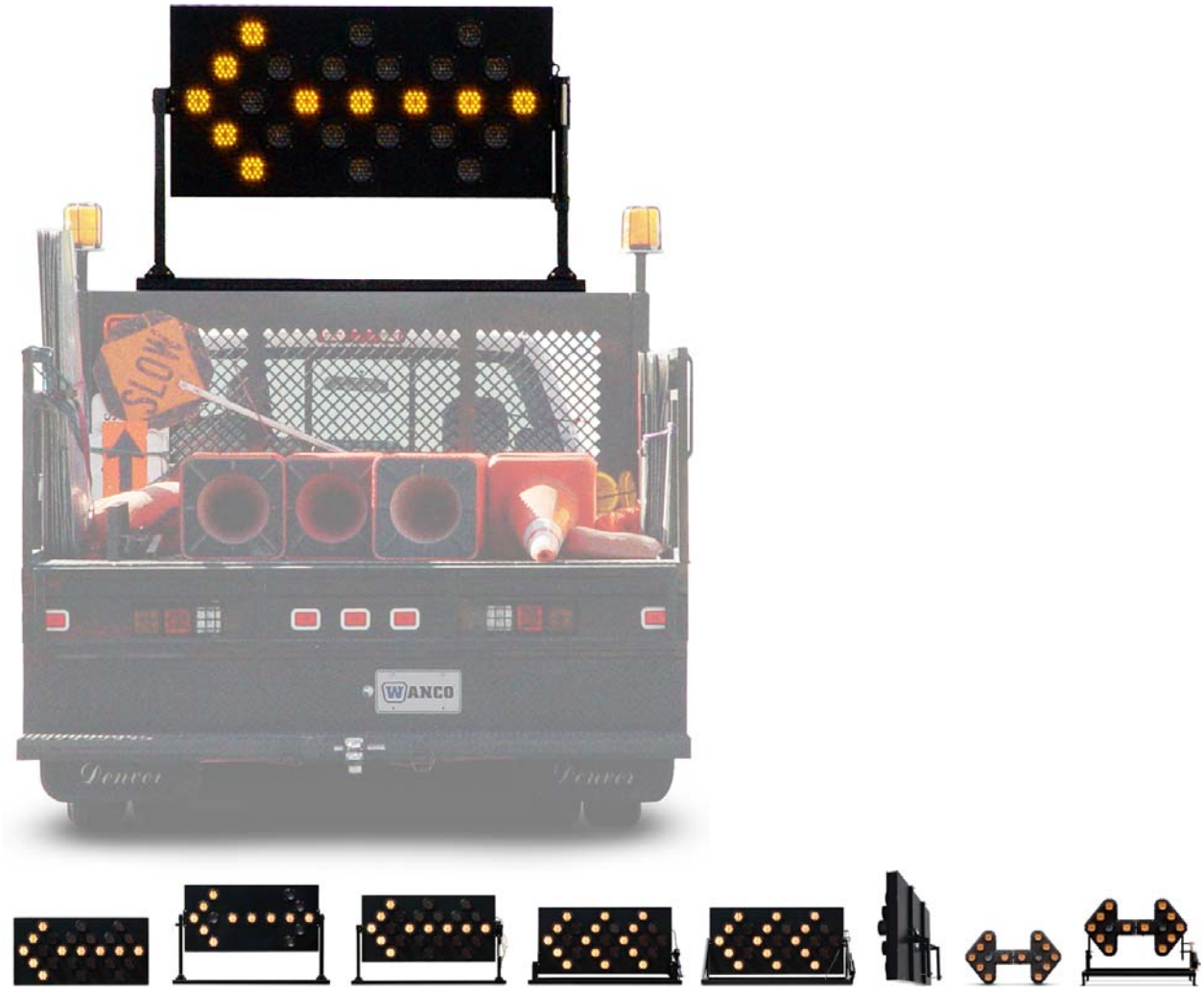
Wanco® Truck-Mounted Arrow Boards



Owner's Manual

March 2015

WANCO® The industry leader.

Contents

List of Figures

List of Tables

1 Introduction

1.1 Read before using

This is the owner's manual for Wanco® Truck-Mounted Arrow Boards. For your safety and protection from injury, carefully read, understand, and observe all instructions in this manual. Always read all instructions before performing a procedure. Illustrations in this document are representative of all arrow board models, but might differ in detail from your arrow board.

Keep this manual or a copy of it with the arrow board. Additional and replacement manuals are available from the factory (see Section 1.4, page 4).

If you have questions regarding this product, please contact Wanco Customer Service using the information in Section 1.4, page 4.

1.2 Arrow board models

All models of truck-mounted arrow boards are covered by this manual, including standard mounting frames and controllers. Skid-mounted arrow boards are covered in a separate document.

All models are operationally similar. Functional differences between models are:

- Arrow board size and shape
- Number of display lights
- Available display patterns
- Controller type
- Mounting frame style

Available options are listed in Table 1-1.

Table 1-1. Options for truck-mounted arrow boards

Option	Arrow board size, H×W *(inches)*				Split arrows
	48×96	36×72	30×60	24×48	
25 lights, 12 arrow patterns[1]	✓	✓	✓		
15 lights, 7 arrow patterns[1]	✓	✓	✓		
15 lights, 5 arrow patterns[2]	✓	✓	✓		
14 lights, 5 arrow patterns[2]					✓
13 lights, 5 arrow patterns[2]				✓	
Wired controller	✓	✓	✓	✓	✓
Wireless controller	✓	✓	✓		
No mounting frame	✓	✓	✓	✓	✓
Manual (auto-lock) tilt-frame	✓	✓	✓	✓	✓
90° power-tilt frame	✓	✓	✓	✓	
90° low-profile power-tilt frame		✓	✓		✓
180° power-tilt frame		✓	✓		
Tailgate mounting kit	✓	✓	✓	✓	
Trailer mounting kit	✓				

1. *Flashing and sequential patterns*
2. *Flashing patterns only*

1.3 Applications

Truck-mounted arrow boards are widely used for temporary work zones and convoys. They feature bright LED lights that are highly visible and legible from a great distance.

Installed on a truck or trailer, arrows and other patterns displayed on the arrow board can be seen from up to a mile away. Display patterns are selected using a controller that is typically installed inside the truck cab. Patterns are illustrated in Figure 1-1.

Common applications include:

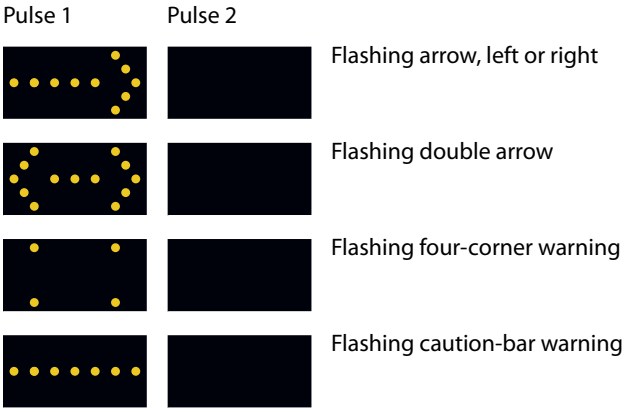
- Accident and incident management
- Emergency repairs
- Road-striping and street-sweeping convoys
- Crash-cushion (TMA) trucks and trailers

The U.S. Department of Transportation's *Manual on Uniform Traffic Control Devices* (MUTCD), which defines the standards for traffic control devices on all public streets and private roads open to public traffic, specifies Type A, B, C, and D arrow boards and defines their minimum size, legibility distance, and number of lights.* Table 1-2 lists the MUTCD Type for each Wanco Truck-Mounted Arrow Board. Consult the MUTCD for distance and legibility requirements for your application. The MUTCD is available online at http://mutcd.fhwa.dot.gov.

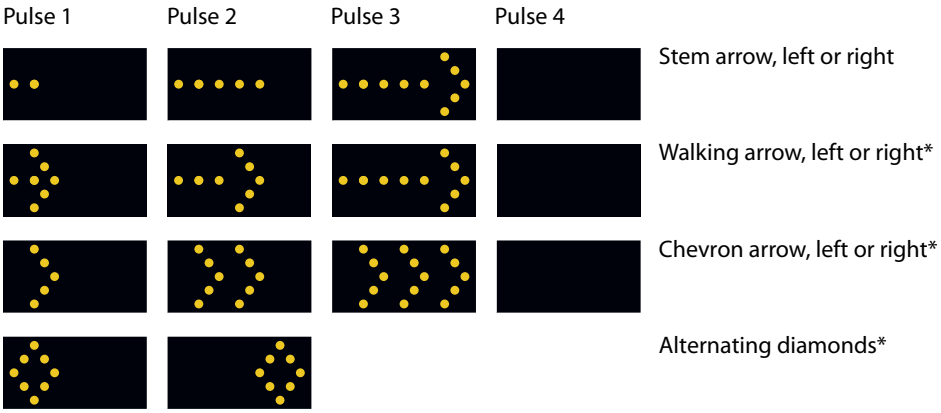
**MUTCD, December 2009 ed., §6F.61, ¶05.*

Figure 1-1. Display patterns

Flashing patterns



Sequential patterns



**Available only on 25-light arrow board models*

Table 1-2. MUTCD arrow board types

Arrow board size or style	MUTCD Type
24×48	A
30×60	B
36×72	B
48×96	C
Split plastic arrows	D

1.4 Where to obtain service

Before calling for service, please have the arrow board identification (ID) number ready. The ID number can be found in all of these locations (see Figure 1-2):

- On the back of the arrow board controller
- For arrow boards with a power-tilt frame, on the tilt-frame actuator
- Inside the display cabinet behind the right-hand light. To remove the light, see Section 6.2, page 34.

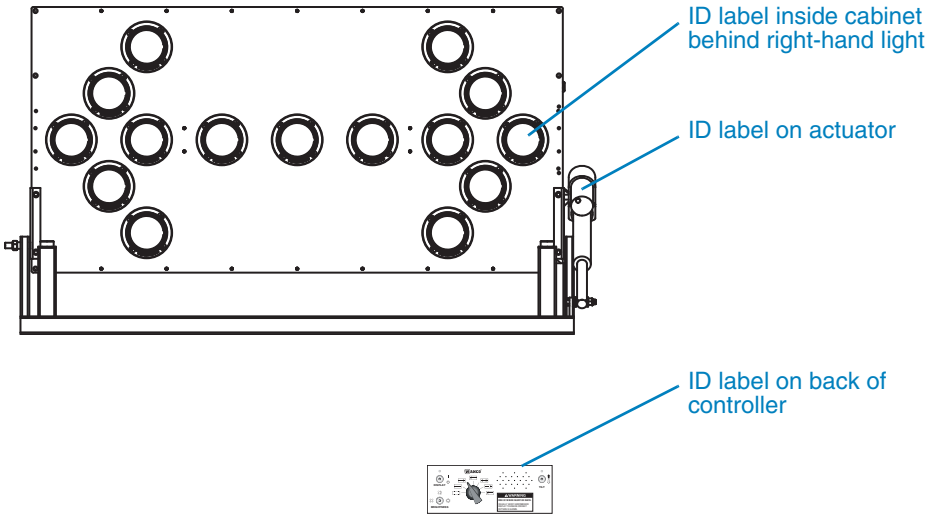
Contact our service department using the following information:

Wanco Inc.
5870 Tennyson Street
Arvada, Colorado 80003

303-427-5700
fax 303-427-5725

www.wanco.com
info@wanco.com

Figure 1-2. Identification number locations



2 Safety Information

2.1 Safety statements in this manual

This manual contains the following types of callouts, which must be followed to reduce the possibility of personal injury, damage to the equipment, or improper service. Each alert has a specific meaning, as described below:

⚠ The safety alert symbol alerts you to potential personal injury hazards. Obey all safety messages that follow this symbol to avoid possible injury or death.

⚠ DANGER

Indicates an imminently hazardous situation which, if not avoided, WILL result in death or serious injury.

⚠ WARNING

Indicates an imminently hazardous situation which, if not avoided, COULD result in death or serious injury.

⚠ CAUTION

Indicates a potentially hazardous situation which, if not avoided, could result in minor or moderate injury.

CAUTION

Used without the safety alert symbol, indicates a potentially hazardous situation which, if not avoided, could result in property damage.

IMPORTANT!

Indicates information that is of particular importance when transporting, operating, or servicing the equipment.

2.2 General safety

⚠ WARNING

Improper use of equipment could cause serious injury or death.

Prior to using this product, carefully read, understand, and observe all instructions in this manual.

⚠ CAUTION

Crush hazard.

When operating or working on the arrow board, keep hands and body parts clear of pinch points.

⚠ CAUTION

Welding on the vehicle can cause electrical damage to the arrow board and its controller.

Always disconnect arrow board and controller from power source before welding on vehicle.

2.3 Operating safety

⚠ WARNING

Improper display could cause a traffic accident resulting in severe injury or death.

Visually inspect arrow board to ensure correct pattern is displayed.

Prior to using the arrow board, ensure the arrow board and its mounting system are in good operating condition. Never use any equipment that is damaged or in need of repair.

2.4 Service safety

2.4.1 Before servicing

⚠ CAUTION

Shock hazard.

Contact with live electrical circuits could damage equipment or cause injury.

- Disconnect arrow board from power before servicing any component on the arrow board.
- Only a qualified electrician should service the electrical system.

⚠ CAUTION

Adverse weather conditions can cause equipment damage and injury.

Whenever possible, perform maintenance indoors.

- If the arrow board, the vehicle, or the ground under or around the vehicle is damp or wet, allow it to dry before servicing.
- Do not service the arrow board if clothing or skin is wet.
- Always take precautions to ensure the safety of service personnel. Whenever possible, perform maintenance indoors, out of the weather.
- For reliable arrow board performance, keep the arrow board and all its components clean.

2.4.2 During servicing

⚠ WARNING

Moving parts can crush and cut.

Keep hands, feet, hair, and loose clothing away from moving parts.

