

GARMIN®

REACTOR™ 40 KICKER THROTTLE ACTUATOR INSTALLATION INSTRUCTIONS

Important Safety Information

WARNING

See the *Important Safety and Product Information* guide in the product box for product warnings and other important information.

You are responsible for the safe and prudent operation of your vessel. The autopilot is a tool that enhances your capability to operate your boat. It does not relieve you of the responsibility of safely operating your boat. Avoid navigational hazards and never leave the helm unattended.

Always be prepared to promptly regain manual control of your boat.

If your motor features a kill switch, you should know how to operate it in case of an emergency. If your motor does not feature a kill switch, you should install one before installing the autopilot system.

Learn to operate the autopilot on calm and hazard-free open water.

Use caution when operating the autopilot near hazards in the water, such as docks, pilings, and other boats.

CAUTION

When in use, beware of hot surfaces on the heat-sink, motor, and solenoid components.

When in use, beware the risk of entrapment or pinching from moving parts.

Failure to install and maintain this equipment in accordance with these instructions could result in damage or injury.

Tools Needed

- Wrenches
- Phillips screwdriver
- Marine sealant
- Loctite® thread lock (for Honda® motor installs)

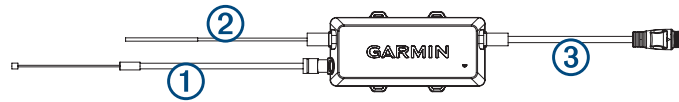
Parts Identification

The throttle actuator is the component of the Reactor 40 Kicker autopilot system that controls the speed of the motor.

You must install the throttle actuator inside the motor housing and connect it to the carburetor throttle lever using the linkage parts supplied in this package. Different motor types require different linkage parts, and the parts are separated into separate bags. These instructions refer to the labels on the bags when discussing the parts needed for different motor types.



Throttle Actuator



Number	Part	Notes
①	Throttle cable	Connects to the carburetor linkage to pull open the carburetor and control the speed of the motor. Consult the section for your motor type for details about how to connect this cable to the carburetor linkage.
②	RPM cable	Connects to the spark plug to measure the motor RPM (<i>Connecting the RPM Cable, page 15</i>).
③	ECU cable	Connects the throttle actuator to the ECU of the autopilot system (<i>Connecting the Throttle Actuator to the ECU, page 15</i>).

Parts Bags

You should refer to this table to determine which parts apply to your motor type.

Ⓐ	Common parts. These parts are used when installing the actuator on all motor types.
①	Parts for 8 through 9.9 horsepower Yamaha® motors.
②	Parts for 15 through 20 horsepower Yamaha motors.
③	Parts for 8 through 9.9 horsepower Mercury® motors.
④	Parts for 15 through 20 horsepower Mercury EFI motors.
⑤	Parts for 8 through 20 horsepower Honda motors.

Installation Preparation

Mounting and Connection Considerations

When preparing to install the throttle actuator, observe the following considerations:

- You must install the throttle actuator inside the motor housing.
- Most motors use a throttle linkage to control the carburetor throttle lever. You should replace the factory-installed throttle linkage with the provided throttle linkage to prevent the throttle actuator from back-driving the throttle on the tiller ([Tiller Back Drive Considerations, page 3](#)).
- You must secure the throttle cable to the motor manifold and connect it to the carburetor throttle lever on the motor using the included bracket and linkage specific to your motor type.
- You can place the throttle actuator box in any available space inside the motor housing after you secure the throttle cable to the manifold and route the other cables. You can use the included large zip ties to secure the throttle actuator box inside the motor housing to keep it from moving during use.
- You must secure the RPM cable to the outside of a spark plug cable ([Connecting the RPM Cable, page 15](#)).
- You must connect the throttle actuator to the ECU of the autopilot system using the provided cable run from inside the motor housing ([Connecting the Throttle Actuator to the ECU, page 15](#)).

NOTE: If the solid collar on the end of the ECU cable connector is too large to fit through a cable pass-through opening in the motor housing, you can remove the solid collar and replace it with the included split collar after routing it through the motor housing (optional).

Tiller Back Drive Considerations

Most motors use a throttle linkage to control the carburetor throttle lever. This linkage opens and closes the carburetor when you adjust the throttle on the tiller arm. Because the autopilot throttle actuator controls the speed of the motor from inside the motor housing, you should replace the factory-installed throttle linkage with the provided throttle linkage. This prevents the throttle actuator from back-driving the throttle on the tiller arm, but still allows you to use the throttle on the tiller arm when you are not using the autopilot system to control the motor.

