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ROSEN
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**Moving Map
&
Cabin Briefing
System**

Technical Manual



Model 0603-003

Technical Manual, RosenView® MX**© 2013 by Rosen Aviation, LLC**

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1. INTRODUCTION

The RosenView® MX provides passengers with a feature-rich moving map and cabin briefing system. A combination of satellite imagery, roadway data, current flight information, destination summary, and a simulated aircraft instrument gauge view allows travelers to view the present location of their flight from departure to arrival. The cabin-briefing system can store up to 16 personalized cabin briefings for flight announcements and landing preparations to enhance the overall flight experience.

This manual describes how to install the RosenView® MX moving map and cabin briefing system onto your aircraft. It contains everything you need to know to wire the unit and confirm that the system is functioning correctly.

Note: Only trained and qualified personnel should perform Installation and service.

1.1. Unpacking

The parts shipped with the RosenView MX:

- RosenView MX Housing Assembly
- Connector kits:
 - Connector kit, w/backshell, HD15, male (P/N **0300-026**)
 - Connector kit, w/backshell, HD26, male (P/N **0300-032**)
 - Connector kit, w/backshell, 21WA4, female (P/N **0300-034**)
- USB flash drive (P/N **100973**)

1.2. Additional System Information

Product documentation and downloads for the [RosenView MX](#) are available on the [Rosen Aviation](#) website.

- [Outline and Installation Drawing](#) (P/N **0603-003-CD**)
- Web-based Configuration Tool:
<http://www.rosenaviation.com/products/RosenViewMXConfigTool.php>
- [RosenView MX User's Guide](#) (P/N **106498**)

1.2.1. Optional Controllers

The following controllers (sold separately) are compatible with the RosenView MX:

- Universal color display remote control (contact Rosen Sales for P/N availability)
- 7-Button Controller (P/N **0300-407**)
- RosenView Briefing Controllers (P/N **0300-410**, **0300-411**, and **0300-412**)

2. SYSTEM DIAGRAM

Figure 1 shows a typical installation of how a RosenView MX integrates into a complete passenger entertainment system with analog audio and video.