To prevent injury, keep hands, feet, hair, and loose clothing away from all moving parts.

3 Assembly

- If the arrow board was ordered without a mounting kit, no assembly is required prior to installation. Proceed to Section 4, page 17, for arrow board installation instructions.
- If the arrow board has a mounting kit:
  - ☐ The mounting frame included with your arrow board might not fit your vehicle. Additional brackets or modifications may be necessary.
  - ☐ For assembly instructions for your arrow board mounting frame, see Table 3-1.

Table 3-1. Assembly instructions

Mounting option	Arrow board base model no.	Assembly instructions
90-degree manual-tilt (auto-lock) frame	WFB WFBLA-14	Section 3.1, below
90-degree power-tilt frame	WFBP	Section 3.2, page 11
90-degree low-profile power-tilt frame	WLP90B WFBLA-14L	Section 3.3, page 12
180-degree power-tilt frame	WFP180B	Section 3.3, page 12
Tailgate kit	WVGB	Section 3.4, page 13
Truck-bed kit	—	Section 3.5, page 14
Trailer-mount kit	—	Section 3.6, page 15

3.1 Auto-lock frame

The auto-lock frame is a manually operated tilt-frame that allows the arrow board to tilt from horizontal to vertical. It has a spring-loaded pin that automatically engages to lock the frame in position at 90-degree intervals. The auto-lock frame does not have an electric actuator.

To assemble the auto-lock frame, refer to Figure 3-1, or Figure 3-2 for split arrows, and follow these steps:

1. Ensure the arrow board is oriented with the cable coming out the bottom.
2. Identify the left upright, which includes the auto-lock mechanism.
3. Attach the left upright to the arrow board using two bolts, four washers, and two nuts.
4. Attach the right upright to the arrow board using two bolts, four washers, and two nuts.

Figure 3-1. Assembling the auto-lock frame with an arrow board

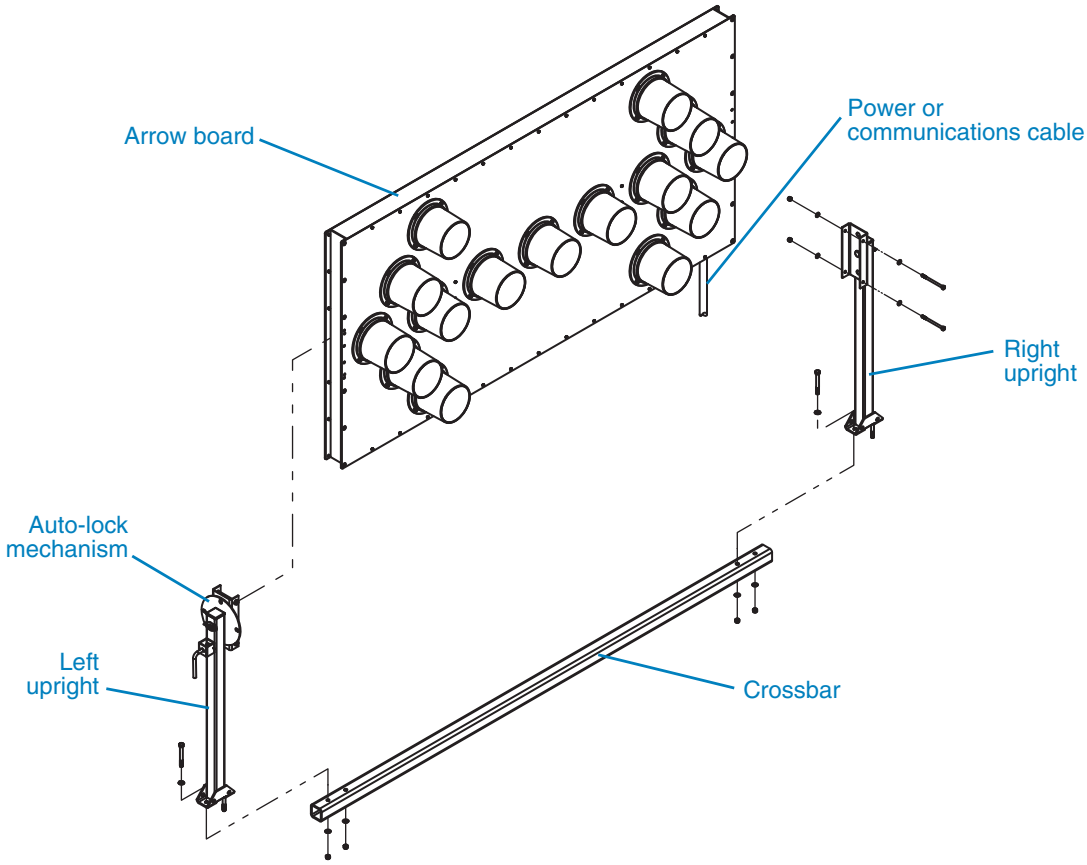
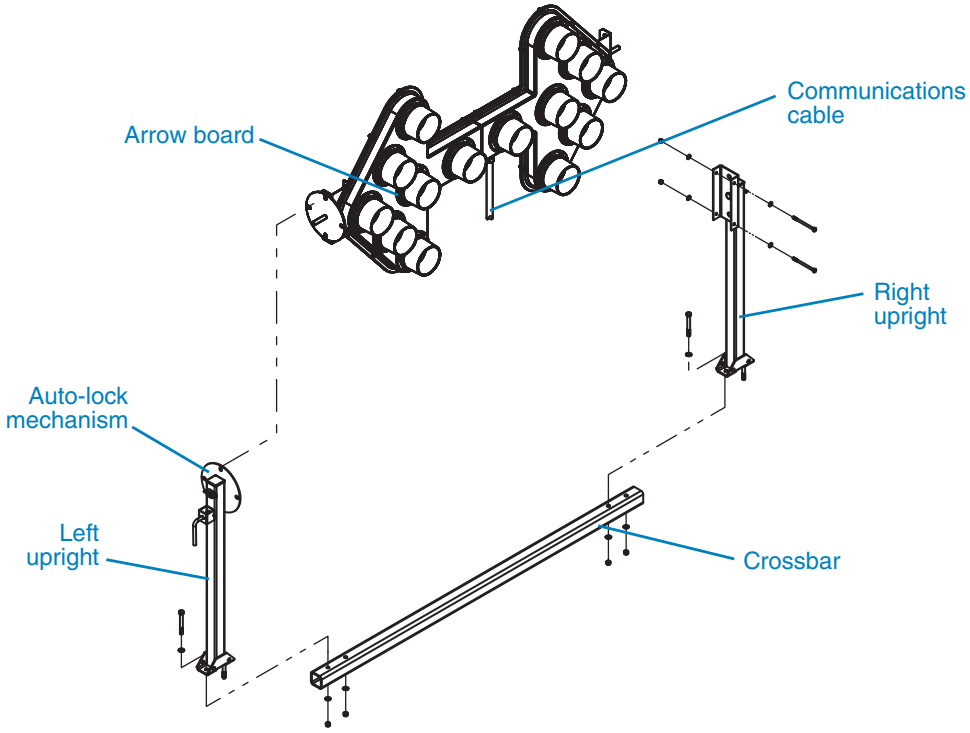


Figure 3-2. Assembling the auto-lock frame with split arrows



5. Attach both uprights to the crossbar using four bolts, eight washers, and four nuts.

   Note that the location of these bolts can also be used for attaching the entire assembly to the vehicle if desired, or to the optional Wanco truck-bed mounting brackets. Longer, user-supplied bolts would go down through the uprights, cross bar, and supporting framework on the vehicle or truck-bed brackets, attaching them together.

   If your installation will use this approach, either attach the uprights to the crossbar now, leaving them hand-tight, and complete the installation later when installing the assembly on the vehicle; or proceed to Section 3.5, page 14, to complete the assembly with the truck-bed brackets.

   Regardless of the installation, the uprights must be attached to the crossbar.

6. Ensure all connections are tight. Test the tilt and auto-lock (see Section 5.4, page 31).

3.2 90-degree power-tilt frame

The 90-degree power-tilt frame has an electric actuator that allows the operator to tilt the arrow board from horizontal to vertical and back again. The operator controls the actuator using the arrow board controller, which is usually located inside the vehicle.

If the arrow board and power-tilt frame were received from the factory already assembled, no further assembly is required prior to installation. Proceed to Section 4, page 17, for arrow board installation instructions.

To assemble the power-tilt frame, refer to Figure 3-3 and follow these steps:

1. Ensure the arrow board is oriented with the cable coming out the bottom.
2. Identify the right upright, which includes the actuator.
3. Attach the right upright to the arrow board using two bolts, four washers, and two nuts.
4. If the arrow board has a wireless controller, it will also have a pigtail on the side for connecting to the actuator. Connect the actuator cable to the pigtail. (Wired controllers connect directly to the actuator later in the installation process.)
5. Attach the left upright to the arrow board using two bolts, four washers, and two nuts.
6. Attach both uprights to the crossbar using four bolts, eight washers, and four nuts.

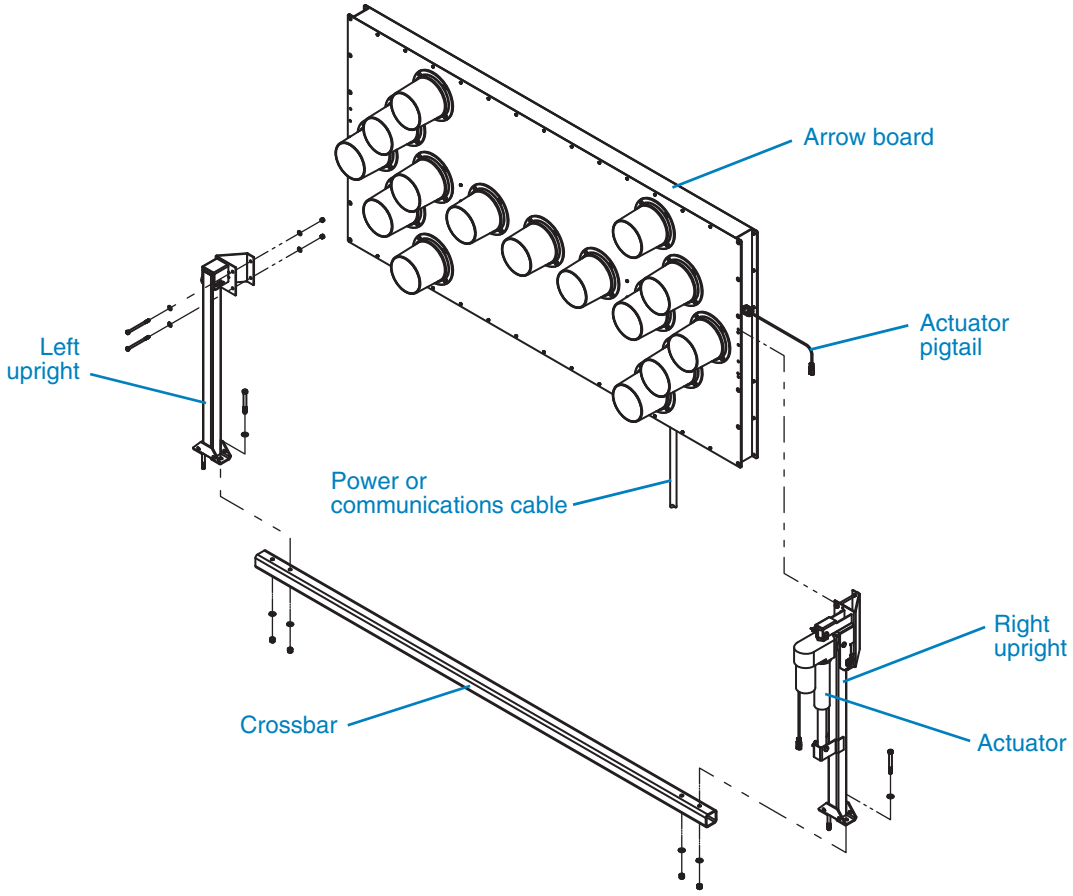
   Note that the location of these bolts can also be used for attaching the entire assembly to the vehicle if desired, or to the optional Wanco truck-bed mounting brackets. Longer, user-supplied bolts would go down through the uprights, cross bar, and supporting framework on the vehicle or truck-bed brackets, attaching them together.

   If your installation will use this approach, either attach the uprights to the crossbar now, leaving them hand-tight, and complete the installation later when installing the assembly on the vehicle; or proceed to Section 3.5, page 14, to complete the assembly with the truck-bed brackets.

   Regardless of the installation, the uprights must be attached to the crossbar.

7. Ensure all connections are tight. Then, after installation (Section 4, page 17), use the controller to test the actuator and tilt for proper operation (see Section 5.3, page 27).

Figure 3-3. Assembling the 90-degree power-tilt frame



3.3 Integral tilt-frames

Some mounting frames are installed onto the arrow board at the factory and do not require any further assembly. If your arrow board has a mounting frame already attached, proceed to Section 4, page 17, for arrow board installation.