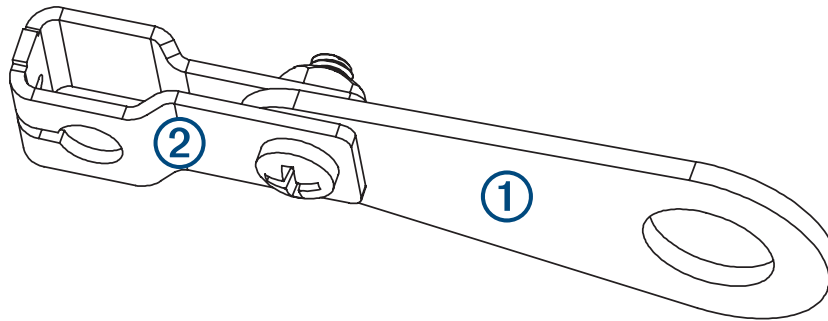
See the connections diagram for your motor type to locate the existing throttle linkage and replace it with the included linkage.

NOTE: Because of the motor design, you cannot replace the throttle linkage on Honda motors. Under typical operation, the throttle actuator back-drives the throttle on the tiller arm on Honda motors, and you must adjust the friction collar on the throttle to allow the actuator to control the speed of the motor ([Adjusting the Throttle Friction, page 13](#)).

Assembling the Carburetor Linkage

The carburetor linkage allows the throttle cable from the actuator to pull open the carburetor throttle lever on the motor.

- 1 Remove the carburetor linkage arm ① from the bag containing the parts for your motor.

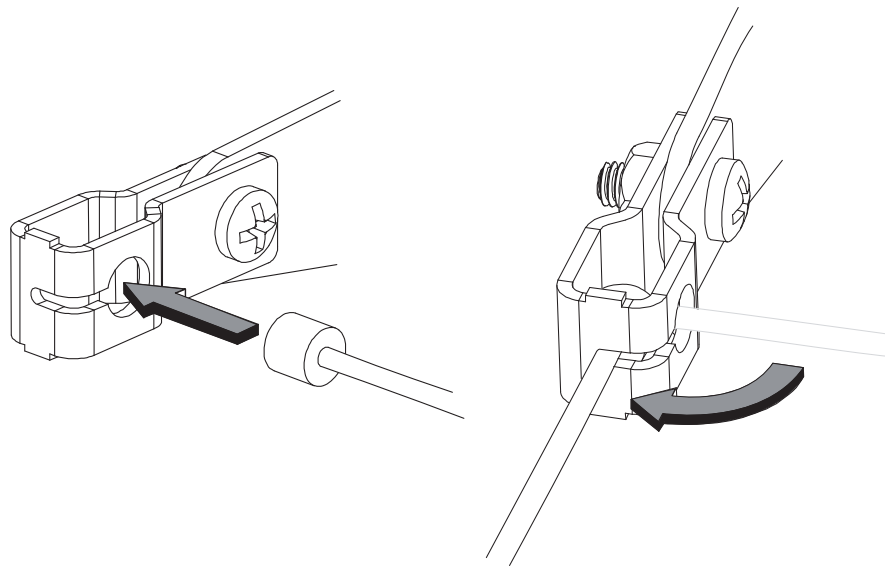


- 2 Remove the carburetor linkage bracket ② from the bag containing common parts ④.
- 3 Using the bolt and nut in the bag containing common parts, connect the carburetor linkage bracket to the carburetor linkage arm on the tapered end of the arm.
- 4 Tighten the nut so the bracket is securely connected to the arm, but loose enough so the bracket moves freely.

Connecting the Throttle Actuator Cable to the Carburetor Linkage

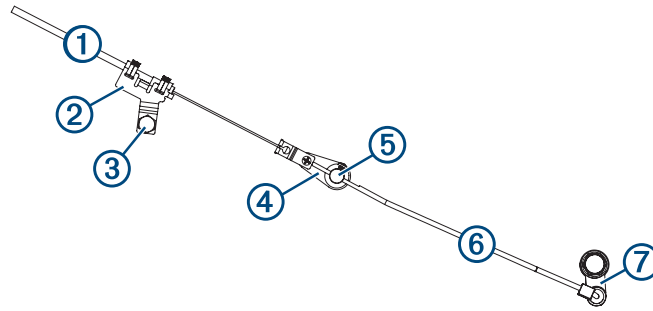
The carburetor linkage is designed to hold the cable from the throttle actuator securely. Because of the design, you must connect the throttle actuator cable to the carburetor linkage before you secure the parts to the motor.

