



**ASCENDENT  
TECHNOLOGY GROUP**



**M-Navigator-EX  
User Guide**

*Thank you for choosing Ascendent's Marine Deployment Kit (Shark MDK)*

## M-Navigator-EX

- PAL Video Format
- 100mm Fixed f/1.6 Thermal Imager
- 43x High-Res Optical Camera
- Gryo-stablized Pan-Tilt Housing
- Marine-grade IP67 Housing
- Radar Integration Unit
- Slew-To-Cue (STC)



## Terminal Box

- Rugged Casing
- Easy-fit Connectors
- Built-in Power



## KBD-300A Joystick Keyboard

- 3-axis Joystick
- Pressure Sensitivity
- Auxillary Commands
- Power-Over-Ethernet (POE)



## 19" Touch Screen Monitor

- Anti-corrosive Mountable Bracket
- Front: IP65, Back: IP54
- 19" High Resolution TFT LCD Screen
- DVI, VGA, Composite, S-Video Inputs
- RS232 Touch & Remote Control
- Quick Brightness Control



## X4S Standalone DVR

- 4 Channel DVR
- USB Backup
- Network Accessible
- Remote Smartphone Connectivity
- Fusion 360 Compatible
- USB Mouse Controlled
- Graphical User Interface (GUI)



# Introduction

The M-Navigator-EX provides fast, accurate, and durable positioning. It is designed for long, maintenance free operation under extreme environmental conditions.

Some general features include:

- Simple to command from joystick keyboard or DVR.
- Resolution of .005 degrees.
- Precise control of position, speed and acceleration.
- Long life direct drive brushless DC motors.
- Designed for severe outdoor operation.
- Model includes 2 axis gyro stabilization, marine hardware and finish.
- Power off pan and tilt axis locks.
- Flexible connectivity options.

This User Guide provides information needed to set up and operate the M-Navigator-EX. The following section provides a brief overview to allow you to get started as quickly as possible. More detailed technical information is provided in the remaining sections.

# Important Safeguards & Warnings

1. Please read these instructions prior to use.
2. Bolt or secure the M-Navigator-EX base to a secure base to keep it from tipping over. Do not place unit on a soft base such as a rubber mat.
3. Installation should be done only by qualified personnel and conform to all local codes.
4. CAUTION: These servicing instructions are for use by qualified service personnel only. To reduce the risk of electric shock, do not perform any servicing other than that contained in the operating instructions unless you are qualified to do so.
5. Use only mounting methods and materials capable of supporting at least four times the combined weight of the M-Navigator-EX.
6. Stand back a safe distance before applying power. The M-Navigator-EX is capable of rapid acceleration and may move suddenly when applying power.
7. Always return to the park position before turning off power to the M-Navigator-EX.

# Quick Setup Steps

The following outlines the basic PTU set-up and installation steps.

1. Unpack the M-Navigator-EX. Mount the unit securely. Refer to the next page for details on mounting the M-Navigator-EX.
2. Connect all supplied cables to designated ports on grey terminal box as show below. Plug in power cable to power outlet. Connect the other end of PTU cable to M-Navigator-EX camera. Connect joystick control to joystick keyboard. (To have PTZ control from DVR and joystick, use optional comm terminal by inserting green plug into back of DVR and plugging both the grey terminal box and joystick keyboard into the comm terminal.)
3. Unpack DVR and setup according to supplied DVR Setup Guide.
4. Connect video 1(Optical) & 2(Thermal) from terminal box to corresponding video inputs on DVR. In order for the PTZ controls to work from the DVR, the Optical Camera must be in channel 1 on the DVR. Power up DVR.
5. Power up the M-Navigator-EX using main power switch on the terminal box. The unit will go through a power-up sequence and move to the home position.
6. The M-Navigator-EX is now ready to accept position commands.



Camera Connection



Grey Terminal Box Connections

# Mounting

1. The M-Navigator-EX is a direct drive system. All direct drive systems require a minimum amount of mounting base inertia to maintain stable motor control.
2. The M-Navigator-EX is designed for vertical mounting with the mounting holes at the bottom. Being gyro-stabilized, the M-Navigator-EX may be mounted in any attitude.
3. Do not mount the M-Navigator-EX on a soft or flexible base. This may lead to unit instability such as severe shaking of one or both axes of rotation.
4. If mounting on a tripod, make sure the tripod is rated for 4 times the combined weight of the M-Navigator-EX.
5. Bolt or secure the M-Navigator-EX to a flat base using four 3/8-16 bolts (not supplied). Bolts are installed from below the M-Navigator-EX and need to be long enough to go all the way through the mounting base of the M-Navigator-EX. Bolt circle is 4.75". Recommended torque is 212 to 236 lbs-inches.

