

# INSTALLATION MANUAL for B103, B104 Controls

## 1.1 DESCRIPTION AND OPERATION

### 1.1.1 GENERAL

The B103 single lever and B104 dual lever control boxes allow combined operation of both throttle and shift for single or twin engines either outboard or inboard-outboard or inboard configuration.

ULTRAFLEX C2 or C8 push-pull cables are available for the control box/powerplant connection. An optional kit is available for installation of the ULTRAFLEX C22 push-pull cable only with the B103 control box.

### 1.1.2 DESCRIPTIVE DATA

The B103 and B104 control boxes provide the following standard features:

- Double action lever(s) (throttle/shift control)
- Throttle control with shift at neutral
- Starting in gear prevention through a neutral safety switch
- Adjustable shift control stroke.

## 1.2 INSTALLATION

### 1.2.1 LOCATING THE CONTROL BOX

Before installation be sure the control box location allows:

- Complete and free turning of the hand lever from the *full forward* to the *full reverse* position.
- Cable routing with long radius bends.

Refer to Fig. 1 for control box dimensions and minimum required clearances.

After determining a proper location refer to Fig. 8 for the single and to Fig. 9 for the dual control mounting templates.

### 1.2.2 FITTING THE CABLES

Route and measure the cable for the length from the control head to the power plant through a straight and free of obstacles run.

Cable bending should be reduced as much as possible. Long radius bends should be used when possible and no bends with a radius of less than 8 inches (203 mm) should be used.

The cables can be sustained by means of suitable cable hangers or routed through segments of conduit for long straight runs.

Do not use fittings that may compress the cable casing.

Outboard powerplant installations require an additional 4-foot length (1200 mm) of the cables arranged in a free loop to allow engine swing.

## 1.3 CONNECTING THE CABLES

### 1.3.1 CABLE OPERATING MODE

Ascertain the correct kind of action required by the specific engine.

The following Table 1 provides a list of engines with the required cable action for shift and throttle control.

ENGINE	SHIFT CABLE ACTION	THROTTLE CABLE ACTION
JOHNSON/EVINRUDE OMC IN/OUTBOARD MERCURY 18, 25 H.P.	"PULL" TO GO FORWARD	"PUSH" TO OPEN THROTTLE
MERCURY OUTBOARDS MARINER OUTBOARDS MERCUISER IN/OUTBOARDS	"PULL" TO GO FORWARD	"PULL" TO OPEN THROTTLE
VOLVO IN/OUTBOARDS	"PUSH" TO GO FORWARD	"PULL" TO OPEN THROTTLE
YAMAHA 90 H.P. & UP U.S MARINE (FORCE)	"PULL" TO GO FORWARD	"PUSH" TO OPEN THROTTLE
YAMAHA IN/OUTBOARD	"PULL" TO GO FORWARD	"PULL" TO OPEN THROTTLE
HONDA, SUZUKI, TOHATSU YAMAHA 70 H.P. & BELOW	"PULL" TO GO FORWARD	"PULL" TO OPEN THROTTLE
INBOARDS (DIESEL, GAS)	MOST TRANSMISSIONS "PULL" TO GO FORWARD	MOST THROTTLES "PULL" TO OPEN

TABLE 1 - Cable Action with Reference to Engine Installation.

### 1.3.2 ADJUSTING THE SHIFT CABLE TRAVEL

The control box can be easily adapted for short (2.70 in/68.5 mm), medium (2.96 in/75.12 mm) or long (3.22 in/81.72 mm) travel of the shift cable. Refer to Fig. 2 where the long travel setting is shown. The standard setting at manufacturing is the medium one (center notch). Setting change is obtained as follows:

- Loosen the two screws fastening the shift arm.
- Release then reset the shift arm to the required travel notch.
- Retighten the two fastening screws.

### 1.3.3 CONNECTING THE SHIFT CABLE

- Check the shift arm setting for cable travel (short, medium or long). Reset if necessary following the above procedure (Refer to Fig. 2).
- Check the shift arm setting for cable action (*pull* or *push*). Refer to Table 1 for proper action referred to the installed engine.
  1. Reversing of the shift arm position on the set gear.
  2. Reversing of the neutral safety switch mounting.
- After inserting the jam nut (Refer to Fig. 3), screw the swivel joint on the shift cable rod end. Allow 1/8 inch (3.18 mm) threaded rod protruding from the joint surface.
- Run the cable end to the rear side of the shift arm then drive the swivel joint through the connecting hole. Insert the cotter pin keeping the swivel joint into position.
- Fasten the cable to casing to the lower part of the housing at the provided hole location for C2 or C8 type cables. Make sure the fastening clamp positively engages the groove in the cable casing end.

