

# EFX 821

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**Warning:** This service manual is for use by Precor trained service providers only. If you are not a Precor Trained Servicer, you must not attempt to service any Precor Product; Call your dealer for service.

This document contains information required to perform the majority of troubleshooting, and replacement procedures required to repair and maintain this product.

This document contains general product information, software diagnostic procedures (when available), preventative maintenance procedures, inspection and adjustment procedures, troubleshooting procedures, replacement procedures and electrical block and wiring diagrams.

To move directly to a procedure, click the appropriate procedure in the bookmark section to the left of this page. You may "drag" the separator bar between this page and the bookmark section to change the size of the page being viewed.

## Section One - Things you Should Know

### Right, Left, Front, and Back Conventions

In this manual, right, left, front, and back are from the perspective of a user standing on the EFX facing the display enclosure.

### General System Information

- The generator performs three functions in the EFX. First, by controlling the amount of electrical load applied to the generator, the user's pedaling resistance is controlled. Second, the generator is used to charge the EFX's internal battery. Lastly, one of the generator's six phase output windings is monitored to determine when the unit is in use and when it is idle. This system also determines the stride rate by determining the operating speed (output frequency) of the monitored generator winding.

### Warning and Caution Statements and General Safety Guidelines

Warning statements indicate a particularly dangerous activity. Warning statements you will find in this manual include:

- If the EFX has been in recent use, the load resistors and load resistor mounting bracket may be extremely hot.
- Because this is a self powered unit, it will either be necessary to either equip the unit with the optional external power supply or have an assistant pedal on the unit while voltage measurements are being taken. Because of the danger of working on the unit while it is in motion using the optional external power supply is strongly recommended.
- When the unit is used, stairarms are in motion; the generator will operate and produce potentially hazardous voltages even when the battery is disconnected.
- To remove power from the EFX, the optional external power supply (when equipped) must be disconnected from the wall outlet and the red (positive) lead must be disconnected from the battery. Always ensure that the EFX external power supply is unplugged from the wall outlet and the red (positive) lead is removed from the battery when you inspect or adjust the EFX, or when you isolate, remove, or replace an EFX component.
- Removing the covers exposes high voltage components and potentially dangerous machinery. Exercise extreme caution when you perform maintenance procedures with the cover(s) removed.
- During service operations you will be very close to moving machinery and voltage bearing components. When you perform maintenance procedures with the covers removed, remove jewelry (especially from ears and neck), tie up long hair, remove neck ties, and do not wear loose clothing.
- Exercise caution when touching any wire or electrical component during EFX operation.

- A pinching hazard exists when the unit is operated by turning the crankarms by hand. It is possible to seriously pinch a finger between the crankarm and stairarm. The stairarms should be removed before operating the crankarms by hand. Caution statements are intended to prevent damage to the EFX as a result of the current activity. Caution statements included in this manual are listed below.
- When it is necessary to lift or move the EFX, ensure that the EFX has adequate support and that you use proper lifting techniques.

### **Safety guidelines you should know and follow include:**

- Read the owner's manual and follow all operating instructions.
- Operate the EFX on a solid, level surface. Visually check the EFX before beginning service or maintenance operations. If it is not completely assembled or is damaged in any way, exercise extreme caution while operating and checking the EFX.
- When operating the EFX, do not wear loose clothing. Do not wear shoes with heels or leather soles. Check the soles of your shoes and remove any embedded stones. Tie long hair back.
- Do not rock the unit. Do not stand or climb on the handlebars, display enclosure, or cover.
- Do not set anything on the handlebars, display enclosure, or cover. Never place liquids on any part of the EFX, while performing service.
- To prevent electrical shock, keep all electrical components away from water and other liquids.
- Do not use accessory attachments that are not recommended by the manufacturer-such attachments might cause injuries.

### **General Information**

For the latest exploded view, part number and part pricing information, visit the Precor dealer website at "[www.precor.com/connection](http://www.precor.com/connection)".

### **Tools Required**

Multimeter	Allen wrench set
Anti-static kit	Screwdriver set
4" - 6" gear puller	7/16" allen key, socket wrench mounted
Precor part number 20030-108 belt gauge	Straight edge
US and metric end wrench set	
US and metric socket wrench set	
Torque wrench, 200 in./lbs.	
Torque wrench, 200 ft./lbs	



**Section Two – Future Content**

**Section Three – Future Content**

**Section Four – Future Content**

**Section Five – Future Content**

## Section Six - P20 Console - EFX



## Procedure 6.1 - P20 - Accessing the Diagnostic Software

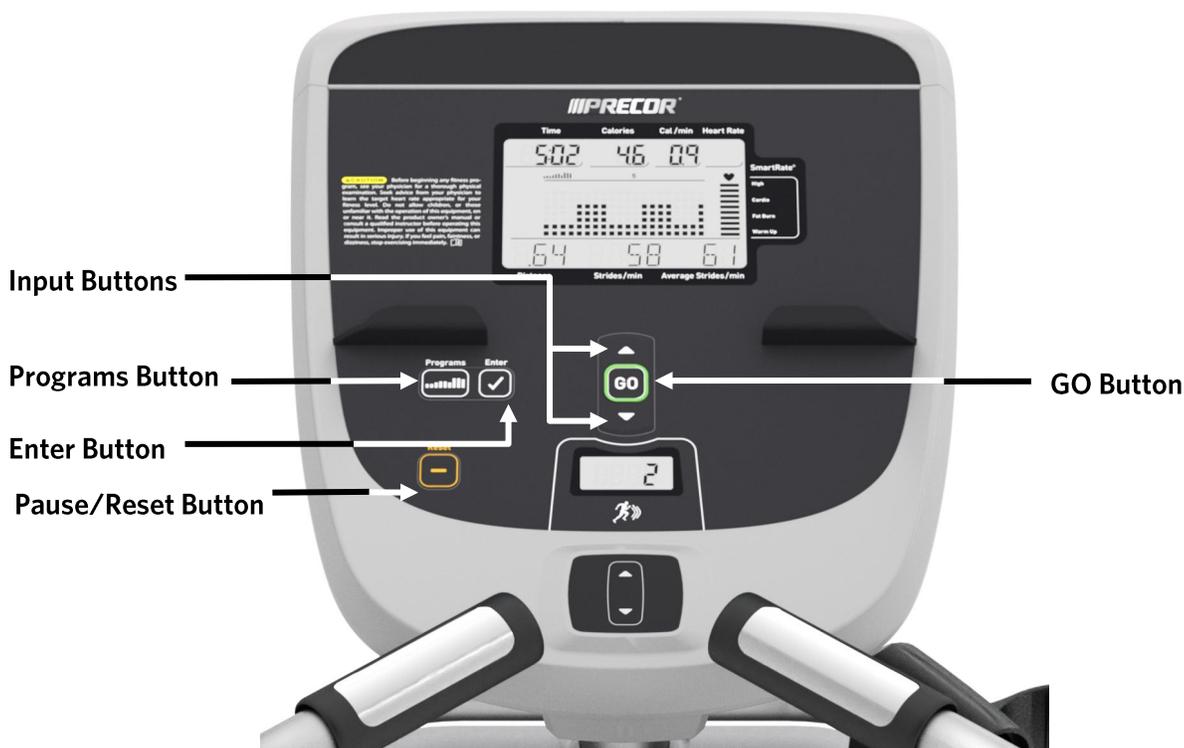
The P20 Console diagnostic software consists of the following modes:

- Beeper Test
- Display Test
- Keyboard Test
- Heart Rate Test
- Machine Test
  - Power Bits Test
  - Brake Test
  - RPM Test
  - Battery Test

### Procedure:

1. Treadmills - Plug the power cord into the wall outlet, and then turn on the treadmill with the circuit breaker. (Treadmill Only)
2. To access this menu from Banner state follow this sequence: **PAUSE/RESET, ENTER, PROGRAMS, INPUT DOWN▼, INPUT UP▲, ENTER, INPUT DOWN▼, INPUT UP▲, and PROGRAMS** sequentially.
3. Use the:
  - **INPUT UP▲ and INPUT DOWN▼** keys to move through the different tests.
  - **GO** key to select the test needed.
  - **PROGRAMS** key to back up one level until reaching Banner state.
  - **PAUSE/RESET** key to return the unit to Banner state from anywhere in the menus.

### Diagram 6.1.1 - P20 Console



4. **BEEPER TEST** will scroll across the display. The display will prompt the user to test the beeper sound. Push the **"GO"** key to select the test.
5. Press the **PROGRAMS** key to exit the belt beeper test.
6. Push **INPUT DOWN▼**, to go to the next test.
7. **KEYBOARD TEST** will scroll across the display.
8. Press the **GO** key, a representation of all of the keys on the console will be displayed. Pressing a key on the console will cause the illuminated representation of that key to turn off. Press all of the keys on the console to ensure that all of the keys are functioning.
9. Press and hold **RESET/PAUSE** key for five seconds to back out of this test.
10. Push **INPUT DOWN▼**, to go to the next test.
11. **LCD TEST** will scroll across the display
12. Press the **GO** key, the unit will test all the different sections of LCD display screen then all sections on, advancing through each section. Check the display to ensure that all LED segments are illuminated.
13. Press the **INPUT DOWN▼**, key, **HEART RATE** will be displayed.
14. Press the **GO** key, grasp both of the heart rate grips on the handlebar, after a couple of seconds the heart rate will be displayed in the heart rate and smart rate displays.
15. Use chest strap transmitter or a test transmitter to test the wireless heart rate function, after a couple of seconds the heart rate will be displayed in the heart rate and smart rate displays.
16. Press the **PROGRAMS** key to exit the heart rate test.
17. Press the **INPUT DOWN▼**, key, **MACHINE TEST** will scroll across the display.
18. You may now proceed to either the brake test or the PWRB test. Press the **INPUT DOWN▼**, key once to access the belt PWRB test or twice to access the BRAKE test.
19. **BRAKE TEST** test. Press the **GO** key, the console will display the power bits (PWRB).
20. Press the **▼** key, the console will display **BRAKE**.
21. Press the **PROGRAMS** key to exit the **BRAKE** test. Press the **INPUT DOWN▼**, RPM will be displayed.
22. Press the **GO** key, **PULSE** will be displayed with the current speed pulse count.
23. Press the **PROGRAMS** key to exit the **PULSE** test. Press the **INPUT DOWN▼**, BATTERY will be displayed.

24. Press the **GO** key, the battery voltage will be displayed as **XX.X VDC**.
25. Press the **PROGRAMS** key to exit the BATTERY test.
26. Press the **PAUSE/RESET** key to exit the hardware validation test.

## Procedure 6.2 – P20 – Displaying Information

The information display will access the following data;

- Odometer
- Hour Meter
- U-Boot Software
- U-Base Software
- Lower Software
- Usage log
- Error Log

### Procedure

Plug the power cord into the wall outlet, and then turn on the treadmill with the circuit breaker. (Treadmill only)

1. To access this menu from Banner state follow this sequence: **PAUSE/RESET**, **INPUT UP▲**, and **ENTER** keys, sequentially.
2. Use the:
  - **INPUT UP▲** and **INPUT DOWN▼** keys to move through the different tests.
  - **GO** key to select the test needed.
  - **PROGRAMS** key to back up one level until reaching Banner state.
  - **PAUSE/RESET** key to return the unit to Banner state from anywhere in the menus.
3. **ODOMETER** display. Press the **GO** key.
4. The odometer will be displayed as **1234567 MILES** or **1234567 KM** depending on club parameter settings (See Procedure 6.3). The odometer is also used to provide the “distance stamp” for the error code log
5. **Note:** The odometer data is stored in non-volatile memory on the upper PCA. If the upper PCA is replaced the odometer data will be lost.
6. Press the **PROGRAMS** key to exit the odometer display.
7. Press **INPUT DOWN▼**, **HOUR METER** display. Press the **GO** key.
8. The operating time of the unit will be displayed as **12345 HOURS**. The operating time is defined as total amount of time that the unit has operated in program modes with the drive motor running. The hour meter is also used to provide the “time stamp” for the error code log.
9. Press the **PROGRAMS** key to exit the hour meter display.
10. Press **INPUT DOWN▼**, **U-BOOT SW** display. This display the installed version of upper boot software. The boot software is used to upload new software into the upper display PCA.
11. Press the **GO** key. The software part number will be displayed as **XXXXX-XXX**.

12. Press the **PROGRAMS** key to exit the U-Boot SW display.
13. Press **INPUT DOWN▼**, U-BASE SW display. This display the installed version of upper PCA software.
14. Press the GO key. The software part number will be displayed as **XXXXX-XXX**.
15. Press the **PROGRAMS** key to exit the U-Base SW display.
16. Press **INPUT DOWN▼**, LOWER SW display. This display the installed version of lower PCA software.
17. Press the **GO** key. The software part number will be displayed as **XXXXX-XXX**.
18. Press the **PROGRAMS** key to exit the lower SW display.
19. Press **INPUT DOWN▼**, USAGE LOG display. Press the **GO** key.
20. Use the **▲,▼** keys to move through the list of programs. A message will scroll describing the program, the number of times and the number of minutes the program was used.
21. Press the **PROGRAMS** key to exit the usage log display.
22. Press **INPUT DOWN▼**, ERROR LOG display. Press the GO key, the quantity of errors in the log will be displayed.
23. Press the GO key, the most recent error will be displayed first.
24. Use the **▲,▼** keys to move through the list of errors. The error messages will list the error name, the odometer reading when the error occurred, the hour meter when the error occurred and the drive motor current reading when the error occurred.
25. If you wish to clear the error log, press and hold the GO key for 5 seconds. The message **ERROR LOG CLEAR** will be displayed.
26. Press the **PAUSE/RESET** key to exit the information display.
27. Please note that the **ERROR LOG** may also be accessed at any time by pressing and holding the **PAUSE/RESET** key for five seconds. If the error log does not contain any errors, the message **STUCK KEY** will be displayed.

## Procedure 6.3 – P20 – Setting Club Parameters

This procedure allows you to change the following club settings:

- Safety Code
- Select Language
- Select Units
- Set Default Workout Time
- Set Max Workout Time
- Set Max Pause Time
- Set Cool Down Time

### Procedure

1. Plug the power cord into the wall outlet, and then turn on the treadmill with the circuit breaker.
2. To access this menu from Banner state follow this sequence: **PAUSE/RESET**, **ENTER**, **INPUT UP▲**, **ENTER**, **PROGRAMS**, **ENTER**, **INPUT UP▲**, and **ENTER** keys, sequentially.
3. Use the:
  - **INPUT UP▲** and **INPUT DOWN▼** keys to move though the different tests.
  - **GO** key to select the test needed.
  - **PROGRAMS** key to back up one level until reaching Banner state.
  - **PAUSE/RESET** key to return the unit to Banner state from anywhere in the menus.
4. Press **INPUT DOWN▼**, **SAFETY CODE** will be displayed. The safety code, when enabled, makes the user enter a password in order to start the treadmill. Press the **GO** key.
5. Use the **INPUT UP▲** and **INPUT DOWN▼** keys to toggle between **ENABLED** and **DISABLED**. If enabled is selected, the display will require the user to enter key combination (**PROGRAMS**, **ENTER**, **INPUT DOWN▼**, and **INPUT UP▲**, sequentially) as a password, in order to start a program.
6. Press the **PROGRAMS** key to exit the safety code display.
7. Press **INPUT DOWN▼**, **SELECT LANGUAGE** will be displayed. Press the **GO** key.
8. Use the **INPUT UP▲** and **INPUT DOWN▼** keys to toggle between the available languages.
9. Press the **PROGRAMS** key to exit the select language display.
10. Press **INPUT DOWN▼**, **SELECT UNITS** will be displayed. Press the **GO** key.
11. Use the **INPUT UP▲** and **INPUT DOWN▼** keys to toggle between **U.S** (miles per hour) and **METRIC** (kilometers per hour).
12. Press the **PROGRAMS** key to exit the set units display.
13. Press **INPUT DOWN▼**, **SET DEFAULT WORKOUT TIME** will be displayed. Press the **GO** key.
14. Use **INPUT UP▲** or **INPUT DOWN▼** key to toggle between ON and OFF. Press **ENTER** key to select.