# Advanced Information

A joystick is not required to control the M-Navigator-EX, but it is normally used to send commands to the M-Navigator-EX. The following description refers to a joystick for simplicity, but it works the same for any method of sending commands to the M-Navigator-EX.

The M-Navigator-EX provides mechanical platform stabilization in both the pan and tilt axes. This stabilization is effective for low frequency (<5Hz) large amplitude oscillations such as those found on a boat or a land vehicle. It can be used in combination with electronic video stabilization, which is effective for higher frequency disturbances.

## Gyro Modes of Operation

The M-Navigator-EX have three different modes of operation. These modes may be set for best operation in varying applications. The three modes apply to both the pan and tilt axes.

**Mode 0** – (Building mount) Position mode only, no gyro control. The M-Navigator-EX remains at a fixed pan angle and a fixed tilt angle regardless of any motion of the M-Navigator-EX base. This is the normal mode for a M-Navigator-EX mounted to a building or any fixed base.

**Mode 1** – (Boat mount) Inertial space Gyro. In this mode the gyro operates with no fixed reference point. The motion control system applies motor torque to keep the pan and tilt axes pointing in the same direction relative to inertial space. For example if the M-Navigator-EX is mounted on a boat and pointed at a sunset, the boat can be driven in a complete circle and the M-Navigator-EX will remain pointed at the sunset for the whole time.

**Mode 2** – (Tower mount) This mode is beneficial when the M-Navigator-EX base may be slowly oscillating or twisting, but is generally secured to the earth. For example when the M-Navigator-EX is mounted on a tower or tall tripod, a boat moored to a dock, or a parked vehicle being disturbed by wind gusts or people climbing into or out of the vehicle.

## **Gyro Drift**

In Mode 1, the gyros have a small amount of random drift. This will cause the payload to slowly move from the initial position. This is normal. The gyros are affected by voltage levels, temperature changes, startup conditions and their minimum sensitivity. Moving the joystick slightly can compensate for the Drift or by sending new drift offset commands to the M-Navigator-EX periodically will help to minimize it.

In Mode 2 the M-Navigator-EX control system can apply some auto drift compensation to substantially reduce the apparent drift. The compensation works independently of the joystick, but requires a 3-minute initial period without any motion commands so it can measure and correct the initial gyro drift. This correction will be remeasured and the compensation adjusted whenever there is a 30 second time period with no motion control commands. It is recommended that if the M-Navigator-EX is being constantly repositioned, that the M-Navigator-EX be stopped for 30 seconds every 5-10 minutes so the gyro drift can be remeasured and more accurately corrected.

## **Radar Mode Explained**

By default, the RS232 port is set to Radar Mode. When in Radar Mode, you can scroll forward through radar contacts by pressing 53, Aux On. Scroll through radar contacts backwards by pressing 51, Aux On. Note that when moving forward through radar contacts (53, Aux On), Radar Slewing is enabled. This slows down and limits panning to allow only slight adjustments. Tilt actions continue to function normally. To disable Radar Slewing (and enable normal panning functions) press 52, Aux On.

## **Pan-Tilt Speeds Explained**

The M-Navigator-EX has three pan-tilt speeds. These speeds are high, medium and low. These speeds are changed using the Open (slower) and Close (faster) keys on the joystick keyboard.

# Joystick Keyboard Commands

To activate one of the following commands, be sure to input the keys in the order provided from left to right. Each key is separated by a comma. For example, to switch into Gyro mode 1, input 3 and then press Aux On.

Key Sequence	Command
1, Aux On	Gyro OFF
3, Aux On	Gyro mode 1
7, Aux On	Gyro mode 2
2, Aux On	Drift Up increment
4, Aux On	Drift Left increment
5, Aux On	Clear Drift Values
6, Aux On	Drift Right increment
8, Aux On	Drift Down increment
10, Aux On	Transfer control to Tracker on 232 port (cycle power to get it back)
11, Aux On	(reserved)
12, Aux On	232 port is Radar and Debug mode
14, Aux On	232 port is Radar mode
51, Aux On	Move DOWN radar contact list and engage if contact is available
52, Aux On	Turn Radar Slewing OFF
53, Aux On	Move UP radar contact list and engage if contact is available
54, Aux On	Do radar cursor slew (if info on cursor 'RSD message' is available)
91-99, Aux OFF	SET PTZ address (1-9) This sets the address in the PTZ itself. The PTZ will only respond to KBD commands that have a matching address.
1-99, CAM	Set KBD address (1-99) This sets the address that the KBD is trying to control. Note: address off 99 is ALL RESPOND
1-6, PRESET	A) If preset is pressed and released quickly the system will GOTO the associated preset location B) If preset is pressed and held for 4 seconds the system will SET the current location as the preset location

**Key Sequence**

1-9, PATTERN

**Command**

This will cause the system to go into TOUR mode.

