Electronic Problems

Error Codes

The treadmill performs an electronic self-test each time that it is powered up. If a problem is detected during either power-up or operation, an error code appears on the display. Note the code recorded by the owner, then reference the table of error codes.

If you replace a faulty PCB Assembly, return it to the factory and note the error code.

<table>
<thead>
<tr>
<th>Code</th>
<th>Indication</th>
<th>Recommended Action</th>
</tr>
</thead>
<tbody>
<tr>
<td>E001</td>
<td>Variable speed drive (VSD)</td>
<td>Replace VSD.</td>
</tr>
<tr>
<td></td>
<td>microprocessor chip failure</td>
<td></td>
</tr>
<tr>
<td>E002</td>
<td>VSD microprocessor</td>
<td>Replace VSD.</td>
</tr>
<tr>
<td></td>
<td>EPROM/SRAM failure</td>
<td></td>
</tr>
<tr>
<td>E004</td>
<td>VSD A/D failure</td>
<td>Replace VSD.</td>
</tr>
<tr>
<td>E101</td>
<td>Controller PCBA</td>
<td>Replace controller.</td>
</tr>
<tr>
<td></td>
<td>microprocessor failure</td>
<td></td>
</tr>
<tr>
<td>E102</td>
<td>Controller PCBA</td>
<td>Replace controller.</td>
</tr>
<tr>
<td></td>
<td>EPROM failure</td>
<td></td>
</tr>
<tr>
<td>E103</td>
<td>Controller PCBA interrupt</td>
<td>Replace controller.</td>
</tr>
<tr>
<td></td>
<td>failure</td>
<td></td>
</tr>
<tr>
<td>E105</td>
<td>Controller PCBA NVRAM failure</td>
<td>Re-initialize NVRAM:</td>
</tr>
<tr>
<td></td>
<td></td>
<td>1. Press Stop, Faster, and Slower to enter Service Mode.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>2. Press Stop and Cool Down to reinitialize.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(For HR ClubTrack Plus, press the NV PROGRAM LOAD TEST key. Proceed to step 4.)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>4. Reconfigure controller, pg 4-30 (HR Plus, adjust the contrast after reconfiguring.)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>If error E105 persists, replace controller.</td>
</tr>
<tr>
<td>E106</td>
<td>ClubTrack Plus Controller display RAM failure</td>
<td>Replace controller.</td>
</tr>
<tr>
<td>E201</td>
<td>Grade error</td>
<td>1. Enter service mode.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>2. Calibrate POT.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>3. If error persists, replace POT.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>4. If error persists, replace VSD.</td>
</tr>
<tr>
<td>E202</td>
<td>Speed error. A software check of redundant speed</td>
<td>Clear the error by pressing Clear or Power.</td>
</tr>
<tr>
<td></td>
<td>variables has indicated a disagreement and the</td>
<td>Attempt to operate the treadmill again. If error persists, replace the VSD board.</td>
</tr>
<tr>
<td></td>
<td>microprocessor will shut down the treadmill.</td>
<td></td>
</tr>
</tbody>
</table>

continued
<table>
<thead>
<tr>
<th>Code</th>
<th>Indication</th>
<th>Recommended Action</th>
</tr>
</thead>
<tbody>
<tr>
<td>E203</td>
<td>Motor overload caused by one of the following:</td>
<td>1. Restrict use to people within the weight/speed specifications.</td>
</tr>
<tr>
<td></td>
<td>1. Runner heavier than weight/speed envelope.</td>
<td>2. Check deck wear; replace if necessary.</td>
</tr>
<tr>
<td></td>
<td>2. Deck wear</td>
<td>3. If the motor does not turn, check the motor leads to ensure all leads are connected. One loose or disconnected lead will cause overload.</td>
</tr>
<tr>
<td></td>
<td>3. Motor lead disconnected or loose</td>
<td>4. Examine board for shorts. Examine board for blackened components or discoloration.</td>
</tr>
<tr>
<td></td>
<td>4. Electrical short on the board near the power electronics</td>
<td>5. Replace board if damaged.</td>
</tr>
<tr>
<td></td>
<td>6. Motor blocked by obstruction</td>
<td></td>
</tr>
<tr>
<td>E204</td>
<td>VSD and controller not communicating</td>
<td>Verify cable connections at both ends. Check for bent or broken pins; replace if required. If error persists, replace VSD or controller as necessary.</td>
</tr>
<tr>
<td>E205</td>
<td>Software tachometer fault</td>
<td>Clear the error by pressing Clear or Power. Attempt to operate the treadmill again. If error persists, replace VSD board.</td>
</tr>
<tr>
<td>E206</td>
<td>Controller or VSD performs inadvertent reset</td>
<td>Verify wire grounding system is intact.</td>
</tr>
<tr>
<td>EPHI</td>
<td>VSD ABS voltage is too high. Line voltage is too high. VSD board failure</td>
<td>Refer to EPHI error code flow chart elsewhere in this chapter.</td>
</tr>
<tr>
<td>EPLO</td>
<td>VSD ABS voltage is too low. Line voltage is too low. Transformer connection is bad. Transformer failure. VSD board failure.</td>
<td>Refer to EPLO error code flow chart elsewhere in this chapter.</td>
</tr>
</tbody>
</table>
SECTION 4 TROUBLESHOOTING

