

## 11. STEERING UNIT



- In order to prevent an electric shock and short circuit, be sure to turn power off before performing work by touching the interior parts of the product.
- Be careful not to damage the wires. Damaged wires may cause electric shock or short circuit or present a fire risk.
- Do not touch undesignated places. Touching places not designated can cause electric shock or short circuit.
- This work should be performed by the site maintenance individual or other skilled professional. Performing work by non-technical personnel can cause electric shock hazard.
- Do not perform work other than those specified in this Manual in order to prevent accidents during performing work and operation after performing work. Performing work not specified in this Manual may require special training for this product. If performing work other than those stated in this manual is required for repair, contact the offices herein stated in this manual or where you purchased the product from and ask for repair or inquire how to repair.
- Be very careful when soldering. Handling a soldering iron carelessly may result in a fire or a burn.
- Be extremely careful when heating the heat-shrinkable tube. Failure to do so may result in a fire or burns.
- After making adjustments or replacements, check the surrounding area before turning the power on. The machine will automatically go through initialization after the power is turned on, and any persons in the vicinity may be struck and/or knocked down by the moving seat.



- Exercise extreme caution when handling the internal parts of the Steering Unit. Watch out for damage, warping and loss. The loss of just one piece may result in damage to or lead to faulty operation of the entire unit.
- When securing the plastic-made parts, do not excessively fasten screws and nuts. Failure to observe this may damage the parts and cause injury due to fragments resulting from damage.



- When adjusting or changing the variable resistor, set the variable resistor values on the Volume Settings screen and check the values on the Input Test screen in Test mode.
- After adjusting or replacing a microswitch, be sure to verify that the switch turns on and off correctly on the Input Test screen in Test mode.

If steering unit response is less than ideal and adjusting the settings on the Volume Settings screen in Test mode has no effect, the problem is most likely due to an incorrectly engaged gear, an improperly placed microswitch, or a broken variable resistor or microswitch.

Follow the steps listed below to correct the gear engagement, adjust the position of the switch, or replace the variable resistor or switch.

Refer to Section 12, "Maintaining the Base Interior", for instructions on how to: adjust and replace the direction control variable resistor.

## 11 — 1 ADJUSTING AND REPLACING THE Y-AXIS VR

The variable resistor that detects the forward and backward tilting operation of the steering unit is called the Y-axis steering VR. Follow the steps listed below to adjust the gear engagement or replace the VR.

In this machine, the VR will not be damaged as long as its axle is rotating within its range of motion when the handles on the machine are tilted to their maximum extent. Secure the VR so that its axle points in the indicated direction and the gear is properly engaged when the handles are not being tilted.

The following tools and instruments are required to perform these operations:

- 3mm diameter hexagonal screwdriver or wrench
- M4-size Phillips screwdriver
- 1.5mm diameter hexagonal screwdriver or wrench
- 10mm diameter spanner
- Soldering iron

### ADJUSTMENT PROCEDURE

- ① Turn off the power.
- ② Remove the 4 hexagonal socket screws around the boost button.

HEXAGONAL SOCKET SCREW (4), black  
M4×10, chrome

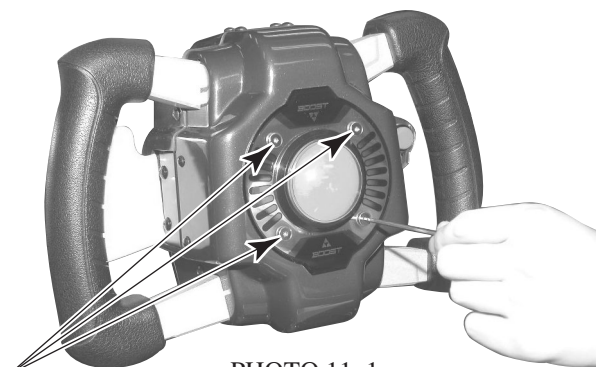


PHOTO 11. 1 a

- ③ Remove the 4 truss screws holding the top and bottom of the front steering cover in place.