3.4 Tailgate kit

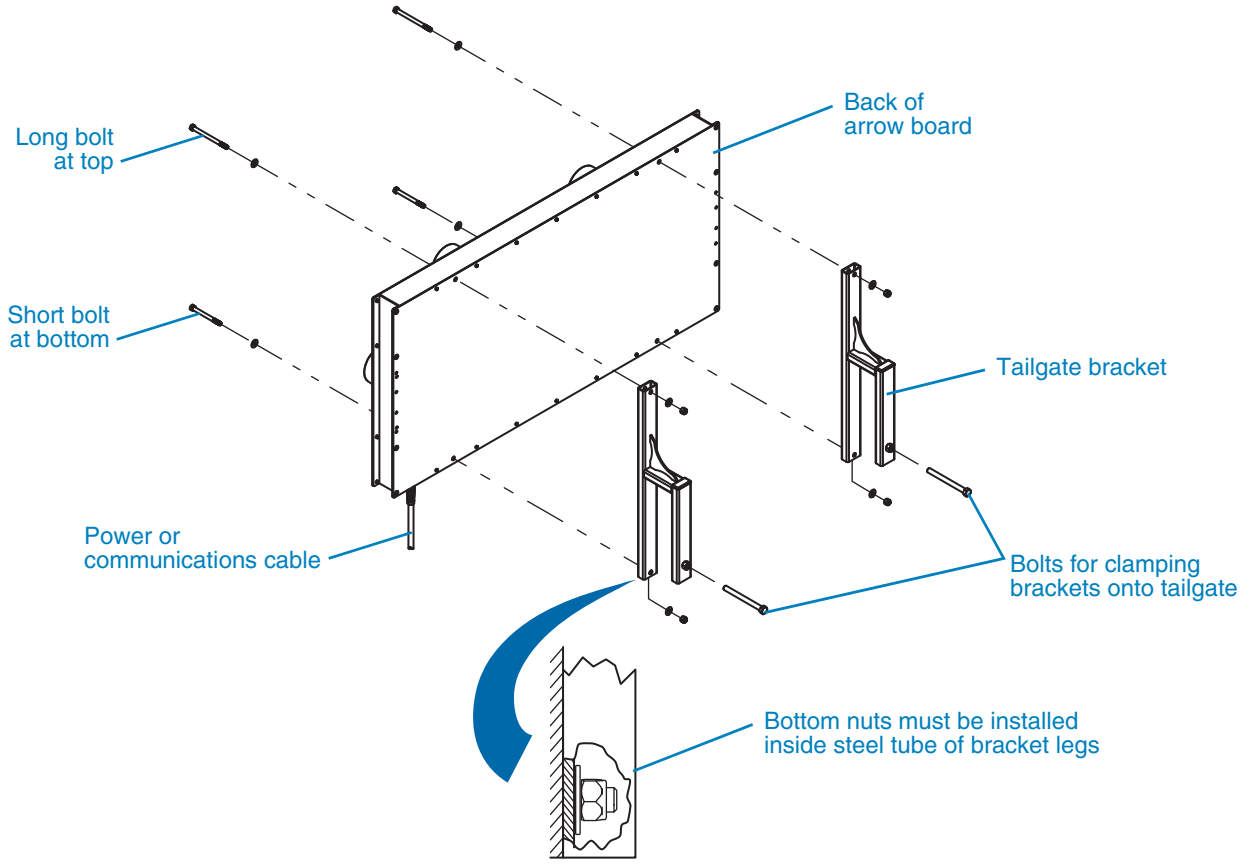
The tailgate kit allows the arrow board to be installed in a fixed position on a truck tailgate. Two brackets are attached to the arrow board and then clamp to the tailgate for permanent or temporary installation.

To assemble the tailgate kit, refer to Figure 3-4 and follow these steps:

1. Ensure the arrow board is oriented with the power or communications cable coming out the bottom.
2. Two mounting holes near the top of the arrow board and two near the bottom are used for attaching the tailgate brackets to the arrow board. Locate these four holes.
3. Attach either bracket to the arrow board using two bolts, four washers, and two nuts. Use the longer bolt at the top of the arrow board, the shorter bolt at the bottom. The washer and nut at the bottom of the bracket must go inside the bracket leg.
4. Repeat Step 3 for the remaining bracket.
5. Ensure all connections are tight.

When installing the arrow board with tailgate brackets onto the truck (Section 4, page 17), ensure the brackets are well seated, all the way down on the tailgate, and the bolts for clamping the brackets to the tailgate are tightened and secure.

Figure 3-4. Assembling the tailgate kit



3.5 Truck-bed kit

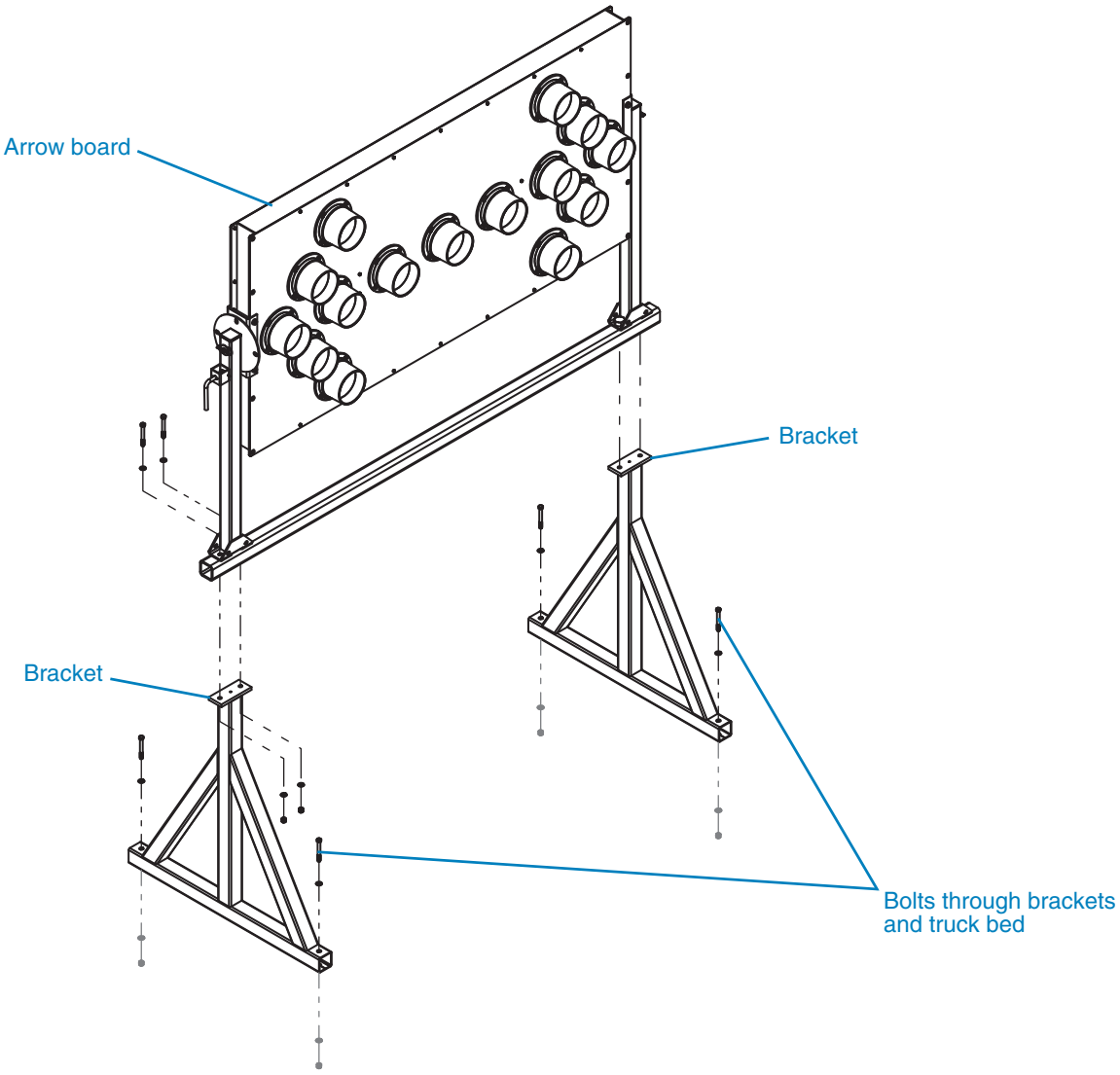
The truck-bed kit allows the arrow board to be installed on a truck bed. Two brackets are bolted to the bed and support either the 90-degree manual-tilt or 90-degree power-tilt frame. Hardware for attaching the brackets to the truck are user-supplied.

To assemble the truck-bed brackets onto the tilt-frame crossbar, use four bolts, eight washers, and four nuts (see Figure 3-5). All bolts should go down through the tilt-frame uprights, crossbar, and truck-bed brackets. Ensure all connections are tight.

When installing the arrow board with truck-bed brackets onto the truck (Section 4, page 17), ensure the brackets are flat and secure on the truck bed. Ensure all connections are tight.

After installation on the truck, test the auto-lock mechanism (see Section 5.3, page 27) or the electric actuator (Section 5.4, page 31) and tilt for proper operation.

Figure 3-5. Assembling the truck-bed kit



3.6 Trailer-mount kit

The trailer-mount kit allows the arrow board to be installed on a trailer, but is specifically designed for easy installation on a Traffix Devices Scorpion® attenuator trailer. On the Scorpion trailer, two uprights slide into brackets on the front end of the trailer frame and are bolted in place. On other trailers, custom brackets must be user-supplied.

The trailer-mount arrow board and tilt-frame are assembled at the factory. For trailer mounting, refer to Figure 3-6 and choose whether to:

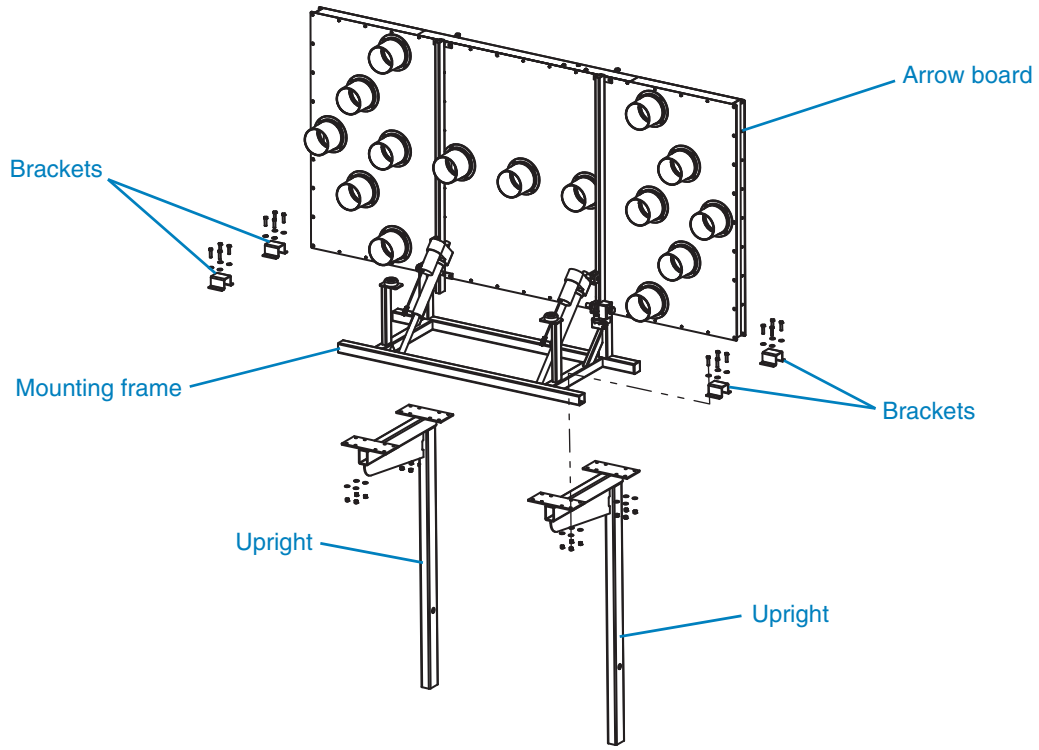
- Attach the two uprights to the arrow board mounting frame and then install the entire assembly on the trailer.
- Attach the uprights to the trailer and then attach the arrow board mounting frame to the uprights.

  Before installing the uprights, orient the arrow board so that it will face traffic (lights toward the rear of the trailer) when it is tilted up to the vertical position.

  Use all four brackets and either set of holes on the uprights to clamp the mounting frame down onto the uprights. Use four bolts, eight washers, and four nuts for each bracket. Ensure all connections are tight.

  After installation (Section 4, page 17), test the actuators and tilt for proper operation (see Section 5.3, page 27).

Figure 3-6. Assembling the trailer-mount kit



4 Installation

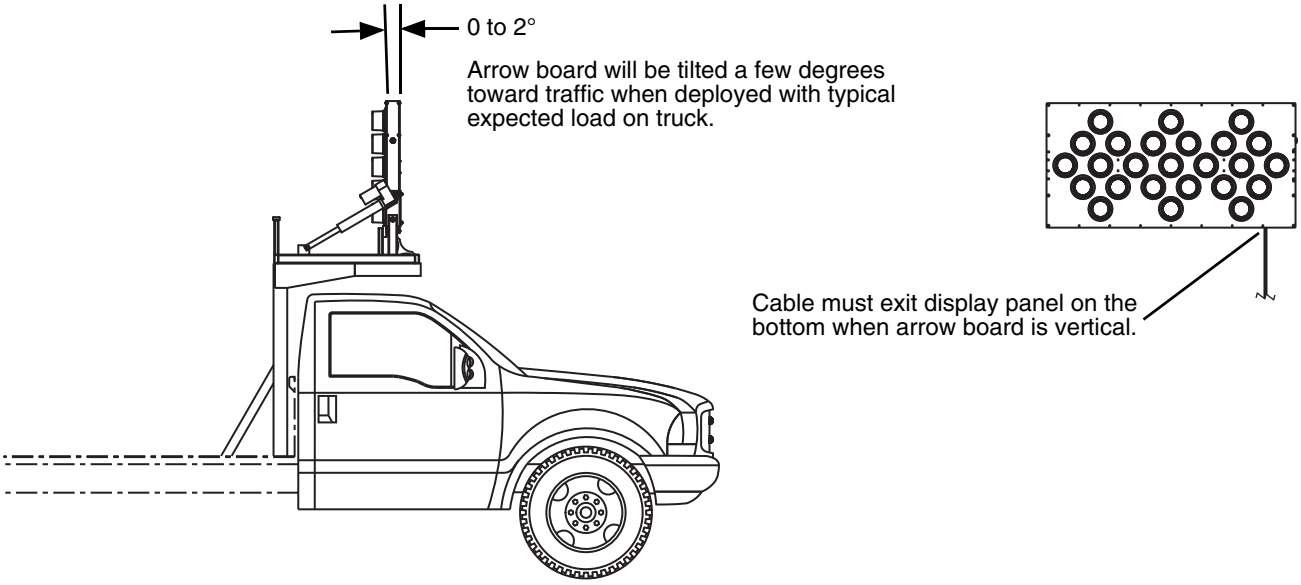
Step 1: Install the arrow board

The Wanco truck-mounted arrow board is designed for installation on a truck or other large vehicle. It may be mounted on the truck bed or over the cab. The arrow board may also be installed on a trailer, such as a crash-cushion (TMA) trailer. Trailer-mounted arrow boards require a power source, such as batteries, an engine, or a generator.