- 1 If necessary, assemble the carburetor linkage ([Assembling the Carburetor Linkage, page 4](#)).
- 2 Place the round end of the throttle actuator cable into the hole on the end of the carburetor linkage.



- 3 Rotate the cable so it feeds through the slot on the end of the linkage.

Yamaha 8 through 9.9 Horsepower Connections



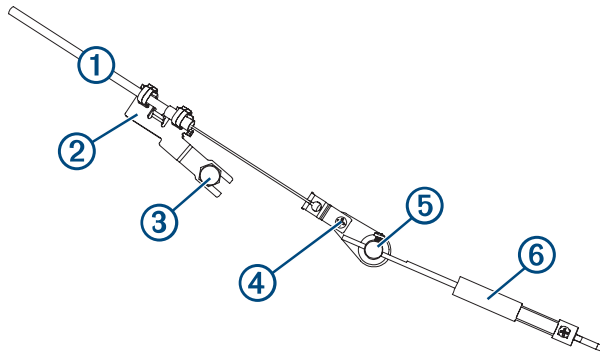
Number	Part	Notes
①	Throttle actuator cable (from the throttle actuator box)	You should connect the throttle actuator cable to the carburetor linkage ④ before securing it to the throttle cable bracket ② (<i>Connecting the Throttle Actuator Cable to the Carburetor Linkage</i> , page 4).
②	Throttle cable bracket	You must secure the throttle actuator cable ① to the throttle cable bracket using the included zip ties (<i>Securing the Throttle Actuator Cable to the Bracket for Most Motor Types</i> , page 14).
③	Manifold mounting location	You must remove the existing bolt on the manifold and use it to secure the throttle cable bracket ②. You may need to move the hose connected to the bolt to properly secure the bracket.
④	Carburetor linkage	You must assemble the carburetor linkage before installing it (<i>Assembling the Carburetor Linkage</i> , page 4).
⑤	Motor carburetor throttle lever	You must remove the set screw on the throttle lever to disconnect the tiller throttle linkage rod ⑥ and install the carburetor linkage ④ and plastic washers.
⑥	Tiller throttle linkage rod	You do not replace this rod when installing the other linkage parts, but you must remove it temporarily to secure the carburetor linkage to the throttle lever ⑤. TIP: You can mark the location on the rod where it connects to the throttle lever so it is easier to note the proper motor idle when you reconnect it.
⑦	Tiller throttle linkage	You must replace this linkage component with the new part provided in the parts bag. You should save the linkage component in case you need to restore the motor to its factory configuration in the future.

Setting the Linkage Components for Proper Idle

After you install the throttle actuator components on the motor, you must adjust them so the motor idles correctly.

- 1 Loosen the throttle actuator bracket on the engine manifold until the throttle actuator does not pull open the carburetor throttle lever.
There should be obvious slack in the throttle actuator cable.
- 2 Adjust the tiller throttle to idle, start the motor, and complete an action:
 - If the motor is not idling correctly, loosen the set screw on the carburetor throttle lever, adjust the tiller throttle linkage rod until the motor idles correctly, and tighten the set screw.
 - If the motor idles correctly, proceed to the next step.
- 3 Using the tiller throttle, increase the speed of the motor, and complete an action:
 - If the motor does not increase its speed and return to idle correctly, repeat the previous step to adjust the tiller throttle linkage rod.
 - If the motor increases its speed and returns to idle correctly, proceed to the next step.
- 4 Adjust the position of the throttle actuator bracket until no slack remains in the throttle actuator cable and the motor idles correctly.
- 5 Tighten the throttle actuator bracket on the engine manifold to set the cable tension.
- 6 If necessary, turn off the motor.