### 1.3.4 CONNECTING THE THROTTLE CABLE

#### Control Box End

- Check the required throttle cable action (*pull* or *push* to open) with reference to the installed engine. Refer to Table 1.
- Remove the hand lever and the control box side cover.
- Check and note the setting of the throttle arm, the link assembly arrangement and the swivel bracket position. (Refer to Figures 4 and 5).  
If cable action changing is required from *pull* to *push* or viceversa proceed as follows:
  1. Remove the swivel bracket from the link assembly.
  2. Remove the two fastening screws and then remove the link assembly from the shift gear. Avoid disturbing the shift arm setting on the selected travel notch.
  3. Push in and rotate the throttle arm 180 degrees until it snaps back and locks into position (cable pivot downward for *pulling*, upward for *pushing*).
  4. Rearrange and screw the link assembly (link turned upward for *pulling*, downward for *pushing*).
  5. Reposition and install the swivel bracket in the proper hole on the link assembly (upper hole for *pulling*, lower hole for *pushing*). Ascertain the swivel bracket rotates freely.
- Install and secure the cable terminal on the throttle arm pivot by means of the suitable washer and retaining ring.
- Fasten the cable casing to the swivel bracket. Ascertain the fastening clamp positively engages the groove in the cable casing end.
- Reinstall the box housing and the hand lever.

#### Engine End

**CAUTION:** Disconnect the throttle cable from the engine before rigging the engine idle. Failure of the above precaution may result in damages to the control, to the cable and to the engine.

- Ascertain the control is in neutral detent.
- Check the engine throttle lever is in a light contact against the idle stop screw (Refer to Fig. 6).
- Connect the throttle cable to the engine throttle lever.
- Pull out the hand lever hub then advance the lever from the neutral detent over the forward range. Return the hand lever to neutral: the lever should snap back when at neutral.

### 1.4 CONNECTING THE NEUTRAL SAFETY SWITCH

The neutral safety switch prevents the engine starting when the transmission is engaged (Refer to Fig. 7).

- Set the control lever to the neutral detent.
- Check the neutral safety switch for continuity.  
A test set made of a lamp series-connected with a battery can be used:
  1. Connect one end of the tester to the COMMON terminal and the other one to the NO (Normally Open) terminal of the switch:  
the test lamp must light on.
  2. Move the hand lever away from the neutral detent in both directions:  
the test lamp must extinguish.

**CAUTION:** Electrical continuity must be assured only when the control is set in neutral. Absolutely no electrical continuity is to be allowed when the control is in gear.

- Connect one terminal of the neutral safety switch to the ignition switch (start lead) and the other one to the starter solenoid.  
Terminals and insulators provided with the control are to be used in order to avoid short-circuit possibility.

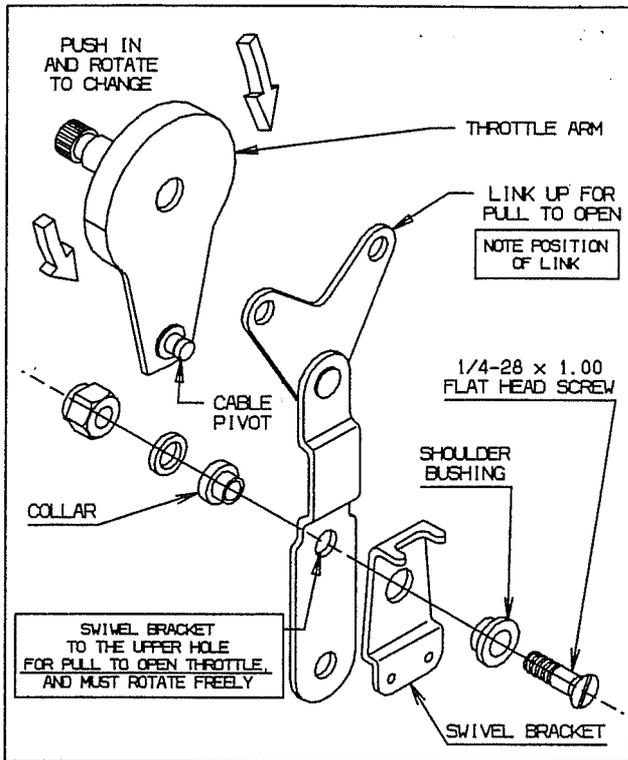


Fig. 4 - "Pull to Open" Setting.