TRUSS SCREW (4), black  
M4×6

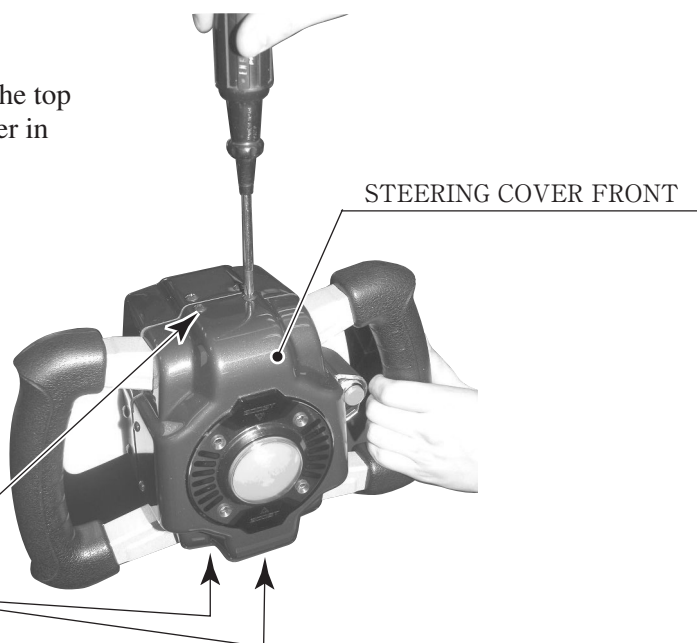


PHOTO 11. 1 b

- ④ Remove the 4 truss screws holding the left and right sides of the front steering cover in place.

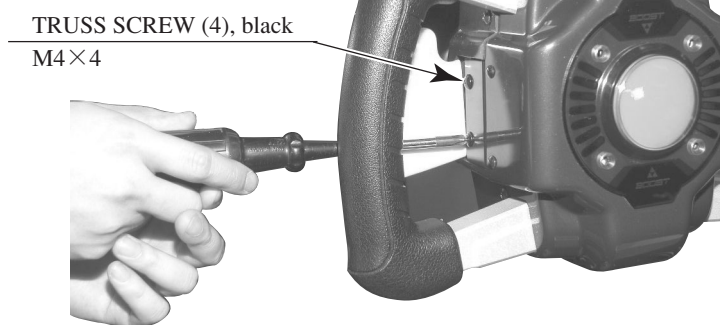


PHOTO 11. 1 c

- ⑤ Detach the front steering cover. There are several wires connected to the inside of the cover. Remove the cover slowly and unplug the connectors, taking care not to damage the wiring.

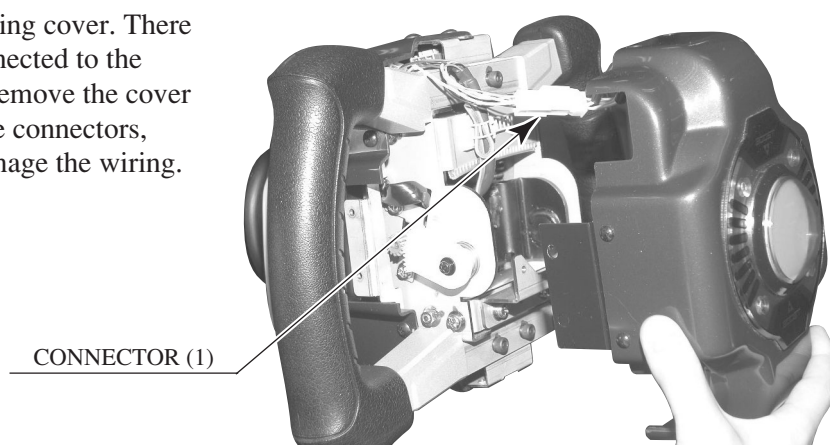


PHOTO 11. 1 d

- ⑥ Remove the 4 truss screws holding the top and bottom of the rear steering cover in place.