15. When set to ON, "30" will be displayed, use **INPUT UP▲** or **INPUT DOWN ▼** key to increase or decrease time.
  - When set to OFF, programs time will be the value in MAX Workout Time
16. Press the **PROGRAMS** key to exit the set default workout time display.
17. Press **INPUT DOWN▼**, **SET MAX WORKOUT TIME** will be displayed. Press the **GO** key.
18. Use the **INPUT UP▲** or **INPUT DOWN▼** keys to select the maximum time a user can remain in a program.
19. Press the **PROGRAMS** key to exit the set max. workout time display.
20. Press **INPUT DOWN▼**, **SET MAX PAUSE TIME** will be displayed. Press the **GO** key.
21. Use the **▲,▼** keys to select the maximum time a program will remain in the pause mode.
22. Press the **BACK** key to exit the set max. pause time display.
23. Press **INPUT DOWN▼**, **SET COOL DOWN TIME** will be displayed. Press the **OK** key.
24. Use the **INPUT UP▲** or **INPUT DOWN▼** keys to select the cool down time. Press the **OK** key.
25. Press the **PROGRAMS** key to exit the set cool down time display.
26. Press the **PAUSE/RESET** key to exit Club Settings.

## Procedure 6.4 – P20 – Documenting Software Problems

When a problem is found with the software in the upper or lower PCA, record the information listed below.

### When a problem occurs, record the following information:

- Model and serial number
- Software version number
- Program number running when the problem occurred

### A description of:

- What happened or failed to happen.
- The action taken by the user just before the problem occurred.
- Problem-related information (such as how far into the program the problem occurred, the work level being used when the problem occurred, error code displayed, etc.).
- The frequency of occurrence.

## Procedure 6.5 – P20 – Replacing Upper PCA

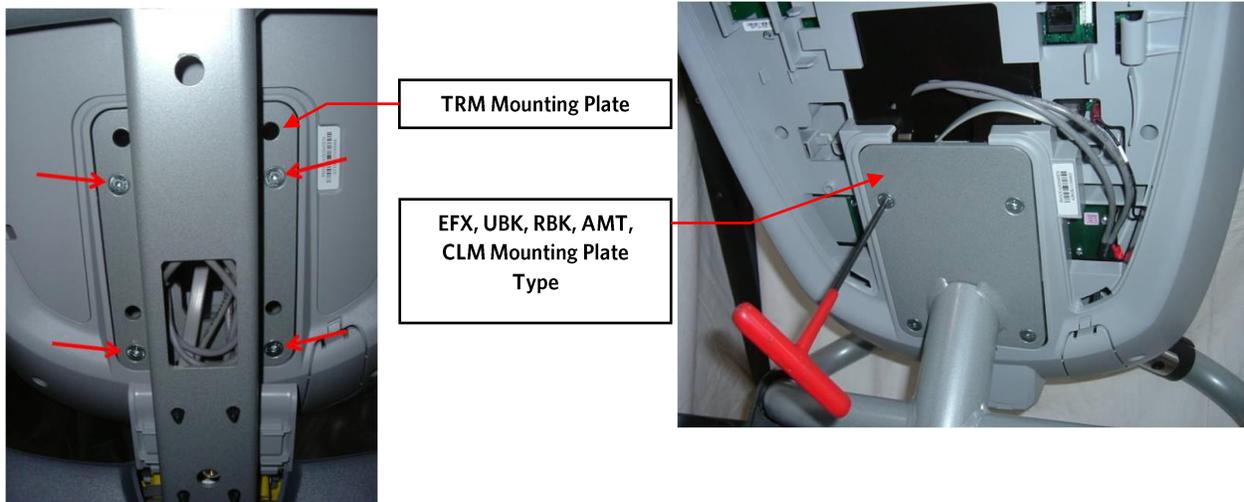
1. Set the treadmill circuit breaker in the “off” position and unplug the treadmill’s line cord from the AC outlet. (Treadmill Only)
2. The PCA’s in the console are static sensitive. They can be damaged if proper static prevention equipment is not used. Attach an anti-static wrist strap to your arm, and then connect the ground lead of the wrist strap to the treadmill’s frame ground.
3. Remove the two screws that fasten the dash transition cover and remove the cover. **See Diagram 6.5.1**

Diagram 6.5.1 – Dash Transition Cover (Treadmill Only)



4. Remove the four screws that fasten the console to the dash mounting plate. **See Diagram 6.5.2.**

Diagram 6.5.2 – Dash Mounting Plate



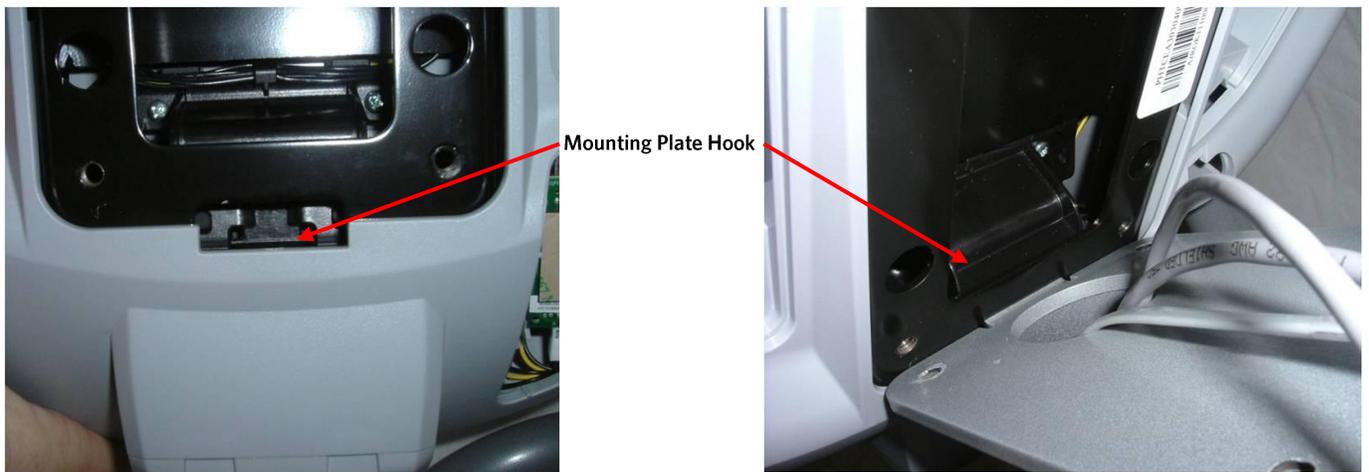
5. Remove the two screws that fasten the access panel to the console. **See Diagram 6.5.3**

Diagram 6.5.3 – Console Access Panel



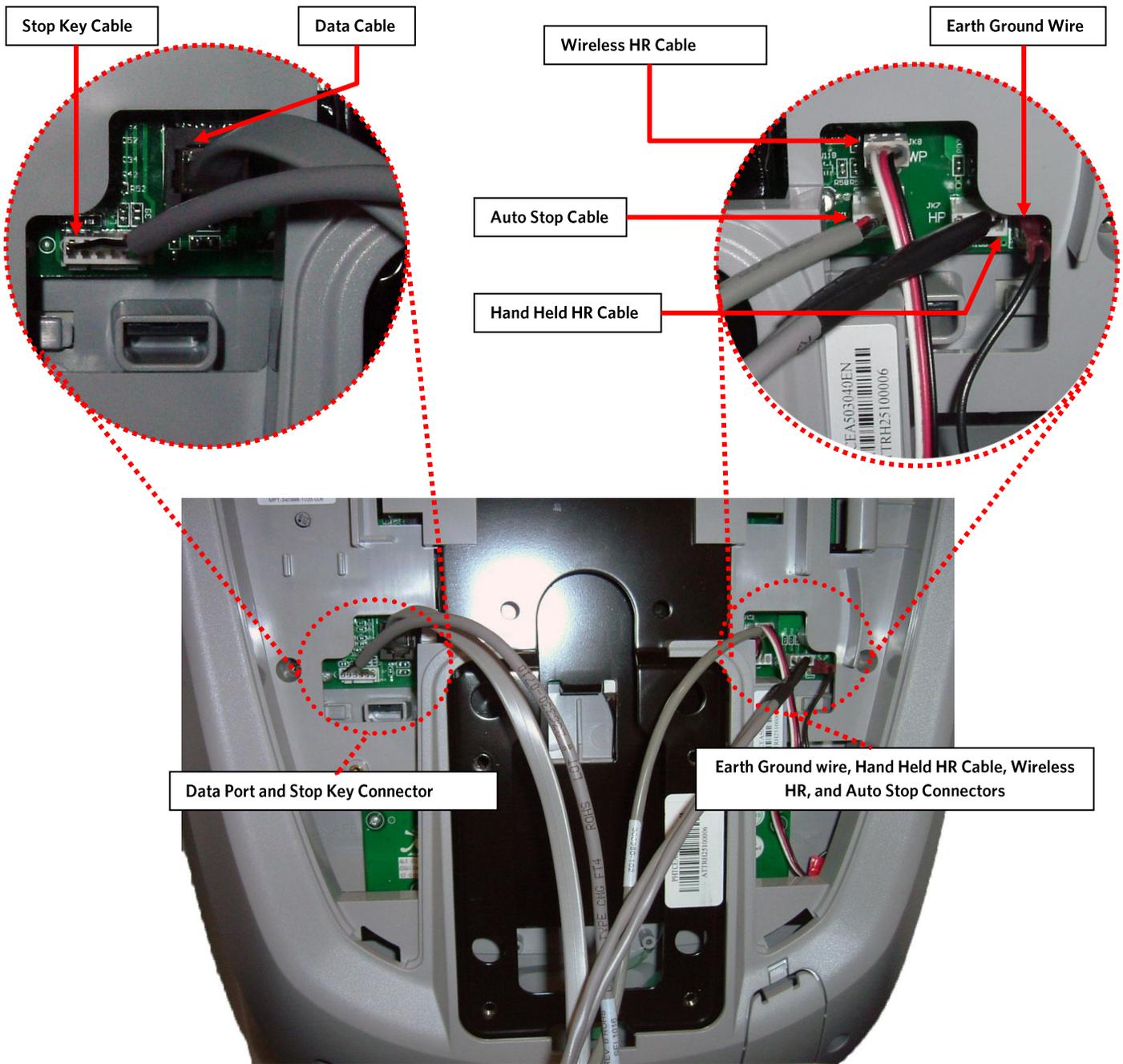
6. Remove access panel:
  - a. Treadmills: Lift the console off the maintenance and then position the console so that the back panel is accessible and remove the back cover.
  - b. AMT's, EFX's, CLM's, UBK's, and RBK's: Tilt the console forward on the maintenance access hook on the dash weldment and remove the back. **See Diagram 5.5.4.**

Diagram 6.5.4 – Maintenance Access Hook



7. Disconnect the Data cable, Auto Stop cable (Treadmill only), Stop Key cable (Treadmill only), Hand Held HR Cable, Earth Ground wire and the Wireless HR Cable from the Upper PCA. **See Diagram 6.5.5.** Remove the console from the maintenance access hook and place it on a flat work surface.

Diagram 6.5.5 - P20 Cable Connectors



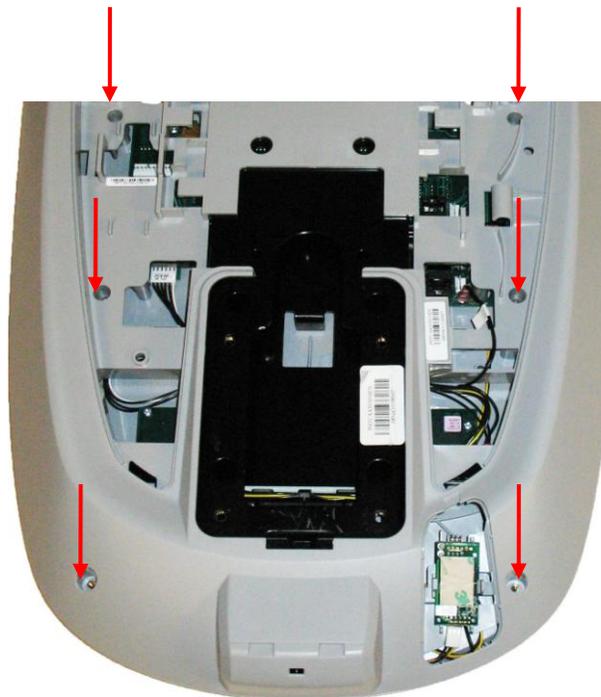
8. Remove the two screws that fasten the back cover to the option cap and remove the cover. **See Diagram 6.5.6**

Diagram 6.5.6 – Option Cap Back Cover



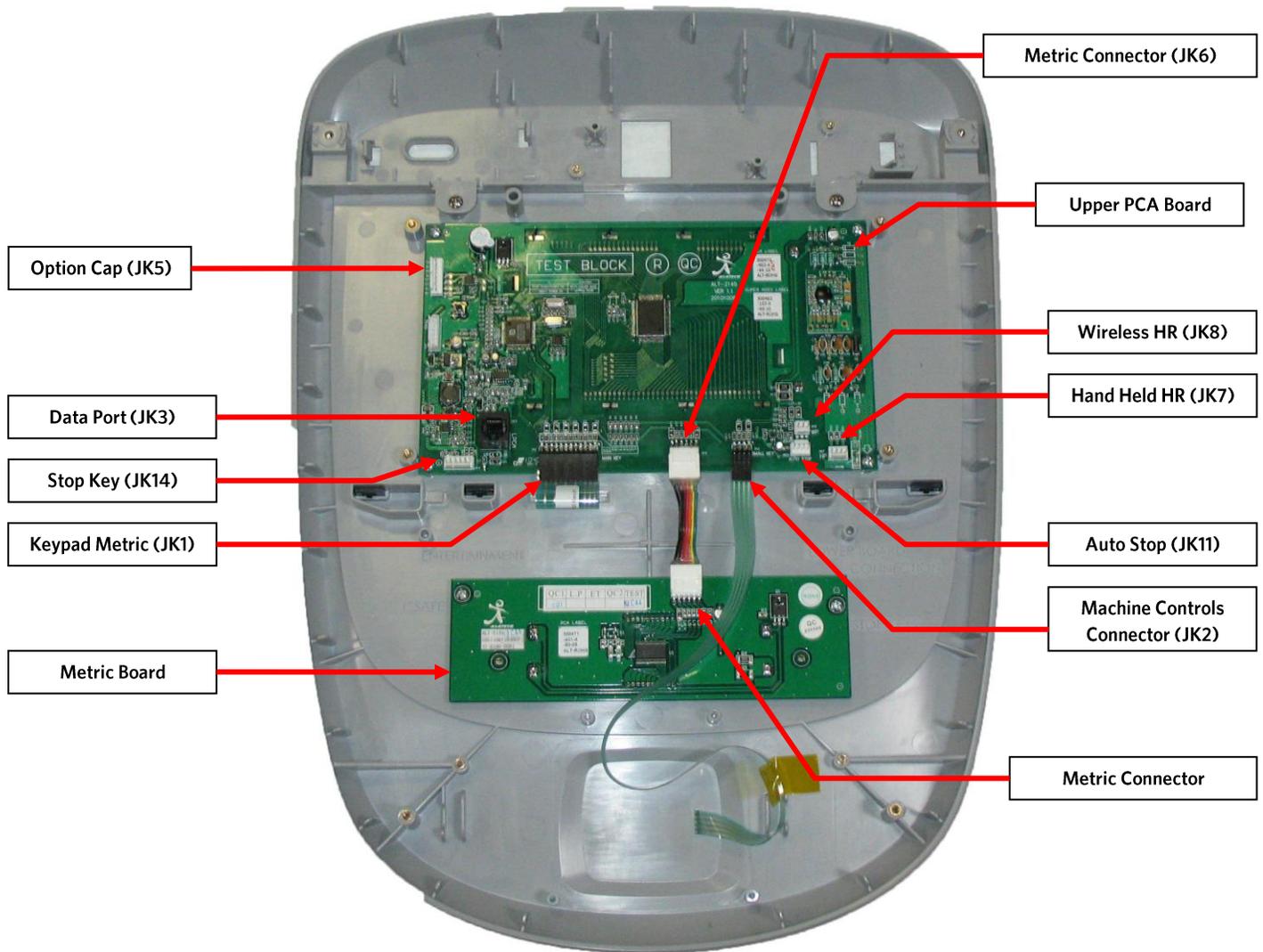
9. Remove the 6 screws that fasten the rear cover from the console and remove. **See Diagram 6.5.7.**

Diagram 6.5.7 – Rear Console Cover



10. Disconnect the Metric cable (JK6), Machine Controls cable (JK12), Option Cap cable (JK5, if applicable), and Keypad Metric cable (JK1) from the Upper PCA board. **See Diagram 6.5.8.**
11. Remove the four screws that fasten the Upper PCA board to the console and remove the Upper PCA.