The arrow board might include an integrated or separate mounting frame. Several types of mounting frames are available from the factory. The mounting frame included with your arrow board might require modifications or additional brackets to fit your vehicle. Because installations vary, the factory does not include nuts and bolts for attaching the arrow board to the truck or trailer. Dimensions for standard Wanco mounting options are provided in Appendix A, page 37.

- Install the arrow board and mounting frame using at least four sets of bolts, nuts, and washers. Orient the arrow board as indicated in Figure 4-1.
- Use shims to ensure that, in the upright position with no load in the truck, the arrow board is vertical. With a typical load on the truck, the arrow board will angle downward about two degrees toward traffic (see Figure 4-1).
- If your arrow board includes a power-tilt frame, it might be necessary to tilt the arrow board up from the horizontal position in order to complete the installation. In this case, you should start by partially installing the arrow board and mounting frame, then make all wiring and power connections, and then complete the arrow board installation.

Figure 4-1. Arrow board installation



Step 2: Install the controller

The arrow board controller is not weather resistant, and must be installed inside the truck cab. When choosing where to install the controller, select a location that will allow easy access and will not interfere with truck controls. Common mounting locations are the windshield and on or under the dashboard.

⚠ WARNING

Poor controller location might result in a traffic accident that could cause serious injury or death.

Locate the controller where it can be operated safely under all driving conditions.

⚠ WARNING

Interfering with air bags could result in serious injury or death.

Do not install the controller where it may interfere with deployment of the vehicle's air bags or any other safety equipment. Refer to the vehicle owner's manual to determine the vehicle's air bag deployment zones.

⚠ CAUTION

Drilling holes through vehicle panels could result in equipment damage or personal injury.

When drilling holes for controller mounting bracket, use care to avoid damaging vehicle wiring and other sensitive equipment.

- To avoid potential interference from other devices, depending on the radio frequencies being used, install the controller as far as possible from other RF-emitting devices.
- Before choosing a location for the controller, take into account that cables must be routed between the arrow board and controller, and from the controller to a power source. For power system requirements, see Section 5.2, page 26.
- If your arrow board is wireless, there is no wiring between the arrow board and controller. However, the arrow board must be wired to a power source, and the wireless controller must also be connected to a power source. The standard power cord for the wireless controller (included) plugs into the truck's power outlet/cigar lighter.
- All Wanco arrow board controllers include a mounting bracket. Because installations vary, the factory does not include hardware for attaching the bracket to the vehicle.
- The mounting brackets for wired controllers can be removed and reoriented to facilitate mounting the controller either on or under the dashboard. For the 5-pattern controller, the tilt switch can be moved up or down toward the top or bottom of the controller.
- The wireless controller includes a fully adjustable suction-cup mount that can attach without hardware to the inside of the truck's windshield or to a smooth surface. On the

back of the wireless controller is a bracket that can accept any universal (camera-type) mount with a 1/4-20 thread.

Step 3: Install wiring

Wiring connections must be made between the arrow board and actuator, the controller, and a power supply (typically the truck's power system).

IMPORTANT!

Wanco truck-mounted arrow boards require power from a 12-volt DC negative-ground system. If your vehicle has an electrical system other than 12VDC, contact the factory before proceeding.

Wanco does not provide detailed wiring schematics for truck-mounted arrow boards. Because installations vary, you should follow the vehicle manufacturer's requirements for installing auxiliary equipment. Consult your vehicle owner's manual or contact the manufacturer for wiring instructions.

1. Determine how the arrow board will be powered (connections to the power source are made later in this procedure).

- When installed on a truck, the arrow board may be wired for power in any of the following ways:
  - ☐ Power provided through the truck's power system
  - ☐ Power provided by an auxiliary battery
  - ☐ Power provided by the truck's power system when the engine is running, and by an auxiliary battery when the engine is off
- When installed on a trailer, the arrow board may be wired for power in any of the following ways:
  - ☐ Power provided by an integral power system that includes batteries that are charged by an automated, regulated solar-based charging system
  - ☐ Power provided by an auxiliary battery
  - ☐ Power provided by a portable generator
- In all cases, the battery must have an active charging system; otherwise, the arrow board will eventually drain the battery voltage and automatically shut down.
- Most vehicle manufacturers provide instructions for installing auxiliary equipment. Consult your vehicle owner's manual or the manufacturer for wiring instructions. Follow all manufacturer's safety requirements.

2. Route cables and make wiring connections:

⚠ WARNING

Interfering with the vehicle's air bags could result in serious injury or death.

When routing cables and wires through the vehicle, ensure that all wiring is clear of air bags and air bag deployment areas. Refer to the vehicle owner's manual to determine the vehicle's air bag deployment zones.

⚠ CAUTION

Improper wiring can result in equipment failure and serious injury.

- When drilling holes, use care to avoid damaging vehicle wiring and other sensitive equipment.
- Where wires and cables penetrate vehicle panels, use appropriate grommets to protect wiring from sharp edges.
- Ensure wires and cables do not interfere with vehicle operation.
- Keep wires and cables clear of gas, clutch, and brake pedals.
- Keep wires and cables clear of pinch points and heat sources such as exhaust pipes.
- Do not force wiring connectors together. Ensure connectors are properly aligned, then gently press together. Do not remove, bend, or damage wire connector pins.
- When tapping into vehicle wiring, ensure connections will not interfere with the vehicle's electronic control systems.

- For wired controllers, refer to Figure 4-2 and follow these instructions:

  a. Route the communications cable from the arrow board into the truck cab and to the controller, then plug the communications cable connector into the back of the controller.

  b. Because the controller does not have an on/off switch, ensure the power cable from the controller will include a circuit-disconnect for disengaging power easily; for example, a relay connected to the vehicle ignition switch. If wiring a fuse into the circuit, the fuse should be at the battery. For an arrow board with a power-tilt frame, use a 25-amp fuse; otherwise, use a 5-amp fuse. Follow all manufacturer's safety requirements.

  c. Plug the power cable connector into the back of the controller, then route the power cable to the power supply. DO NOT connect the cable to power yet.

d. If the arrow board has a power-tilt frame, route the actuator cable from the controller out of the truck cab and to the actuator, then plug the connector into the actuator.

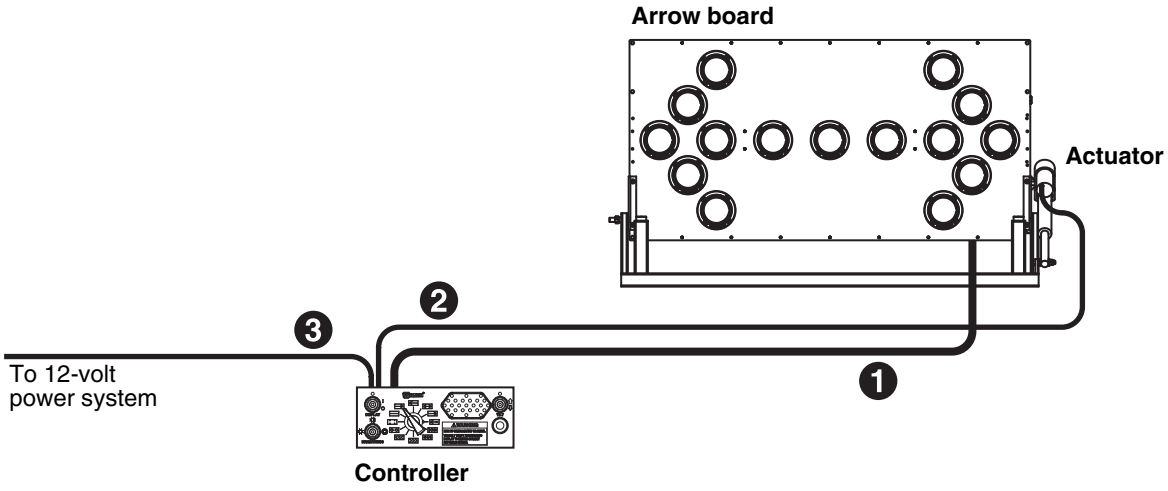
e. Use nylon cable ties to fasten the cables to the truck, away from pinch points and heat sources.

f. Check all wiring connections and fasteners, ensuring no wiring will come loose during operation.

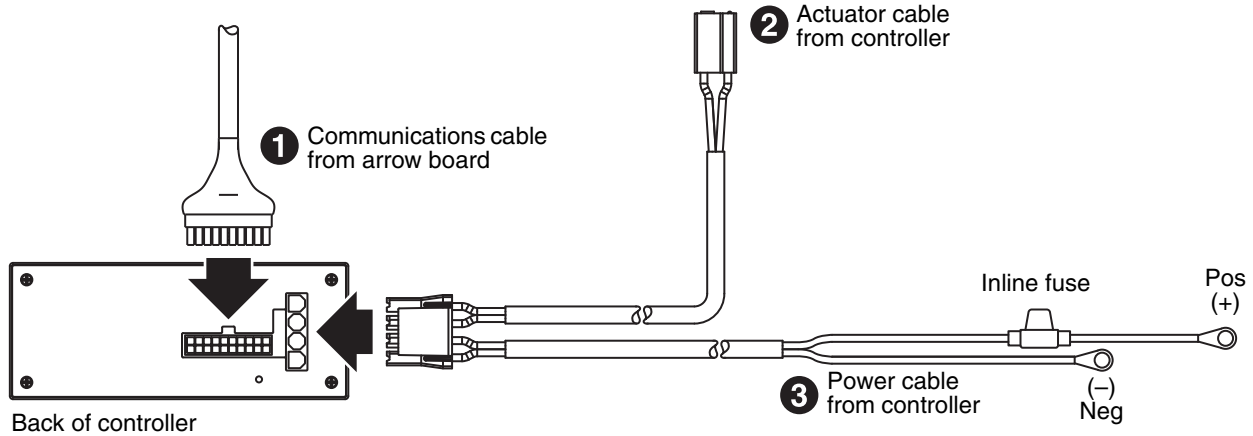
g. Connect the power cable (from the controller) to the power supply according the truck manufacturer's instructions. Follow all manufacturer's safety requirements.

Figure 4-2. System wiring for wired controllers

Overview



Detail



- For wireless controllers, refer to Figure 4-3 and follow these instructions:

    a. Because the wireless arrow board does not have an on/off switch, ensure the power cable from the arrow board will include a circuit-disconnect for disengaging power easily; for example, a relay connected to the vehicle ignition switch. If wiring a fuse into the circuit, the fuse should be at the battery. For an arrow board with a power-tilt frame, use a 25-amp fuse; otherwise, use a 5-amp fuse. Follow all manufacturer's safety requirements.

    b. Route the power cable from the arrow board to the power supply. DO NOT connect the cable to power yet.

    c. Use nylon cable ties to fasten the power cable to the vehicle, away from pinch points and heat sources.

    d. Check all wiring connections and fasteners, ensuring no wiring will come loose during operation.

    e. Connect the power cable to the power supply according the vehicle manufacturer's instructions.

    f. Plug the power cable from the controller into the truck's power outlet/cigar lighter. If the truck does not have a power outlet, then the controller must be wired to a power supply, usually the truck's 12-volt power system, according to the truck manufacturer's instructions. Follow all manufacturer's safety requirements. If wiring a fuse into the power circuit, use a 2-amp fuse. If necessary, contact the factory for an appropriate power cable (see Section 1.4, "Where to obtain service," page 4).

Step 4: Completing the installation

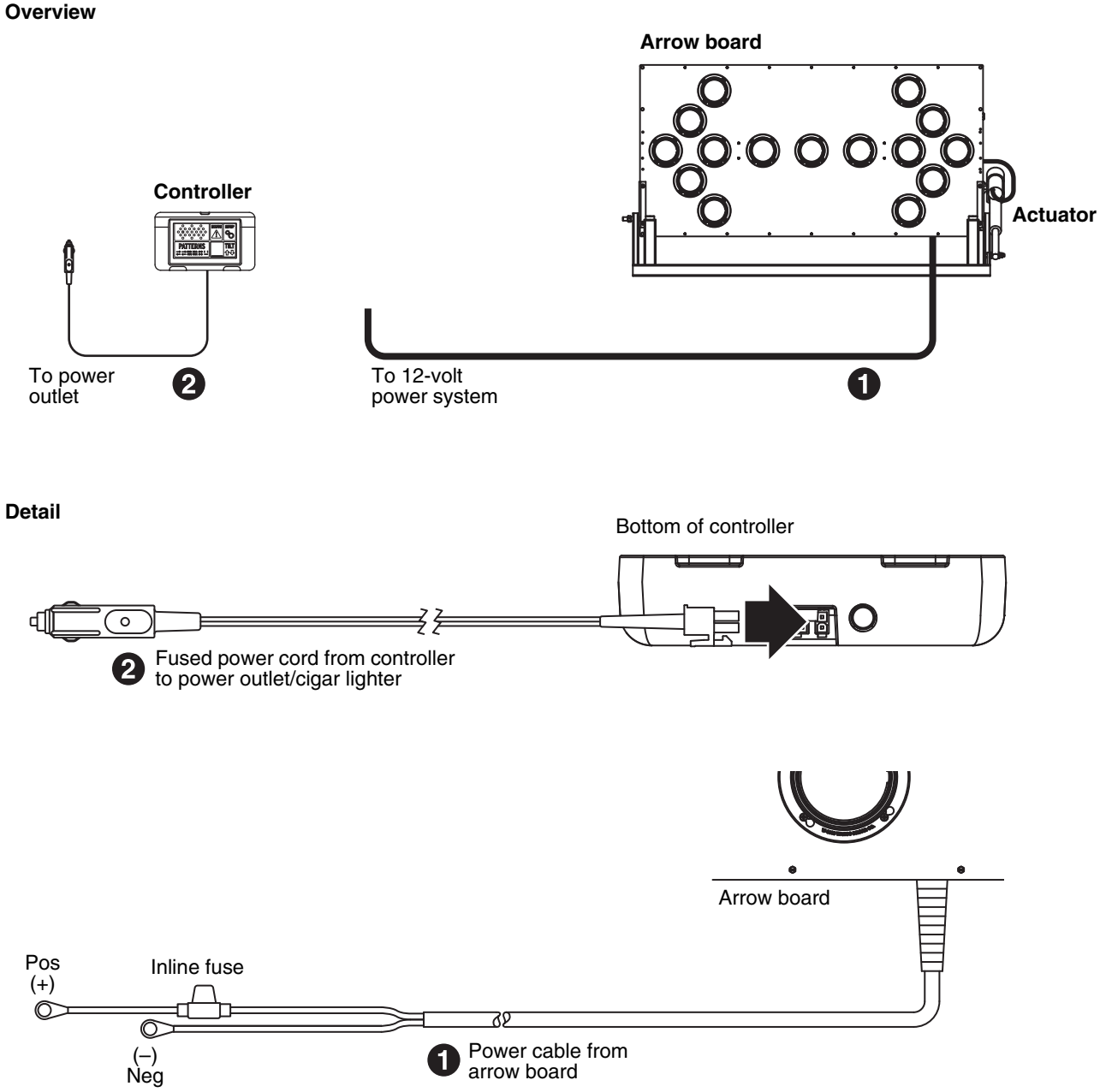
The arrow board is now operational. If necessary, use the controller to raise the arrow board part way, then install the remaining sets of bolts, nuts, and washers in the mounting frame.