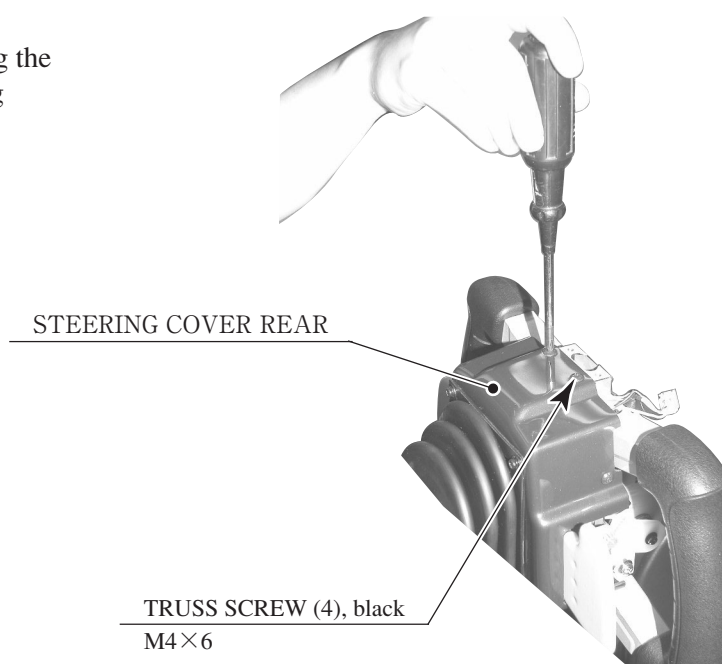


PHOTO 11. 1 e

- ⑦ Remove the 4 truss screws holding the left and right sides of the rear steering cover in place.

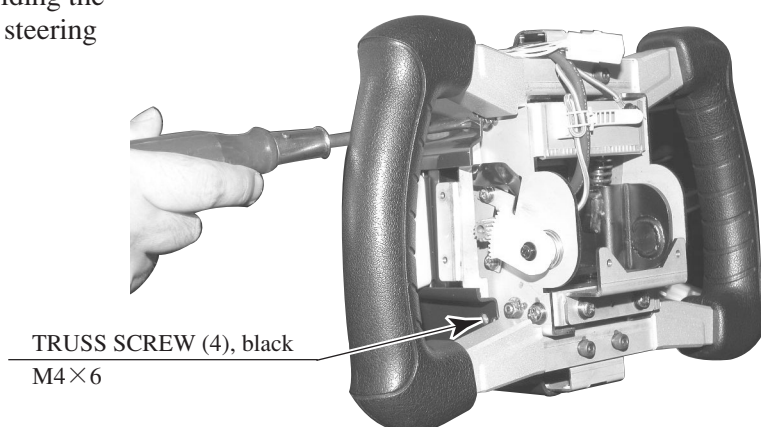


PHOTO 11.1 f

- ⑧ Push the rear steering cover towards the interior of the machine, pressing down on the accordion-fold behind the cover. The Y-axis VR should now be visible inside the cover, on the left side when facing the monitor.

NOTE: The steering unit has been removed in this photograph for better visibility. It is not necessary to remove the steering unit when performing the actual operation.