In TOUR mode the system will toggle between each of the 6 preset locations. The associated number selected determines the "dwell" time at each location.

NEAR

Focus near

FAR

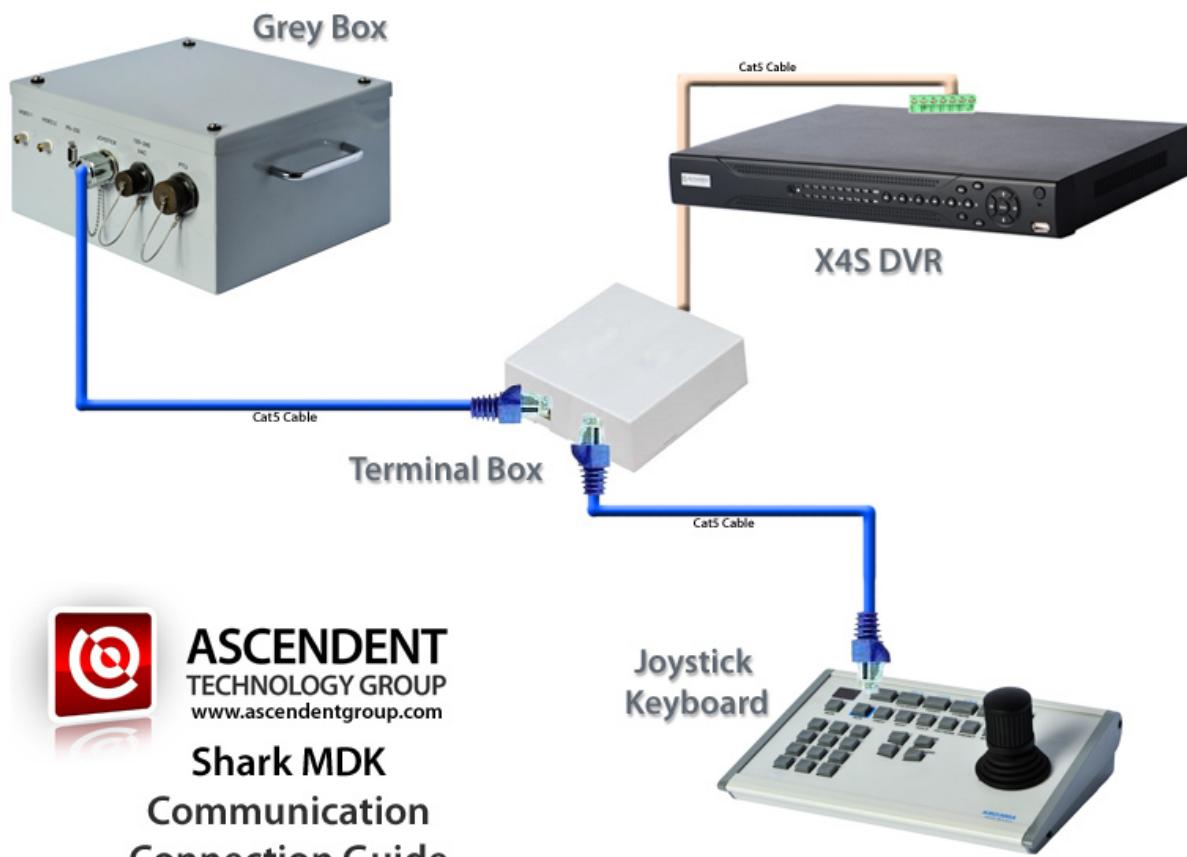
Focus far

OPEN

Gear DOWN (the system has three gears: high/medium/low)

CLOSE

Gear UP (the system has three gears: high/medium/low)



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**Shark MDK**  
Communication  
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## Maintenance & Warranty

No maintenance or internal adjustments are normally required. The M-Navigator-EX is sealed and there are no user serviceable parts inside. Removal of any cover or screws will void the warranty. The unit may be cleaned with water and a mild detergent if needed.

For warranty or repair service contact Ascendent Technology Group.  
Visit [www.ascendentgroup.com](http://www.ascendentgroup.com) or call 1.866.200.9191