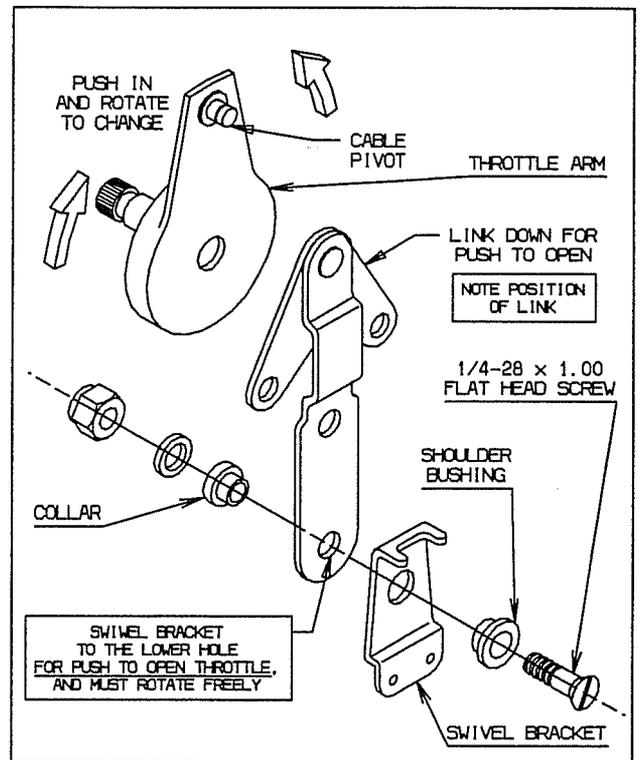


Fig. 5 - "Push to Open" Setting.

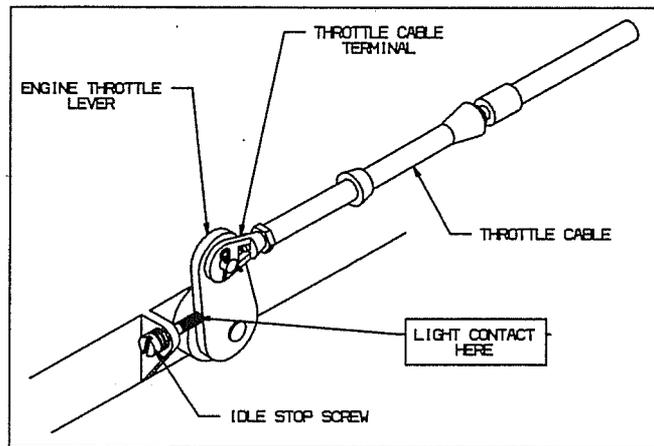


Fig. 6 - Engine Throttle Connection.

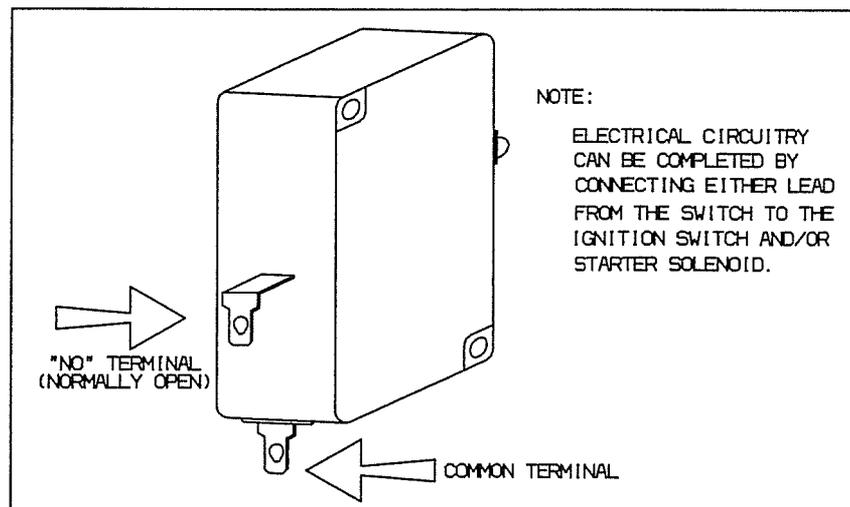


Fig. 7 - Neutral Safety Switch.