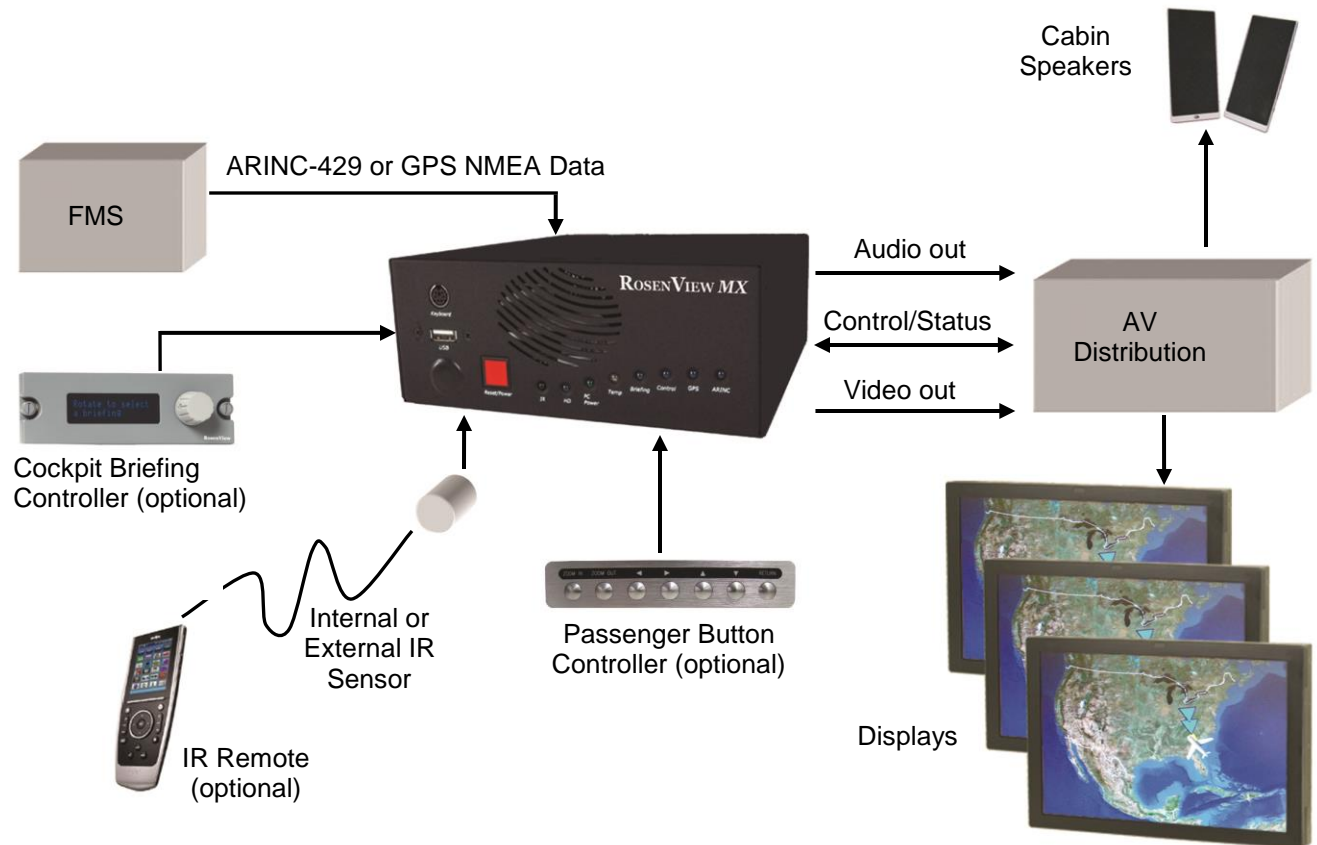


Figure 1 Typical in-flight entertainment system

3. DATA SYSTEM CONNECTIONS

There are several ways to connect RosenView MX to the aircraft's data systems. There are two ARINC 429 inputs, and the unit can receive flight data from one or both inputs. There is also one RS-232 (GPS) input.

The unit shall look first at the ARINC 429 data inputs for flight data, followed by the GPS (RS-232) input for data not available on the ARINC 429 data inputs.

The 429 buses can be either low or high-speed buses (the bus speed is auto-detected).

The RS-232 bus speed is auto-detected as well, 1200 to 9600 baud.

Table 1 Labels on the ARINC 429 data bus

Data	ARINC Label
UTC Time	125
GMT Time	150
Barro Corrected Altitude	204
Static Air Temperature	213
GAMA Flight Plan	
Data Record Header	074
Active Waypoint From/To	075
Wpt Mess. Chars 7-9	301
Wpt Mess. Chars 10-12	302
Waypoint Type	303
Wpt Mess Chars 1-3	304
Wpt Mess Chars 4-6	305
NAV/WPT/AP Latitude	306
NAV/WPT/AP Longitude	307
Present Position Latitude	310
Present Position Longitude	311
Ground Speed	312
True Heading	314
Wind Speed	315
Wind Angle	316
Magnetic Heading	320
Distance to Destination	351
Time to Destination	352
Destination Local Time Offset	353
Destination Airport ID 1*	365
Destination Airport ID 2*	366
Equipment ID	371

* Rockwell Collins Proline 21 only

To achieve at least basic operation, labels 125 or 150, 204, 260, 310, 311, and 312 are necessary. Additional labels will provide more information, such as Destination Airport, Outside Air temperature, etcetera, but they will not be shown unless they are supplied.

3.1. Moving Map Connection Options

Option 1

The best option is to connect to the ARINC 429 bus from the FMS or bus concentrator that contains the labels shown previously. This can be connected to either of the ARINC 429 inputs.

Option 2

Connect two different 429 buses. For example, connect to your GPS for most information and to another bus (airdata computer) to get the additional information.

Option 3

Connect to a NMEA-183 GPS RS-232 output from a GPS Unit. This will yield less information since some of the GPS units do not output route information with this, and many do not output altitude.

Option 4

Connect to one or two ARINC 429 buses, and then connect to an RS-232 output from an air data computer or GPS (aviation RS-232 format) to get altitude and waypoint information.