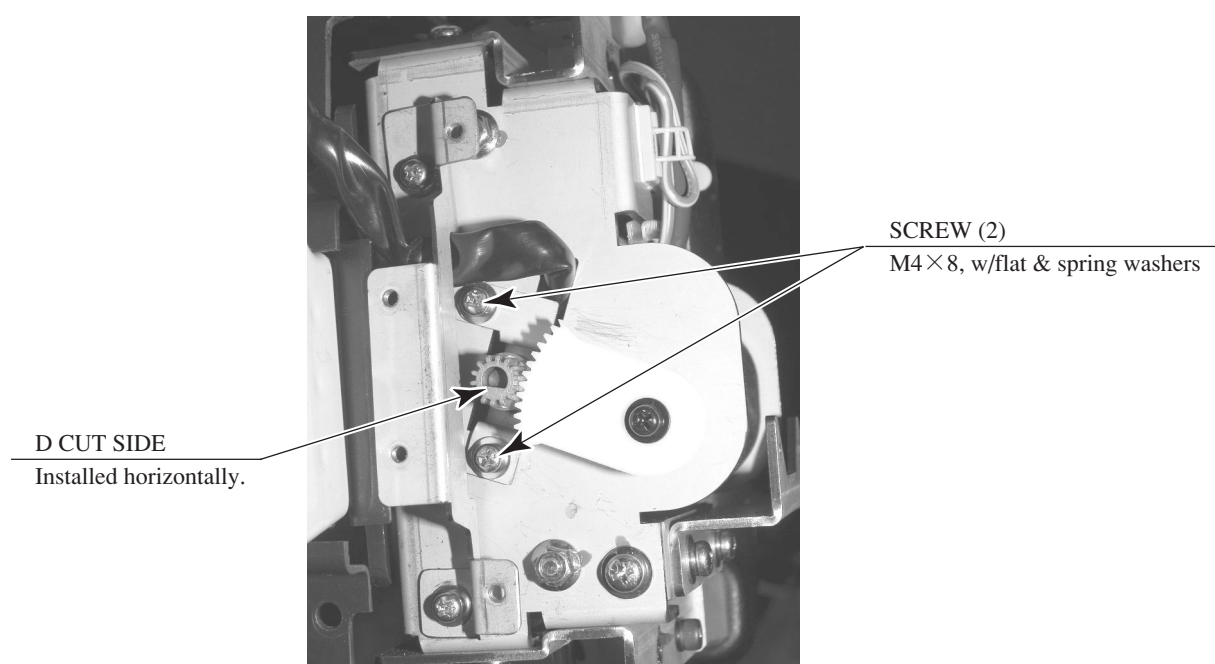


PHOTO 11.1 g

- ⑨ Loosen the 2 screws holding the variable resistor bracket in place, move the variable resistor bracket, and adjust the gear engagement for angle and positioning.

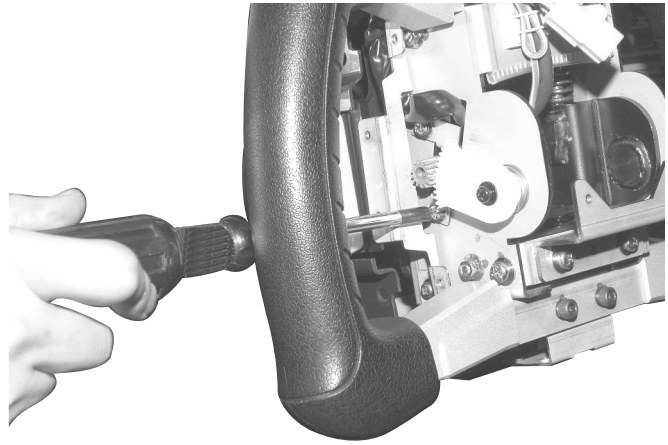


PHOTO 11. 1 h

- ⑩ Engage and secure the gear at such an angle that the D-cut side of the VR axle is horizontal and facing downward when the steering unit is not tilted.
- ⑪ Manipulate the steering unit and make sure the gear is turning smoothly.
- ⑫ Repeat the above steps in reverse to replace the front and rear steering covers. Take care not to pinch the wires or overtighten screws.  
Note that the screws used to secure the left and right sides of the front steering cover have different dimensions from the others. Check the screw sizes before installing them.
- ⑬ Adjust the variable resistor settings on the Volume Settings screen. (see 10-3G.)
- ⑭ Check to make sure the "STEERING Y" value on the Input Test screen is within the range  $78H \pm 8H$ .

## REPLACEMENT PROCEDURE

- ① Perform steps ① through ⑦ under "Adjustment Procedure" to detach the front and rear steering covers.
- ② Unplug the Y-axis VR wire connectors and unfasten the harness lug holding the wiring in place.