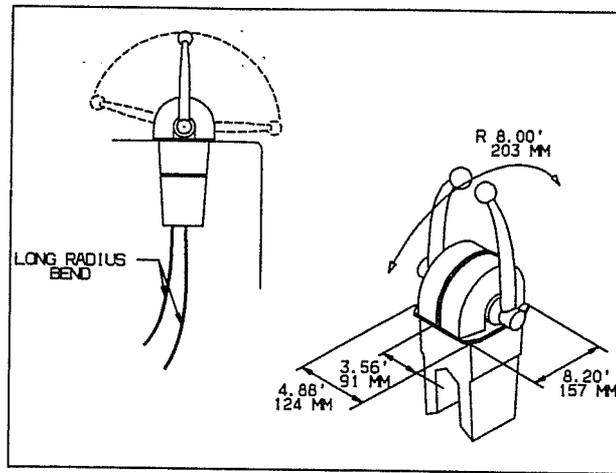


Fig. 1 - Control Box Clearances.

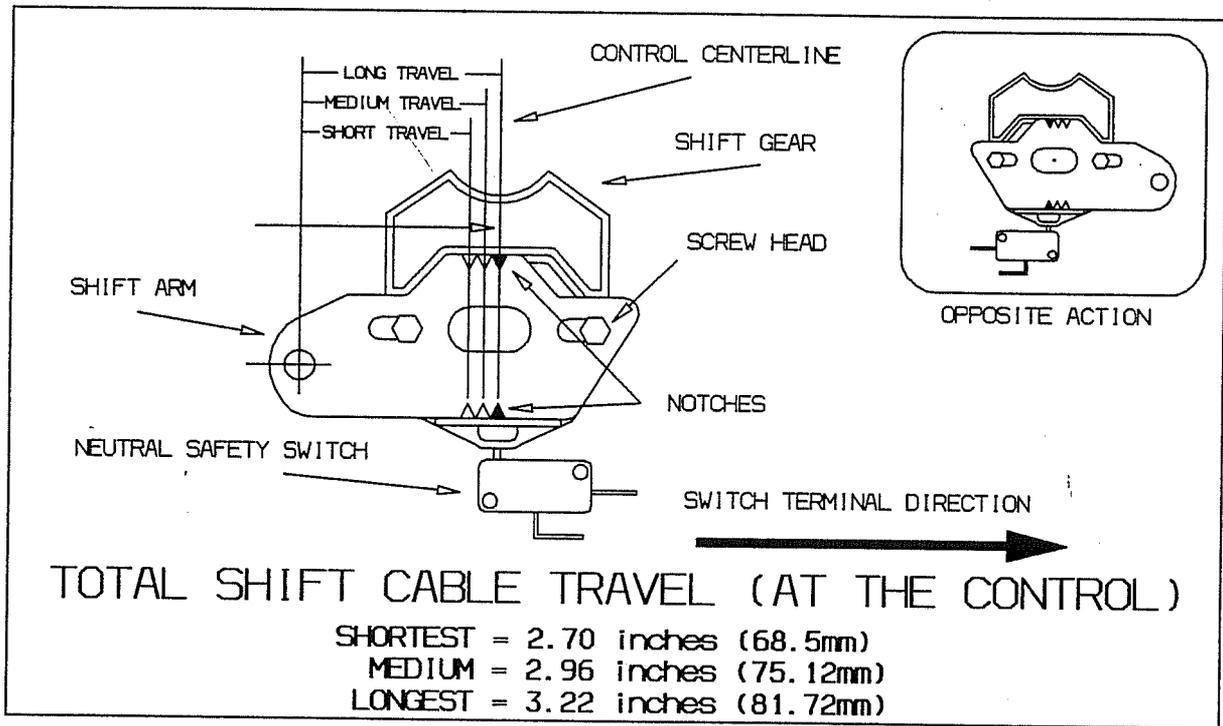


Fig. 2 - Shift Cable Travel Setting.