Diagram 6.5.8 – P20 Upper PCA & Metric Board



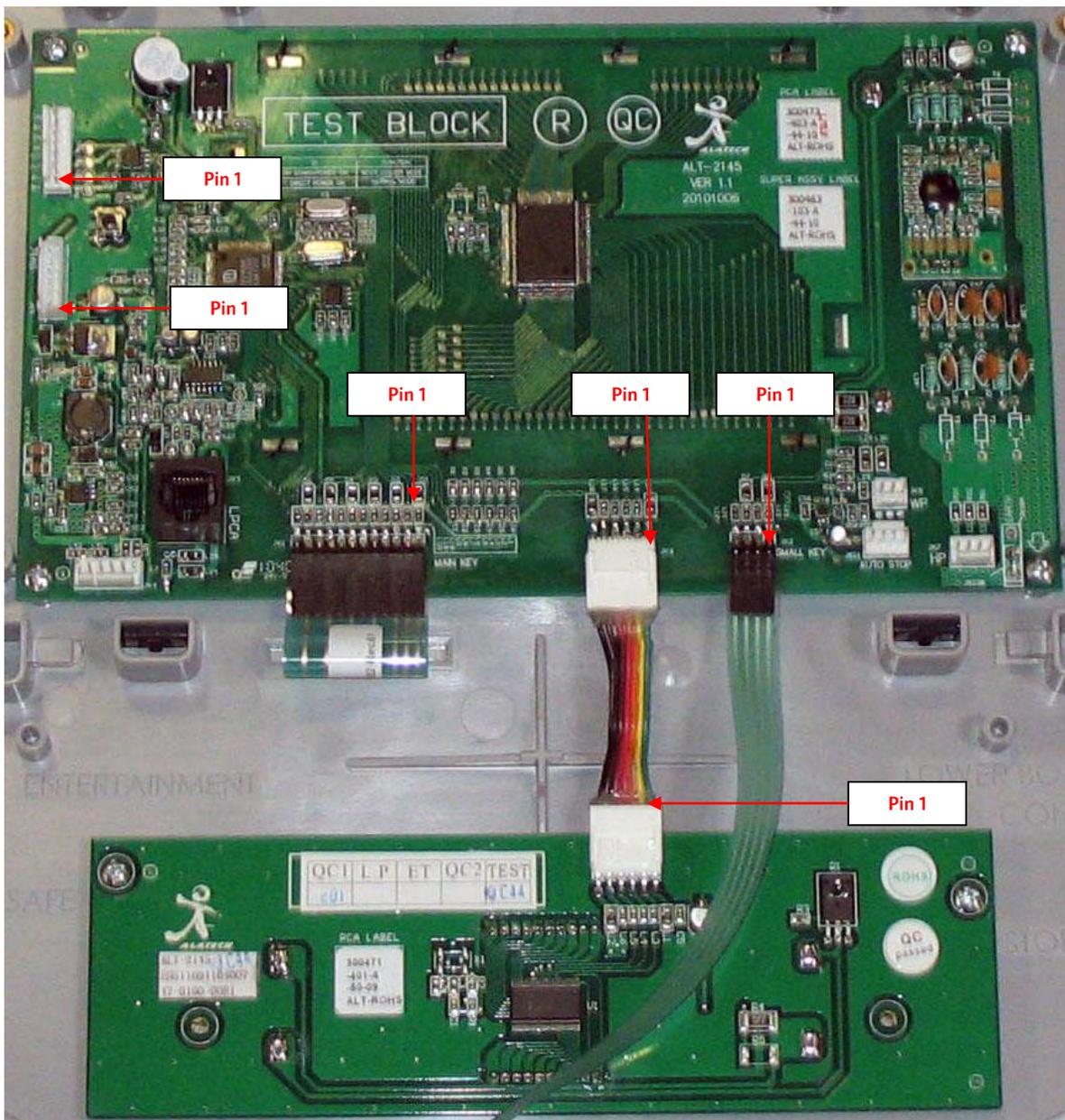
12. Install the replacement upper PCA into the console using the four screws removed in step 12. Torque to 10 inch pounds.

**Note:** Do not use an electric screw driver or over tighten the screws. Over tightening may damage the console. This type of damage is not covered under warranty.

13. The green wire in the Metrics cable indicate pin 1 and the symbol ( $\nabla$ ) indicates Pin 1 on the PCA. Align the green wire with the pin 1 markings on the upper PCA. **See Diagram 6.5.9**

**Note:** If pin 1 is not marked on the Upper PCA refer to **Diagram 6.5.9**.

Diagram 6.5.9 – P20 PCA – Pin 1 Reference



14. Connect the Metrics cable, Machine Controls cable, Keypad Metric cable, and Option Cap cable (if applicable) to the Upper PCA.
15. Replace the P20 Rear Cover removed step 10 and secure the cover with the screws 6 screws. Torque to 10 inch pounds.

**Note:** Do not use an electric screw driver or over tighten the screws. Over tightening may damage the console. This type of damage is not covered under warranty.
16. Replace the P30 Option Cap back cover removed step 9 and secure the cover with the screws 2 screws. Torque to 10 inch pounds.

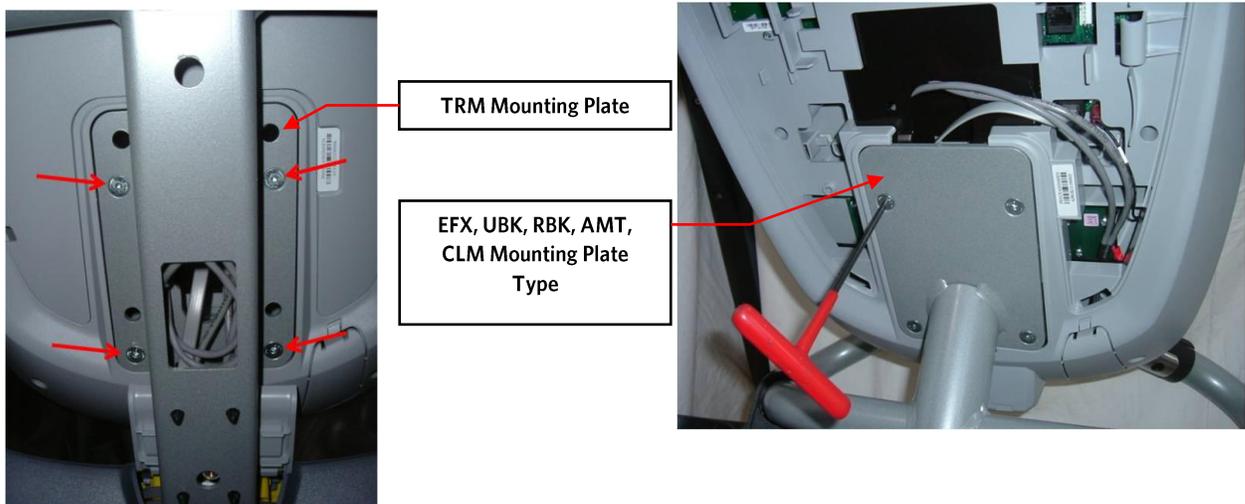
**Note:** Do not use an electric screw driver or over tighten the screws. Over tightening may damage the console. This type of damage is not covered under warranty.
17. Place the P20 console on the maintenance access hook.
18. Reconnect the Data cable, Auto Stop cable (Treadmill only), Stop Key cable (Treadmill only), Hand Held HR cable, Wireless HR cable, and the Earth Ground wire and to the Upper PCA. **See Diagram 6.5.5.**
19. Replace the access cover with the hardware removed in step 5.
20. Tilt the console back against the mounting plated. While tilting the console back feed the excess cable into weldment tube making sure that the cables will not become pinched.
21. Fasten the console to the dash mounting plate with the four screws removed in step 4. **See Diagram 6.5.2.**
22. Fasten the dash transition cover using the two screws removed in step 3. **See Diagram 6.5.1**
23. Check treadmill operation per Section Seven.

## Procedure 6.6 – P20 – Replacing the Metric Board

1. Set the treadmill circuit breaker in the “off” position and unplug the treadmill’s line cord from the AC outlet.  
(Treadmill only)
2. The PCA’s in the console are static sensitive. They can be damaged if proper static prevention equipment is not used. Attach an anti-static wrist strap to your arm, and then connect the ground lead of the wrist strap to the treadmill’s frame ground.
3. Remove the two screws that fasten the dash transition cover and remove the cover. **See Diagram 6.6.1**  
**Diagram 6.6.1 – Dash Transition Cover (Treadmill only)**



4. Remove the four screws that fasten the console to the dash mounting plate. **See Diagram 6.6.2.**
5. **Diagram 6.6.2 – Dash Mounting Plate**



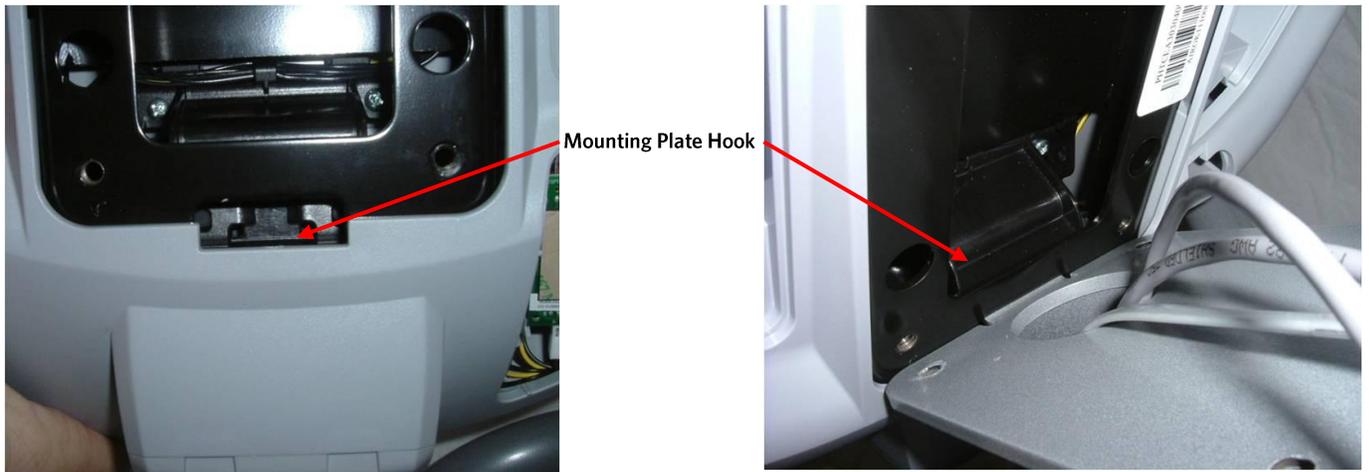
6. Remove the two screws that fasten the access panel to the console. **See Diagram 6.6.3**

Diagram 6.6.3 – Console Access Panel



7. Remove Access panel:
  - a. Treadmills: Lift the console off the maintenance hook and then position the console so that the back panel is accessible and remove the back cover.
  - b. AMT's, EFX's, CLM's, UBK's, and RBK's: Tilt the console forward on the maintenance access hook on the dash weldment and remove the back.

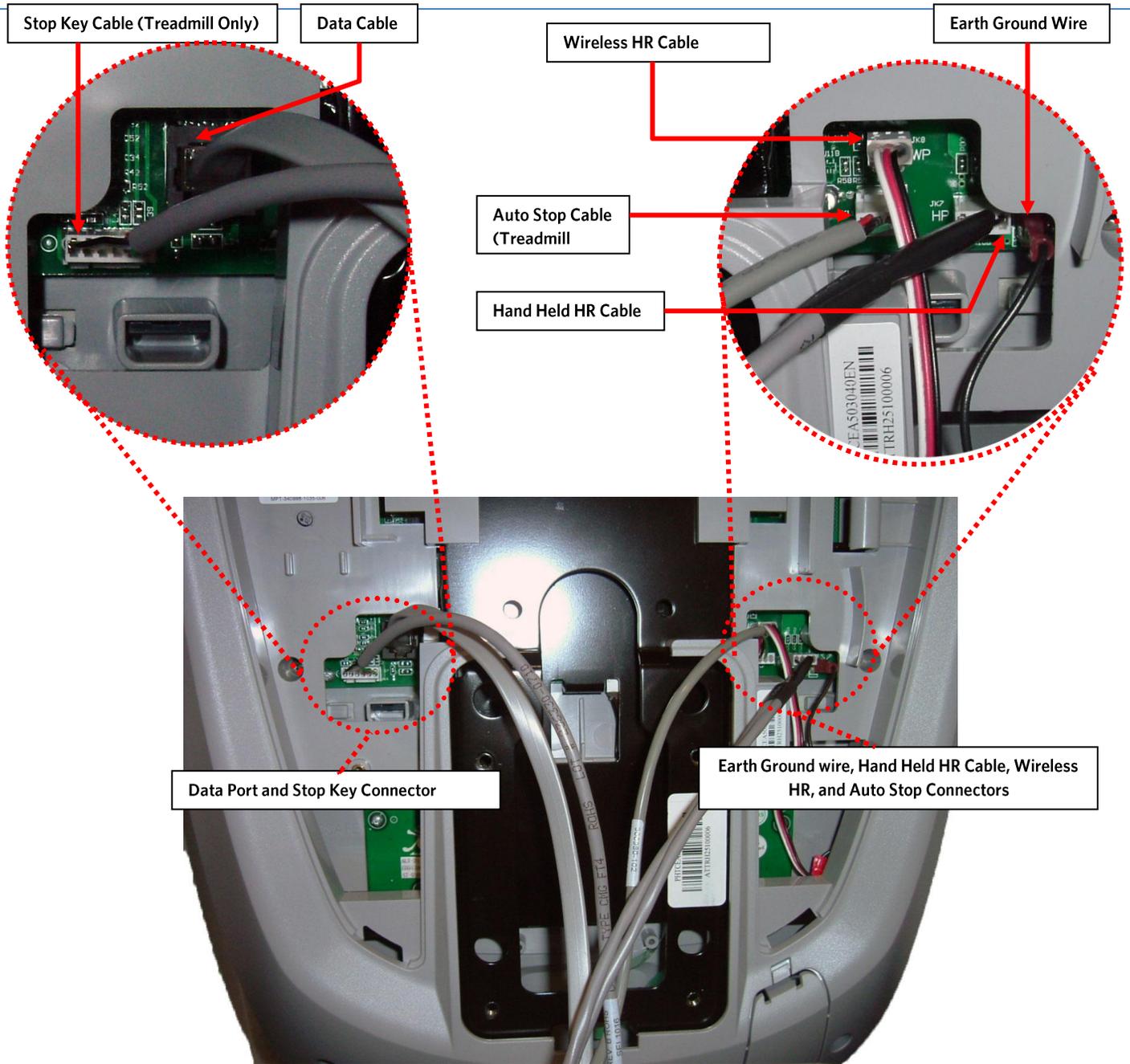
See Diagram 6.6.4. Diagram 6.6.4 – Maintenance Access Hook



8. Disconnect the Data cable, Auto Stop cable (Treadmill only), Stop Key cable (Treadmill only), Hand Held HR Cable, Earth Ground wire and the Wireless HR Cable from the Upper PCA. **See Diagram 6.6.5.** Remove the console from the maintenance access hook and place it on a flat work surface.