Yamaha 15 through 20 Horsepower Connections

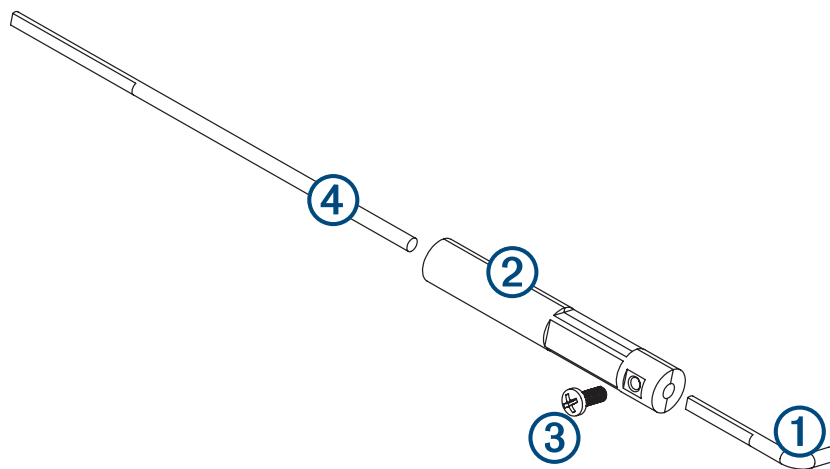


Number	Part	Notes
①	Throttle actuator cable (from the throttle actuator box)	You should connect the throttle actuator cable to the carburetor linkage ④ before securing it to the throttle cable bracket ② (<i>Connecting the Throttle Actuator Cable to the Carburetor Linkage, page 4</i>).
②	Throttle cable bracket	You must secure the throttle actuator cable ① to the throttle cable bracket using the included zip ties (<i>Securing the Throttle Actuator Cable to the Bracket for Most Motor Types, page 14</i>).
③	Manifold mounting location	You must remove the existing bolt on the manifold and use it to secure the throttle cable bracket.
④	Carburetor linkage	You must assemble the carburetor linkage before installing it (<i>Assembling the Carburetor Linkage, page 4</i>).
⑤	Motor carburetor throttle lever	You must remove the set screw on the throttle lever to disconnect the tiller throttle linkage rod ⑥ and install the carburetor linkage ④.
⑥	Tiller throttle linkage barrel-slider mechanism	You must replace the existing tiller throttle linkage rod with the barrel-slider mechanism provided in the parts bag (<i>Assembling the Barrel Slider Throttle Linkage, page 7</i>). You should save the existing tiller throttle linkage rod in case you need to restore the motor to its factory configuration in the future.

Assembling the Barrel Slider Throttle Linkage

For some motors, you must replace the existing throttle linkage with a barrel-slider mechanism to prevent back-driving the tiller throttle.

- 1 If necessary, open the parts bag for your motor model, and remove the barrel-slider mechanism parts.
- 2 Insert the small bent rod ① into the short end of the barrel ②.



The flat portion of the small rod fits into the barrel one way only.

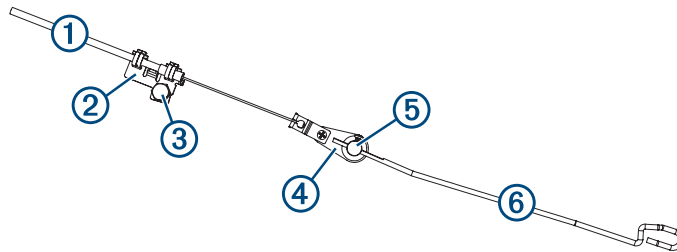
- 3 Secure the small rod using the set screw ③.
- 4 Insert the round end of the long rod ④ into the other side of the barrel.

Setting the Linkage Components for Proper Idle

After you install the throttle actuator components on the motor, you must adjust them so the motor idles correctly.

- 1 Loosen the throttle actuator bracket on the engine manifold until the throttle actuator does not pull open the carburetor throttle lever.
There should be obvious slack in the throttle actuator cable.
- 2 Loosen the set screw on the carburetor throttle lever, and slide the rod into the barrel slider until it stops.
- 3 Tighten the set screw.
- 4 Adjust the tiller throttle to idle, start the motor, and complete an action:
 - If the motor is not idling correctly, loosen the set screw on the carburetor throttle lever, adjust the tiller throttle linkage rod in the barrel slider until the motor idles correctly, and tighten the set screw.
 - If the motor idles correctly, proceed to the next step.
- 5 Using the tiller throttle, increase the speed of the motor, and complete an action:
 - If the motor does not increase its speed and return to idle correctly, repeat the previous step to adjust the tiller throttle linkage rod in the barrel slider.
 - If the motor increases its speed and returns to idle correctly, proceed to the next step.
- 6 Adjust the position of the throttle actuator bracket until no slack remains in the throttle actuator cable and the motor idles correctly.
- 7 Tighten the throttle actuator bracket on the engine manifold to set the cable tension.
- 8 If necessary, turn off the motor.