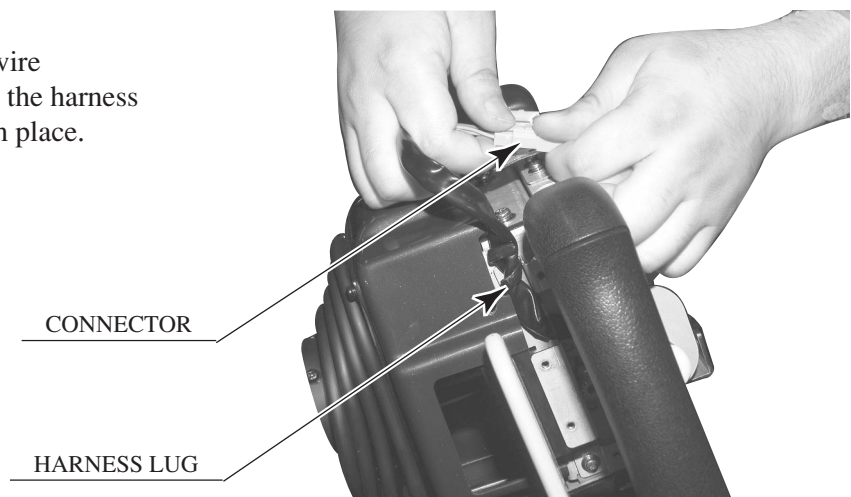


PHOTO 11. 1 i



- ③ Remove the 2 screws holding the variable resistor bracket in place and then remove the Y-axis VR, bracket and all.

SCREW (2)  
M4×8, w/flat & spring washers

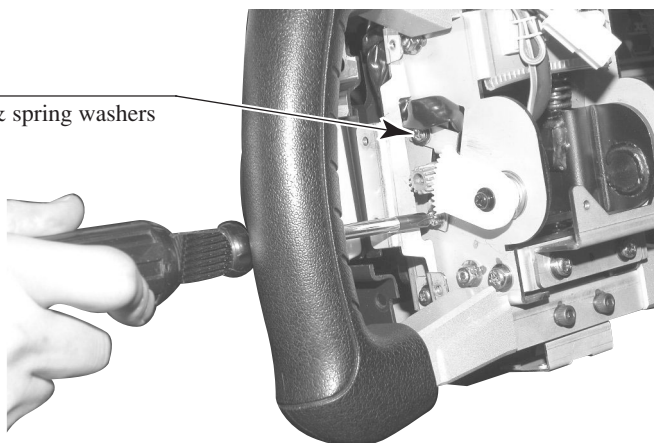


PHOTO 11. 1 j

HEXAGON SOCKET SCREW (2)  
M3×4

- ④ Loosen the 2 hexagon socket screws holding the gear in place and disengage the gear from the VR axle.