Diagram 6.6.5 - P20 Cable Connectors

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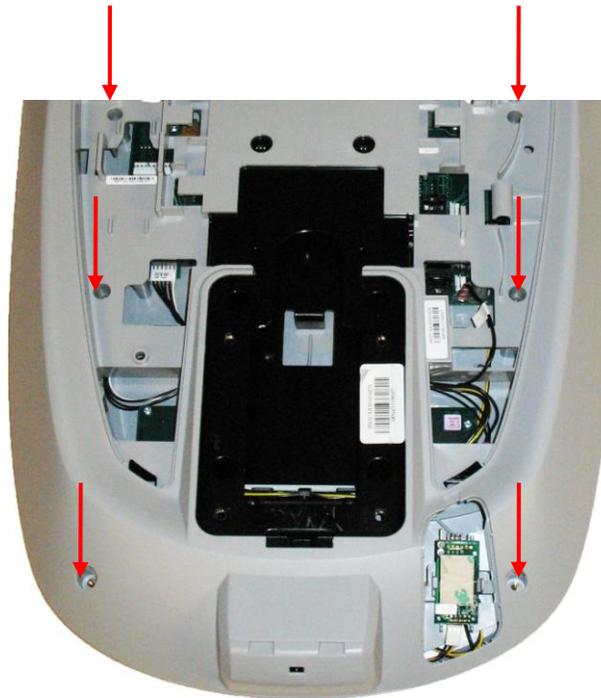


9. Remove the two screws that fasten the back cover to the option cap and remove the cover. **See Diagram 6.6.6**



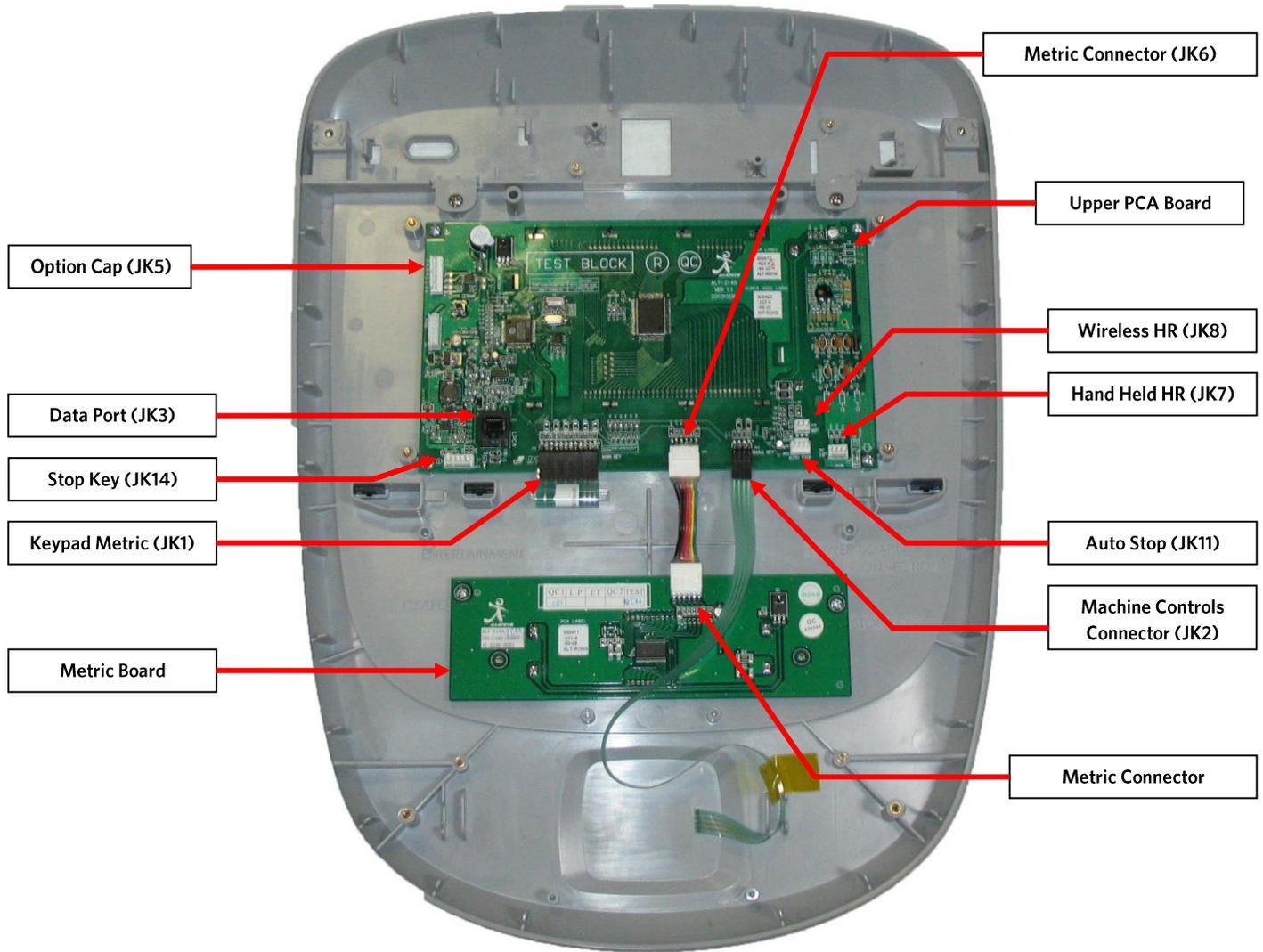
10. Remove the 6 screws that fasten the rear cover from the console and remove. **See Diagram 6.6.7.**

Diagram 6.6.7 – Rear Console Cover



11. Disconnect the Metric cable from the Metric PCA board. **See Diagram 6.6.8.**

12. Remove the four screws that fasten the Metric PCA board to the console and remove the Metric PCA and the four spacers.



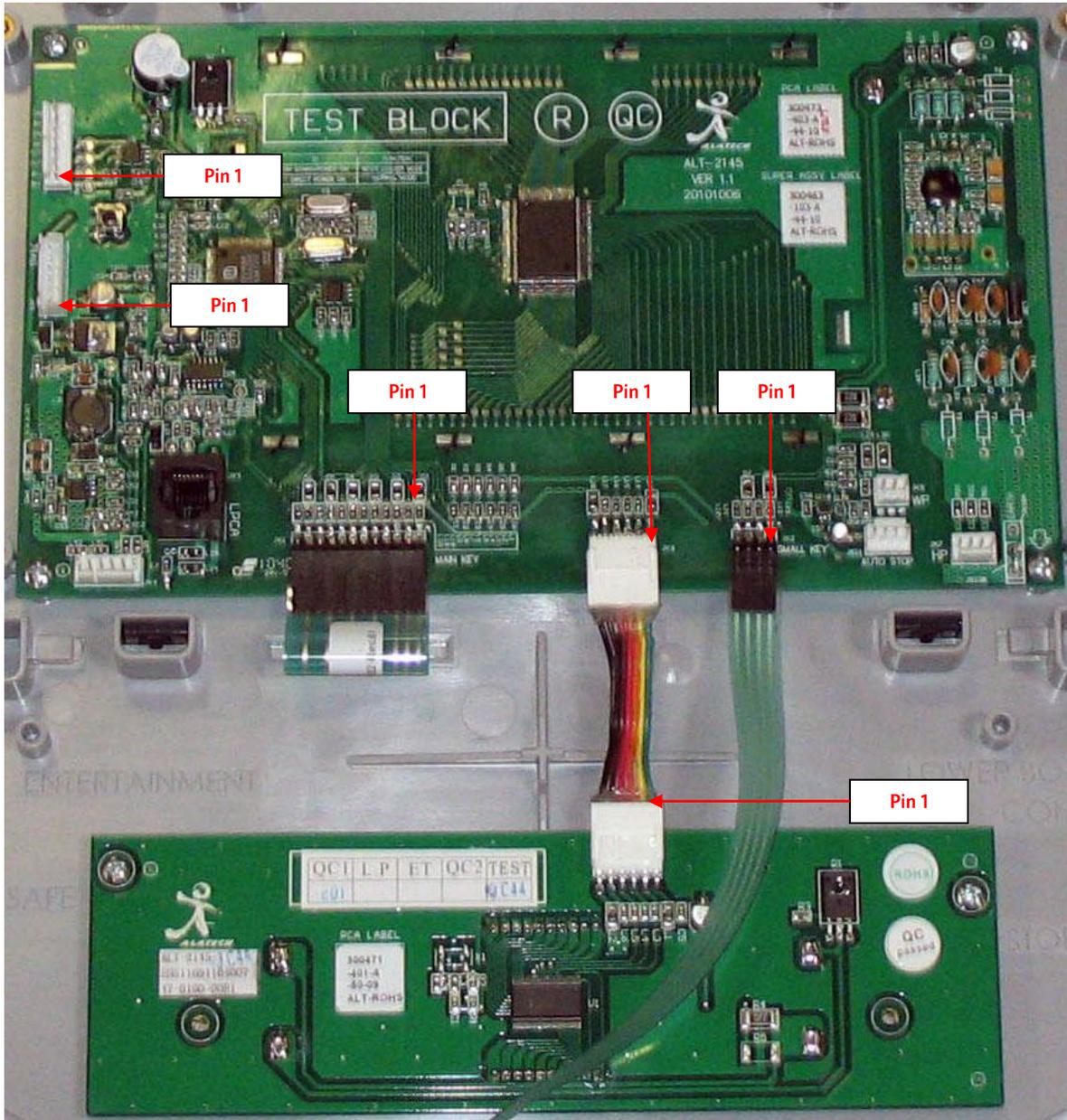
13. Install the replacement Metric PCA board into the console using the four screws removed in step 12. Torque to 10 inch pounds.

**Note:** Do not use an electric screw driver or over tighten the screws. Over tightening may damage the console. This type of damage is not covered under warranty.

14. The green wire in the Metrics cable indicate pin 1 and the symbol (▽) indicates Pin 1 on the Metric board. Align the green wire with the pin 1 markings on the Metric board. **See Diagram 6.6.9**

**Note:** If pin 1 is not marked on the Metric boards refer to **Diagram 6.6.9**.

Diagram 6.6.9 – P20 PCA – Pin 1 Reference



15. Connect the Metrics cable, to the Metric board.
16. Replace the P20 Rear Cover removed step 10 and secure the cover with the screws 6 screws. Torque to 10 inch pounds.
 

**Note:** Do not use an electric screw driver or over tighten the screws. Over tightening may damage the console. This type of damage is not covered under warranty.
17. Replace the P30 Option Cap back cover removed step 9 and secure the cover with the screws 2 screws. Torque to 10 inch pounds.

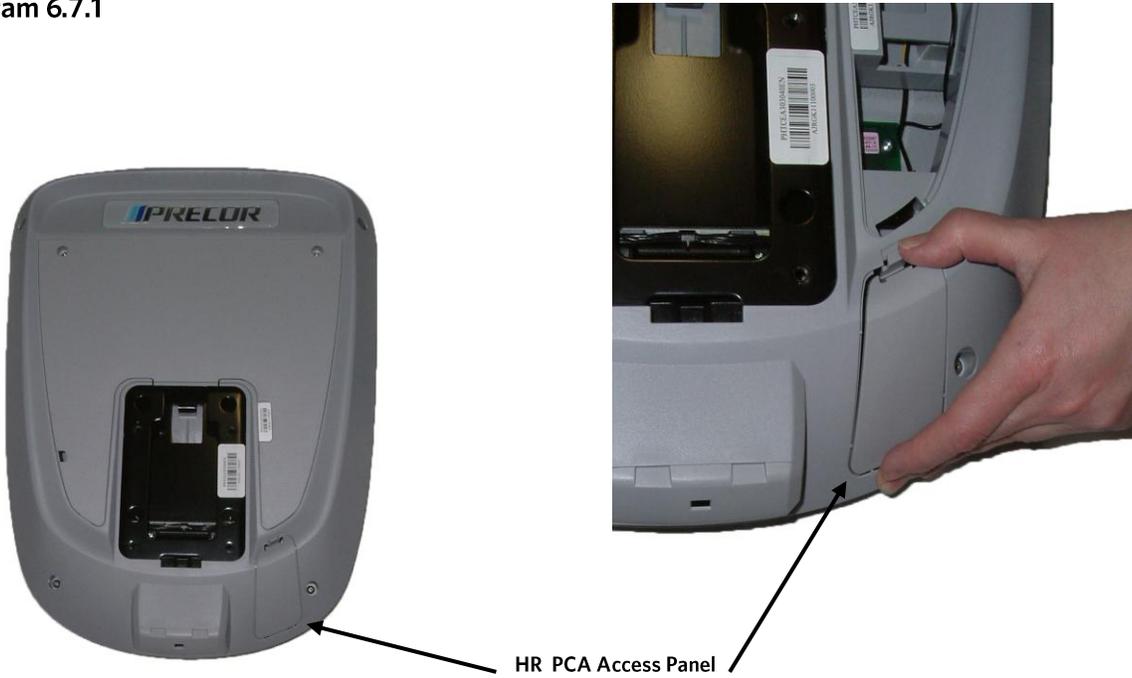
**Note:** Do not use an electric screw driver or over tighten the screws. Over tightening may damage the console. This type of damage is not covered under warranty.

18. Place the P20 console on the maintenance access hook.
19. Reconnect the Data cable, Auto Stop cable (Treadmill only), Stop Key cable (Treadmill only), Hand Held HR cable, Wireless HR cable, and the Earth Ground wire and to the Upper PCA. **See Diagram 6.6.5.**
20. Replace the access cover with the hardware removed in step 6.
21. Tilt the console back against the mounting plated. While tilting the console back feed the excess cable into weldment tube making sure that the cables will not become pinched.
22. Fasten the console to the dash mounting plate with the four screws removed in step 4. **See Diagram 6.6.2.**
23. Fasten the dash transition cover using the two screws removed in step 3. **See Diagram 6.6.1**
24. Check operation per Section Seven.

## Procedure 6.7 – P20 – Replacing Heart Rate PCA

1. Set the treadmill circuit breaker in the “off” position and unplug the treadmill’s line cord from the AC outlet (Treadmill only).
2. Remove the console access panel per procedure 6.5.
3. The PCA’s in the console are static sensitive. They can be damaged if proper static prevention equipment is not used. Attach an anti-static wrist strap to your arm, and then connect the ground lead of the wrist strap to the frame ground.
4. Disconnect the HR cable connector from the upper PCA.
5. Remove the HR PCA access panel on the back of the console. **See Diagram 6.7.1**
6. The HR PCA snaps into its mounting. Press its tabs downward and remove the HR PCA from its mounting.
7. Pull the HR PCA cable out of the console.
8. Route and the new HR cable through the console and reconnect it onto the upper PCA. **See Diagram 6.7.2.**
9. Snap the HR PCA into its mounting.
10. Replace the HR PCA access panel removed in step 5.
11. Replace the console access panel removed in step 2.
12. Check operation per Section 7.

Diagram 6.7.1



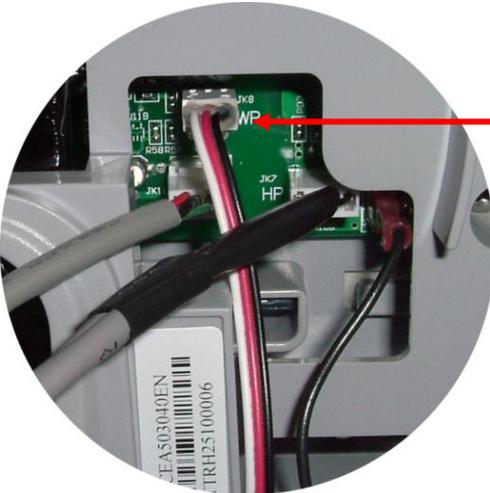
**Procedure 6.8 – Future Content**

**Procedure 6.9 – Future Content**

**Procedure 6.10 – Future Content**

**Diagram 6.7.2**

Wireless cable connection  
on the upper PCA



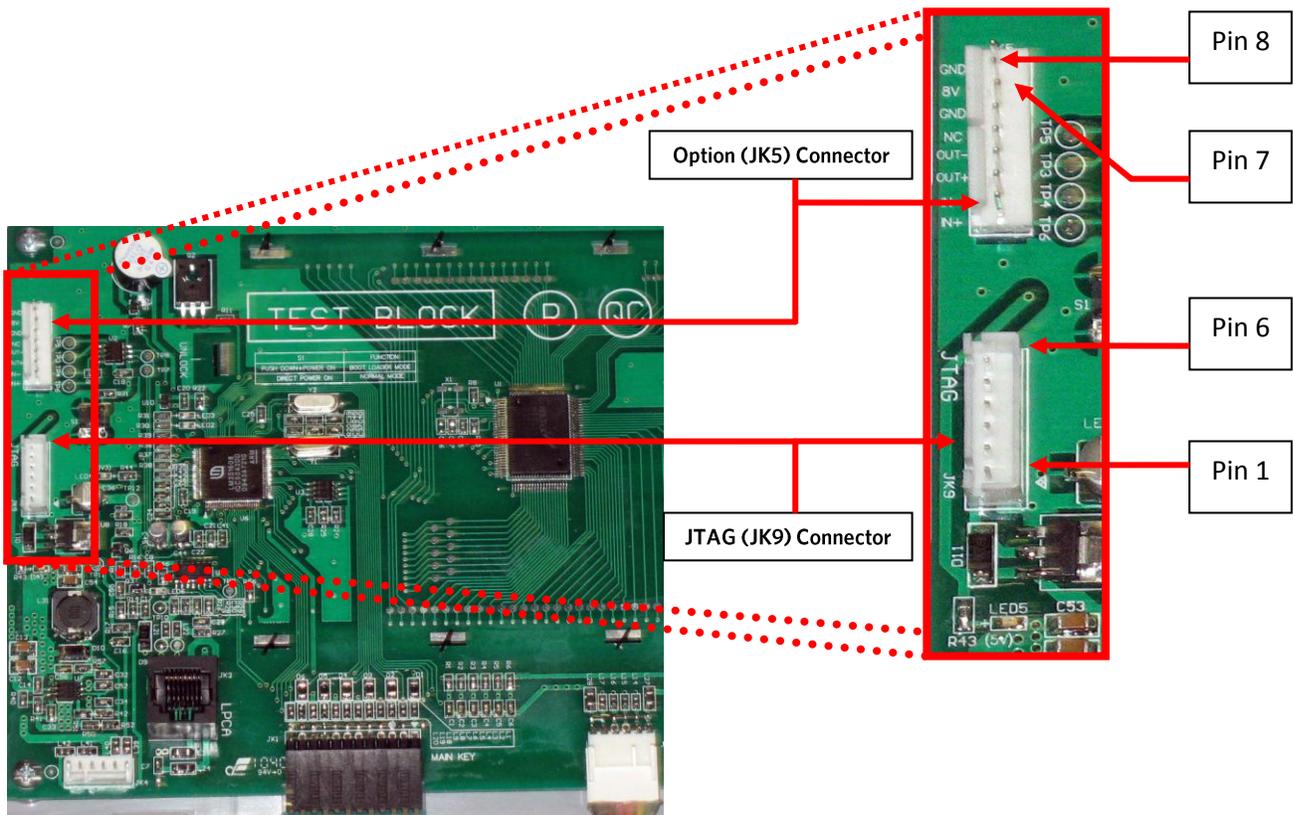
## Troubleshooting 6.11 – P20 – Troubleshooting the Keypad and the Upper PCA

### Procedure

**Note:** The green wire on the cables shown in **Diagram 6.11.1** denotes pin 1. When these cables are inserted into their connectors, the green wire must align with the pin 1 designation on the PCA. If pin 1 is not marked on the PCA refer to **Diagram 6.11.1**.