- If the arrow board system is powered by the vehicle power system, power to the arrow board is on when the vehicle engine is running.
- If the arrow board system is powered by an auxiliary battery, and power is not on continuously, then power to the arrow board must be manually engaged.
- A wireless arrow board is always on when power is applied, regardless of whether the arrow board is showing a pattern (an arrow or other pattern). Wired arrow boards are on only when showing a pattern.

IMPORTANT!

It is important to understand when the arrow board and controller are drawing power from the power system. Before operating the arrow board, refer to Section 5.2, page 26.

Figure 4-3. System wiring for wireless controllers



5 Operation

5.1 Safety

⚠ WARNING

Improper display could cause a traffic accident resulting in severe injury or death.

- Visually inspect arrow board to ensure correct pattern is displayed.
- Verify arrow board is fully upright and visible to traffic while in use.

⚠ WARNING

Contact with overhead obstructions could result in equipment damage, severe injury, or death.

Avoid driving under low-hanging obstructions while the arrow board is onboard the vehicle.

- Before operating the arrow board, read and follow all safety instructions in Section 2, page 5).
- Observe all applicable laws when using the arrow board.
- Safe location of the arrow board is the responsibility of the operator.
- The arrow board may add height to the vehicle, even when in the transport (horizontal) position. Contact with overhead obstructions such as signs, bridges, wires, garage doors, and tree limbs could damage the arrow board and the vehicle, and could cause injury or death if people or traffic are nearby.
- For safe operation, consider wind resistance:
  - Deploying the arrow board (i.e., changing its position from horizontal to vertical) while the vehicle is moving will increase stress on the electric actuator and mounting system due to increased wind resistance. Likewise, in the deployed (vertical) position, wind resistance increases as the vehicle speeds up, increasing stress on pivot points, the mounting system, and the arrow board itself.
  - Use care when deploying the arrow board while the vehicle is moving, and when traveling at high speeds while the arrow board is deployed. Before operating the vehicle, always check the condition of the arrow board and its mounting frame, mounting brackets, actuator, and wiring for potential failures. Ensure pivot points are in good condition, including nuts, bolts, etc.

IMPORTANT!

It is important to understand when the arrow board and controller are drawing power from the power system. Before operating the arrow board, refer to Section 5.2, page 26.

5.2 Power usage

IMPORTANT!

The arrow board and controller continue to draw power from the power system even when they appear to be off. Additionally, the controller might appear to be off, but could actually be on. Therefore, if the power supply is active, the battery may be drained unless it is being actively charged.

In cases where battery power is being supplied to the arrow board system but the battery is not being actively charged, such as when the truck's 12-volt system provides power and the truck engine is off:

- The battery charge will be drained quickly by an arrow board with a power-tilt frame if the tilt-frame actuator is operating and the arrow board is moving up or down. The actuator does not draw power unless it is in use.
- The battery charge will be drained slowly by an arrow board that is showing a display pattern (an arrow or other pattern). The lights on the arrow board draw a negligible amount of power.
- The battery charge will be drained slowly by a wireless arrow board, because wireless arrow boards are always on, regardless of whether they are showing a display pattern.
- The battery charge will be drained slowly by a controller that is on, which includes all wired controllers (because wired controllers do not have an on/off switch) and wireless controllers that are on.
  - Wired controllers have an LED power indicator that is lit when power is applied to the arrow board. Although the indicator is not lit while the arrow board display is switched off, the controller is on and drawing power.
  - The wireless controller has an on/off button. Additionally, the controller can be put into sleep mode, in which the controller is on and ready to be used, but its touchscreen display is blank. In sleep mode, the controller appears to be off, but it is on and drawing power.
  - All controllers draw a negligible amount of power, even when they are not in use.
- The battery charge will not be drained by a wired arrow board that is blank (not showing a display pattern). Wired arrow boards only draw power when they are showing an arrow or other pattern. Power is applied only to the lights that are on.

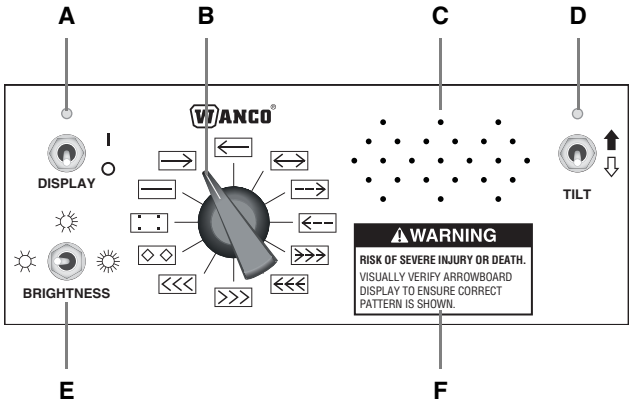
5.3 Controller

5.3.1 Wired controllers

Depending on the arrow board model and its mounting frame, the controller includes the components called out in the following illustrations:

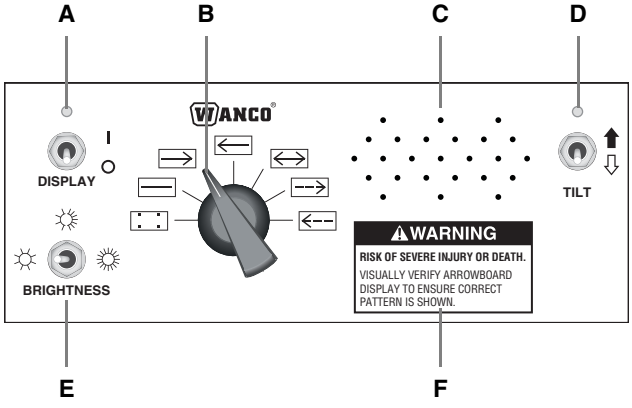
- For 25-light arrow boards, see Figure 5-1.
- For 15-light arrow boards with flashing- and sequential-pattern capability, see Figure 5-2.
- For 15-light arrow boards with flashing-only capability, 14-light split arrows, and 13-light (24×36) arrow boards, see Figure 5-3.

Figure 5-1. 12-pattern controller for 25-light arrow boards



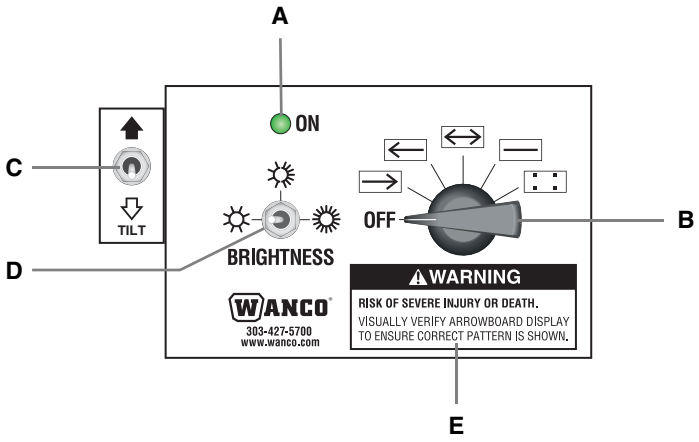
A – Display on/off switch and indicator
B – 12-pattern selector switch
C – Pattern display
D – Power-tilt switch and indicator (if installed)
E – Display-brightness control switch
F – Hazard notice

Figure 5-2. 7-pattern controller for 15-light flashing-and-sequential arrow boards



A – Display on/off switch and indicator
B – 7-pattern selector switch
C – Pattern display
D – Power-tilt switch and indicator (if installed)
E – Display-brightness control switch
F – Hazard notice

Figure 5-3. 5-pattern controller for flashing-only arrow boards



A – Display on/off indicator
B – 5-pattern selector switch (display is blank when set to OFF)
C – Power-tilt switch (if installed)
D – Display brightness control switch
E – Hazard notice

Power on/off

On 12- and 7-pattern controllers, the on/off toggle switch turns the arrow board display on and off. On 5-pattern controllers, the pattern selection switch has an OFF position that turns off power to the arrow board display. In any position other than OFF, power to the display is on.

All wired controllers are on and drawing power while the power system is on. Wired controllers do not have an on/off switch.

Pattern selection and display

To choose a display pattern for the arrow board, rotate the pattern selector switch to the desired pattern. For examples of all available patterns, see Figure 1-1, page 3.

On 12- and 7- pattern controllers, the LED pattern display on the controller shows the selected pattern while power is on. The flashing of the LED display mimics the flashing of the arrow board. However, if the arrow board experiences a failure (e.g., if a light is broken), the LED display on the controller will not reflect the failure. You should always visually inspect the arrow board after selecting a pattern.

Power-tilt

If the arrow board is equipped with a power-tilt frame and the controller includes a power-tilt switch, you can raise and lower the arrow board by pressing and holding the switch while power is on. When you release the switch, the tilt-frame stops moving. On 12- and 7- pattern controllers, the tilt-indicator is lit while you hold the switch. The arrow board should be down (horizontal) when it is not being used.

For arrow boards with a 180-degree power-tilt frame, the tilt switch on the controller allows you to operate the tilt frame continuously, so that the arrow board can face forward, toward oncoming traffic; backward, toward traffic behind the vehicle; and downward when the arrow board is not being used.

When the arrow board reaches the end of its range of motion, the actuator makes a clicking or ratcheting sound. This sound is normal and is not an indication of damage to the actuator. When you hear this sound, release the switch.

Brightness

The brightness toggle switch has three positions:

Dim	For nighttime use or when daylight glare is low
Bright	For daytime use and when daylight glare is high
Auto-brightness	For an arrow board equipped with a photocell, automatically adjusts display brightness based on ambient light: dim at night and bright during the day For an arrow board that does not have a photocell, this setting behaves the same as the Dim setting For photocell location, see Section 6.1, "Periodic maintenance," page 33

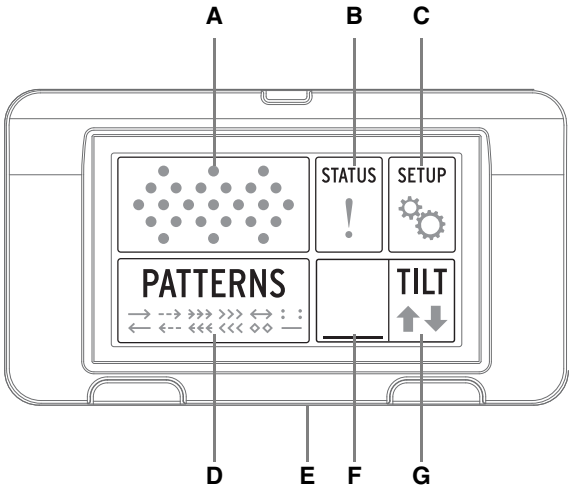
5.3.2 Wireless controller

The wireless arrow board controller (Figure 5-4) is a smart controller that "knows" the arrow board it is connected to and shows you only the functions available for that board.

When a wireless arrow board is shipped with a controller from the factory, the controller and arrow board are "paired" and ready to use. (If they were not paired, the wireless controller would not be able to wirelessly control the arrow board.) If the controller and arrow board are not paired, you must first pair them. For pairing instructions, see the controller quick-setup guide or user's manual.

- To use the wireless controller for pattern display selection and power-tilt-frame operation, see below.
- For complete instructions, see the wireless controller user's manual.

Figure 5-4. Wireless controller, main screen



A – Pattern display
B – Status button and indicator
C – Setup button
D – Pattern selector button
E – On/off button
F – Tilt-frame display (if enabled)
G – Tilt button

Pattern display

The pattern display shows the selected pattern. If the arrow board is blank, the pattern display is black. The flashing of the pattern display mimics the flashing of the arrow board. However, if the arrow board experiences a failure (e.g., if a light is broken), the pattern display on the controller will not reflect the failure. You should always visually inspect the arrow board after selecting a pattern.

Status

Press the Status button to view the controller Status screens.

In the event of an alarm, the Status button will flash the alert symbol (⚠). Press the Status button to view alarms.

Setup

Press the Setup button to access controller and arrow board configuration screens.

Pairing

Complete pairing instructions are provided in the wireless controller user's manual.

Night mode

Press the Night button to dim the touchscreen display during nighttime hours. When in night mode, the Night button changes to a Day button. Press the Day button to switch the display back to the brighter day mode.

