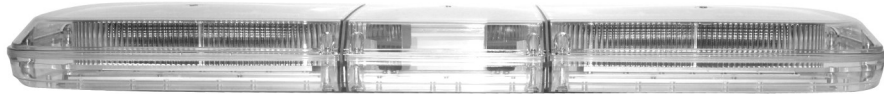# INSTALLATION AND INSTRUCTION MANUAL

M-Tech®Plus

SABRE LIGHTBARS

Models
5364LED, 5462LED, 5464LED and 5564LED

Patents 9,291,328 and D683,252

PROUDLY MADE IN THE USA
An ISO 9001:2015 Certified Company

⚠ *Keep any radio frequency sensitive equipment at least 20" from the bar and power cable(s). Our circuits have been designed to limit RFI emissions, but certain very sensitive equipment may still be affected.*

⚠ **CAUTION !!**
PLEASE NOTE: THE DIRECT MOUNT IS THE STANDARD MOUNT INCLUDED WITH THE LIGHTBAR.
THE HOOK MOUNTS MUST BE USED ON ALL POLICE AND/OR OTHER EMERGENCY VEHICLES!!!
THE HOOK MOUNTS ARE SOLD SEPARATELY. THEY ARE NOT INCLUDED WITH EACH LIGHTBAR. THEY MUST BE ORDERED SEPARATELY. SEE THE ACCOMPANYING HOOK MOUNT MANUAL FOR A COMPLETE LIST OF AVAILABLE MOUNTS AND KNOWN VEHICLE APPLICATIONS.

⚠ **WARNING!**
It is the sole responsibility of the owner to ensure the lightbar is mounted securely. Check your light every time you enter the vehicle to ensure that it is mounted securely. The manufacturer assumes no responsibility for the secure mounting of this light.

⚠ **WARNING!**
This light utilizes high-intensity LED Lamps. DO NOT stare directly into the light while it is on, as momentary blindness and/or permanent eye damage may occur.

Table of Contents

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NOTICE

QUICK-INSTALL WIRING GUIDE

⚠ WIRE COLORS AND FUNCTIONS WILL VARY FROM HARNESS TO HARNESS. PLEASE BE SURE TO CORRECTLY IDENTIFY YOUR HARNESS AND USE THE CORRESPONDING TABLE. IN ADDITION, ALL LIGHTBARS ARE SHIPPED WITH A WORKSHEET THAT IDENTIFIES THE FUNCTION FOR EACH WIRE COLOR IN THAT SPECIFIC LIGHTBAR.

11-Wire Harness *(271-PHANTOM)*

Green w/Yellow	*Not Used or Optional Component*
White w/Brown	*Not Used or Optional Component*
Brown	Rear Enable *(Turns on Rear Facing M-Tech Plus™ Lights)*
Orange	Front Enable *(Turns on Front Facing M-Tech Plus™ Lights)*
White	Synchronization *(Used to synchronize two or more lights together)*
Green	Passenger Side Pattern Select *(Touch and release to +12-24 VDC to change patterns)*
Purple	High/Low Select *(Optional - Ground for low intensity)*
Red w/Green	Driver Side Pattern Select *(Touch and release to +12-24 VDC to change patterns)*
Red	Power *(Connect to constant +12-24 VDC †)*
Black	Ground *(Connect to the negative side of the battery)*
Bare	Ground *(Shield - Connect to a good chassis ground)*

20-Wire Harness Wiring *(271RAZOR)*

Blue	Driver Side Alley Light *(Switched +12VDC Only)*
White w/Blue	ICL Power *(Intersection Clearing Lights)*
White w/Yellow	Front Corner *(Controls any lights in the front corners other than ICL)*
Orange w/Yellow	Front Enable *(Turns on Front Facing M-Tech Plus™ Lights)*
Brown w/Yellow	*Not Used or Optional Component*
Red	Power *(Connect to constant +12-24 VDC †)*
Red w/Green	Passenger Side Pattern Select *(Touch and release to +12-24 VDC to change patterns)*
Purple	Optional - High/Low *(Ground for low intensity)*
Green w/Yellow	Front Center *(Controls any lights in the front centers)*
Red/Black	Driver Side Pattern Select *(Touch and release to +12-24 VDC to change patterns)*
White w/Brown	Alt. Front Center *(Controls any alternate lights in the front centers)*
Green w/Red	Rear Center *(Controls any lights in the rear centers)*
Brown w/Red	*Not Used or Optional Component*
Orange w/Red	Rear Enable *(Turns on Rear Facing M-Tech Plus™ Lights)*
White w/Red	Synchronization *(Used to synchronize two or more lights together)*
Yellow w/Black	Alt. LED 1 *(Controls any alternate LED lights)*
White w/Black	Alt. LED 2 *(Controls any additional alternate LED lights)*
Gray	Passenger Alley *(Switched +12VDC Only)*
Black	Ground *(Connect to the negative side of the battery)*
Bare	Ground *(Shield - Connect to a good chassis ground)*