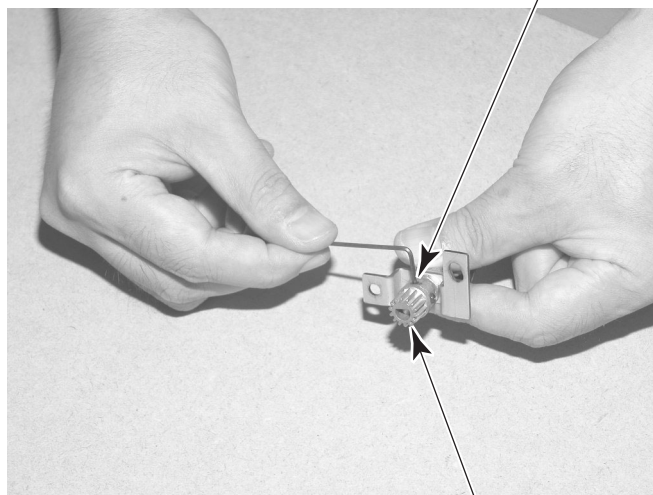


PHOTO 11. 1 k

GEAR

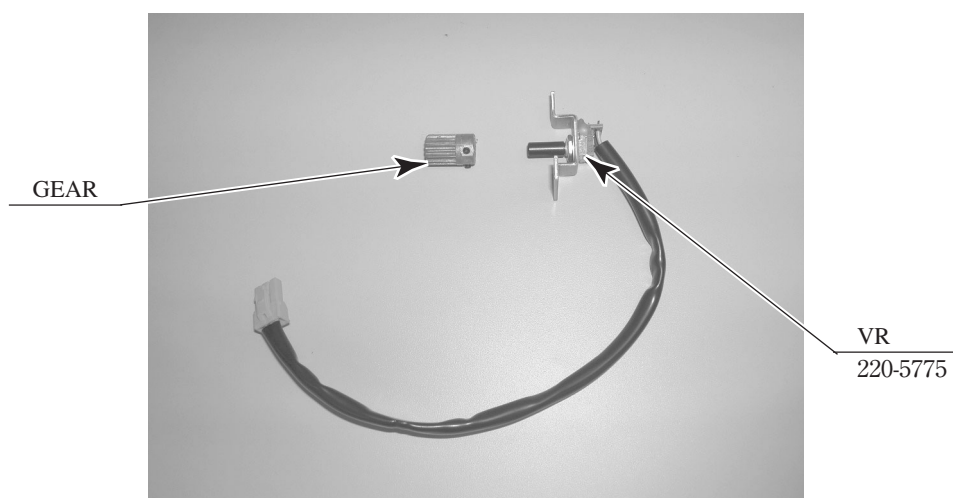


PHOTO 11. 1 l

- ⑤ The wires connected to the old VR can be reused for the new VR. Use the soldering iron to melt the welds and remove the wires from the VR.
- ⑥ Solder the wires to the new VR. Check the wiring diagram to make sure there are no mistakes in the wiring.

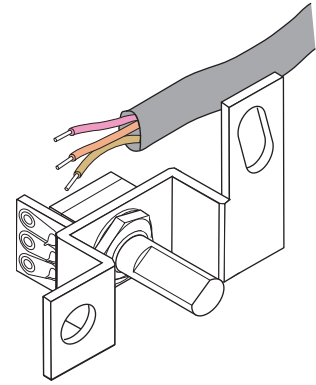


FIG. 11. 1

- ⑦ Attach the gear to the new VR.
- ⑧ Install the new Y-axis VR. Engage and secure the gear at such an angle that the D-cut side of the VR axle is level and facing downward when the steering unit is not being tilted.
- ⑨ Manipulate the steering unit make sure the gear is turning smoothly.
- ⑩ Plug in the wiring connectors and secure the wires with the harness lug.
- ⑪ Repeat the above steps in reverse to replace the front and rear steering covers. Take care not to pinch the wires or overtighten screws.  
Note that the screws used to secure the left and right sides of the front steering cover have different dimensions from the others. Check the screw sizes before installing them.
- ⑫ Adjust the variable resistor settings on the Volume Settings screen. (see 10-3G.)
- ⑬ Check to make sure the "STEERING Y" value on the Input Test screen is within the range  $78H \pm 8H$ .

## 11 — 2 REPLACING THE MICROSWITCHES

Movement in the steering unit's paddle levers is detected by 2 microswitches on the bottom of the interior of the steering cover. Follow the steps listed below to replace or adjust the position of these switches.

Note that each of the 2 microswitches on the bottom of the steering unit is linked to the paddle on the OPPOSITE side in the "PADDLE LEFT/RIGHT" test on the Input Test screen; that is, the microswitch on the right controls the "PADDLE LEFT" value, and vice-versa. Check to make sure the switch being replaced or adjusted is the correct one.

The following tools and instruments are required for the following operations:

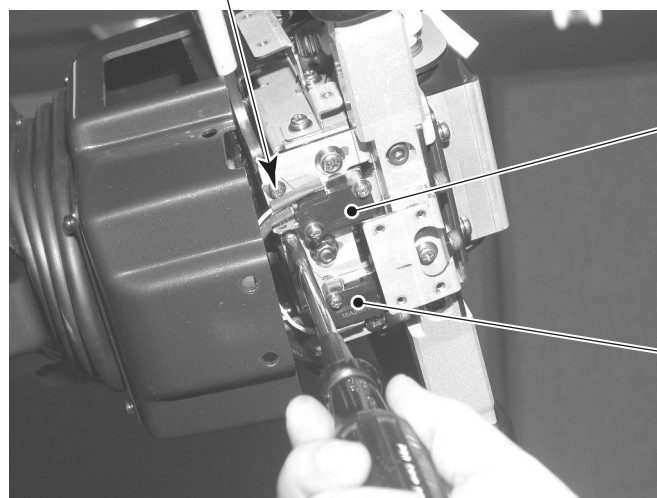
- 3mm diameter hexagonal screwdriver or wrench
- M4-size Phillips screwdriver
- M3-size Phillips screwdriver
- Nippers
- Cutters
- Soldering iron
- Industrial dryer

### ADJUSTMENT PROCEDURE

- ① Perform steps 1 through 7 for adjusting the Y-axis VR to remove the front steering cover and detach the rear steering cover (see 11-1).
- ② Loosen the 2 screws securing the SW ADJUST plate on which the microswitch to be adjusted is installed, and then move the SW ADJUST plate to adjust it. Do not loosen the screws on the side the microswitch is installed on.