Mercury 8 through 9.9 Horsepower Connections



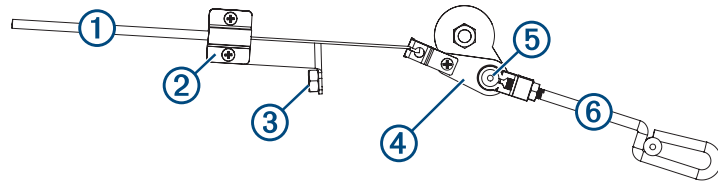
Number	Part	Notes
①	Throttle actuator cable (from the throttle actuator box)	You should connect the throttle actuator cable to the carburetor linkage ④ before securing it to the throttle cable bracket ② (<i>Connecting the Throttle Actuator Cable to the Carburetor Linkage, page 4</i>).
②	Throttle cable bracket	You must secure the throttle actuator cable ① to the throttle cable bracket using the included zip ties (<i>Securing the Throttle Actuator Cable to the Bracket for Most Motor Types, page 14</i>).
③	Manifold mounting location	You must remove the existing bolt on the manifold and use it to secure the throttle cable bracket ②.
④	Carburetor linkage	You must assemble the carburetor linkage before installing it (<i>Assembling the Carburetor Linkage, page 4</i>).
⑤	Motor carburetor throttle lever	You must remove the set screw on the throttle lever to disconnect the tiller throttle linkage rod ⑥ and install the carburetor linkage ④ and plastic washers.
⑥	Tiller throttle linkage rod	You must replace the existing tiller throttle linkage rod with the new rod provided in the parts bag. You should save the existing tiller throttle linkage rod in case you need to restore the motor to its factory configuration in the future.

Setting the Linkage Components for Proper Idle

After you install the throttle actuator components on the motor, you must adjust them so the motor idles correctly.

- 1 Loosen the throttle actuator bracket on the engine manifold until the throttle actuator does not pull open the carburetor throttle lever.
There should be obvious slack in the throttle actuator cable.
- 2 Adjust the tiller throttle to idle, start the motor, and complete an action:
 - If the motor is not idling correctly, loosen the set screw on the carburetor throttle lever, adjust the tiller throttle linkage rod until the motor idles correctly, and tighten the set screw.
 - If the motor idles correctly, proceed to the next step.
- 3 Using the tiller throttle, increase the speed of the motor, and complete an action:
 - If the motor does not increase its speed and return to idle correctly, repeat the previous step to adjust the tiller throttle linkage rod.
 - If the motor increases its speed and returns to idle correctly, proceed to the next step.
- 4 Adjust the position of the throttle actuator bracket until no slack remains in the throttle actuator cable and the motor idles correctly.
- 5 Tighten the throttle actuator bracket on the engine manifold to set the cable tension.
- 6 If necessary, turn off the motor.

Mercury 15 through 20 Horsepower Connections



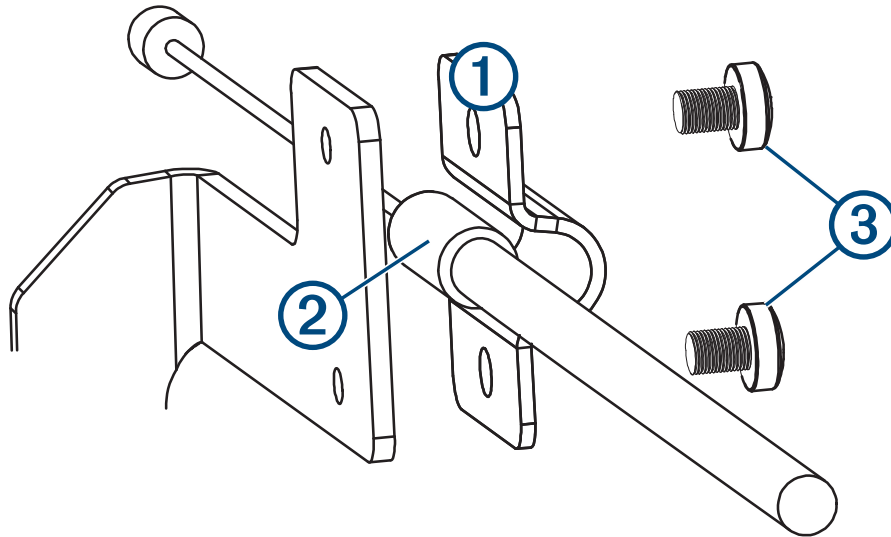
Number	Part	Notes
①	Throttle actuator cable (from the throttle actuator box)	You should connect the throttle actuator cable to the carburetor linkage ④ before securing it to the throttle cable bracket ② (<i>Connecting the Throttle Actuator Cable to the Carburetor Linkage, page 4</i>).
②	Throttle cable bracket	You must secure the throttle actuator cable ① to the throttle cable bracket using the screws on the bracket (<i>Securing the Throttle Actuator Cable to the Bracket for Mercury 15 through 20 Horsepower Motors, page 11</i>).
③	Manifold mounting location	You must remove the existing bolt on the manifold and use it to secure the throttle cable bracket ②.
④	Carburetor linkage	You must assemble the carburetor linkage before installing it (<i>Assembling the Carburetor Linkage, page 4</i>).
⑤	Motor carburetor throttle lever	You must disconnect the tiller throttle linkage ⑥ from the throttle lever to install the carburetor linkage ④.
⑥	Tiller throttle linkage	You must modify the factory tiller throttle linkage using the new part provided in the parts bag (<i>Modifying the Tiller Throttle Linkage, page 11</i>).