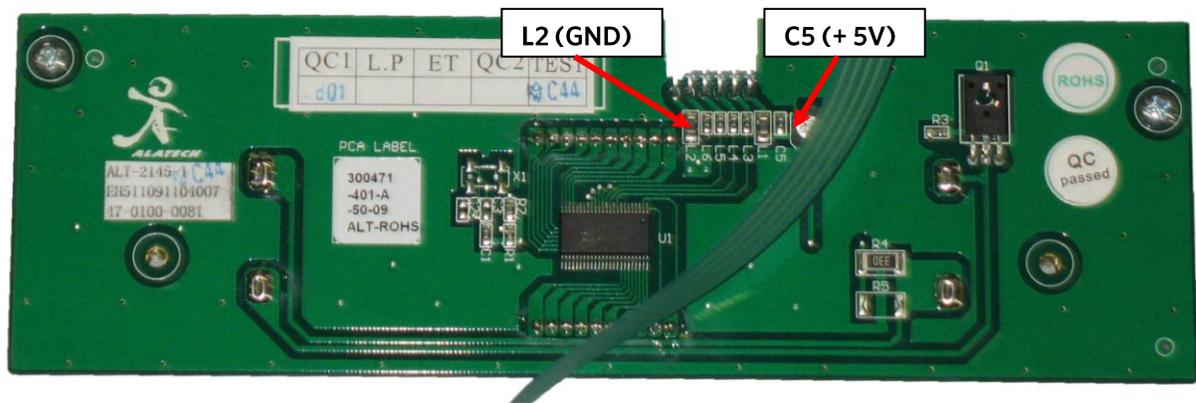
1. Set the treadmill's on/off switch in the "off" position (Treadmill Only). Access the upper electronics and machine controls per Procedure 6.5, steps 1 through 11. Place the console on the maintenance mounting hook and reconnect all cables.
2. If the message STUCK KEY is when the unit is turned on for treadmill's or pedaling on the RBK, UBK, AMT, and EFX, skip to step 23.
3. If a key does not function, skip to step 18.
4. If the display does not illuminate, continue with step 5.

**Diagram 6.11.1 - Console, Upper PCA , JTAG (J9), & Option Cap Connector**



5. If the upper PCA is not illuminating, skip to step 12.
6. If the metrics PCA is not illuminating, continue with step 7.
7. Remove the four screws that fasten the metrics PCA to the display face and rotate it so that the front of the PCA is visible. For treadmill's set the on/off switch in the "on" position for AMT's, EFX's, UBK's, RBK's and CLM's start pedaling.
8. With a DC voltmeter, measure between C5 (+5V) and L2 (GND) on the metric board and L27 (+5V) and L28 (GND) of JK6 connector of the upper PCA for 5Vdc. See Diagram 6.11.3

**Diagram 6.11.3 - Metrics PCA, Front View**



9. If 5 Vdc is not present on C5 and 5 Vdc is present on L27, replace the metrics cable between the upper PCA and the metrics PCA.
10. If 5 Vdc is present on C5 and the upper PCA is illuminating normally, replace the metrics PCA.
11. If you have performed steps 7 - 10 and the metrics PCA still does not illuminate, contact Precor customer support for assistance.
12. Set the treadmill's on/off switch in the "on" position. (Treadmill Only)
13. With a DC voltmeter, measure between pins 1 and 6 of JK9 (JTAG Connector) for 3.3 Vdc and between pins 6 and 7 of JK5 (Option Cap connector) for 8 Vdc.
14. If 3.3 Vdc is not present on JK9 and 8 Vdc is present on JK5, replace the upper PCA.
15. If 8 Vdc is not present on JK5, temporarily replace the upper PCA to power control module cable with a known good cable.
16. If the upper PCA illuminates normally, replace the upper PCA to power control module cable permanently. If the upper PCA still does not illuminate, replace the power control module (treadmills) or Lower PCA (AMT's, EFX's, UBK's, RBK's and CLM's).
17. If you have performed steps 12 - 16 and the upper PCA still does not illuminate, contact Precor customer support for assistance.

18. Set the treadmill's on/off switch in the "on" position. (Treadmill Only)
19. If none of the keys on the display are functioning, check the stop switch cable connection to the upper PCA (Treadmill's only). If the stop switch is not connected or the stop switch is not functioning, none of the display keys will operate. This feature insures that the treadmill has a functioning stop switch when it is in use (Treadmill's only).
20. If a particular key is not functioning, perform the keyboard test in **Procedure 6.2**. If the test verifies that the key is not functioning, replace the display face.
21. If the display face has been replaced and the same key or control is still not functioning, replace the upper PCA.
22. If you have performed steps 18 - 22 and the same key is still not functioning, contact Precor customer support for assistance.
23. Remove the keypad cable from the upper PCA. **See Diagram 6.5.8.**
24. For treadmill's set the on/off switch in the "on" position for AMT's, EFX's, UBK's, RBK's and CLM's start pedaling.
25. If the **STUCK KEY** message is no longer displayed, replace the display face. If the **STUCK KEY** message is still being displayed continue with step 26.
26. Set the treadmill's on/off switch in the "off" position. (Treadmill Only)
27. Remove the Machine Control cable from the upper PCA.
28. For treadmill's set the on/off switch in the "on" position for AMT's, EFX's, UBK's, RBK's and CLM's start pedaling.
29. If the **STUCK KEY** message is no longer displayed, replace the machine the display face.
30. If the **STUCK KEY** is still being displayed with the keyboard cable disconnected, replace the upper PCA.
31. If you have performed steps 23 - 30 and the **STUCK KEY** message is still being displayed, contact Precor customer support for assistance.

## Troubleshooting 6.12 - P20 - Troubleshooting Handheld Heart Rate

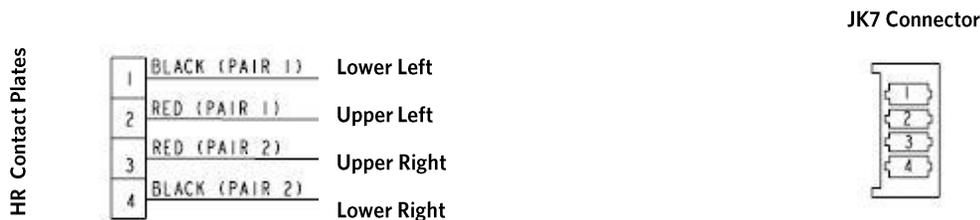
### Circuit Description

The hand held heart rate system is actually a dual system, that is, it can accept a heart rate signal from either the hand held heart rate contacts on the unit's handlebar or from a Polar heart rate chest strap transmitter. The heart rate circuit in upper PCA is configured for hand held priority. That is, if both a chest strap and hand heart rate signal are being received, the system will accept the hand held signal and ignore the chest strap signal. If a hand held signal is not being received, the system will accept the chest strap signal.

### Note:

There are four typical failure modes for the hand held/chest strap heart rate system. They are: hand held is normal - no chest strap reading; no hand held reading - chest strap normal; no hand held or chest strap reading or constant or intermittent readings when neither hand held or chest strap are in use.

### Diagram 6.12.1 - Hand held/chest strap heart rate PCA



### Normal hand held reading - No chest strap reading

1. Access the diagnostic program (Procedure 6.1). Advance to the heart rate display portion of the diagnostic program. Verify that a chest strap signal is not being accepted with either a Polar heart rate test transmitter or a known good chest strap transmitter. If this reading is good, skip to step 3.
2. Using a known good Polar heart rate chest strap, verify that the heart rate operates with the known good chest strap. If the known good Polar chest strap does correct the problem, replace the original chest strap transmitter.
3. If the above procedures did not correct the problem, replace the wireless heart rate receiver.

### No hand held reading - Normal chest strap reading

4. Access the diagnostic program (Procedure 6.1). Advance to the heart rate display portion of the diagnostic program. Verify that a hand held signal is not being accepted by firmly grasping both the right and left hand held contacts on the handlebars. Cover as much of the top and bottom contact surface area with your hands as possible (without moving your hands), you should receive a heart rate reading within ten seconds.
5. If the hand held signal is now being accepted, something in the near vicinity is radiating RF (radio frequency) energy that is being received by the chest strap portion of the heart rate PCA. Discount the Wireless HR cable from the upper PCA.
6. If a hand held signal still not being accepted, skip to step 7.
7. Access the diagnostic program (Procedure 6.1). Advance to the heart rate display portion of the diagnostic program. Verify that a hand held signal is not being accepted by firmly grasping both the right and left hand held contacts with the opposite hands, right hand on the left handlebar contacts and left hand on the right handlebar contacts. Cover as much of the top and bottom contact surface area with your hands as possible, you should receive a heart rate reading within ten seconds. If a hand held signal is still not being accepted, skip to step 9.
8. If a hand held signal was accepted in step 11, the hand held contact wiring is reversed. The harness that connects to the hand held contacts in the handlebar is segregated into two groups. One group has blue shrink wrap around it and the other group has black shrink wrap around it. The "blue" group must go to the right hand contacts and the "black" group must go to the left hand contacts. If necessary, rewire the hand held contacts as described above and test as described in step 4.
9. If the wiring is correct, refer to Diagram 6.12.1 for the following measurements. With an ohmmeter measure between the "lower right contact" pin on the JK7 connector and the lower right hand held heart rate contact on the handlebar. The reading should be  $1\ \Omega$  or less. Measure between the "upper right contact" pin on the JK7 connector and the upper right hand held heart rate contact on the handlebar. The reading should be  $1\ \Omega$  or less. Measure between the "upper left contact" pin on the JK7 connector and the upper left hand held heart rate contact on the handlebar. The reading should be  $1\ \Omega$  or less. Measure between the "lower left contact" pin on the JK7 connector and the lower left hand held heart rate contact on the handlebar. The reading should be  $1\ \Omega$  or less. If any of the above readings are greater than  $1\ \Omega$ , replace the heart rate PCA to handlebar wire harness.

**No hand held reading - No chest strap reading**

10. Access the diagnostic program (Procedure 6.1). Advance to the heart rate display portion of the diagnostic program. Verify that neither a chest strap signal or a hand held signal is being accepted with either a heart rate test transmitter or a chest strap transmitter.
11. Check the plug/connector connections on both the hand held heart rate (JK7) and wireless heart rate (JK8) at the upper PCA.
12. If neither a chest strap signal or a hand held signal is being accepted, measure between the replace the upper PCA.

## Section Seven – Checking EFX Operation

This section provides you with a quick method of checking EFX operation. Check the operation of the EFX at the end of most maintenance procedures.

### Procedure

1. Start striding on the EFX or plug the optional external power supply (when available) into the EFX and the AC outlet.
2. When the **PRECOR** banner displayed, press **GO** (P20).
3. Select Resistance Level 1.
4. Operate the EFX for 4-5 minutes. As you operate the EFX, concentrate on the operating sounds made by the unit. Be on the alert for unusual rubbing, hitting, grinding, or squeaking noises.
5. If the EFX makes unusual noises, troubleshooting per Section Nine.
6. If the EFX electronic display does not change appropriately, troubleshoot per Section Five Six, Troubleshooting the Keypad and Upper PCA.
7. Press the **RESISTANCE ▲** key until you reach Resistance Level 10. Operate the EFX for another 2-3 minutes.
8. If the EFX resistance does not change or the operation of the EFX feels inconsistent compared with Resistance Level 1, troubleshoot per Section Nine.
9. Press the **RESISTANCE ▲** key until you reach Resistance Level 20. Operate the EFX for another 2-3 minutes.
10. If the resistance of the EFX does not change or the EFX operation feels inconsistent with Resistance Levels 1 and 10, troubleshoot per Procedure 9.2.
11. Check the LED's mounted on the upper PCA and the function keys displayed on the electronic console by performing, console diagnostics tests, Section Six.

## Section Eight - Inspection and Adjustment Procedures

### Procedure 8.1 - Measuring the Resistance of a Generator

#### Caution

If an external power supply is connected to the EFX, disconnect the external power supply from the EFX before continuing with this procedure.

#### Procedure

Remove the screw at the right rear of the rear cover. Grasp the right side of the rear cover and rotate it counterclockwise to remove the cover. Refer to Procedure 10.1.

Remove the two screws that retain the black plastic shield. Remove the black plastic shield from the EFX.

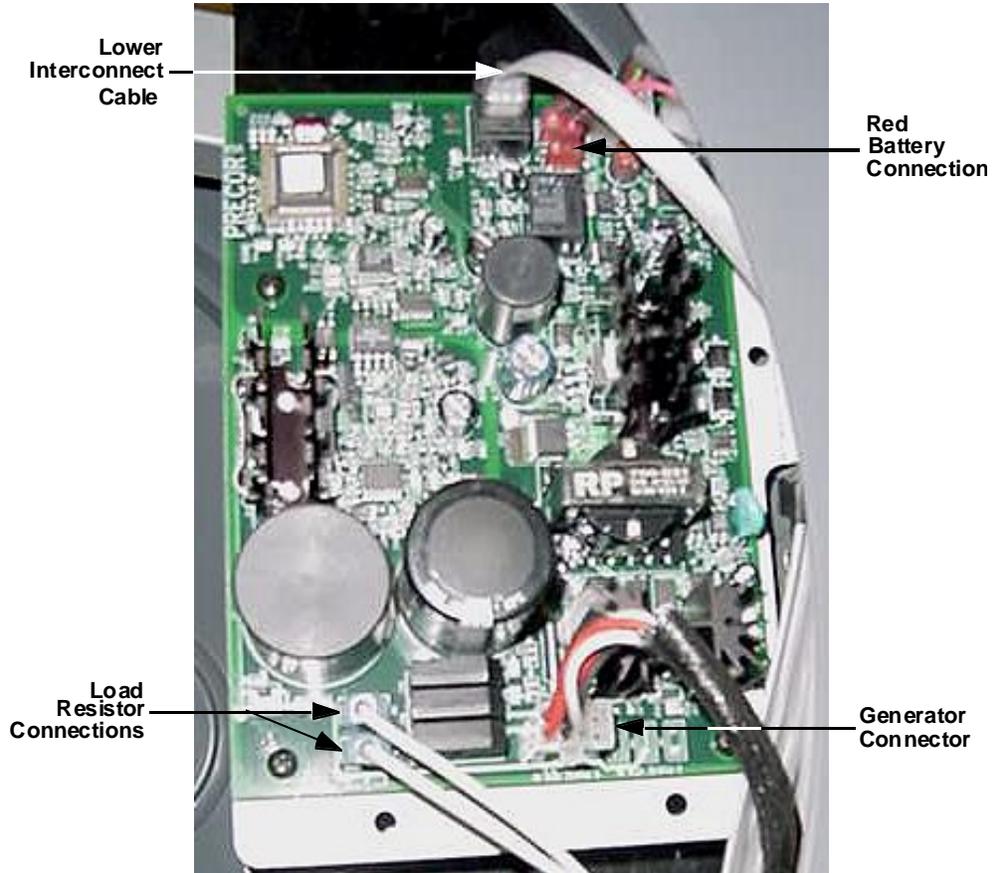
Remove the red battery lead from the lower PCA. See Diagram 10.3.1

#### WARNING

Before continuing with this procedure, review the Warning and Caution statements listed in Section One, Things You Should Know.