SCREW (2)

M3×6, w/flat & spring washers



PADDLE RIGHT SIDE SWITCH

PADDLE LEFT SIDE SWITCH

PHOTO 11. 2 a



- ③ Adjust the switch so that the roller on its actuator terminal touches the pin that interlocks with the paddle lever when the lever is not being manipulated.
- ④ Tighten the 2 screws.
- ⑤ Manipulate the paddle lever to make sure the microswitches are turning on and off properly. Listen for a clicking sound. Also, make sure that the switch does not adhere to the actuator itself when turned on.
- ⑥ Replace the front and rear steering covers. Take care not to pinch the wires or overtighten the screws.  
Note that the screws used to secure the left and right sides of the front steering cover have different dimensions from the others. Check the dimensions of the screws before installing them.
- ⑦ On the Input Test screen, check to make sure that the microswitches turn on and off consistently when the paddle levers are manipulated (see 10-3B).

## REPLACEMENT PROCEDURE

- ① Remove the front steering cover and detach the rear steering cover (see 11-1).
- ② Unplug the wire connectors from the microswitch and unfasten the harness lug holding the wires in place.

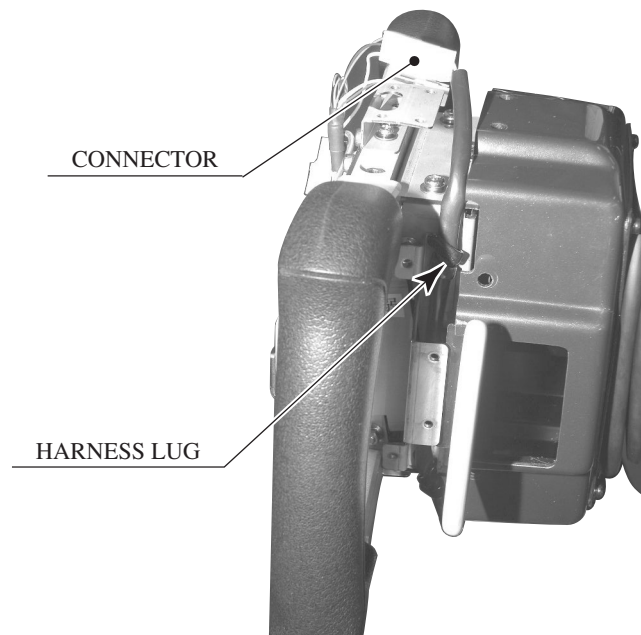


PHOTO 11. 2 b

- ③ Remove the 2 screws holding the SW ADJUST plate in place and then remove the microswitch together with the SW ADJUST plate.

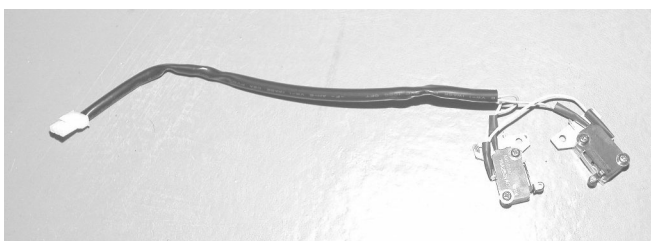
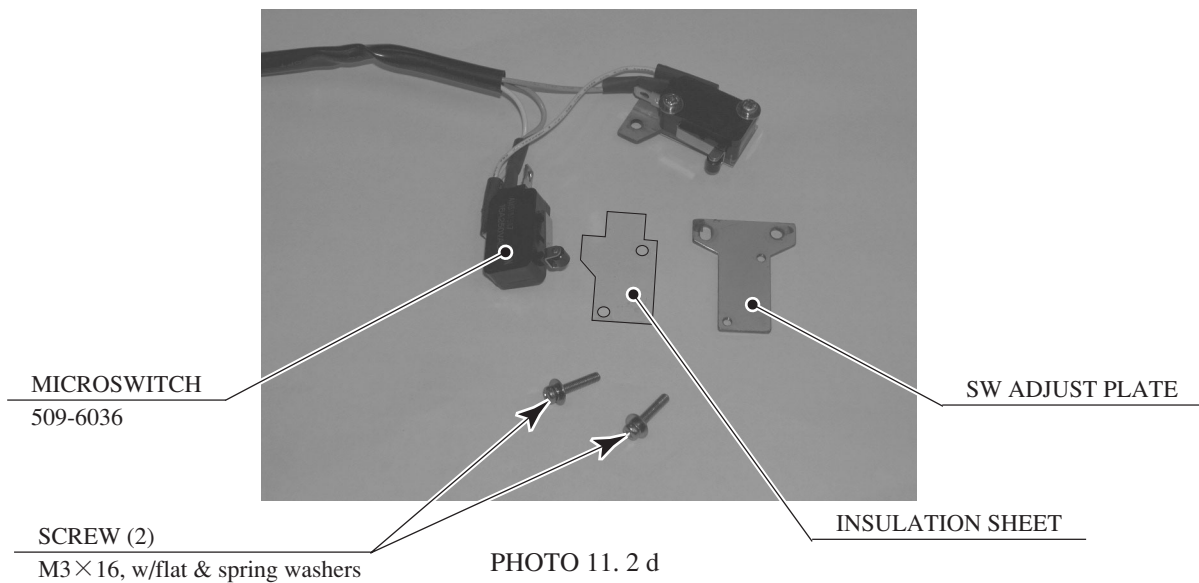


