

- Displays RVR values and trend at touchdown, mid-point and at roll-out
- RVR values are displayed in conformance with FAA and ICAO recommended ranges in both feet and meters
- Indicates center and edge light intensity settings in 5 increments
- Simultaneous data display for up to three runways with runway designations
- Visual and audio indication of low visibility threshold alerts
- Alarm indication of center and edge light setting mismatch
- Display is readable at over 10 ft (3m) distance in light levels from direct sunlight to near darkness
- Display is readable at $\pm 30^\circ$ horizontal and $\pm 20^\circ$ vertical angles
- Dual communication data channel utilization for reliable data transmission
- Can be remotely via modem connection
- Utilizes back-lit dichroic liquid crystal display to assure readability under all light conditions
- Built-in self-test to assess operational readiness

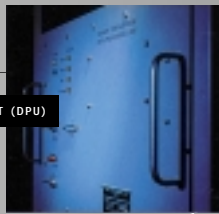
CONTROLLER DISPLAY



Data Processing Unit (DPU)

- Computes up to 18 RVR values simultaneously corresponding to 6 physical or 12 logical runways
- Computes visual range, trend and runway light settings for each runway
- Archives data in non-volatile memory for later reporting
- RVR values every minute for last 15 minutes
- RVR values every 5 minutes for last hour
- RVR values every hour for last 15 days
- Raw data for 30 seconds
- Operator initiated incident observation archiving
- Maintenance data integrity assured by separate dedicated built-in maintenance processor
- Minimum maintenance time achieved through remote fault isolation to card level
- Supports -18 Visibility sensors -1 Ambient light sensor -12 Runway light intensity monitoring sensors -26 Displays
- Support interfaces for 1 Maintenance data terminal and 3 External users
- RVR data reliability is achieved through:
 - Sensor data quality checks
 - Communication error checks
 - Use of FAA proven RVR computation algorithms
 - Equipment status monitoring

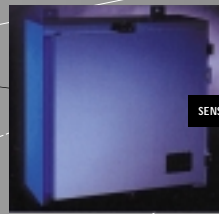
DATA PROCESSING UNIT (DPU)



Sensor Interface Electronics (SIE)

- Converts sensor outputs to digital format
- Samples sensor outputs at 2-second interval
- Transmits digitized sensor data and maintenance information to DPU
- Implements 300-band half-duplex communication protocol
- Reliable DPU/SIE communication with up to 5 miles (8km) of 19 AWG twisted pair cable
- 4-hour battery backup sustains operation during temporary power outages
- All three sensors utilize a common basic interface electronics interface, simplifying maintenance and reducing spares
- A personality module adapts the interface to one of the three types of sensors
- Simple communication link using built-in modem
- Supplies power to sensors
- Incorporates built-in test to supply status and failure information to remote monitoring system

SENSOR INTERFACE ELECTRONICS (SIE)



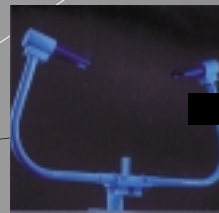
AMBIENT LIGHT SENSOR



RUNWAY LIGHT INTENSITY MONITOR



VISIBILITY SENSOR



Ambient Light Sensor

- Measurement range from 0.5 F.L. to > 12,000 F.L.
- Measures ambient light to an accuracy of $\pm 10\%$
- Resolution is 0.1 F.L. or 10% of reading
- Time constant is less than 30 seconds
- Operates in all ambient light conditions
- Remote maintenance monitoring improves MTR
- Built-in window and hood heaters prevent condensation on sensor optics for improved data reliability
- Built-in sensor window contamination monitoring and compensation reduces periodic maintenance
- Internal status and failure monitoring reduces fault isolation time

Runway Light Intensity Monitor

- Measures center and edge light current regulator output in range of 0-25 amperes
- The accuracy of measurement is 6% of reading or 0.1 amperes, whichever is greater
- Sensor time constant is 1 second
- Compatible with 6.6 and 20 amperes current regulators
- Up to four sensors per runway light intensity monitor SIE
- Split core transformer implementation eliminates need to cut power cables for installation
- Maintenance free operation