† - The Red wire **MUST** be connected to +12VDC for the front and rear warning LEDs to operate. If you are NOT utilizing a separate Front and Rear enable function, you may connect the Red wire, along with the Front enable wire and Rear Enable wire to +12-24VDC through your On/Off switch.
If you ARE using a separate Front and Rear Enable function, connect this wire to constant +12-24VDC.
Please note: When the red POWER wire is connected to constant power the light will draw a small current (20 mA). If your vehicle will be sitting for extended periods of time (i.e. more than a few days), it is recommended all power wires be routed through an ignition switched power source.

14-Wire Harness Wiring *(271-TOWBAR)*

Light Blue	Optional - High/Low *(Ground for low intensity)*
Orange	Rear Enable *(Turns on Rear Facing M-Tech Plus™ Lights)*
Yellow	Left Stop *(+12VDC Only - Used only if you have STT lights in your bar)*
Green	Right Stop *(+12VDC Only - Used only if you have STT lights in your bar)*
White w/Orange	Work Lights *(+12VDC Only - Used only if you have worklights in your bar)*
Brown	Tail *(+12VDC Only - Used only if I.D. or STT lights are in your bar)*
Red	Power *(Connect to constant +12-24 VDC †)*
Red w/White	*Not Used or Optional Component*
Red w/Green	Passenger Side Pattern Select *(Touch and release to +12-24 VDC to change patterns)*
Black w/Green	Driver Side Pattern Select *(Touch and release to +12-24 VDC to change patterns)*
White w/Green	Front Enable *(Turns on Front Facing M-Tech Plus™ Lights)*
Gray	Synchronization *(Used to synchronize two or more lights together)*
Black	Ground *(Connect to the negative side of the battery)*
Bare	Ground *(Shield - Connect to a good chassis ground)*

16-Wire Harness Wiring *(271-STROBE)*

Light Blue	Driver Side Alley Light *(Switched +12VDC Only)*
White w/Brown	Pursuit *(Used only if Pursuit lights are in your bar)*
White w/Blue	ICL Power *(Intersection Clearing Lights)*
Green w/Yellow	Takedowns *(Used only if Takedown lights are in your bar)*
Red	Power *(Connect to constant +12-24 VDC †)*
Red w/Black	Driver Side Pattern Select *(Touch and release to +12-24 VDC to change patterns)*
Red w/White	Synchronization *(Used to synchronize two or more lights together)*
Red w/Green	Passenger Side Pattern Select *(Touch and release to +12-24 VDC to change patterns)*
Black w/Green	Rear Enable *(Turns on Rear Facing M-Tech Plus™ Lights)*
White w/Green	Front Enable *(Turns on Front Facing M-Tech Plus™ Lights)*
Orange	*Not Used or Optional Component*
White	Rear Flashers *(Used only if Rear Flashers are in your bar)*
Orange w/Red	Optional - High/Low *(Ground for low intensity)*
Gray	Passenger Alley *(Switched +12VDC Only)*
Black	Ground *(Connect to the negative side of the battery)*
Bare	Ground *(Shield - Connect to a good chassis ground)*

† - The Red wire **MUST** be connected to +12VDC for the front and rear warning LEDs to operate. If you are NOT utilizing a separate Front and Rear enable function, you may connect the Red wire, along with the Front enable wire and Rear Enable wire to +12-24VDC through your On/Off switch. If you ARE using a separate Front and Rear Enable function, connect the Red wire to constant +12-24VDC. *Please note: When the red POWER wire is connected to constant power the light will draw a small current (20 mA). If your vehicle will be sitting for extended periods of time (i.e. more than a few days), it is recommended all power wires be routed through an ignition switched power source.*

⚠️ **WIRE COLORS AND FUNCTIONS WILL VARY FROM HARNESS TO HARNESS. PLEASE BE SURE TO CORRECTLY IDENTIFY YOUR HARNESS AND USE THE CORRESPONDING TABLE. IN ADDITION, ALL LIGHTBARS ARE SHIPPED WITH A WORKSHEET THAT IDENTIFIES THE FUNCTION FOR EACH WIRE COLOR IN THAT SPECIFIC LIGHTBAR.**

Mounting Instructions

Please review the separate Mounting Bracket manual that is also enclosed with your bar for mounting instructions.