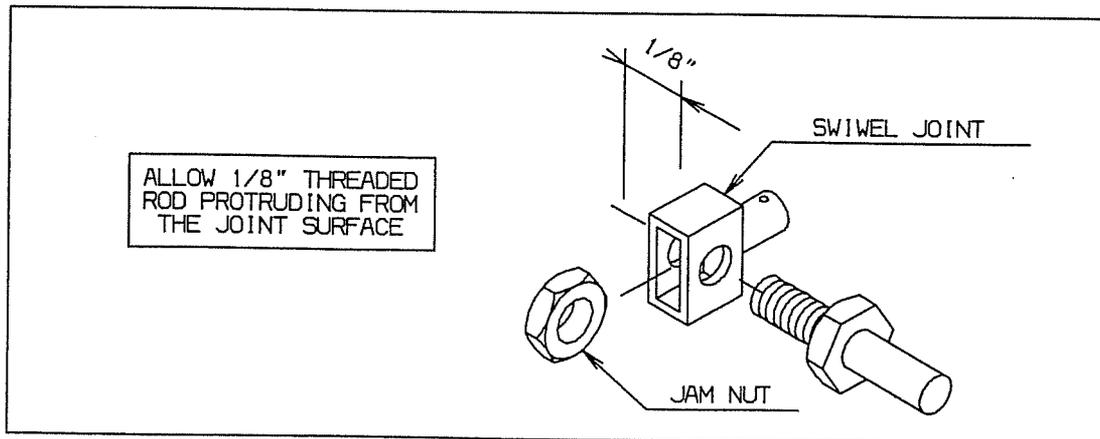


Fig. 3 - Shift Cable Swivel Connection.