Options

Press the Options button for additional setup options, which are described in the wireless controller user's manual.

Brightness

To change the arrow board brightness, press the Setup button, then press one of the following buttons:

DIM	For nighttime use or when daylight glare is low
BRIGHT	For daytime use and when daylight glare is high
AUTO-BRIGHTNESS	For an arrow board equipped with a photocell, automatically adjusts display brightness based on ambient light: dim at night and bright during the day For an arrow board that does not have a photocell, this setting behaves the same as the DIM setting For photocell location, see Section 6.1, "Periodic maintenance," page 33

Pattern selection

To choose a display pattern for the arrow board, press the Patterns button and then press a button for the desired pattern or to blank the arrow board. For examples of all available patterns, see Figure 1-1, page 3.

Power on/off

Wireless controllers have an on/off button—the white button on the bottom of the controller. If the controller is on, you can turn it off by pressing and holding the button for three seconds. If the controller is off, you can turn it on by pressing and releasing the button.

Wireless controllers also have a sleep mode, in which the controller is on and ready to be used, but its touchscreen display is blank. To put the wireless controller into sleep mode, press and release (do not hold) the on/off button. To exit sleep mode, touch the touchscreen or press and release the on/off button.

If touching the screen does not activate it, then the controller is off. To turn it on, press and release the white button on the bottom of the controller.

If the controller is on, regardless of whether it is in sleep mode, it is drawing power while the power system is on.

Power-tilt

If the arrow board is equipped with a power-tilt frame and the controller is properly configured, you can raise and lower the arrow board using the tilt screen on the controller. Press the Tilt button to view the tilt screen.

The tilt-frame display on the controller's main screen indicates the tilt-frame position, up or down, if it is known by the controller. After you press the Tilt button to view the tilt screen, you can use the arrow buttons to tilt the arrow board. The arrow board should be down (horizontal) when it is not being used.

For arrow boards with a 180-degree power-tilt frame, the arrow buttons on the tilt screen allow you to operate the tilt frame continuously, so that the arrow board can face forward, toward oncoming traffic; backward, toward traffic behind the vehicle; and downward when the arrow board is not being used.

5.4 Tilt-frames

- All power-tilt frames are operated using the controller (see Section 5.3, page 27).
- The auto-lock frame is operated manually. It has a spring-loaded pin that automatically engages to lock the frame in position at 90-degree intervals. To tilt the arrow board on the auto-lock frame, pull the locking-pin out, away from the arrow board, and then tilt the arrow board. Release the pin when the arrow board begins to move. The pin will automatically lock the arrow board when it is tilted 90 degrees, snapping into place with an audible "click."

6 Maintenance

6.1 Periodic maintenance

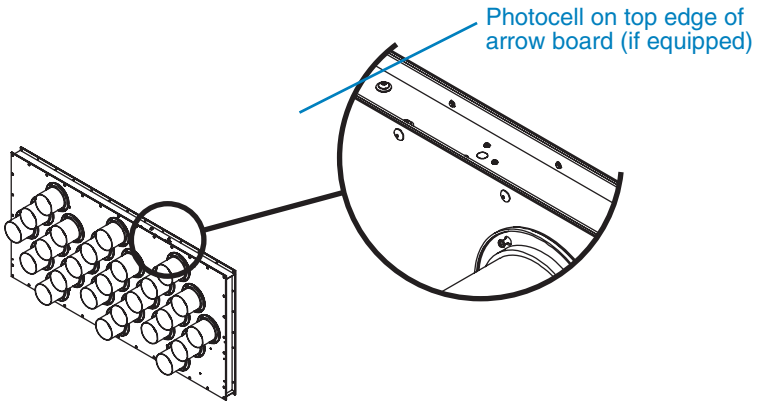
⚠ WARNING

If the arrow board is not working properly, a traffic accident could occur, resulting in serious injury or death.

After maintenance, before sending the arrow board back into service, verify all display lights are functioning properly.

- The arrow board display has 25, 15, 14, or 13 LED lights.
  - ☐ Check the display lights for proper operation.
  - ☐ Replacement lights are available from the factory (see Section 1.4, "Where to obtain service," page 4).
  - ☐ To replace a light, see Section 6.2.
- For reliable arrow board performance, keep the arrow board and all its components clean.
- If the arrow board has a photocell (see Figure 6-1), keep the photocell cover clean. Use a soft, damp cloth.
- At least once a week:
  - ☐ Check external cables and wires for signs of wear or damage. Repair or replace cables and wires when worn or damaged.
  - ☐ If the arrow board is installed on a tilt-frame, check pivot points and moving parts for wear and damage. Repair or replace as needed.
- At least once a month:
  - ☐ Check all mounting brackets, including nuts and bolts, to ensure they are properly tightened and secure. Tighten, repair, or replace as needed.
  - ☐ Check all screws that attach visors over LED lights on arrow board display. Screws can loosen over time. Tighten whenever necessary.

Figure 6-1. Photocell location



6.2 Lubrication

To lubricate moving parts, use any common lubrication grease.

The lubrication schedule may vary depending on location, application, and frequency of use. Follow the schedule listed in Table 6-1 or set a more frequent schedule if needed for your arrow board and your application.

Table 6-1. Lubrication schedule

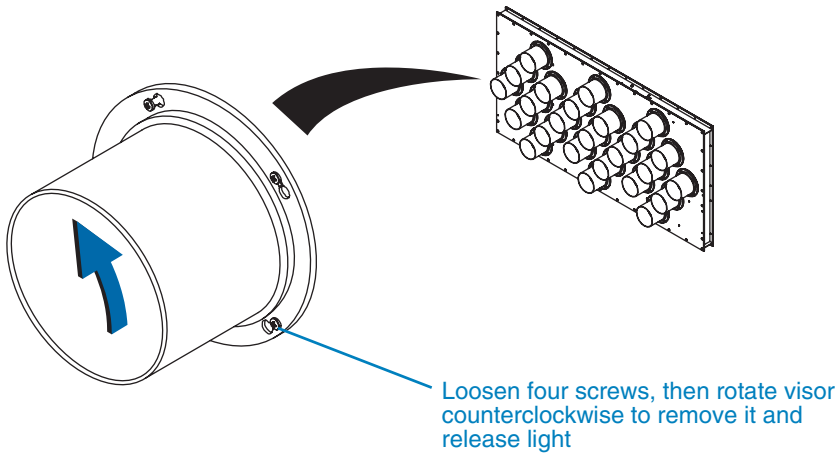
Frequency	Instructions
At least weekly	If the arrow board is installed on a tilt-frame with an electric actuator, lubricate the actuator's top and bottom pivot points.
At least monthly	If the arrow board is installed on a tilt frame, lubricate the pivot points.
As needed	Lubricate all other moving parts
Always	Wipe away any extra or spilled grease

6.3 Replacing a light or visor

To replace an LED light or visor on the arrow board display:

1. Loosen the four screws that hold the visor in place over the light and rotate the visor counterclockwise (see Figure 6-2).
2. The LED light will be loose when you remove the visor. Gently pull the visor away from the display panel, using care not to let the light fall.
3. If replacing a visor, reverse the procedure to install a replacement visor.
4. If replacing a light, gently pull the light out of the display panel and disconnect its wiring, then reverse the procedure to install the new light.

Figure 6-2. Visor detail



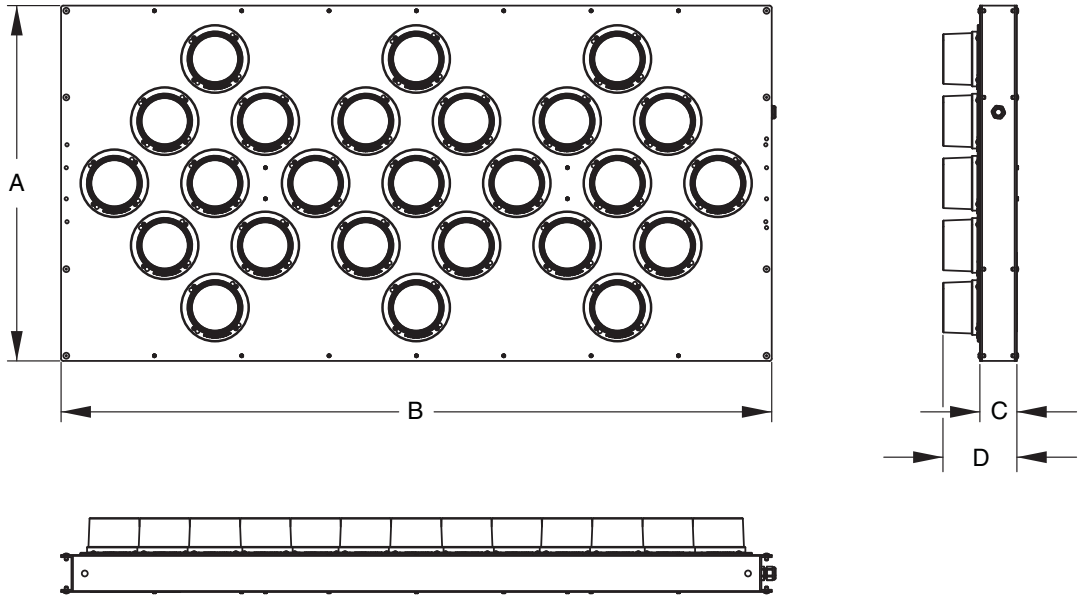
6.4 Wiring and replacement parts

For wiring diagrams and replacement parts, contact the Wanco Service Department (see Section 1.4, "Where to obtain service," page 4).

Appendix
A Mounting Options

A.1 Rectangular arrow boards

Figure A-1. Arrow board without mounting frame



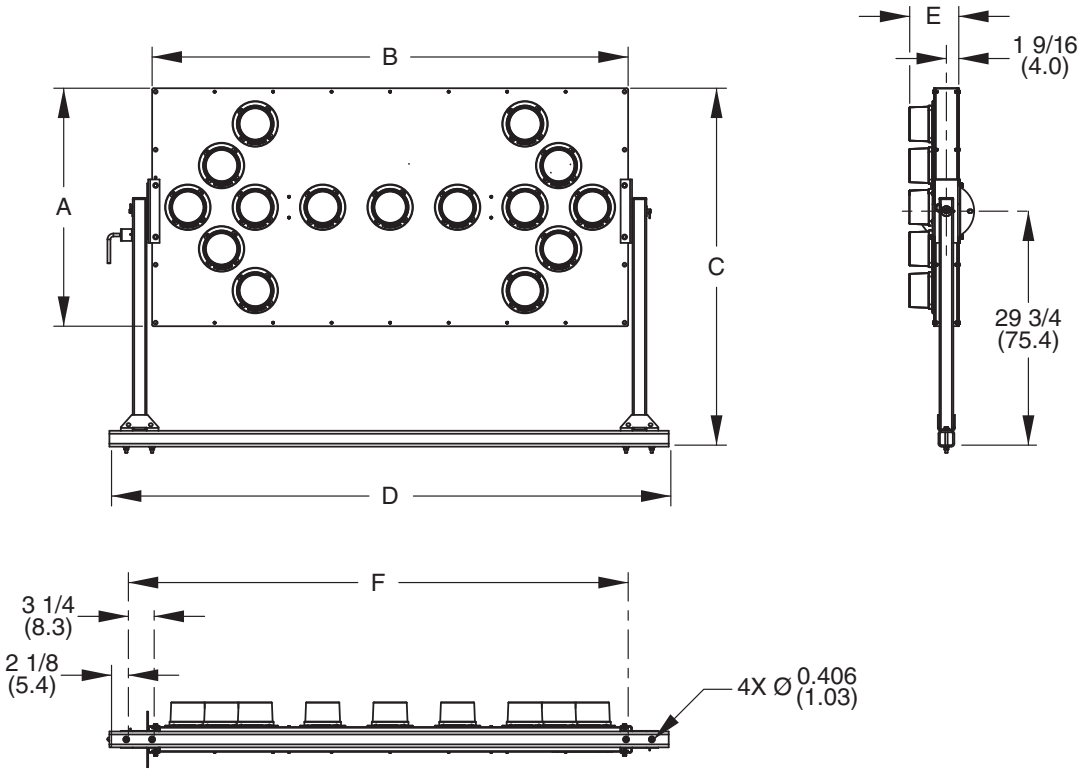
Dimensions in inches (cm)

Arrow board size	A	B	C	D	Weight, approx. lbs. (kg)
24×48	24 (60.9)	48 (121.9)	3 1/8 (7.9)	6 3/16 (15.8)	42 (19)
30×60	30 (76.2)	60 (152.4)	3 1/8 (7.9)	6 3/16 (15.8)	72 (33)
36×72	36 (91.4)	72 (182.8)	3 1/8 (7.9)	8 1/4 (21.0)	100 (45)
48×96	48 (121.9)	96 (243.8)	3 1/8 (7.9)	8 1/4 (21.0)	112 (51)

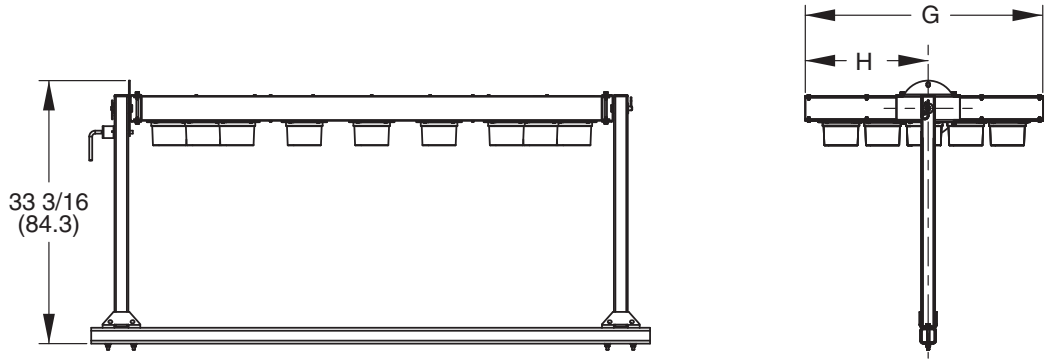
Figure A-2. Arrow board with manual-tilt (auto lock) frame