With ARINC 429 connected, RosenView MX will always try to use the data there first, and then it will look to the RS-232 connection if connected. Some GPS devices output altitude in the type 1 (non-NMEA) information string, but not on their ARINC bus.

Option 5

Connect the RS-232 input to a NMEA-183, ARNAV, Shadin, Icarus, or Apollo output from a GPS or other instrument outputting this type of information.

Option 6

Connect two ARINC buses for everything except altitude, and then connect the RS-232 input to an altitude encoder that outputs Shadin, Icarus, or Apollo format.

3.2. Acceptable Input Formats for RS-232

The RosenView MX accepts flight data from a GPS RS-232 input if data is not available on the ARINC 429 data inputs. The unit also supports Garmin, NMEA, ARNAV, and Shadin input (as shown in the following examples).

3.2.1. NMEA – 183

The following information is an example of NMEA - 183:

```
$GPRTE,2,1,c,0,PBRCPK,PBRTO,PTELGR,PPLAND,PYAMBU,PPFAIR,PWARRN,
PMORTL,PLISMR*73
$GPRTE,2,2,c,0,PCRESY,GRYRIE,GCORIO,GWERR,GWESTG,7FED*34
```

\$GPRTE	Route info
C	Number of sentences in sequence
C	Sentence number
c/w - 'c'	Current active route, 'w' = waypoint list starts with destination waypoint
	Name or number of the active route onwards
	Names of waypoints in Route

3.2.2. Type 1 Format (ARNAV Format)

Electrical Interface

The output signals will be compatible with RS-232C. This format will generate data at 9600 to 115200 baud with a word length of 8 bits, one stop bit, and no parity. Once the baud rate is determined, it will not change.

The RS-232 data will have the following general format:

STX	ASCII start-of text character (02 hex)
T1s	Type 1 sentences (see following paragraphs for description)
T2s	One or more Type 2 sentences (see following paragraphs for description)
ETX	ASCII end-of-text character (03 hex)

Output Sentences Type 1

The Type 1 output sentences shall have the following general format:

Id	item designator (single ASCII alphabetic character)
Dddd	item data (1 to 10 printable ASCII characters)
CR	ASCII carriage-return character (0D hex)
LF	ASCII line feed character (0A hex)

Each Type 1 sentence will be output by the unit at least once every second. The track will be output in True (not magnetic) degrees.

Output Sentences Type 2

The unit will receive Type 2 sentences that will have the following format:

Id	item designator (three ASCII characters)
Seq	sequence number (1 binary byte)
Wpt	waypoint identifier (5 ASCII characters)
Lat	waypoint latitude (3 binary bytes)
Lon	waypoint longitude (4 binary bytes)
Myar	magnetic variation at waypoint (2 binary bytes)
CR	ASCII carriage return character (0D) hex
LF	ASCII line feed character (0A hex)

Each waypoint in the route being navigated by the unit will have a Type 2 sentence output by the unit at least (approximately) once every second.

If no route is being navigated (i.e., the active route is empty), the following Type 2 sentence should be received approximately once every second:

Id	item designator (three ASCII characters; route sequence number is "01")
Seq	sequence number (1 binary byte; last waypoint flag is set; route sequence number is 1)
CR	ASCII carriage return character (0D hex)
LF	ASCII line feed character (0A hex)

3.2.3. Shadin Formats (Altitude Sentence, Airdata Z, Airdata G, Airdata S)

Only Shadin S format has most of the data required to run fully on the RosenView MX. Formats Z and G do not have positional information, and none of the Shadin formats have destination information.

3.3. Control Inputs



Controller drawings are available on the [External Controllers](#) page of the Rosen Aviation website. Select your model from the drop-down list.

Briefing files are part of the configuration file that you load through the [RosenView MX Configuration Tool](#). The briefing controllers can play the briefings after you upload this file to the RosenView MX and allow it to reboot.

RosenView Briefing Controller (P/N 0300-412)

- i) This model plays all briefings that can be loaded into the configuration file.
- ii) To start a briefing, rotate the controller knob to select the briefing and push the knob to begin play.
- iii) To stop a briefing, push the controller knob.