Electrical Connections

All standard lightbar models are designed for 12VDC negative ground vehicles only. Reverse polarity will cause serious damage to the lightbar and/or vehicle. Contact the automotive dealer if there are any doubts about the polarity of your vehicle.

Direct Wiring Guide

If the wire supplied is too short, Star recommends direct wiring to the terminal block on the inside of the lightbar, rather than making connections to the end of the wire that is supplied. This lightbar is designed so that *no* wire connectors are needed and only a few common tools are necessary in order to do this. Direct wiring allows the wire connections to the lightbar to be made in a clean and dry environment, avoiding any problems that may arise due to weathering on external connections. There is also an increase in voltage loss with the addition of each connection. Wiring directly inside the lightbar reduces the number of connections. However, making connections to the wires already provided is an acceptable alternative, as long as these connections are good electrical connections and are resistant from weathering effects. For direct wiring into the lightbar, follow the instructions listed below.

1. Determine the number of wires that you will need to run. Your lightbar may not use all of the wires in the harness that was shipped with the lightbar. Please note which functions your bar has, then review the lists on pages 1-2 to determine which wires you will need to connect. The bare drain wire in our harness is optional (but recommended) and is only necessary if you are experiencing RFI problems.

2. Locate the end of the lightbar into which the wire harness runs. The black terminal block(s), which you will be making your wire terminations to, should also be located at this same end.

3. Remove the dome lens at this end of the lightbar:

   Step A: Loosen the four screws holding each dome on.

   Step B: Lift the dome off of the base exposing the interior components.

   Step C: When all work is completed, reverse the steps to reinstall the dome, taking care that the gasket is properly aligned.
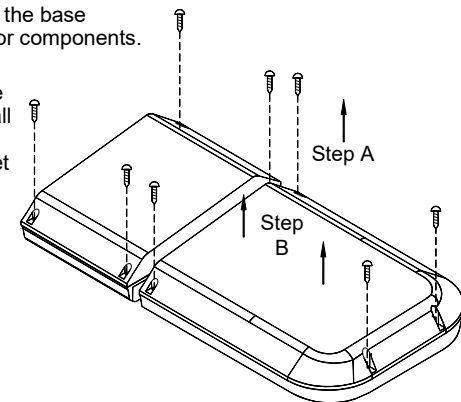
4. The wiring harness will connect to one or more terminal blocks inside the lightbar. All of the wires coming from the harness are terminated on one side of the terminal block and the wires leading to the internal components terminate on the opposite side of the terminal block. The Wiring Guide on pages 1-2 lists the wire colors from the harness in the same order as they are connected to the terminal block(s). Using the Wiring Guide, note which end of the terminal block(s) the wires in your harness start from.

5. Loosen the screws on the HARNESS SIDE of the terminal block and remove the harness. Remember that there may be "dead" wires from the harness connected to the terminal block inside your lightbar, but there will be no wires connected to the terminal across from them. These are extra wires in the harness that are not used. Replacing these wires in your new harness is not necessary.

6. Run the new external wires up through the wire bushing into the base and to the terminal block(s). Use the Wiring Guide to help determine where each of your new wires should be connected.

7. Strip each wire 1/4". Connect the external wires to the proper poles of the terminal block by inserting the stripped portion of the wire under the rising clamp screw and tightening down the screw. Note that <u>no wire terminals are needed</u> for connecting wires to this terminal block.

> *Be sure to check that no strands of wire are loose and shorting to the adjacent terminal or to the base of the lightbar*.

All switches used should be rated for at least 125% of their rated load.

Please note that your lightbar may have more or fewer wires in the harness or from the lightbar, and it may or may not use terminal jumpers as pictured below.