Dimensions in inches (cm)

Deployed



Travel position

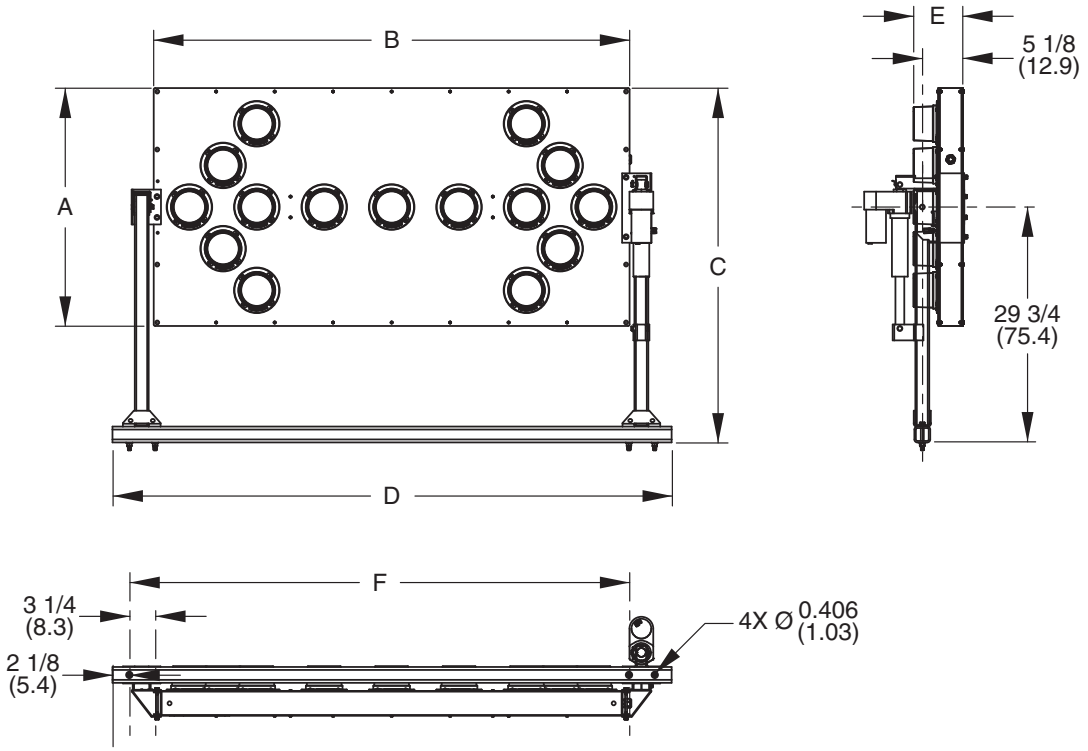


Arrow board size	A	B	C	D	E	F	G	H	Weight, approx. lbs. (kg)
24×48	24 (60.9)	48 (121.9)	41 3/4 (106.1)	58 1/2 (148.6)	6 3/16 (15.8)	51 (129.5)	24 (60.9)	12 (30.5)	92 (41)
30×60	30 (76.2)	60 (152.4)	44 3/4 (113.7)	70 1/2 (179.1)	6 3/16 (15.8)	63 (160.0)	30 (76.2)	15 (38.1)	122 (55)
36×72	36 (91.4)	72 (182.8)	47 3/4 (121.3)	82 1/2 (209.6)	8 1/4 (21.0)	75 (190.5)	36 (91.4)	18 (45.7)	150 (67)
48×96	48 (121.9)	96 (243.8)	53 3/4 (136.5)	106 1/2 (270.5)	8 1/4 (21.0)	99 (251.5)	48 (121.9)	24 (60.9)	162 (73)

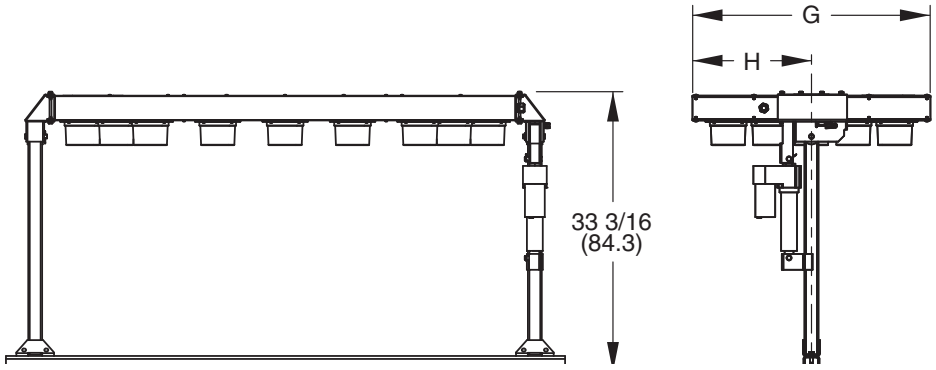
Figure A-3. Arrow board with 90-degree power-tilt frame

Dimensions in inches (cm)

Deployed



Travel position

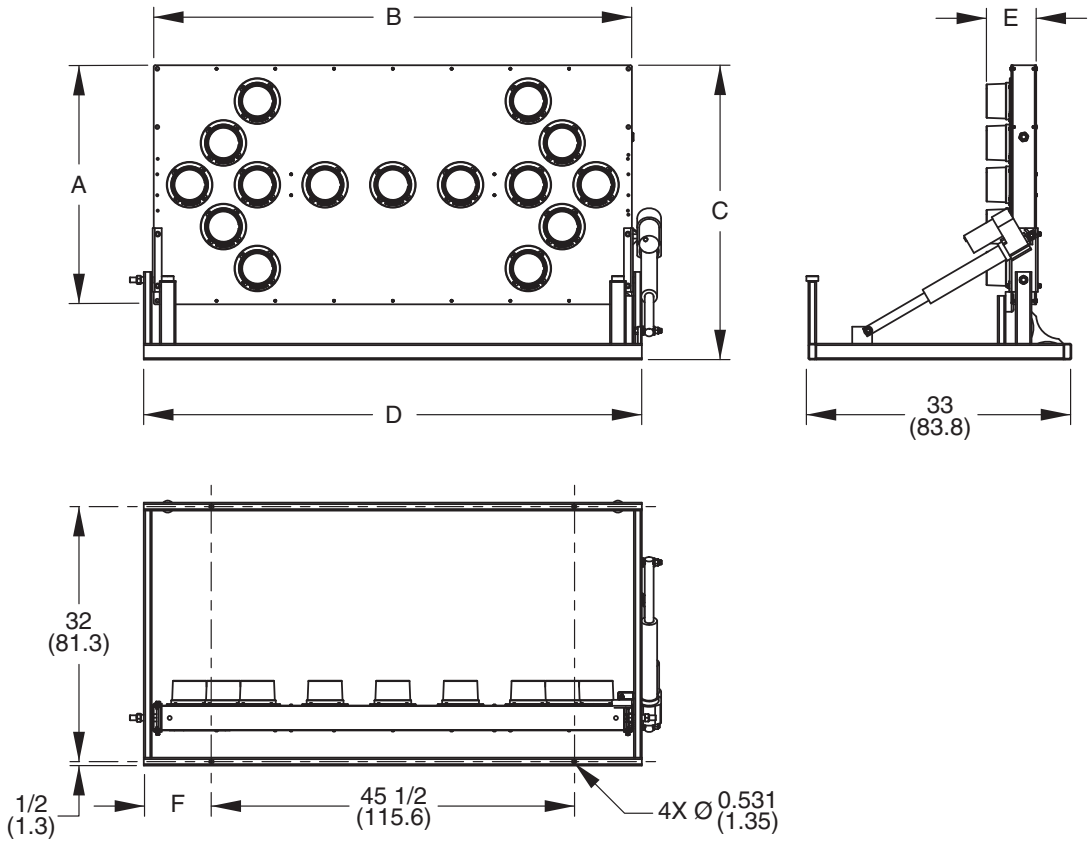


Arrow board size	A	B	C	D	E	F	G	H	Weight, approx. lbs. (kg)
24×48	24 (60.9)	48 (121.9)	41 3/4 (106.1)	58 1/2 (148.6)	6 3/16 (15.8)	51 (129.5)	24 (60.9)	12 (30.5)	112 (51)
30×60	30 (76.2)	60 (152.4)	44 3/4 (113.7)	70 1/2 (179.1)	6 3/16 (15.8)	63 (160.0)	30 (76.2)	15 (38.1)	142 (65)
36×72	36 (91.4)	72 (182.8)	47 3/4 (121.3)	82 1/2 (209.6)	8 1/4 (21.0)	75 (190.5)	36 (91.4)	18 (45.7)	170 (77)
48×96	48 (121.9)	96 (243.8)	53 3/4 (136.5)	106 1/2 (270.5)	8 1/4 (21.0)	99 (251.5)	48 (121.9)	24 (60.9)	182 (83)

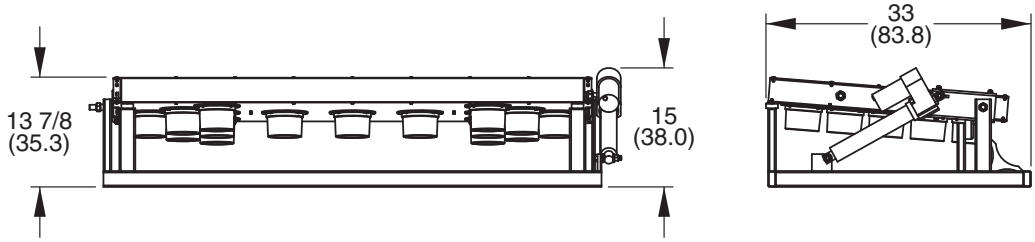
Figure A-4. Arrow board with 90-degree low-profile power-tilt frame

Dimensions in inches (cm)

Deployed



Travel position

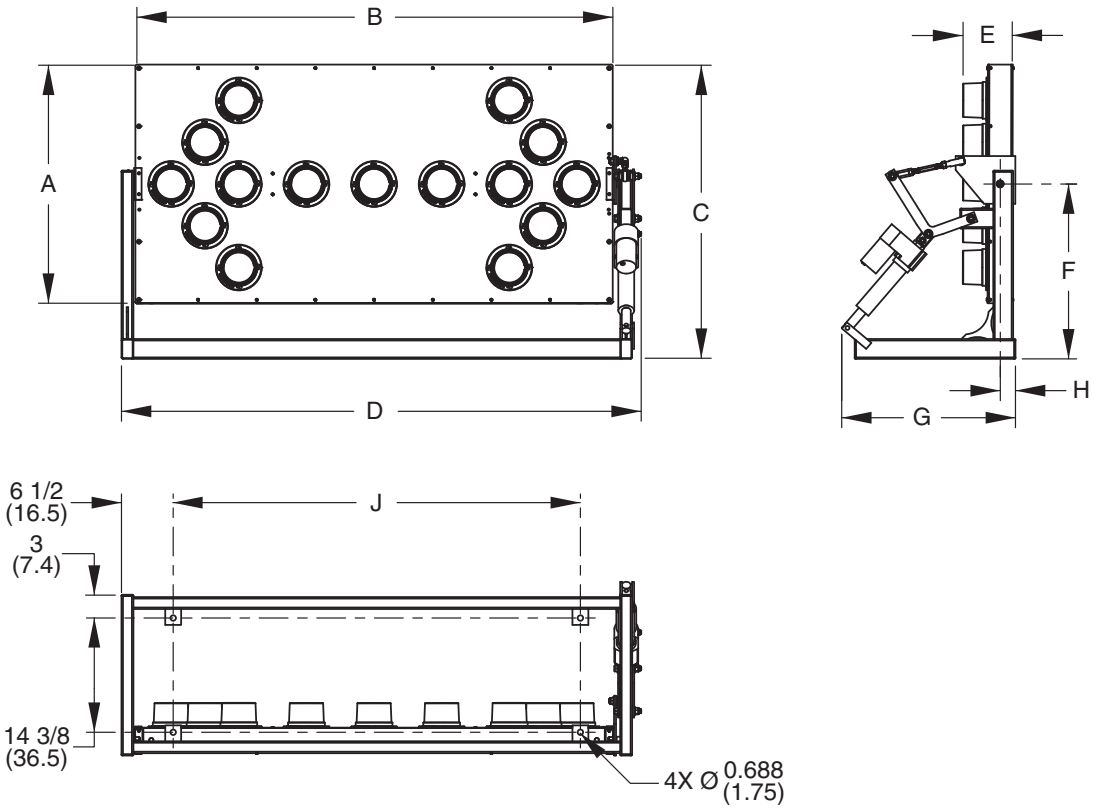


Arrow board size	A	B	C	D	E	F	Weight, approx. lbs. (kg)
30×60	30 (76.2)	60 (152.4)	37 (94.0)	62 1/2 (158.8)	6 3/16 (15.8)	8 1/2 (21.6)	132 (60)
36×72	36 (91.4)	72 (182.8)	39 (99.1)	74 1/2 (189.2)	8 1/4 (21.0)	14 1/2 (36.8)	160 (72)

Figure A-5. Arrow board with 180-degree power-tilt frame

Dimensions in inches (cm)