PHOTO 11. 2 c

- ④ Remove the 2 screws securing the microswitch to be replaced and then remove the SW ADJUST plate and the transparent insulation sheet.



- ⑤ The wires connected to the old microswitch can be reused for the new microswitch. Remove the heat contraction tube covering the soldered areas, use the soldering iron to melt the solder, and remove the wires from the microswitch.
- ⑥ Solder the wires to the new microswitch. Check the wiring diagram to make sure there are no mistakes in the wiring. In addition, use a heat contraction tube or other protection to prevent short-circuiting.
- ⑦ Attach the SW ADJUST plate and the insulation sheet to the new microswitch and secure them with 2 screws. Be sure to insert the insulation sheet between the switch and the plate.
- ⑧ Install the SW ADJUST plate with the new microswitch in the bottom of the steering unit. Adjust the position of the plate so that the roller on the microswitch's actuator terminal touches the pin that interlocks with the paddle lever when the lever is not being manipulated, and secure it with 2 screws.
- ⑨ Connect the wire connectors and secure the wires with a harness lug.
- ⑩ Manipulate the paddle lever to make sure the microswitches are turning on and off properly. Listen for a clicking sound. Also, make sure that the switch does not adhere to the actuator itself when turned on.
- ⑪ Replace the front and rear steering covers. Take care not to pinch the wires or overtighten the screws.  
Note that the screws used to secure the left and right sides of the front steering cover have different dimensions from the others. Check the dimensions of the screws before installing them.
- ⑫ On the Input Test screen, check to make sure that the microswitches turn on and off consistently when the paddle levers are manipulated (see 10-3B).



- Be sure to use the designated type of grease. If a non-designated type grease is used, components may break.
- Do not apply grease to any part of the machine other than those parts specifically indicated. Doing so may result in malfunctioning and/or deterioration of parts.
- The period for greasing specified herein is a standard. Apply greasing to the specified portions as occasion arises.

Use spray grease once every three months to grease up the gear mesh portion of the constituent parts.

Use "Grease Mate" (part number 090-0066) for the spray grease.

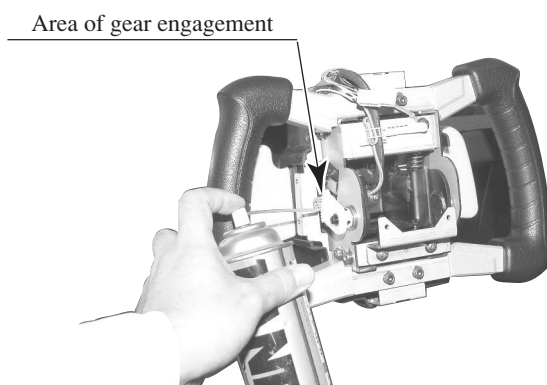


PHOTO 11. 3