Securing the Throttle Actuator Cable to the Bracket for Mercury 15 through 20 Horsepower Motors

Before securing the cable to the bracket, you should connect the end of the throttle actuator cable to the carburetor linkage (*Connecting the Throttle Actuator Cable to the Carburetor Linkage, page 4*).

NOTE: This type of bracket is used to secure the throttle actuator cable for the Mercury 15 through 20 horsepower motor only. If you are installing the throttle actuator on all other motor types, you must follow the instructions for that bracket instead (*Securing the Throttle Actuator Cable to the Bracket for Most Motor Types, page 14*).

- 1 Place the top of the bracket ① over the raised portion of the throttle actuator cable ②.

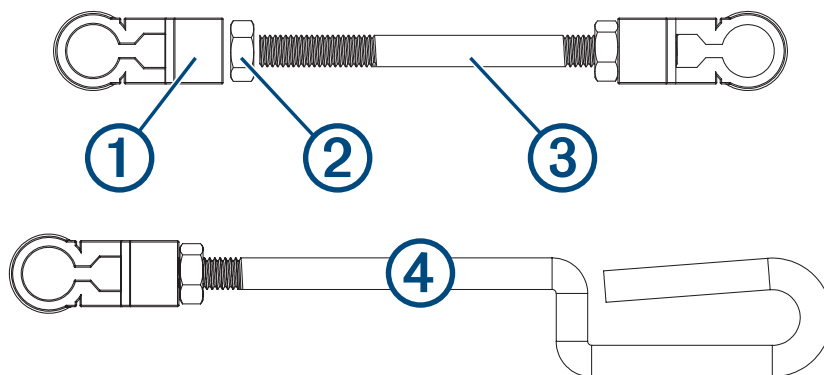


- 2 Secure the cable to the bracket using the included screws ③.

Modifying the Tiller Throttle Linkage

On Mercury 15 through 20 horsepower motors, you must modify the tiller throttle linkage to prevent the throttle actuator from back-driving the tiller throttle.

- 1 Disconnect the existing tiller throttle linkage from the motor.
- 2 Remove one end of the linkage ① and the nut ② by unscrewing the rod ③.

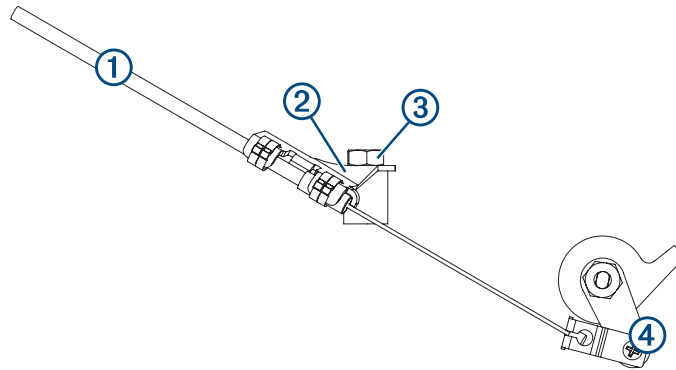


- 3 Store the rod and other end of the linkage in case you need to restore the motor to factory condition in the future.
- 4 Screw the existing nut onto the replacement rod ④ from the parts bag.
- 5 Screw the existing end of the linkage onto the replacement rod.