Briefing Control Panel (P/N 0300-410 and 0300-411)

- i) These models play briefings 1-4 in the Configuration file from the panel buttons. To play all other briefings, you must use a **0300-412** briefing controller.
- ii) Press **Brief 1** (or the desired briefing) and then press **Play** to start the briefing; the Briefing Control Panel's green LED will light while the briefing is active.
- iii) To stop an active briefing, press **Cancel**.

7-Button Controller (P/N 0300-407)

The 7-Button Controller offers hard controls for **Zoom** (in and out), **Pan** (N, S, E, and W), and **Return** to center the map on the current aircraft position.

RS-485

You can control the RosenView MX with RS-485, and its default RS-485 address is 31. For specifications, request the *RS485 Network Message Definitions* instruction (P/N **9002933**) from Rosen Customer Support at 541.342.3802.

IR Remote

The RosenView MX accepts control commands from an internal or external IR interface.

3.4. Audio/Video Outputs

RosenView MX outputs VGA and Composite video outputs of the moving map and one stereo audio output for briefings.

1. **VGA Output:** VGA connects to the 15-pin, high-density connector. VGA will produce the best results when using monitors sized 10" or above.

Note: When used with Rosen Aviation bulkhead displays, a cabin controller can switch between Composite and VGA via the source input on the display's external switch controller connector. See the applicable display's technical manual for specific source input toggle information.

The RosenView MX resolution is set to 1024x768 by default when shipped from the factory. You can change the VGA resolution to either 640x480 or 800x600 by inserting a USB drive into the RosenView MX that contains a script to change the resolution. For downloads and instructions about how to run the scripts, please contact Rosen Customer Support.

2. **S-Video Output:** S-Video connects to coaxial pins A1 and A2 on the main interface connector (21 WA4).
3. **Composite Video Output:** There are also two separate composite video outputs on pins A3 and A4.
4. **Audio Output:** Audio Left, Right, and Ground connect to pins 1 through 3 on the 26-pin Data Interface Connector.

4. MOVING MAP DISPLAY

4.1. Moving Map Data

The following figure shows a medium-altitude satellite image of a moving map with typical flight data and the default option settings. While the RosenView MX receives flight data, the information banners on the map views may initially be blank or say “Waiting for data...” If a data parameter is not available, the associated data field will not display.

The flight data displayed in the information banners depends on the setting options in the configuration file. The Destination Airport parameter is required to see the flight path, but the maps do not require it.

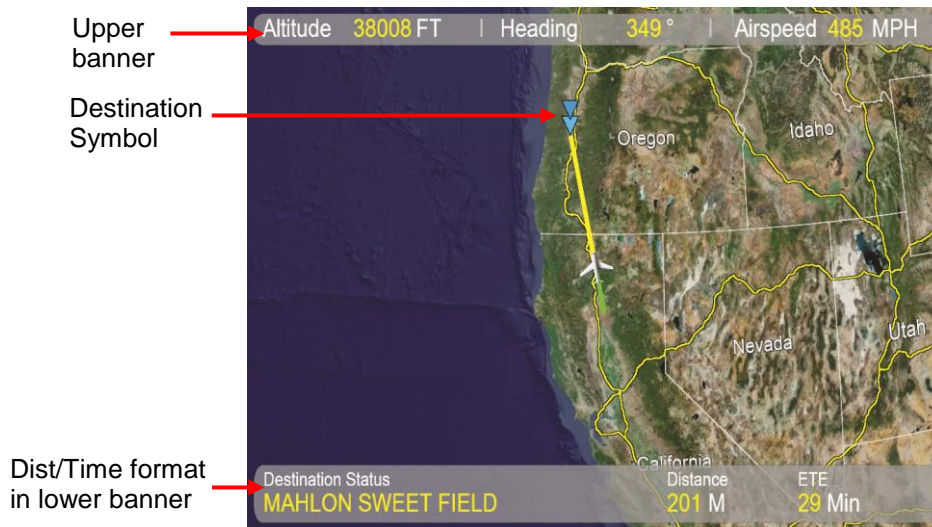


Figure 2 Moving map view with flight data

The lower banner displays in one of two data formats:

- Dist/ETE – displays the flight distance and estimated time en route (time until arrival)
- Local Time – the time at the destination airport

4.1.1. Zoom and Pan Options

Nine zoom levels of satellite imagery are available to view map data. To change the map level once you reach the lowest- or highest-level maps, press Zoom for the opposite direction.