From Lightbar Components

Remove These

From Wire Harness

BLACK
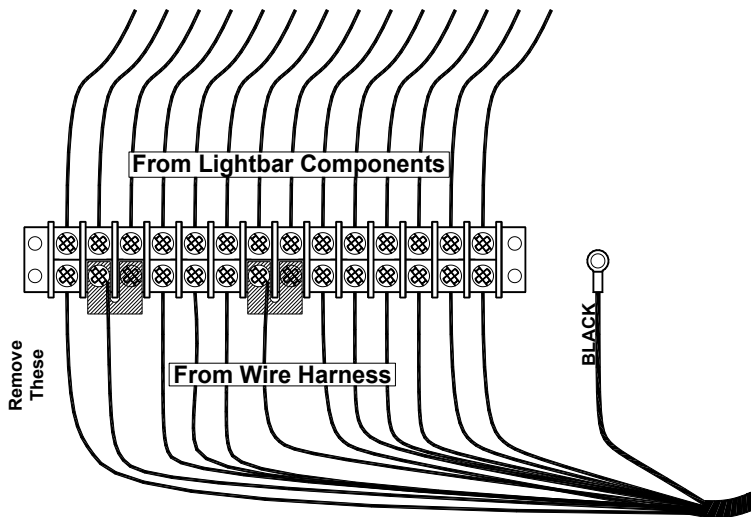
Wiring Notes

All standard lightbar models are designed for 12VDC negative ground vehicles only. Reverse polarity will cause serious damage to the lightbar and/or vehicle. Contact the automotive dealer if there are any doubts about the polarity of your vehicle.

⚠ RF INTERFERENCE

Please take the following steps to help eliminate any Radio Frequency Interference (RFI) with your two-way radio.

- *DO NOT* run the power wire for the lightbar along same path as any antenna wires.
- *DO NOT* run the power wire for the lightbar along same path as any radio power wires.
- *DO NOT* tap power for the lightbar off of the radio power wires.
- *DO NOT* mount the lightbar within 20" of any antennae. Sometimes mounting the lightbar or antenna over by just one foot can make a large difference in the interference.
- Ensure the black wire from the lightbar has a good connection to the ***negative side of the battery***.

- For all standard Sabre lightbars, 15 feet of cable (plus a drain wire and a foil shield) is supplied with the bar. All wires are color coded and sized at the correct gauge. If this length is not sufficient, it is recommended that the wire harness be completely replaced with the only connections to be made directly at the terminal block inside the lightbar. This will reduce the number of wire connections and help prevent any weathering problems on these connections. Refer to the *Direct Wiring Guide* on pages 3-4 for further instructions on this.

- **CAUTION: All wires and switches should be rated for <u>at least</u> 125% of their maximum current load.** In addition, all wires connected to the positive terminal of the battery should be fused <u>at the battery</u> for 125% of their rated load. The load can be calculated by adding all lamp wattages and dividing by 13. (Load <Amps> = Total Watts / 13 volts) **<u>Do not use</u>** 1/4" diameter glass fuses, as they are not suitable for continuous duty above 20 amps. If you are unsure of the current draw, please contact our Customer Service Department.

- **TESTING THE LIGHTBAR BEFORE IT IS PROPERLY FUSED & INSTALLED WILL VOID THE WARRANTY!!**

- <u>The black ground wire should be connected to the negative terminal of your vehicle's battery</u>. This wire should be as short as possible in order to minimize the voltage loss in this wire and reduce any chance of overheating.

- Your harness will contain all of the colored wires in its corresponding harness. Most applications though, will not use every wire. The "dead" wires in the harness will be connected to the terminal block inside your lightbar, but there will be no wires connected to the terminal across from them. These "dead" wires can be used for additional components that may be added at some point in the future, or they may be used to separately switch components that are currently wired together.

- Since many of the lightbars we build have custom components, and numerous different harnesses are used, wire colors WILL vary. You can use the Wire Guide on pages 1-2 or the worksheet shipped with each bar to identify the function of each wire If you are still unsure of the function of a particular wire, you may test the function by grounding the black wire and applying +12VDC to the wire in question. Be sure to use a 20-amp fuse when testing.