Rear facing

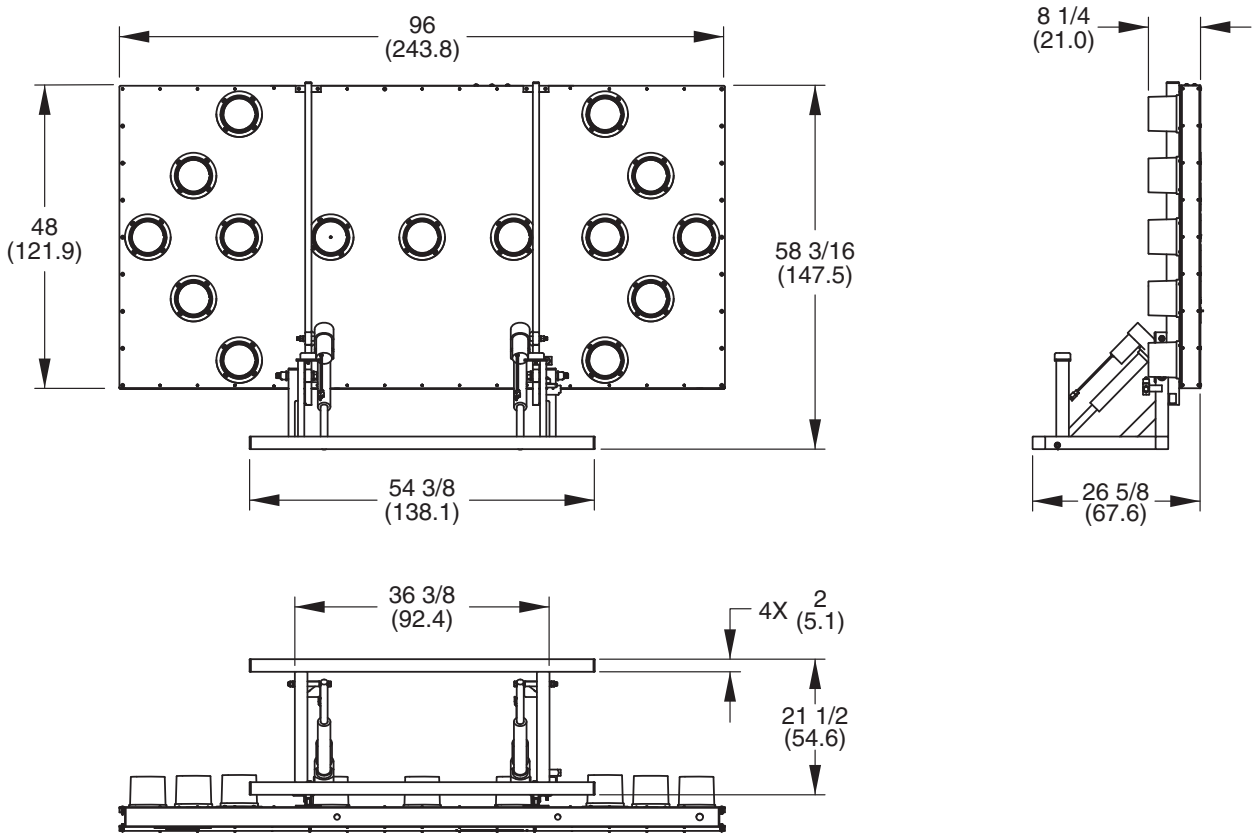


Arrow board size	A	B	C	D	E	F	G	H	J	Weight, approx. lbs. (kg)
30×60	30 (76.2)	60 (152.4)	37 (94.0)	65 3/8 (166.0)	6 3/16 (15.8)	22 (55.9)	21 7/8 (55.4)	1 15/16 (4.9)	51 3/16 (130.0)	182 (83)
36×72	36 (91.4)	72 (182.8)	40 (101.6)	77 3/8 (196.4)	8 1/4 (21.0)	21 7/8 (55.6)	21 3/4 (55.2)	1 13/16 (4.6)	63 3/16 (160.5)	210 (95)

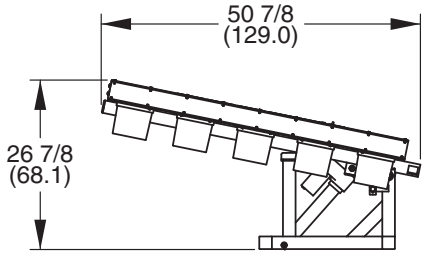
Figure A-6. Arrow board with low-profile trailer-mount frame

Dimensions in inches (cm)

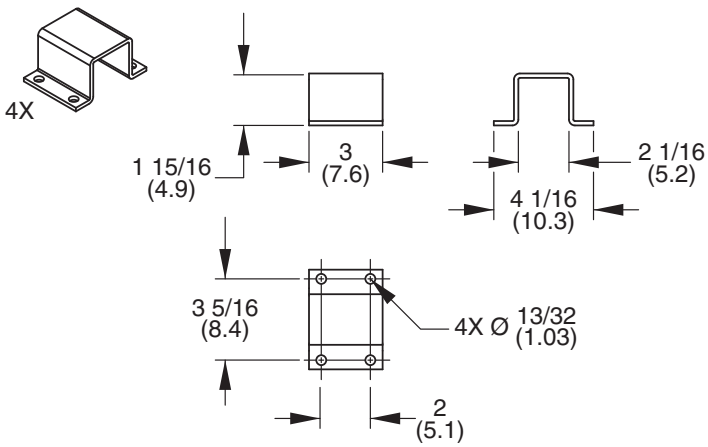
Deployed



Travel position



Mounting brackets



A.2 Split arrows

Figure A-7. Split arrows without mounting frame

Dimensions in inches (cm)

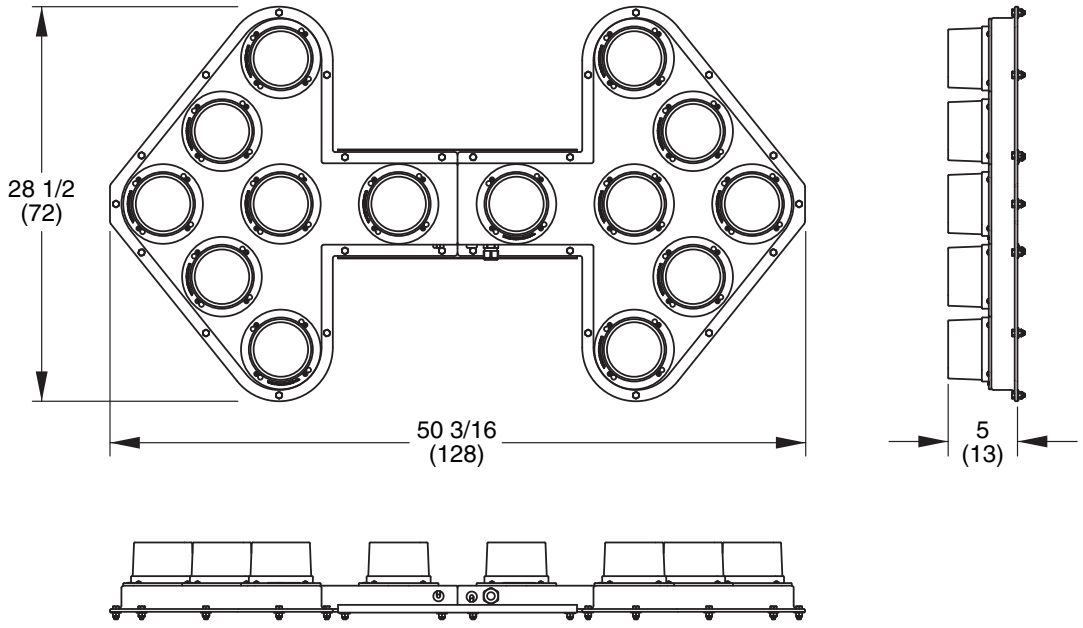
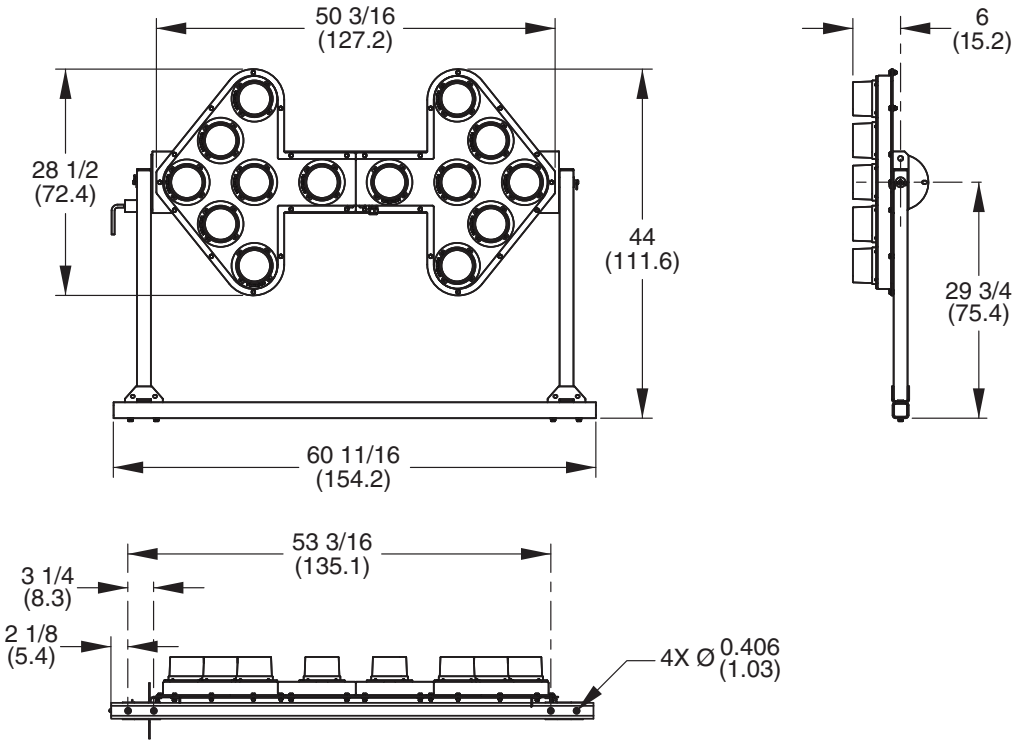


Figure A-8. Split arrows with manual-tilt (auto lock) frame

Dimensions in inches (cm)

Deployed



Travel position

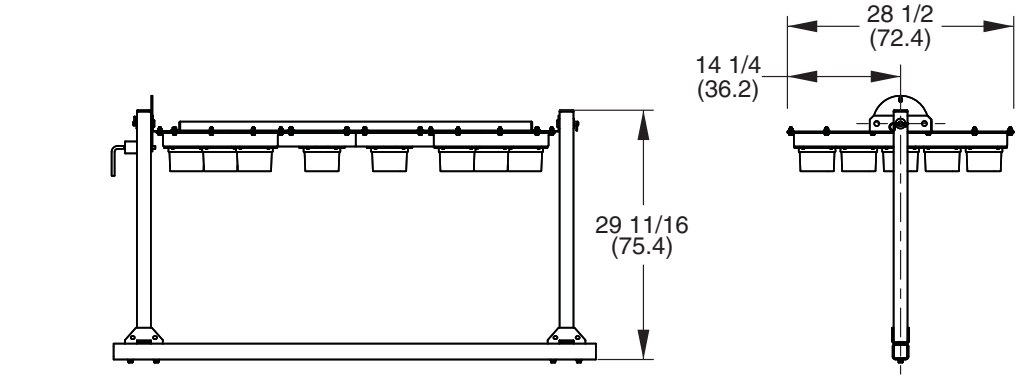
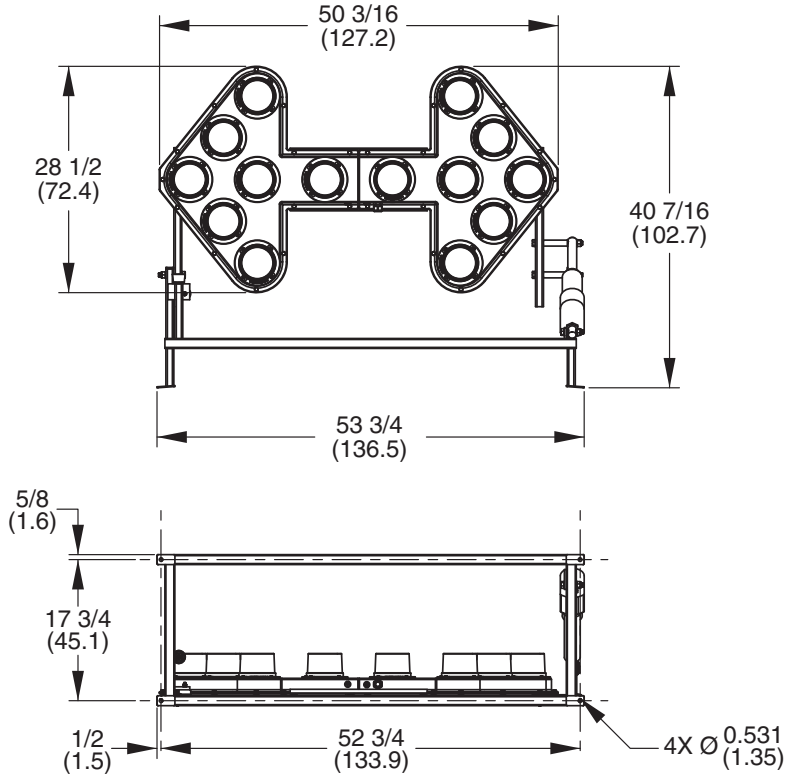


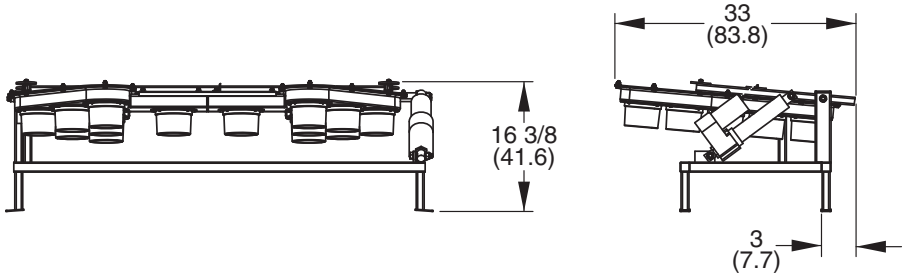
Figure A-9. Split arrows with 90-degree low-profile power-tilt frame

Dimensions in inches (cm)

Deployed



Travel position



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