As long as the RosenView MX receives continuous Pan commands from a controller within the preset timeout period, the map will not cycle to the next view.

4.2. Current Flight Data

Flight information views can include a Current Flight Data page, as shown below, which shows the upper banner data and other travel conditions in an instrument gauge view.



Figure 3 Instrument view of current flight data

4.3. Destination Status

A summary view of lower banner data formats appears on the Destination Status page. The RosenView MX refreshes the data each time the view type appears in the viewing sequence.



Figure 4 Graphic summary of the destination status

5. INSTALLATION GUIDELINES

5.1. Mounting

The RosenView MX may be mounted in any orientation as long as the following conditions are met:

1. The front panel is accessible so that a user/technician may perform field updates and configurations.
2. Vents on the front and back are unblocked to supply adequate ventilation. Leave a minimum of one-inch clearance between the vents and any obstructions. A vent pattern or opening in the cabinet must have at least 5.5 square inches of open area.

The maximum mounting-screw penetration into the housing does not exceed .25 inches. Two mounting holes are available on each side for 6-32 screws, as shown below, and on the [Outline and Installation Drawing](#).

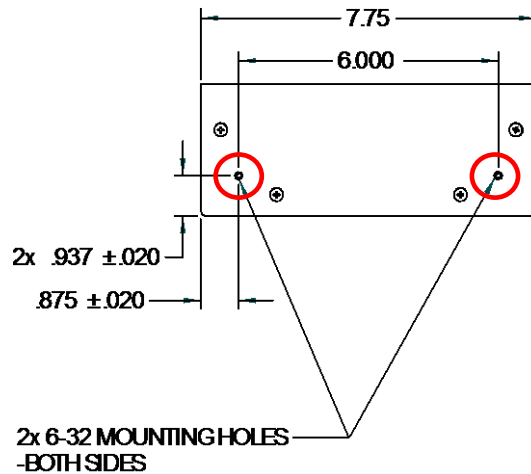


Figure 5 RosenView MX mounting requirements

3. Connect the power and the available inputs, and then press Reset/Power on the front panel.



Figure 6 RosenView MX rear panel connections

6. ROSENVIEW MX CONNECTIONS, LEDS, AND CONTROLS

The front side of the RosenView MX unit houses the USB port, Reset/Power button, and LED displays. The plug in the lower-left corner covers a connector used only by Rosen Aviation technicians. The PS/2 keyboard connection is not used.



Figure 7 RosenView MX front panel

6.1. Front Panel Indicators

Except for resetting the unit, you cannot control the RosenView MX from the front panel; however, you can control the moving map using an IR remote or button controller.

Table 2 RosenView MX front panel controls

Control	How it Works
PS/2 Keyboard Connection	Not used.
USB port	Insert the USB flash drive with a customization file into the USB port to load custom configuration files into RosenView MX.
Reset/Power	Press and hold the Reset/Power button for about one second and then release it to reset RosenView MX; the system will cycle power and reboot.

Table 3 RosenView MX LED definitions

LED	How it Works
IR	A blinking blue light indicates active remote control input.
HD	(Hard Drive) LED remains off during normal idle operation and blinks when the hard drive is active.
PC Power	A green LED indicates three possible conditions: a) Remains on during normal operation. b) Blinks while the RosenView MX system is booting up. c) Remains off if a system error prevents boot up.
Reset/Power	A steady red light indicates the unit is operating normally. To reset the RosenView MX, press and hold the Reset/Power button for about one second and then release it. The system will cycle power, reboot, and reset the map processor.
Temp	The temperature alarm indicator: A blinking red LED indicates the internal system temperature is either above or below the allowed parameters. This LED remains off during normal temperature conditions. (The RosenView MX monitor screen will also be blank if the internal system temperature is above or below the allowed parameters.)
Briefing	The active briefing indicator. A blinking blue LED indicates the unit is playing a briefing. The Briefing LED will blink as long as the briefing is active; it remains off when no briefing is active.
Control	Control activity indicator. It blinks blue when any control inputs are active (RS-232 serial control, IR control, or RS-485). This LED remains off when no control inputs are active.
GPS	This LED indicates activity on the RS-232 GPS data input. A blinking blue LED indicates when the unit is receiving data.
ARINC	This LED indicates activity on the ARINC 429 data input. A blinking blue LED indicates the unit is receiving valid data. Note: when both GPS and ARINC inputs are in use, only the ARINC light will blink.