Visibility Sensor

- Measures the atmospheric extinction coefficient over an extinction coefficient range of 1.5/km to 1100/km
- Accuracy is $\pm 20\%$ RMSE from 1/km to 10/km and $\pm 15\%$ RMSE from 10/km to 1100/km (90% confidence level)
- Time constant is less than 10 seconds
- Sensitivity is not affected by rapid change of ambient light
- Forward scatter-based measurement method assures low maintenance and reliable operation
- Automated sensor calibration reduces set up time
- Built-in window and de-icing heaters prevent condensation on sensor optics for improved data reliability
- Built-in sensor window contamination monitoring and compensation reduces periodic maintenance
- Internal status and failure monitoring reduces fault isolation time
- Lookdown geometry assures reliable operation under severe weather (blowing rain/snow) conditions

RVR Performance Characteristics

- Completed six month field reliability test, demonstrating system MTBF in excess of 20,000 hours
- Compatible with CAT I, CAT II and CAT IIIa, IIIb operation
- Measures RVR from 50 feet (15m) to 6500 feet (2036m) with an accuracy of $\pm 20\%$ RMSE over the range of 1000 ft-6500 ft and $\pm 15\%$ RMSE over the range of 50 ft-1000 ft (300m)
- Ambient light level is measured to $\pm 10\%$ accuracy in the range of 0.5 F.L. to 12,000 F.L.
- Runway light excitation loop current measurement accuracy is 6% of reading, or 0.1 AMP, whichever is greater
- RVR values are computed every two seconds
- Data displayed in FAA or ICAO specified ranges

RVR Features

- Complies with FAA specification and ICAO recommendation for RVR measurement and reporting
- Reports RVR measurement, RVR trend and runway light intensity values
- Audio and visual indication of low visibility threshold alarms
- 15 day archive of RVR data and operator reported incidents in non-volatile memory for later recall
- External interface support included for:
 - ASOS
 - Maintenance processor system (MPS)
 - Other external users
- Flexible to accommodate from 1 through 18 visibility sensors, up to 12 runway light intensity monitors and from 1 to 26 controller displays
- System setup and data security is protected by password access control

Maintenance Features

- Designed for 20 year service life
- Low system maintenance is achieved by:
 - Reliable operation (20,000 hours MTBF)
 - Average mean time to repair is 18 minutes
 - Diagnostics results are accessible locally or remotely via modem hook-up to video terminal
 - Automatic monitoring and reporting of "soft" equipment failure /degradation improves the effectiveness of preventive maintenance
- Built-in monitoring of sensor optics allows for a periodic (scheduled) maintenance time of over 90 days

Environmental Characteristics (Outdoor Assemblies)

Operating temperature	-60°F to 130°F (-50°C to 55°C)
Relative humidity	5% - 100% condensing
Wind	up to 125 knots (65 m/s)
Ice build-up	up to 1/2 inch (1.25 cm) - over 60 minute period
Pressure altitude	-1,500 to 10,000 feet (-460m to 3059m)
Snow	accumulation up to 12 inches (30cm) with 40 knot (20m/s) wind
Hail	1/2 inch diameter
Rain	3 inches per hour with 40 knot (20m/s) wind
Salt fog	MIL-STD-810 method 509.2, Proc.1
Solar radiation	MIL-STD-810 method 505.2, Proc.1
EMI protection	MIL-STD-461, emission and susceptibility
Lightning protection	FAA-STD-019 AND FAA-STD-020

The Teledyne Runway Visual Range (RVR) system is an automated computer controlled measurement and monitoring system reporting minimum visibility limits existing on airport runways to the air traffic controller.

Developed under contract to the FAA for CAT IIIb operation, this system employs state of the art technology in visibility measurement to assure the best available information for use with other navigation and landing aids.

TELEDYNE RVR SYSTEM



A major feature of the system is its very high Mean Time Between Failures of 20,000 hours and low maintenance needs. The system is designed to operate continuously under hostile weather conditions without the need for human intervention. Extensive built-in health monitoring circuitry allows a Mean-Time-Repair of 18 minutes.

TELEDYNE
RUNWAY VISUAL
RANGE SYSTEM
(RVR)