1. Set the ohmmeter to a range that will conveniently read up to 50 W.
2. Remove the six phase generator connector from the lower PCA, refer to **Diagram 8.1.1**, below.
3. With an ohmmeter, read between terminals 1 & 2, terminals 1 & 3, terminals 1 & 5, terminals 1 & 6, and terminals 1 & 7 on the six phase generator connector (J1). Each of the readings should be between 36 W and 40 W.
4. If any of the readings are significantly high or significantly low, remove the intermediate cable from the generator and perform the same measurements as in step 4 on the generator connector. If the reading is now correct check and or replace the intermediate cable. Refer to **Diagram 8.1.1**. If the readings are still incorrect, remove the six phase generator.
5. Replace the generator per Procedure 10.17. Reconnect the intermediate cable removed in step 5 to the replacement generator and the lower PCA.
6. Reconnect the red battery lead to terminal M6 of the lower PCA.
7. Set the black plastic shield in its mounting position and fasten it with the screws removed in step 2.
8. Set the right side of the rear cover in its mounting position and rotate it clockwise. Ensure that the cover is fully engaged and fasten it with the screw removed in step 1.

Diagram 8.1.1



## Procedure 8.2 - Inspecting and Adjusting Belt Tension

### Procedure

1. Remove both screws at the rear of the rear cover. Grasp the right side of the rear cover and rotate it counterclockwise to remove the cover. Grasp the left side of the rear cover and rotate it clockwise to remove the cover. Refer to procedure 7.1.

### WARNING

Before continuing with this procedure, review the Warning and Caution statements listed in Section One, Things You Should Know.

### WARNING

If the EFX has been in recent use, the load resistors and mounting bracket may be extremely hot.

2. Remove the two screws that retain the black plastic shield on the left side of the EFX. Remove the black plastic shield from the EFX.
3. Place a 20030-108 or equivalent belt gauge on the input belt as shown in Diagram 8.2.1.

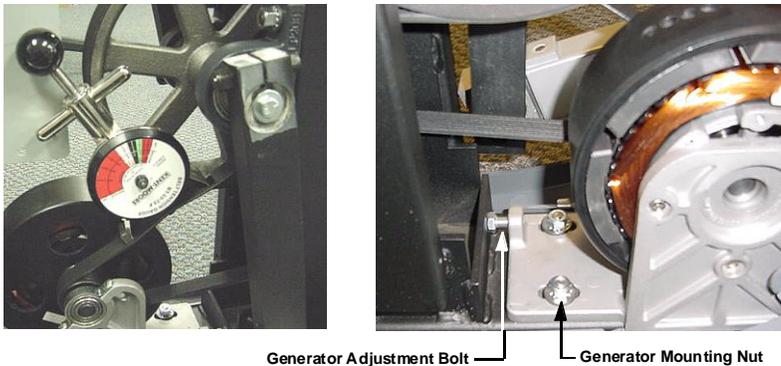
### Diagram 8.2.1 - Input Belt Tension Measurement



4. The belt gauge should read approximately 160 lbs. If the belt tension is significantly high or low the belt tension may be adjusted using the adjustment bolts shown in Diagram 8.2.1. To adjust the belt tension, first straighten the locking tabs on both bolts. When adjusting the tension, turn both bolts equal amounts. When the adjustment is complete the step up pulley shaft must remain perpendicular to the frame and drive belt. Turning the adjustment bolts clockwise will increase belt tension, turning the adjustment bolts counter-clockwise will decrease belt tension.

5. Changing the tension of the input drive belt will also affect the tension of the generator belt. If the input belt tension has been changed, continue with step 7.
6. Place a 20030-108 or equivalent belt gauge on the generator belt as shown in Diagram 8.2.2.

### Diagram 8.2.2 - Generator Belt Tension Measurement



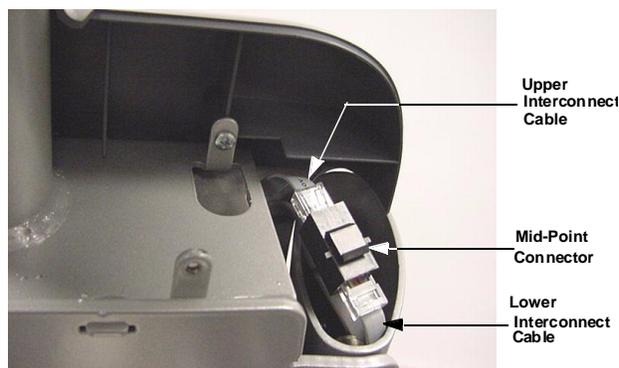
7. The belt gauge should approximately 110 lbs. If the generator belt tension is significantly high or low, it may be adjusted using the adjustment bolt shown in Diagram 8.2.2. First loosen, but do not remove the four generator mounting nuts. Thread the adjustment bolt into or out of the generator to change the belt tension. When the tension is correct, tighten the locking nut. Tighten and torque the four generator mounting nuts to 200 inch pounds.
8. If either the input pulley belt or the generator belt is being replaced with a new belt, the belt tension should be set 20 lbs. higher than the previous readings. Therefore a new input pulley belt should be tensioned to 180 lbs. and a new generator belt should be tensioned to 130 lbs. Over time and use the belts will "relax" and the tensions will be as stated in steps 4 and 7.
9. Reconnect the red battery lead to terminal M6 of the lower PCA.
10. Set the right side of the rear cover in its mounting position and rotate it clockwise. Ensure that the cover is fully engaged and fasten it with the screw removed in step 1. Set the left side of the rear cover in its mounting position and rotate it counterclockwise. Ensure that the cover is fully engaged and fasten it with the screw removed in step 1.

## Section Nine - EFX - Troubleshooting Procedure

### Troubleshooting 9.1 - Troubleshooting the Lower and Upper Interconnect Cables

1. Remove the five screws from the rear of the upper display housing. Remove the display housing front panel from the display housing. Disconnect the upper interconnect cable from the upper PCA.
2. Remove the four screws from the access cover below the display. Disconnect the upper interconnect cable from the mid-point connector. Refer to Diagram 9.1.1

**Diagram 9.1.1 - Data Cable Mid-Point Connector**



3. External of the upper column, connect a replacement upper interconnect cable to the mid-point connector and the upper PCA.
4. Check operation as described in Section Seven. If the unit works properly, replace the upper interconnect cable as described in Procedure 10.4.
5. If the symptoms are unchanged, remove the external upper interconnect cable. Reconnect the internal upper interconnect cable to the mid-point connector and the upper PCA. Set the display housing front panel in it's mounting position and fasten it with the five mounting screws removed in step 1. Trouble shoot the lower interconnect cable starting with step 6.
6. Remove the right side rear cover as described in procedure 10.1.
7. Disconnect the lower interconnect cable from the mid-point connector and the lower PCA. Refer to Diagram 9.1.1.
8. External of the frame, connect a replacement lower interconnect cable to the mid-point connector and the lower PCA.
9. Check operation as described in Section Seven. If the unit works properly, replace the lower interconnect cable as described in Procedure 10.4.

10. If the symptoms are unchanged, remove the external lower interconnect cable. Reconnect the internal lower interconnect cable to the mid-point connector and the lower PCA. Remove the upper and lower interconnect cables from the mid-point connector. Connect a replacement mid-point connector between the two interconnect cables and retest the unit per Procedure 10.4.
11. If you have performed all of the procedures above and have been unable to correct the problem, call Precor customer support.

## Troubleshooting 9.2 – Troubleshooting the Generator

The generator performs three functions in the EFX. First, by controlling the amount of electrical load applied to the generator, the user's pedaling resistance is controlled. Second, the generator is used to charge the EFX's internal battery. Lastly, one of the generator's six phase output windings is monitored to determine when the unit is in use and when it is idle. This system also determines the stride rate by determining the operating speed (output frequency) of the monitored generator winding.

### Warning

Because this is a self-powered unit, it will either be necessary to either equip the unit with the optional external power supply or have an assistant pedal on the unit while voltage measurements are being taken. Because of the danger of working on the unit while it is in motion using the optional external power supply is strongly recommended.

1. Perform the generator resistance test per Procedure 8.1. If any of the resistance measurements are significantly high or significantly low, replace the generator.
2. The following voltage reading must be taken while the unit is in motion. Extreme care must be taken to keep meter leads, hands, etc. clear of all moving parts. Using an AC voltmeter, measure the voltage between 1 & 3, 2 & 3, 5 & 7 and 6 & 7 on J1 of the lower PCA. All AC voltage readings will vary depending on the unit's stride rate at the time the measurement is taken. At a stride rate of 100 strides per minute, all three voltage readings will be approximately 100 VAC -110 VAC.
3. If any of the six readings in step 2 are significantly low, replace the generator.
4. If you have performed all of the above tests and are unable to resolve the problem, contact Precor customer support.

## Section Ten - EFX Replacement Procedures

### Procedure 10.1 - Replacing the Rear Covers

#### **WARNING**

Before continuing with this procedure, review the Warning and Caution statements listed in Section One, Things You Should Know.

#### **Replacing the Left and/or Right Side Rear Cover**

1. Remove the two screws at the rear of the rear cover.
2. Grasp the left side cover and rotate it clockwise to remove it.
3. Grasp the right side cover rotate it counterclockwise to remove it.
4. Reverse steps 2 and three to replace the left and ride side covers. Replace the screws removed in step 1 to fasten the left and right side covers.

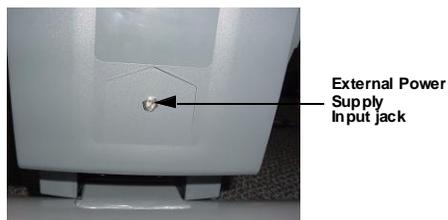
#### **Replacing the Top Section of the Rear Cover**

5. Remove the left and right side covers as described above.
6. Loosen, do not remove, the two screws that fasten the top cover to the frame upright.
7. Remove the two screws the fasten the top cover to the front cover and remove the top cover.
8. Set the replacement top cover in its mounting position and fasten it with the four screws removed in steps 2 and 3.
9. Replace the left and right side covers as described above.

#### **Replacing the Rear Section of the Rear Cover**

10. Remove the left and right side covers as described above.

#### **Diagram 10.1.1 - External Power Supply Input Jack**



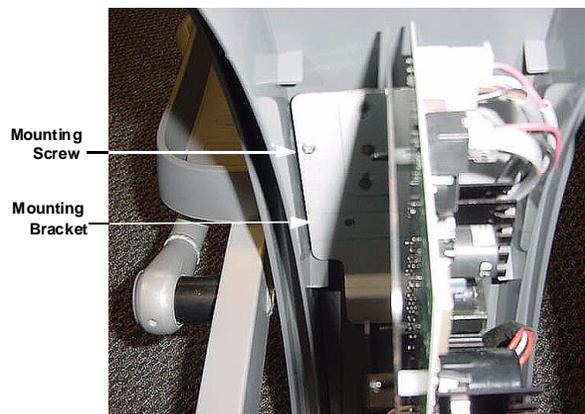
11. Remove the top section of the cover as described above.

12. Remove the nut retaining the external power supply input jack. Refer to Diagram 10.1.1
13. Remove the external power supply input jack from the cover.
14. Remove the four screws (2 each side) that fasten the cover to the frame. Slide the two wire clips off of the cover's left side. Remove the cover from the EFX.
15. Set the replacement cover in its mounting position and fasten it with the screws removed in step 12. Slide the two wire clips into place on the covers left side.
16. Set the external power supply input jack at its mounting location and fasten it with the nut removed in step 10.
17. Replace the left and right side covers as described above.

### Replacing the Front Section of the Rear Cover

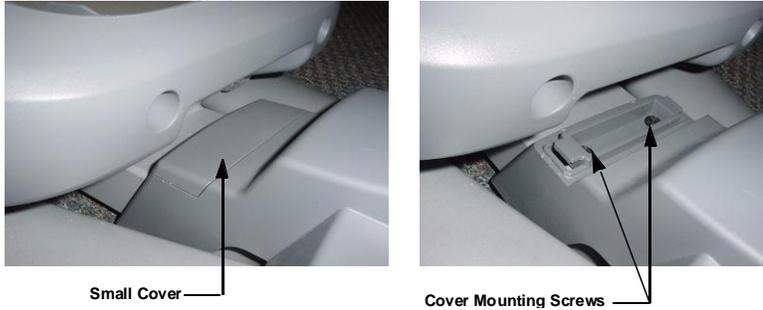
18. Remove the left and right side covers as described above.
19. Remove the top section of the cover as described above.
20. Remove the four screws that fasten the rear cover section to the frame. Carefully slide the rear cover section rearwards a couple of inches. to clear the overlap between the front and rear cover sections.
21. Remove the cables from the two lower cable clips on the inside of the front section of the cover.
22. Remove the two screws that fasten the lower PCA mounting bracket to the front section of the cover. Refer to Diagram 10.1.2.

Diagram 10.1.2 - Lower PCA Mounting Bracket



23. Remove the lower PCA and bracket and carefully support it away from the front section of the cover.
24. Remove the small cover at the front portion of the cover section by sliding it forward and off of the front section of the cover. Refer to Diagram 10.1.3. Remove the two cover mounting screws.

### Diagram 10.1.3 - Small Cover

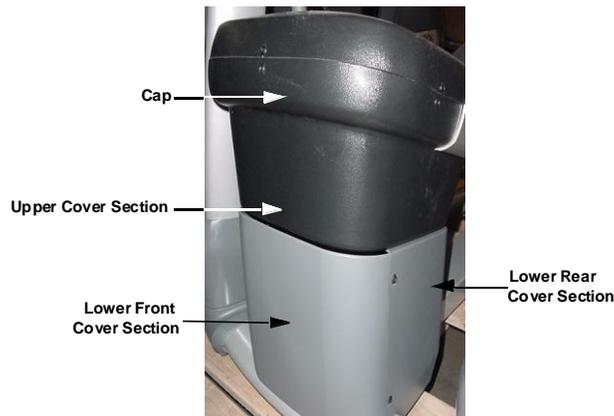


25. Remove the front section of the cover from the EFX. Remove the cable clips from the cover and snap them into their mounting positions in the replacement cover.
26. Set the replacement cover in its mounting position. Fasten the cover with the two screws removed in step 25. Slide the small cover, removed in step 24, onto the front section of the cover.
27. Slide the rear section of the cover back into its mounting position and fasten it with the four screws removed in step 20.
28. Set the lower PCA and mounting bracket in its mounting position and fasten it with the two screws removed in step 22.
29. Dress the cables, remove in step 21, into the two lower cable clips on the front section of the cover.
30. Replace the top section of the cover as described above.
31. Replace the left and right cover sides as described above.

## Procedure 10.2 – Replacing the Front Covers

1. Remove the four screws that fasten the lower front cover section. Remove the front cover section. Refer to Diagram 10.2.1.
2. Remove the two screws in the upper inside surface of the lower rear cover section that retains the upper cover section. Remove the upper cover section and cap from the EFX.
3. Remove the screws that fasten the cap to the upper cover section.
4. Set the replacement cap and/or upper cover section together and fasten them with the screws removed in step 3.
5. Place the upper cover section and cap on the lower rear cover section and fasten it with the screws removed in step 2.
6. Set the lower front cover section in its mounting position and fasten it with the screws removed in step 1.

### Diagram 10.2.1 - Front Covers



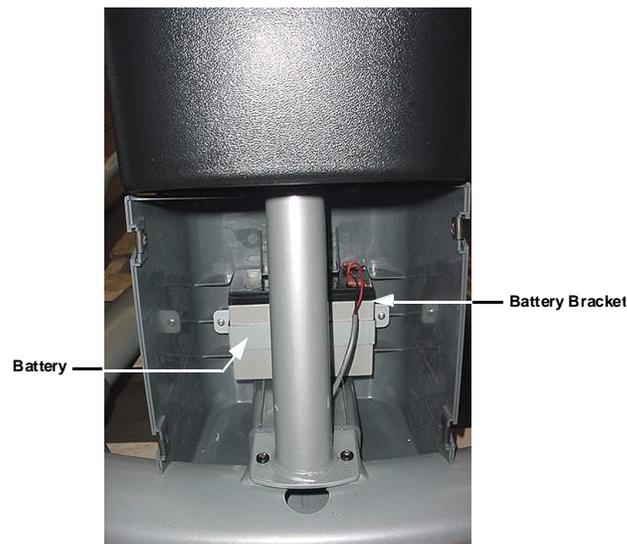
### Replacing the Lower Front

7. Remove the four screws that fasten the lower front cover section. Remove the front cover section. Refer to Diagram 7.4.
8. Set the replacement lower front cover section in its mounting postdating and fasten it with the screws removed in step 7.