Wire Functions

⚠️ WIRE COLORS AND FUNCTIONS WILL VARY FROM HARNESS TO HARNESS. PLEASE BE SURE TO CORRECTLY IDENTIFY YOUR HARNESS AND USE THE CORRESPONDING TABLE IN THE WIRING GUIDE ON PAGES 1-2. IN ADDITION, ALL LIGHTBARS ARE SHIPPED WITH A WORKSHEET THAT IDENTIFIES THE FUNCTION FOR EACH WIRE COLOR IN THAT SPECIFIC LIGHTBAR.

Ground - Connect to the negative side of the battery.

Bare/Shield - Connect to the negative side of the battery.

Power (Red) - Connect to +12 VDC through your switch. *Be sure to use a 10 amp fuse when connecting the switch to the positive side of the power supply.*

The Red wire **MUST** be connected to +12VDC for the front and rear M-Tech Plus™ LEDs to operate.

Please note: When the red POWER wire is connected to constant power the light will draw a small current (20 mA). If your vehicle will be sitting for extended periods of time (i.e. more than a few days), it is recommended all power wires be routed through an ignition switched power source.

Front Enable - When the red POWER wire has power to it, applying +12VDC to the Front Enable wire will switch the front M-Tech Plus™ lights on independently from the rear M-Tech Plus™ lights.

Rear Enable - When the red POWER wire has power to it, applying +12VDC to the Rear Enable wire will switch the rear M-Tech Plus™ lights on independently from the front M-Tech Plus™ lights.

If you do not need independent control of the front and rear M-Tech Plus™ lights, it is recommended that you connect all THREE wires (Power, Front Enable, and Rear Enable) together through your switch.

Driver Side Pattern Select - Touch and release to +12 VDC to change the flash pattern on the Driver side M-Tech Plus™ array *(see page 7)*.

Passenger Side Pattern Select - Touch and release to +12 VDC to change the flash pattern on the Passenger side M-Tech Plus™ array *(see page 7)*.

High/Low - Used for switching between High and Low power.
- Leave disconnected for High Power only (cover with wirenut or tape).
- Connect to Ground for Low Power only.
- Connect to Ground through a switch for High/Low switching.

Synchronization - Using this wire, two or more M-Tech Plus™ circuits or lights can be synchronized with one another. If you will be synchronizing two or more units together, or synchronizing this light with other synchronizable lights, *leave this wire disconnected for now*. Connect the SYNC wires from all units together **ONLY AFTER PROGRAMMING** them for the **same** pattern (see Pattern Programming on page 7).

Additional components - If your bar contains any additional components including, but not limited to, those listed below, applying +12VDC to the appropriate wire will activate those components:

- Driver Alley
- Passenger Alley
- Intersection Clearing Lights
- Takedown Lights
- Pursuit Lights
- Rear Flashers
- Work Lights
- Right Stop Lights
- Left Stop Lights
- Tail Lights
- I.D. Lights
- Additional LED Lights
- Additional Strobe Lights
- Additional Rotating Lights

Please Note: **ONLY** the M-Tech Plus heads are **+12-24VDC**. All other components are **+12VDC only**.

Pattern Programming

Before changing the pattern, please review these key points about programming the lightbar:

- The driver's side circuit and passenger's side circuit are programmed with different wires. The colors will vary depending upon your harness. Review the chart on page 1 that corresponds to your harness to identify the color of each of the programming wires.

- The two sides are usually programmed at the same time by connecting the two pattern programming wires together. The only exception typically will be when you wish to set the two sides for patterns that differ from one another.