Setting the Linkage Components for Proper Idle

- 1 Loosen the two screws that hold the throttle actuator cable to the bracket until the throttle actuator does not pull open the carburetor throttle lever.
There should be obvious slack in the throttle actuator cable.
- 2 Adjust the tiller throttle to idle, start the motor, and complete an action:
 - If the motor is not idling correctly, remove the tiller throttle linkage and adjust the length of the rod until the motor idles correctly.
 - If the motor idles correctly, proceed to the next step.
- 3 Using the tiller throttle, increase the speed of the motor, and complete an action:
 - If the motor does not increase its speed and return to idle correctly, repeat the previous step to adjust the tiller throttle linkage.
 - If the motor increases its speed and returns to idle correctly, proceed to the next step.
- 4 Adjust the position of the throttle actuator cable in the bracket until no slack remains in the cable and the motor idles correctly.
- 5 Tighten the two screws to secure the throttle actuator cable to the bracket and set the cable tension.
- 6 If necessary, turn off the motor.

Honda 8 through 20 Horsepower Connections



Number	Part	Notes
①	Throttle actuator cable (from the throttle actuator box)	You should connect the throttle actuator cable to the carburetor linkage ④ before securing it to the throttle cable bracket ② (<i>Connecting the Throttle Actuator Cable to the Carburetor Linkage, page 4</i>).
②	Throttle cable bracket	You must secure the throttle actuator cable to the throttle cable bracket using the included zip ties (<i>Securing the Throttle Actuator Cable to the Bracket for Most Motor Types, page 14</i>).
③	Manifold mounting location	You must loosen the existing bolt on the manifold and slide the throttle cable bracket into place ②. You should not remove the bolt from the manifold, because it is difficult to put the bolt back in place after it has been removed.
④	Carburetor linkage	You must assemble the carburetor linkage before installing it (<i>Assembling the Carburetor Linkage, page 4</i>). The carburetor linkage arm is keyed to fit one way on the carburetor only. You must remove the existing lock washer to install the carburetor linkage bracket, and you should apply Loctite thread lock to the bolt when securing the bracket.

Adjusting the Throttle Friction

Because the throttle actuator back-drives the tiller throttle on Honda motors, you must adjust the throttle friction on the tiller arm for the actuator to work properly.

- 1 Locate the friction collar on the tiller arm.
The friction collar adjusts the tension on the tiller throttle, and when fully tightened, keeps the throttle at a set position.
- 2 Adjust the friction collar so that it is fully loosened.
The throttle actuator is able to control the speed of the motor only when the friction collar is fully loosened.

Common Installation Procedures

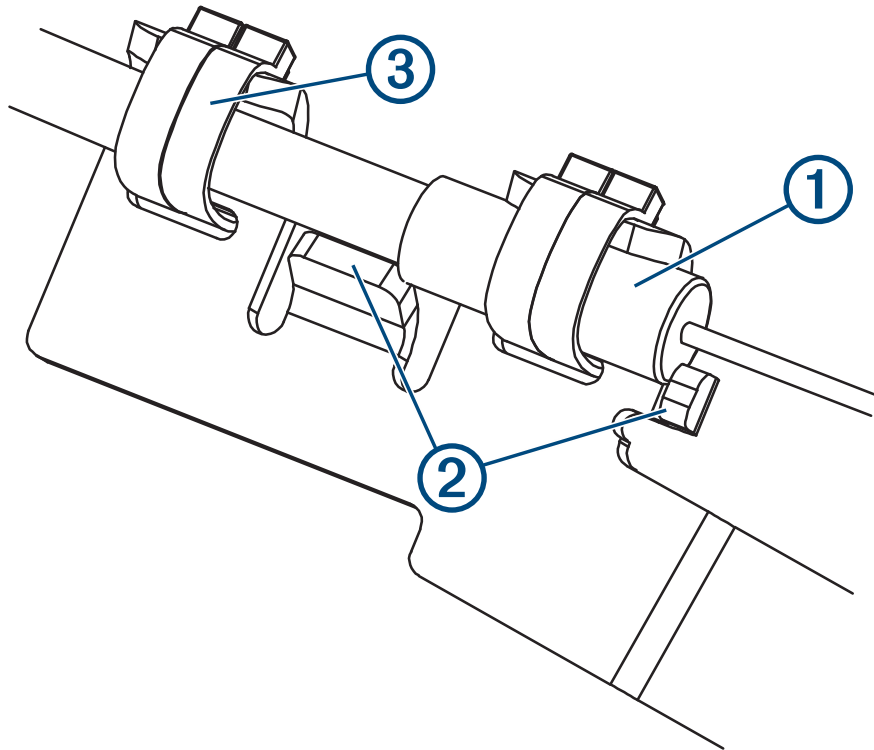
These procedures are the same for all motor models.

Securing the Throttle Actuator Cable to the Bracket for Most Motor Types

Before you secure the cable to the bracket, you should connect the end of the throttle actuator cable to the carburetor linkage ([Connecting the Throttle Actuator Cable to the Carburetor Linkage, page 4](#)).