## Replacing the Lower Rear Cover Section

9. Remove the four screws that fasten the lower front cover section. Remove the front cover section. Refer to Diagram 10.2.1.
10. Remove the two screws in the upper inside surface of the lower rear cover section that retains the upper cover section. Remove the upper cover section and cap from the EFX.
11. Remove the two screws that fasten the battery bracket to the lower rear cover section. Refer to Diagram 10.2.2

Diagram 10.2.2 - Lower Rear Cover Section



12. Remove the battery bracket. Slide the battery out of the lower rear cover section.
13. Remove the screws that fasten the lower rear cover section to the frame. Remove the lower rear cover section from the EFX.
14. Set the replacement lower rear cover section in its mounting position and fasten it with the screws removed in step 13.
15. Set the battery and battery bracket in their mounting positions and fasten them with the screws removed in step 11.
16. Set the upper cover section and cap in their mounting position and fasten them with the screws removed in step 10.
17. Set the lower front cover section in its mounting position and fasten it with the screws removed in step 9.

## Procedure 10.3 – Replacing the Lower PCA

### Removing the Lower PCA

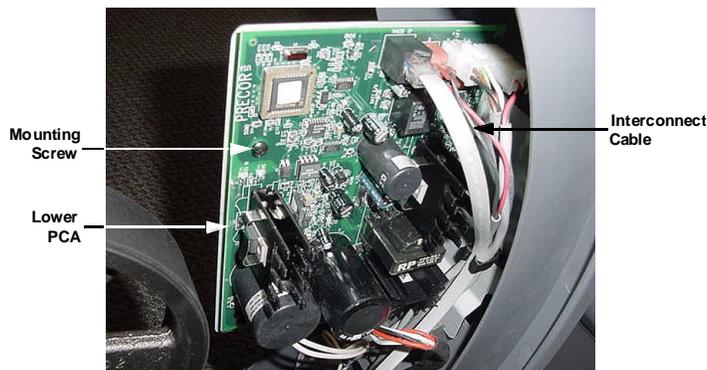
1. Remove the rear cover and disconnect the red battery lead from terminal M6 of the lower PCA.

### WARNING

Before continuing with this procedure, review the Warning and Caution statements listed in Section One, Things You Should Know.

2. Remove the right side rear cover per Procedure 10.1.
3. Attach the wrist strap to your arm, then connect the ground lead of the wrist strap to the EFX frame.
4. Disconnect the all of cables and wiring from the lower PCA.
5. Remove the four screws that secure the lower PCA to its mounting bracket, refer to Diagram 10.3.1.

### Diagram 10.3.1 - Lower PCA



### Replacing the Lower PCA

6. Position the replacement lower PCA at its mounting position and fasten the lower PCA with the four screws removed in step 5.
7. Reconnect the lower PCA cables and wiring as follows. Connect the interconnect cable to connector J2. The 2 conductor cable (red and black wires) from the input power jack to the J4 connector. The 8 conductor cable from the generator to connector J1. The 6 conductor cable from the incline motor to connector J5 (EFX 885,883, 835,833 only). From the battery, connect the red wire to M6 and the black wire to M7 of the lower PCA. Connect the two leads from the load resistors to M1 and M2, the polarity of the load leads is not critical, either lead may be connected to either the M1 or M2 terminal.

8. Remove the ground lead of the wrist strap from the EFX frame, and then remove the wrist strap from your arm.
9. Re-install the rear cover, and then check the operation of the EFX 821 as described in Section Seven.

## Procedure 10.4 – Replacing the Upper or Lower Interconnected Cables

Before you install a new interconnect cable, ensure that the interconnect cable is defective as described in Procedure 10.4.

### WARNING

Before continuing with this procedure, review the Warning and Caution statements listed in Section One, Things You Should Know.

1. Attach the wrist strap to your arm, then connect the ground lead of the wrist strap to the EFX frame.

### Replacing the Upper Interconnect Cable

2. Remove the display housing per Procedure 6.5.5 (P20).
3. The upper and lower interconnect cables are connected behind the access cover below the display. Refer to Diagram 9.1.1.
4. Disconnect the upper interconnect cable from the mid-point connector. Tape the end of the replacement interconnect cable to the upper end of the old interconnect cable (display housing end).
5. Carefully pull the old interconnect cable out of the mid-point access hole while feeding the new interconnect cable into the unit. When the new cable is fully into the unit, remove the tape and discard the old interconnect cable. Connect the upper interconnect cable to the mid-point connector and push them into the access hole.
6. Connect the upper interconnect cable to the upper PCA. Replace the display housing per Procedure 6.5 (P20).
7. Remove the ground lead of the wrist strap from the EFX frame, and then remove the wrist strap from your arm.
8. Check the operation of the EFX as described in Section Seven.

### Replacing the Lower Interconnect Cable

9. Remove the right side rear cover per Procedure 10.1. Disconnect the interconnect cable from the lower PCA (connector J2). Refer to Diagram 10.3.1.
10. The upper and lower interconnect cables are connected behind the access cover below the display. Refer to Diagram 9.1.1.
11. Disconnect the lower interconnect cable from the mid-point connector. Tape the replacement interconnect cable to the old interconnect cable at the lower PCA end of the old interconnect cable.

12. Carefully pull the old interconnect cable out of the mid-point access hole while feeding the new interconnect cable into the unit. When the new cable is fully into the unit, remove the tape and discard the old interconnect cable. Connect the lower interconnect cable to the mid-point connector and push them into the access hole.
13. Connect the new interconnect cable to the lower PCA.
14. Check the operation of the EFX as described in Section Seven.

## Procedure 10.5 – Replacing a Crankarm Assembly

### WARNING

Before continuing with this procedure, review the Warning and Caution statements listed in Section One, Things You Should Know.

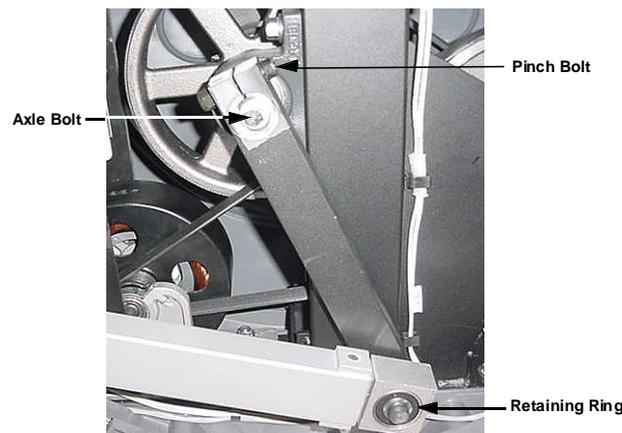
1. It is only necessary to remove the right or left side of the rear cover to access the crankarm being replaced. Remove the necessary side(s) of the rear cover.
2. Remove the stairarm assembly as described in Procedure 10.13.

### Note:

Notice the position of the two crank arms. When the crankarms are replaced, they must be positioned so that they are 180 degrees opposing.

3. Remove the axle bolt that secures the crankarm to the input pulley shaft. Remove the pinch bolt. Refer to Diagram 10.5.1. It may be necessary, use a Pitman arm puller or 4" to 6" gear puller to remove the crankarm. Do not use a hammer or mallet to remove the crankarm.
4. If you are removing both crank arm assemblies, repeat steps 2 and 3 for the second crankarm assembly.

Diagram 10.5.1 – Crankarm



### Replacing a Crank Arm Assembly

5. Clean the crankarm mounting bolt threads and the input pulley shaft threads with an alcohol swab. Allow them to dry and apply blue loctite to the crankarm mounting bolt threads.
6. Position the crankarm on the input pulley shaft. Thread and hand tighten the axle bolt into the input pulley shaft. Torque the axle bolt to 200 in/lbs.

7. Replace the pinch bolt and locknut, torque the pinch bolt to 400 inch pounds.
8. Replace the stairarm assembly as described in Procedure 10.13, steps 11 to 12.
9. If you are replacing both crankarm assemblies, repeat steps 6 and 7 for the second crankarm assembly.
10. Replace the right side and/or left side rear cover.

## Procedure 10.6 – Future Content

## Procedure 10.7 – Replacing the Input Pulley Belt

### WARNING

Before continuing with this procedure, review the Warning and Caution statements listed in Section One, Things You Should Know.

1. Remove the left and right side rear covers per Procedure 10.1.
2. Remove the stairarm assemblies as described in Procedure 10.13
3. Remove the crankarm assemblies as described in Procedure 10.5.
4. Remove the input pulley assembly per Procedure 10.9.
5. Remove the left and right tension bolts, locking tabs and brackets from the step up pulley assembly. Remove the generator belt from the generator's pulley.
6. Slide the step up pulley assembly with both the generator and input pulley belts out of the drive unit.
7. Remove the input pulley belt. Set the replacement input pulley belt in its mounting position on the step up pulley assembly.
8. Set the step up pulley assembly with the generator and input belt at its mounting position in the drive unit. Replace the tensioning bolts, locking tabs and brackets removed in step 6. Thread, but do not tighten, the left and right tension bolts into the step up pulley shaft.
9. Place the other end of the generator belt on the generator's pulley.
10. Place the other end of the input pulley belt on the input pulley assembly and mount the input assembly per Procedure 10.9
11. Replace the crankarm assemblies per Procedure 10.5.
12. Replace the stairarm assemblies per Procedure 10.13
13. Tension both belts per Procedure 8.2. Note the differences between tensioning a new belt and a existing (used) belt.
14. Check the operation of the EFX as described in Section Seven.

## Procedure 10.8 – Replacing the Generator Pulley Belt

### WARNING

Before continuing with this procedure, review the Warning and Caution statements listed in Section One, Things You Should Know.

1. Remove the left and right side rear covers per Procedure 10.1.
2. Remove the stairarm assemblies as described in Procedure 10.13
3. Remove the crankarm assemblies as described in Procedure 10.5.
4. Remove the input pulley assembly per Procedure 10.9
5. Remove the left and right tension bolts, locking tabs and brackets from the step up pulley assembly.
6. Remove the three generator mounting screws shown in Diagram 8.2.1.
7. Remove the two bearing clamp screws shown in Diagram 10.17.2. Remove the bearing clamp.
8. Lift the generator and remove its drive belt.
9. Slide the step up pulley assembly with both the generator and input belts out of the drive unit.
10. Remove the generator belt. Set the replacement generator belt in it's mounting position on the step up pulley assembly.
11. Set the step up pulley assembly with the generator and input belt at its mounting position in the drive unit. Replace the tensioning bolts, locking tabs and brackets removed in step 6. Thread, but do not tighten, the left and right tension bolts into the step up pulley shaft.
12. Lift the generator and place the drive belt around the generator's pulley.
13. Replace and tighten the three generator mounting screws removed in step 6. Set the bearing clamp in its mounting position, replace and tighten the two bearing clamp mounting screws removed in step 7.
14. Mount the input assembly per Procedure 10.9.
15. Replace the crankarm assemblies per Procedure 10.5.
16. Replace the stairarm assemblies per Procedure 10.13.
17. Tension both belts per Procedure 8.2. Note the differences between tensioning a new belt and an existing (used) belt.
18. Check the operation of the EFX as described in Section Seven.

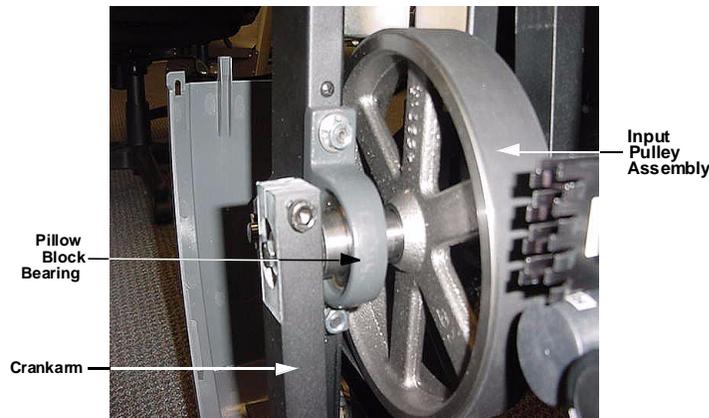
## Procedure 10.9 – Replacing the Input Pulley Assembly

### WARNING

Before continuing with this procedure, review the Warning and Caution statements listed in Section One, Things You Should Know.

1. Remove the left and right side rear covers per Procedure 10.1.
2. Remove the stairarm assemblies as described in Procedure 10.13.
3. Remove the crankarm assemblies as described in Procedure 10.5
4. Remove the input pulley assembly mounting nuts (2 per pillow block bearing).
5. Straighten the locking tabs and turn the left and right tension bolts counterclockwise until tension is removed from the both belts. (Refer to Diagram 8.2.1)

Diagram 10.9.1 - Input Pulley Assembly



6. Remove the input pulley assembly. Slide input pulley belt off of the input pulley assembly.
7. Hold the replacement input pulley assembly at it's mounting position and slide the input belt over and past the pillow block bearing and onto the input pulley assembly.
8. Replace the nuts on the pillow block bearings and torque them to 400 inch pounds.
9. Replace the crankarms per Procedure 7.7. The crankarms must be parallel to the frame uprights. Refer to Diagram 10.9.1. If necessary loosen the four drive unit mounting bolts, align the drive unit and torque the drive unit mounting bolts to 400 inch pounds.
10. Tension both belts per Procedure 8.2. Note the differences between tensioning a new belt and a existing (used) belt.
11. Replace the left and right side rear covers.

## Procedure 10.10 – Replacing the Input Step Up Pulley Assembly

### WARNING

Before continuing with this procedure, review the Warning and Caution statements listed in Section One, Things You Should Know.

1. Remove the left and right side rear covers per Procedure 10.1.
2. Remove the stairarm assemblies as described in Procedure 10.13.
3. Remove the crankarm assemblies as described in Procedure 10.5
4. Remove tension from the input pulley and generator belts as described below:
  - a. Straighten the locking tabs and turn the left and right tension bolts counterclockwise until tension is removed from the both belts. (Refer to Diagram 8.2.1)
  - b. Remove both tension bolts and slide the input belt off of the step up pulley assembly.
5. Place the input belt and step up belt in place on the replacement step up pulley. Set other
6. Place the input belt and step up belt in place on the replacement step up pulley. Set other end of the generator belt on the generator pulley.
7. Replace the tension bolts and associated hardware removed in step 4b.
8. Tension both belts per Procedure 8.2. Note the differences between tensioning a new belt and a existing (used) belt.
9. Replace the crankarms per Procedure 10.5.
10. Replace the left and right side rear covers.

## Procedure 10.11 – Replacing the Stairarm Wheel

### Procedure

#### WARNING

Before continuing with this procedure, review the Warning and Caution statements listed in Section One, Things You Should Know.

1. Remove the lift cover per Procedure 10.2.
2. Grasp the center ramp cover and lift it upwards to unsnap it from the ramp. Remove the center ramp cover from the EFX and set it aside.
3. Remove the two screws that fasten the ramp end cap to the ramp. Remove the ramp end cap.
4. The left side and/or right side ramp trim will need to be removed in order to access the stairarm wheels.
5. Loosen, but do not remove, the five screws that fasten ramp trim(s) required to access the wheel(s) being replaced. Slide the ramp trim(s) off the front of the ramp.
6. Remove the screw retaining the wheel being replaced. Refer to Diagram 10.11.1. Slide the wheel off the stairarm axle.

#### Diagram 10.11.1 - Stairarm Wheel



7. Slide the replacement wheel onto the stairarm axle. Fasten the wheel with the hardware removed in step 6. Apply blue loctite to the wheel mounting screws and torque them to 180 inch pounds.
8. Repeat the procedure in steps 6 and 7 for each wheel being replaced.
9. Align the T-nuts on the ramp trim(s) with the channel in the bottom front of the ramp. Slide the trim onto the ramp while feeding each T-nut into the ramp channel. Do not tighten the trim fastening screws at this time. Repeat this procedure with the remaining trim strip, if required.

10. Set the ramp end cap at its mounting position and fasten it with the screws removed in step 3.
11. Align the ramp trim(s) with the ramp end cap and tighten the five trim mounting screws.
12. Set the ramp center cover at its mounting position and press downward to snap it onto place.
13. Replace the lift cover per Procedure 10.2.

## Procedure 10.12 – Replacing the Stairarm Pedal

1. Loosen and remove the four screws that fasten the stairarm pedal onto the stairarm. Refer to Diagram 10.12.1.
2. Remove the stairarm pedal from the stairarm.
3. Set the replacement stairarm pedal at it's mounting position on the stairarm.
4. Install and tighten the stairarm pedal mounting hardware removed in step 2.