6.2. Other System Functions

6.2.1. Test Mode

1. To enter test mode, remove 28V power from RosenView MX, and then while pressing and holding in the Reset/Power button, turn on the 28V power supply.
2. Continue to hold in the Reset/Power button for a couple seconds and then release.
3. After booting up, test mode will run on the monitor.

The GPS and ARINC LEDs blink in unison for the first few minutes when the RosenView MX is in Test Mode.



If the GPS and ARINC LEDs are alternately blinking on and off, then the unit is not receiving data or there is a connection/wiring error.

7. TECHNICAL REFERENCES AND SUPPORT



Always check the [RosenView MX](#) product web page to ensure that you are working with the most current revision of technical documentation.

Table 4 Technical references

Product	Part Number	Location
Optional External Briefing Controllers	0300-410, 0300-411, and 0300-412	www.rosenaviation.com
RosenView System 7-Button Controller	0300-407	www.rosenaviation.com
RosenView MX Outline and Installation Drawing	0603-003-CD	www.rosenaviation.com
<i>RS-485 Network Message Definitions</i>	9002933	Contact Rosen Customer Support
Universal Color Remote Control	Contact Rosen Sales for part number availability	

7.1. Troubleshooting

If the display does not function properly, refer to the following troubleshooting table for symptoms and possible solutions before contacting Rosen Customer Support

Note: Always use an oscilloscope to verify the video signal. Always use a multimeter to verify voltages. Check actual results against the requirements described in this manual.

Table 5 Troubleshooting tips and solutions

Problem	Possible Solutions
No destination data	<ul style="list-style-type: none"> Enabled once the pilot inputs the flight data.
Data is missing	<ul style="list-style-type: none"> Verify the label is available on the ARINC bus. It is possible to hook up two different ARINC buses. Note: Certain data points do not show up on the GPS/RS-232 bus.
No video	<ul style="list-style-type: none"> Verify that a signal is reaching the display using an oscilloscope or another display. Verify that the display is turned on. Verify that the pinout is correct.

Screen is black	<ul style="list-style-type: none"> • Verify that the display is receiving power. • Verify that the pinout is correct. • Verify that the video source is on. • Verify all connections between the source and the display. • Ensure the internal system temperature is not above or below the allowed parameters.
Image flickers	<ul style="list-style-type: none"> • Verify that the signal cable is secure. • Verify that the vertical frame frequency is 75 Hz or less.
Image is distorted	<ul style="list-style-type: none"> • Verify pinouts. • Verify that a signal is reaching the display using an oscilloscope or another display. • Examine the display for pinched or damaged cables.
GPS and ARINC LEDs are blinking on and off	<ul style="list-style-type: none"> • The unit is not receiving data or there is a connection/wiring error.

7.2. RTCA DO-160 Qualification

The table below shows the DO-160 compliance of the RosenView MX. All testing is to DO-160 Rev E, except as noted. Omitted categories are not applicable to this product or its expected installation.

Table 6 DO-160 Level E & F test criteria

Description	Section	Category	Comments
Temperature and Altitude	4		
Ground Survival/Short-Time Operating Low Temp	4.5.1	A1	
Operating Low Temperature	4.5.2	A1	
Ground Survival/Short-Time Operating High Temp	4.5.3	A1	
Operating High Temperature	4.5.4	A1	
In-flight Loss of Cooling	4.5.5	–	Not applicable
Altitude	4.6.1	A1	
Decompression	4.6.2	A1	(50,000 ft.)
Overpressure	4.6.3	A1	
Temperature Variation	5		
Temperature Variation	5.3.1	C	
Humidity	6		
Humidity	6.3.1	A	