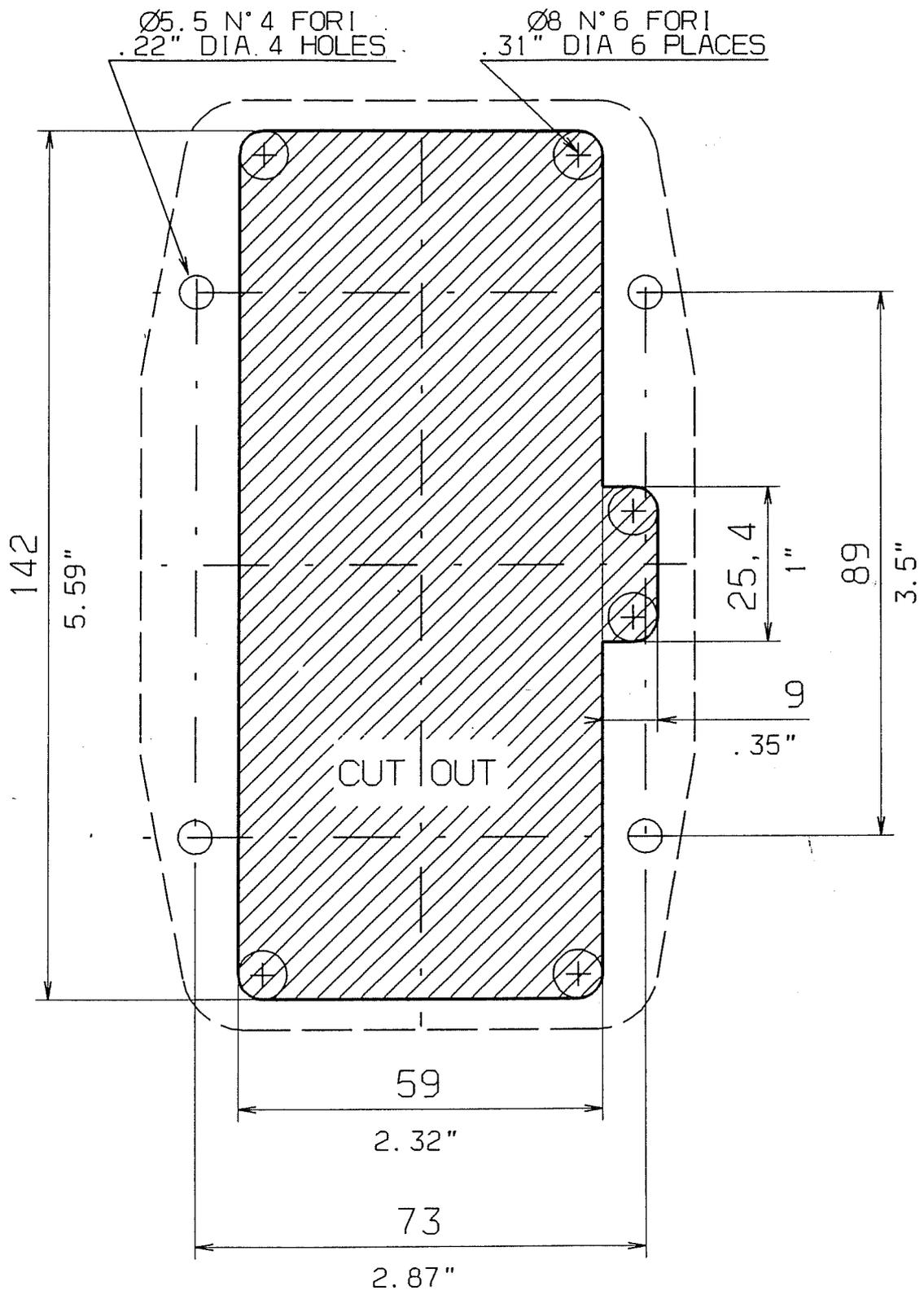


Fig. 8 - Single Control Template

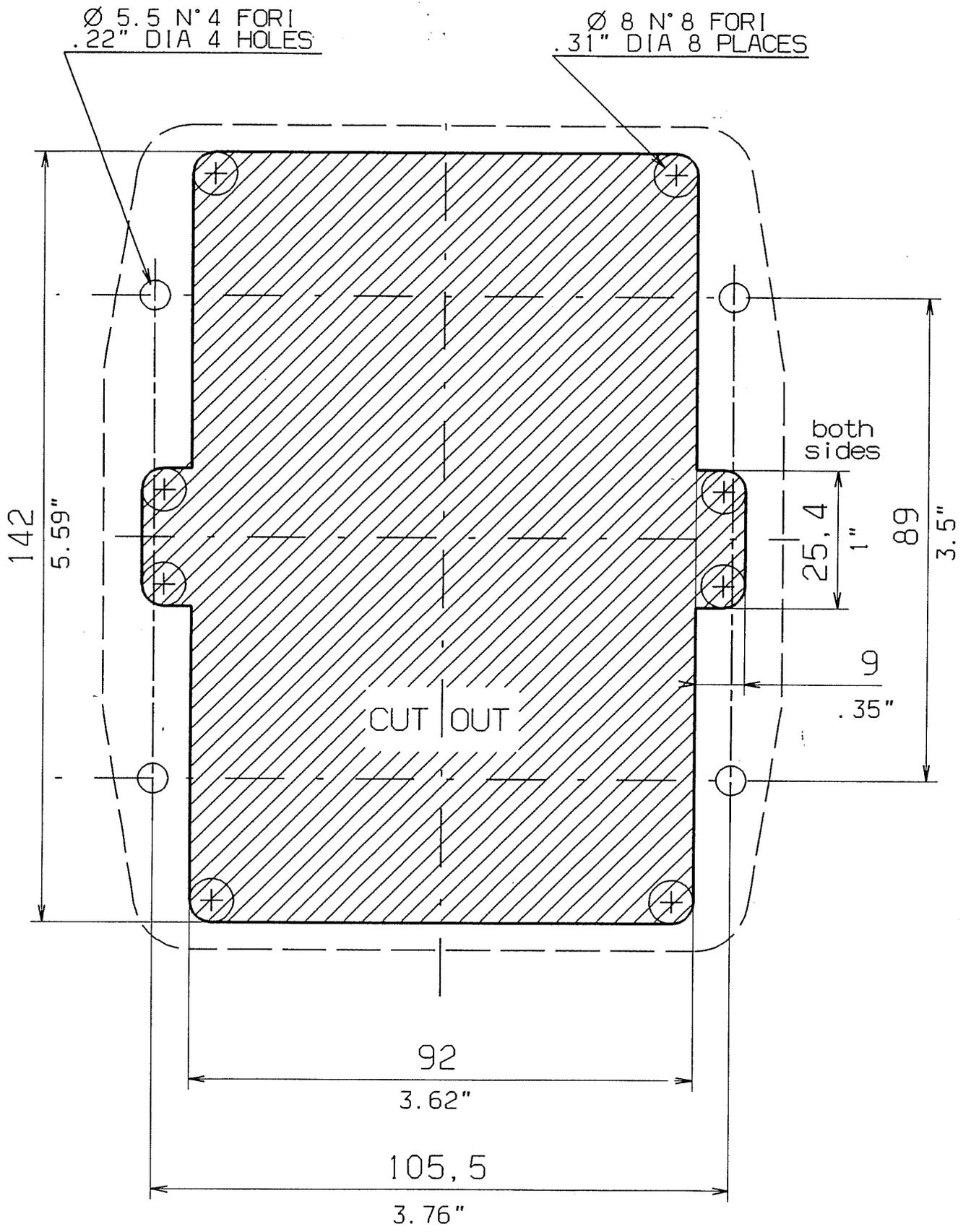


Fig. 9 - Dual Control Template