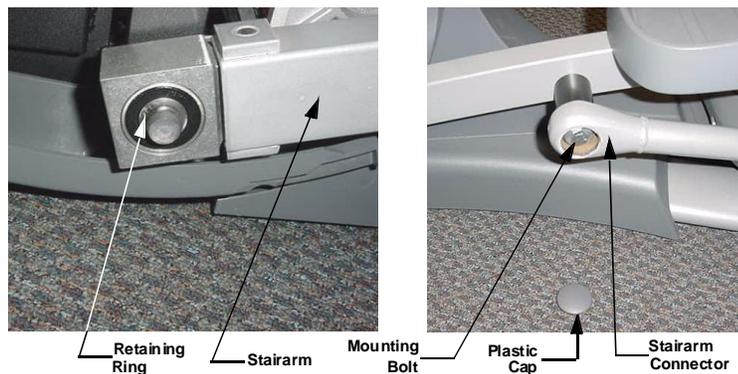
**Diagram 10.12.1 - Stairarm Pedal**



## Procedure 10.13 – Replacing the Stairarm

1. Remove the left and right side rear cover.
2. Remove the cover from the rear of the stairarm. The cover's retaining screw is on the inside and must be accessed from the opposite side of the EFX. Carefully, rotate the stairarm to a position just forward of vertical to gain access to the cover's retaining screw.
3. Remove the Front cover per Procedure 10.2.
4. Grasp the center ramp cover and lift it upwards to unsnap it from the ramp. Remove the center ramp cover from the EFX and set it aside.
5. Remove the two screws that fasten the ramp end cap to the ramp. Remove the ramp end cap. Refer to Diagram 10.12.1.
6. The left side and/or right side ramp trim will need to be removed in order to access the stairarm wheels.
7. Loosen, but do not remove, the five screws that fasten ramp trim(s) required to access the wheel(s) being replaced. Slide the ramp trim(s) off the front of the ramp.
8. Remove the plastic cap from the stairarm connector. Remove the bolt that fastens the stairarm connector to the stairarm. Retain the bolt, two washers, a steel spacer and a large black spacer for later use. Refer to Diagram 10.13.1.

**Diagram 10.13.1 - Stairarm and Stairarm Connector**



1. Remove the retaining ring that fastens the stairarm to the crankarm and remove the stairarm from the EFX.
2. Remove the stairarm pedal per Procedure 10.12 and install it on the replacement stairarm.
3. Remove both wheels and slide them onto the replacement stairarm's axle. Apply blue loctite to the wheel mounting screws and torque the wheel mounting screws to 180 inch pounds.

4. Slide the stairarm onto the crankarm and set the stairarm in its ramp track. Fasten the stairarm to the crankarm with the retaining ring removed in step 7.
5. Slide the large black spacer onto its mounting position on the replacement stairarm. Slide the steel spacer into the end of the stairarm connector. Fasten the stairarm connector to the stairarm with the bolt, removed in step 6, and a washer on each side of the steel spacer in the end of the stairarm connector.
6. Align the T-nuts on the ramp trim(s) with the channel in the bottom front of the ramp. Slide the trim onto the ramp while feeding each T-nut into the ramp channel. Do not tighten the trim fastening screws at this time. Repeat this procedure with the remaining trim strip, if required.
7. Set the ramp end cap at its mounting position and fasten it with the screws removed in step 3.
8. Align the ramp trim(s) with the ramp end cap and tighten the five trim mounting screws.
9. Set the ramp center cover at its mounting position and press downward to snap it onto place.
10. Replace the front cover per Procedure 10.2.
11. Replace the stairarm cover(s) with the hardware removed in step 2.
12. Replace the left and right side covers per Procedure 10.1.

## Procedure 10.14 – Replacing the Ramp Assembly

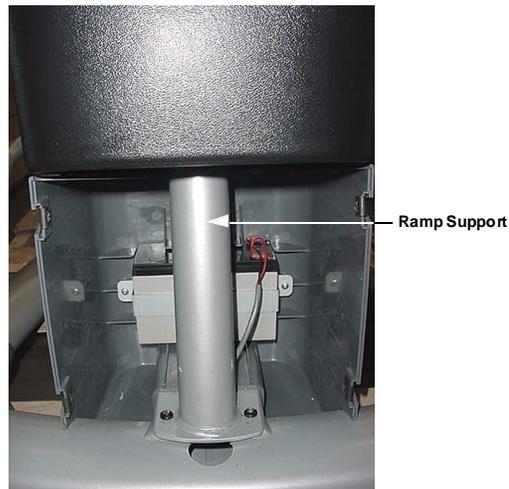
1. Remove both stairarms per Procedure 10.13.
2. Remove the four bolts that fasten the ramp pivot to the ramp. Refer to Diagram 10.14.1.

### Diagram 10.14.1 - Rear Ramp Mounting



3. Remove the upper cover section and cap per Procedure 10.2.
4. Remove the two bolts that fasten the ramp support to the ramp. Refer to Diagram 10.14.2.

### Diagram 10.14.2 - Front Ramp Mounting



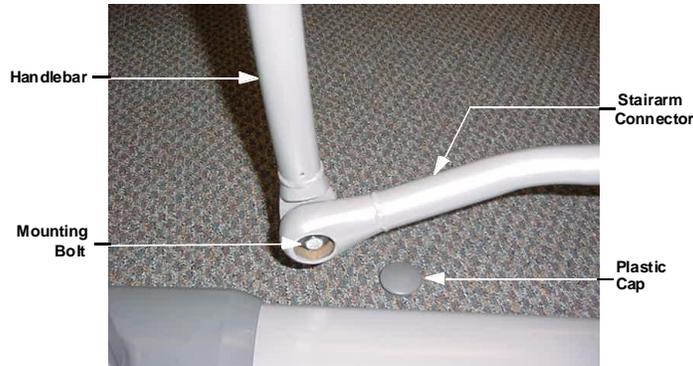
5. Remove the ramp from the EFX.
6. Remove the two screws that fasten the rear ramp end cap to the ramp. Set the rear ramp end cap at its mounting position on the replacement ramp and fasten with the screws removed above.

7. Set the replacement ramp in its mounting position and hand start ramp pivot mounting bolts removed in step 3. Do not tighten them at this time.
8. Replace and securely tighten the two screws, removed in step 4, that fasten the ramp to the ramp support.
9. Apply blue locitite to the four ramp pivot bolts (installed in step 7) and torque them to 480 inch pounds (40 foot pounds).
10. Slide the stairarm onto the crankarm and set the stairarm in its ramp track. Fasten the stairarm to the crankarm with its retaining ring.
11. Slide the large black spacer onto its mounting position on the stairarm. Slide the steel spacer into the end of the stairarm connector. Securely tighten the stairarm connector to the stairarm with the bolt, removed in step above, and a washer on each side of the steel spacer in the end of the stairarm connector.
12. Align the T-nuts on the ramp trim(s) with the channel in the bottom front of the ramp. Slide the trim onto the ramp while feeding each T-nut into the ramp channel. Do not tighten the trim fastening screws at this time. Repeat this procedure with the remaining trim strip, if required.
13. Align the ramp trim(s) with the ramp end cap and tighten the five trim mounting screws.
14. Set the ramp center cover at its mounting position and press downward to snap it onto place.
15. Place the upper cover section and cap on the lower rear cover section and fasten it with the screws removed in step 2.
16. Set the lower front cover section in its mounting position and fasten it with the screws removed in step 1.

## Procedure 10.15 – Replacing a Handlebar

1. Remove the plastic cap from the inside lower end of the handlebar. Refer to Diagram 10.15.1. Remove the bolt that fastens the handlebar to the stairarm connector. There are two washers and a steel spacer in the stairarm connector.

### Diagram 10.15.1 - Lower Handlebar Mounting



2. Remove the stairarm connector from the handlebar.
3. Remove the bolts that fasten the center of the handlebar to the handlebar pivot. Refer to Diagram 10.15.2.

### Diagram 10.15.2 - Center Handlebar Mounting



4. Set the handlebar at its mounting position and hand start the mounting bolts removed in step 3 that fasten the handlebar to the handlebar pivot. Do not tighten them at this time.
5. Slide the spacer into the stairarm connector and place a washer on each side of the spacer. Position the handlebar and the stairarm connector at their mounting positions and hand start the mounting bolt.
6. Securely tighten the handlebar to stairarm connector bolt. Replace the plastic cap on the stairarm connector.
7. Torque the handlebar to handlebar pivot bolts to 150 inch pounds.

## Procedure 10.16 – Replacing a Stairarm Connector

### WARNING

Before continuing with this procedure, review the Warning and Caution statements listed in Section One, Things You Should Know.

1. Remove the plastic cap from the stairarm end of the stairarm connector. Remove the bolt that fastens the stairarm connector to the stairarm. Refer to Diagram 10.5.1. There are two washers and a spacer in the stairarm connector.
2. Remove the plastic cap from the inside lower end of the handlebar. Refer to Diagram 10.15.1. Remove the bolt that fastens the handlebar to the stairarm connector. There are two washers and a spacer in the stairarm connector.
3. Remove the stairarm connector.
4. Slide the spacer into the bushing in the rear of the stairarm connector and place a washer on each side of the spacer. Set the stairarm connector at its mounting position and fasten it with the bolt removed in step 3. Securely tighten the stairarm connector bolt. Snap the plastic cap removed in step 3 into the stairarm connector.
5. Slide the spacer into the bushing in the front of the stairarm connector and place a washer on each side of the spacer. Position the handlebar and stairarm connector at their mounting positions and hand start the mounting bolt.
6. Securely tighten the handlebar to stairarm connector bolt. Replace the plastic cap on the stairarm connector.

## Procedure 10.17 – Replacing a Generator

### WARNING

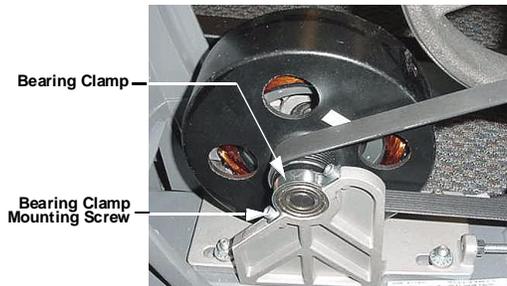
When the unit is used, stairarms are in motion or the generator is rotated by any means, the generator will produce potentially hazardous voltages even when the battery is disconnected.

1. Remove the rear cover and disconnect the red battery lead from terminal M6 of the lower PCA.
2. Remove the three generator mounting screws shown in Diagram 10.17.1.
3. Remove the two bearing clamp screws shown in Diagram 10.17.2. Remove the bearing clamp.
4. Lift the generator and remove its drive belt.
5. Loosen all four generator mounting nuts. Loosen the locking nut on the generator's adjustment bolt and thread the adjustment bolt into tab to remove tension from the generator's drive belt. Remove the drive belt from the generator's pulley.
6. Remove the four generator mounting nuts. Disconnect the generator's cable connector from the intermediate cable and remove the generator from the EFX.
7. Remove the adjustment bolt and its locking nut from the generator's mounting base.
8. Thread the adjustment bolt and locking nut into the tab on the replacement generator.

### Diagram 10.17.1 - Generator Mounting



9. Set the replacement generator at its mounting position. Remove the three generator mounting screws, the two bearing clamp screws and the bearing clamp. Lift the generator and place the drive belt around the generator's pulley.

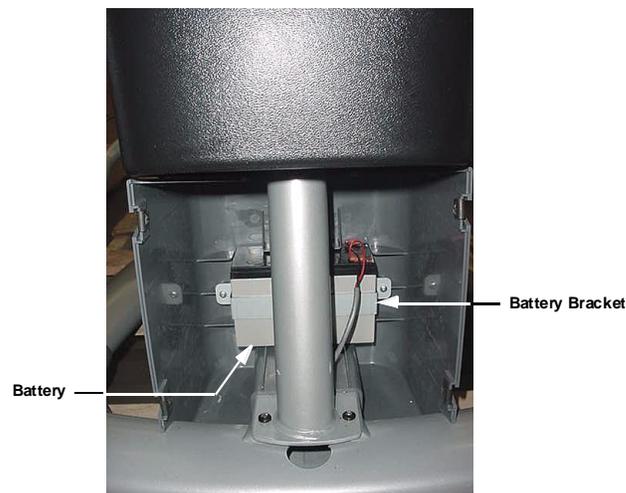
**Diagram 10.17.2 - Generator Bearing Clamp**

10. Replace and tighten the three generator mounting screws removed in step 9. Set the bearing clamp in its mounting position, replace and tighten the two bearing clamp mounting screws removed in step 9.
11. Hand start, but do not tighten the four mounting nuts removed in step 6. The generator must be able to move in order to adjust the belt tension.
12. Adjust the generator drive belt tension per Procedure 8.2.
13. Reconnect the red battery lead removed in step 1 and replace the rear cover.
14. Check the operation of the EFX as described in Section Seven.

## Procedure 10.18 – Replacing a Battery

1. Remove the four screws that retain the lower front cover section, remove the lower front cover section and set it aside.
2. Remove the hitch pin from the clevis at the lower mount of the incline motor. Remove the clevis pin from the lower incline motor mount. Lift the incline motor out of its mounting position and set it on the floor in front of the EFX. Refer to Diagram 10.18.1.

### Diagram 10.18.1 - Replacing a Battery

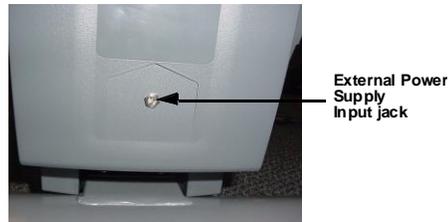


3. Remove the two screws that fasten the battery bracket to the rear cover section and remove the battery bracket.
4. Slide the battery out of the rear cover section and set it on the floor beside the incline motor.
5. Disconnect the red and black wires from the battery.
6. Connect the red and black wires disconnected in step 6 to the replacement battery. The red wire must be connected to the terminal marked with the red dot.
7. Set the battery in its mounting position. Set the battery bracket in its mounting position and fasten it with the screws removed in step 8.
8. Set the incline motor in its mounting position and slide the clevis pin into the incline motor's lower mount. Fasten the clevis pin with the hitch pin.
9. Set the lower front cover section in its mounting position and fasten it with the four screws removed in step 2.

## Procedure 10.19 – Replacing an External Power Input Jack

1. Remove the left and right side rear covers sections per Procedure 10.1.
2. Disconnect the J4 connector from the lower PCA.

### Diagram 10.19.1 - Power Input Jack Mounting



3. Remove the nut that fastens the external power input jack to the rear cover support. Refer to Diagram 10.19.1.
4. Remove the power jack's wiring from the wire clips and discard the power jack and wiring.
5. Fasten the replacement external power input jack into the cover with the mounting nut provided with the power input jack.
6. Route the power input jack wiring through the wire clips to the lower PCA. Connect the plug on the power input jack wiring to the J4 connector on the lower PCA.
7. Replace the left and right side rear covers.
8. Check the operation of the EFX as described in Section Seven.

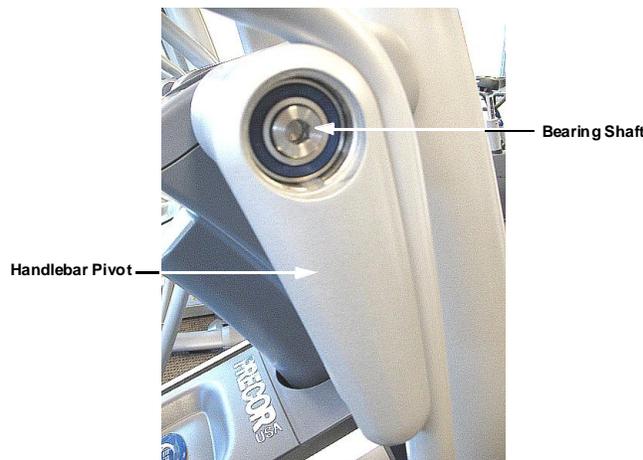
## Procedure 10.20 – Replacing a Handlebar Pivot

### WARNING

Before continuing with this procedure, review the Warning and Caution statements listed in Section One, Things You Should Know.

1. Remove the handlebar per Procedure 10.15.
2. Remove the cap from the upper end of the handlebar pivot. Remove the bearing shaft from the upper end of the upper pivot arm. The bearing shaft will be very tight, a long handled socket wrench with a 7/16" hex key will be necessary for removal. See Diagram 10.22.1.

### Diagram 10.22.1 - Handlebar Pivot



3. Remove the handlebar pivot from the unit.
4. Set the upper end of the handlebar pivoting it's mounting position and carefully thread the bearing shaft into the frame. Care must be taken to avoid cross-threading the bearing shaft.
5. Torque the bearing shaft to 150 foot pounds (1800 inch pounds).
6. Replace the handlebar per Procedure 10.15.
7. Insert the cap into the upper end of the upper pivot arm.

**Section Eleven - Future Content**

**Section Twelve - Future Content**

**Section Thirteen - Future Content**

**Section Fourteen - Wiring Diagrams**

**Wiring Diagram 14.1 - EFX**