Description	Section	Category	Comments
Operational Shocks & Crash Safety	7		
Operational Shocks	7.2.1	B	DO-160F
Crash Safety (Impulse)	7.3.2	B	DO-160F
Crash Safety (Sustained)	7.3.3	B	DO-160E
Vibration	8		
Random Vibration – Fixed Wing Aircraft	8.5.2	S (Curve B)	DO-160F
Magnetic Effect	15		
Magnetic Effect	15.3	Z	
Power Input	16		
Normal Operating Conditions (DC)	16.6.1		
Average Value Voltage (DC)	16.6.1.1	A	
Ripple Voltage (DC)	16.6.1.2	Z	
Momentary Power Interruptions (DC)	16.6.1.3	A	
Normal Surge Voltage (DC)	16.6.1.4	A	
Engine Starting Under Voltage Operation (DC)	16.6.1.5	B	
Abnormal Operating Conditions	16.6.2		
Voltage Steady State (DC)	16.6.2.1	A	
Momentary Under Voltage (DC)	16.6.2.3	A	
Abnormal Surge Voltage (DC)	16.6.2.4	B	
Voltage Spike	17		
Voltage Spike	17.4	B	
Audio Frequency Conducted Susceptibility	18		
AF Conducted Susceptibility- Power Inputs	18.3.1	Z	
Induced Signal Susceptibility	19		
Magnetic Fields Induced Into Equipment	19.3.1	AC	
Magnetic Fields Induced Into Interconnecting Cables	19.3.2	AC	
Electric Fields Induced Into Interconnecting Cables	19.3.3	AC	
Spikes Induced Into Interconnecting Cables	19.3.4	AC	
Radio Frequency Susceptibility	20		
Conducted Susceptibility (CS) – 10 KHz to 400 MHz	20.4	T	
Radiated Susceptibility (RS) – 100 MHz to 18 GHz	20.5	T	

Description	Section	Category	Comments
Emission of Radio Frequency Energy	21		
Conducted RF Emission	21.4	M	DO-160F
Radiated RF Emission	21.5	M	DO-160F
Electrostatic Discharge (ESD)	25		
Electrostatic Discharge (ESD)	25.5	A	DO-160F

7.2.1. D0-178B

The RosenView MX has no effect on the flight operation of the aircraft. The unit only receives information from the avionics systems and does not transmit data to the avionics systems. Therefore, the unit's software falls under the DO-178B Level E classification and the requirements are not applicable.

7.3. Specifications

Product specifications are available on the [RosenView MX Outline and Installation Drawing](#) (P/N **0603-003-CD**) on the [Rosen Aviation](#) website.

8. DEFINITIONS

- ARINC** Aeronautical Radio, Inc. Data bus standard for transmission of avionics data on a differential serial bus.
- DC** Direct current
- DST** Daylight Saving Time
- ETE** Estimated time en route
- FMS** Flight Management System
- GAMA** General Aviation Manufacturers Association
- GMT** Greenwich Mean Time
- GND** Ground
- GPS** Global Positioning System
- HD** Hard Drive
- I/O** Input / Output
- IR** Infrared
- LED** Light-emitting Diode
- NMEA** National Marine Electronics Association – group which maintains the GPS sentence format standards

- PAL** Phase Alternate (by) Line the analog video specification used by most European countries and their former colonies world wide
- PC** Personal Computer
- PS/2** Personal system 2 (trademarked IBM keyboard specification)
- RF** Radio frequency
- RGB** Red, Green, Blue
- RS-232** Standard for transmitting serial information using single-ended signaling (data lines referenced to ground)
- RS-485** Standard for transmitting serial information using differential signaling on a pair of wires. Offers higher data rates and more noise immunity than RS-232.
- USB** Universal Serial Bus; a high-speed differential signaling serial bus typically used to connect peripheral devices to a personal computer
- UTC** Universal Time Coordinated
- V** Volts
- VGA** Video Graphics Array
- WPT** Waypoint

9. REVISION HISTORY



Revision E is limited to draft or prototype documents. Revisions I, O, Q, S, X and Z are not to be used.

Revision	Date	Revision Description	EC
A	12/18/13	Initial release	13-0438