NOTE: This type of bracket is used to secure the throttle actuator cable for most motor types. If you are installing the throttle actuator on a Mercury 15 through 20 horsepower motor, you must follow the instructions for that bracket instead ([Securing the Throttle Actuator Cable to the Bracket for Mercury 15 through 20 Horsepower Motors, page 11](#)).

- 1 Place the raised portion of the throttle actuator cable ① into the bracket between the raised tabs ②.



- 2 Secure the cable to the bracket using the included zip ties ③.

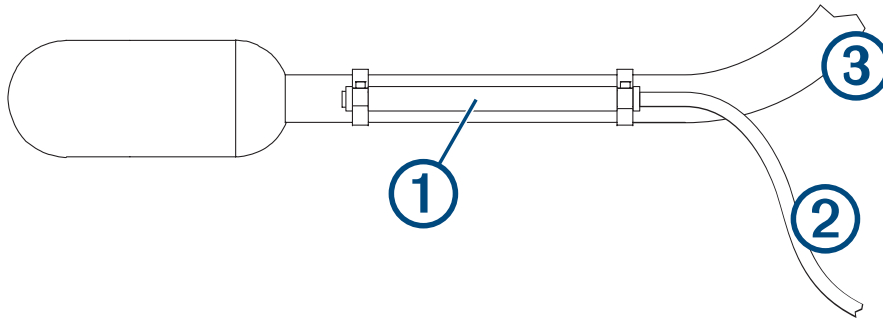
Connecting the RPM Cable

NOTICE

You must not cut or strip the RPM cable or the spark plug cable. Cutting or stripping either cable will result in damage to the throttle actuator, the motor, or both.

The RPM cable monitors engine RPM, and is needed for proper autopilot operation.

- 1 Route the RPM cable from the throttle actuator box to a spark plug cable on the motor.
- 2 Secure the wrapped tip of the RPM cable ① to the outside of the spark plug cable using the included zip ties.



- 3 Secure the RPM cable so that the wrapped tip of the cable is the only part of the RPM cable that contacts the spark plug cable.

NOTICE

Routing the unwrapped portion ② of the RPM cable alongside the spark plug cable ③ may result in a lost RPM signal and cause issues with the autopilot operation.

Connecting the Throttle Actuator to the ECU

After you connect the throttle actuator and linkages inside the motor, you must connect the throttle actuator to the autopilot ECU.

- 1 Locate the cable pass-through location on the motor.
This area is where the motor cables are routed from the inside of the motor to the outside of the motor, and is usually near the tiller arm.
- 2 If necessary, create a cable pass-through opening in the motor housing for the ECU cable.
- 3 Route the ECU cable on the throttle actuator from the inside of the motor to the outside of the motor.
NOTE: If the solid collar on the end of the ECU cable connector is too large to fit through a cable pass-through opening in the motor housing, you can remove the solid collar and replace it with the included split collar after routing it through the motor housing (optional).
- 4 Route the ECU cable to the location where you installed the autopilot ECU, and connect it to the THROTTLE port.
- 5 If necessary, apply marine sealant to the cable pass-through opening to protect the inside of the motor from water ingress.

Testing the Throttle Actuator Installation

Before you can test the installation, you must install all of the autopilot components and all of the throttle actuator linkage components, and connect the throttle actuator to the ECU.

- 1 Turn on the motor.
- 2 Turn on the autopilot system.
- 3 Engage the autopilot.
- 4 On the remote control, press ▲ to increase the throttle using the throttle actuator.
The throttle actuator should move the throttle to full speed.
- 5 On the remote control, press ▼ to decrease the throttle using the throttle actuator.
The throttle actuator should return the motor to idle.
- 6 Complete an action:
 - If the throttle actuator does not move the throttle from full speed to idle, adjust the throttle cable bracket and repeat this test.
 - If the throttle actuator controls the throttle correctly, turn off the motor and the autopilot system.

Specifications

Dimensions (L × W × H)	151 × 60 × 23 mm (6 × 2.35 × 0.9 in.)
Weight	181 g (6.4 oz.)
Temperature range	From 0° to 70°C (from 32° to 158°F)
Material	Glass-reinforced nylon and aluminum
Water rating*	Throttle actuator housing: IEC 60529 IPX7*
ECU cable length	3 m (9 ft.)
Input voltage	From 12 to 24 Vdc

*The device withstands incidental exposure to water of up to 1 m for up to 30 min. For more information, go to www.garmin.com/waterrating.

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