Flash Pattern	Pattern Description	Shortcut For All except Value	Shortcut for Value Versions
1	Alternating Flicker		3 Sec
2	Alternating Fast Double Flash		
3	Alternating Triple Flash		
4	Alternating ECE Double Flash	3 Sec	
5	Alternating ECE Quad Flash		
6	Alternating Quad Flash	6 Sec	6 Sec
7	Alternating Quad Flash w/Post-Pop		
8	Alternating Single Flash		
9	Alternating Slow Double Flash		
10	Alternating Variable		
11	Alternating Post Pop		
12	Alternating Random		
13	Alternating Quintflash	9 Sec	9 Sec
14	Alternating Fast Doubleflash, Alternating Flicker *(Amber Value versions)* / Swing *(All others)*		
15	Alt. Quad, Alt. Flicker, Alt. Double, Flicker *(Amber Value versions)* / Alternating Fast Double Flash, Alternating Flicker *(All others)*		
16	Simultaneous Quad w/Post Pop (Phase 1) *(Amber Value versions)* / Alternating Quad Flash, Alternating Flicker, Alternating Fast Double Flash, Flicker *(All others)*		12 Sec
17	Simultaneous Quad w/Post Pop (Phase 2) *(Amber Value versions)* / Counter Clockwise Rotation *(All others)*		
18	Alt. Triple, Alt. Non-Synch Double, Alt. Quint, Flicker *(Amber Value versions)* / Simultaneous Quad w/Post Pop (Phase 1) *(All others)*	12 Sec	
19	Steady burn one side, Other side Single Flash *(Amber Value versions)* / Simultaneous Quad w/Post Pop (Phase 2) *(All others)*		
20	Cycle All *(Amber Value versions)* / Alt. Triple, Alt. Non-Synch Double, Alt. Quint, Flicker *(All others)*		
21 ☼	Steady burn one side, Other side Single Flash		N/A
22 ☼	Cycle All		N/A
23 ☼	Quad w/Post Pop, Fast Double w/Post Pop		N/A
24 ☼	Alternating Non-Synch Double		N/A
25 ☼	Swing, Flicker		N/A
26 ☼	Slow Double, Fast Double		N/A
27 ☼	Alternating Fade		N/A
28 ☼	Simultaneous Flicker (Phase 1)		N/A
29 ☼	Simultaneous Flicker (Phase 2)		N/A
30 ☼	Simultaneous ECE Doubleflash (Phase 1)	15 Sec	N/A
31 ☼	Simultaneous ECE Doubleflash (Phase 2)		N/A
32 ☼	Simultaneous ECE Quadflash (Phase 1)		N/A
33 ☼	Simultaneous ECE Quadflash (Phase 2)		N/A
34 ☼	Sim. Quad (Phase 1), Alt. Triple, Sim. Flicker (Phase 1), Alt. Fast Double		N/A
35 ☼	Sim. Quad (Phase 2), Alt. Triple, Sim. Flicker (Phase 2), Alt. Fast Double		N/A

Pattern Shortcuts: Hold *Pattern Select Wire* to +12VDC for indicated time.

☼ Patterns 21-35 are **NOT** included in the Amber Value versions

Troubleshooting

Symptom	Possible solutions
Flash Pattern is not changing	Pattern select wire must be pulled to +12VDC to change pattern.
Unit stuck in high power	High/Low wire must be grounded to activate low power mode.
Bar is not synchronizing with other product	-Check to ensure all desired lights to be synchronized have the capability of being synchronized.
	-Check to ensure synchronization wire is connected to all units that are desired to be synchronized.
	-Check to ensure all lights to be synchronized are set to same *Pattern*.
	-Ensure that the entire system that is desired to be synchronized is powered up at the same time via the same switch.
	-Ensure that the total amount of synchronizable products in the system does not exceed 6 lights.
One single LED is out.	The entire flasher board will need to be replaced.
One complete half of the bar is out.	-Check wiring to the flasher board that is experiencing the problem.
	-The entire LED board on that side may need to be replaced.
If the bar is experiencing erratic flashing or side to side synchronizing within the bar is not working.	-Ensure both sides are set to the same *Pattern Type*.
	-Ensure synchronization wire is connected between both flasher boards internally.
	-Ensure both flasher circuits in the bar are powered from the same power switch.

Low Voltage Detection *(excludes value versions)*

This light is equipped with low input voltage detection. If the battery voltage drops below 10VDC, the lightbar will go into a constant flicker mode. Once the input voltage returns to normal (greater than 12V) the unit will return to the normal flashing.

Service

If you have any questions concerning this or any other product, please contact our
Customer Service Department at (585) 226-9787.

If a product must be returned for any reason, please contact our
Customer Service Department to obtain a Returned Materials Authorization
number (RMA #) before you ship the product back.
Please write the RMA # clearly on the package near the mailing label.

NOTICE

Due to continuous product improvements, we must reserve the right to change any specifications and information, contained in this manual at any time without notice. Star Safety Technologies, Inc. makes no warranty of any kind with regard to this manual, including, but not limited to, the implied warranties of merchantability and fitness for a particular purpose. Star shall not be liable for errors contained herein or for incidental or consequential damages in connection with the furnishing, performance, or use of this manual.

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