This Section consists of several tables that isolate most problems that could occur during treadmill operation, and provide a variety of suggestions for onsite repair. The tables include:

1. error codes.
2. mechanical noises.
3. test points on the TMU.
4. fuses.
5. control cable pinouts (for continuity and signal testing).
6. power-up problems.
7. failure to start.
8. speed change problems.
9. elevation problems.
10. walking belt not tracking correctly.
11. belt slippages.
12. bearing and other treadmill noises.

In addition, this Section includes:

- a discussion of the error codes that can appear on the display.
- troubleshooting techniques for bearing problems.
- the information and tests available in Technician Access mode.

ERROR CODES

The treadmill performs an electronic self-test each time that it is powered up. If a problem is detected during either power-up or operation, an error code appears on the display.

**WARNING**

When PL05 appears on the display, ensure that nobody is on the walking belt when you press the red Reset button. The belt starts moving immediately, and the sudden start and subsequent loss of balance could cause serious personal injury.

PL05 indicates a power interrupt. Ensure that nobody is on the walking belt, then press the red Reset button on the hood.

- The belt will move momentarily, then stop.
- The red Reset light is extinguished.
- You must press CLEAR to remove PL05 from the display and return it to normal.

The treadmill is then ready for use.

If an error code consisting of the letter E followed by three numbers appears, such as E101, refer to Table 4-2 on page 4-4. If you replace a faulty PCB Assembly, please return it to the factory and note the error code.

**TROUBLESHOOTING BEARING PROBLEMS**

**WARNING**

Observe the following precautions when servicing the treadmill:

- Do not start the walking belt when someone is on the treadmill. The belt starts moving immediately, and the sudden start and subsequent loss of balance could cause serious personal injury.
- High voltage is present when the treadmill hood is removed and the treadmill is plugged in.
- Do not wear loose clothing around rotating machinery.
- Never place your fingers near rotating parts.

All bearings are sealed and permanently lubricated, so maintenance is not required. The following information is provided to assist in diagnosing and trouble-shooting bearing failures.

Most failures cause clicking or knocking noises that are heard during treadmill operation. Determining the type and the rate of bearing noise can help establish which bearing is at fault. Table 4-3 on page 4-5 is a diagnostic
summary of bearing noises, along with other noises that may indicate problems.

- **Transmission bearings** generally click when they fail.
  - The input shaft assembly rotates at a constant speed, so the rate of the bearing noise (i.e. the number of clicks per minute) remains constant regardless of the walking belt speed.
  - The speed of the output shaft assembly varies with the treadmill speed, so the rate of the bearing noise (i.e. the number of clicks per minute) increases or decreases along with the walking belt speed.
- Front and rear roller assembly bearings tend to knock when they fail. (There are exceptions, however.) Also, the rate of the bearing noise (number of knocks per minute) varies with treadmill speed, because the roller speeds increase or decrease as belt speed changes.

A stethoscope with an open or tube end, or a piece of hose about two feet long, is useful for isolating bearing problems. (Hold one end of the hose near the suspected bearing, and the other end near your ear.) Compare several bearings to determine the sound of a faulty one. Read the warning on page 4-1 first before attempting this!

**TECHNICIAN ACCESS MODE**

The treadmill is equipped with a technician (privileged) access mode to aid in troubleshooting the controller (DPU) and display.

- To enter tech access mode, **simultaneously** press and release STOP BELT, FASTER, and SLOWER. P000, which indicates that no key is pressed, appears in the SELECT display. (You may remain in tech access mode to perform all tests. It is not necessary to exit and re-enter the mode.)
- To exit tech access mode, **simultaneously** press and release the same three keys.

**Firmware Revision Numbers**

To display the firmware revision levels of the DPU and TMU PCB assemblies:

1. Enter the tech access mode.
2. **Simultaneously** press STOP BELT and GRADE UP. The revision level of the DPU appears in the SELECT display.
3. **Simultaneously** press STOP BELT and GRADE DOWN. The revision level of the TMU appears in the SELECT display.

**Display Tests**

To test the displays on the keypanel:

1. Enter the tech access mode.
2. **Simultaneously** press STOP BELT, GRADE UP, and GRADE DOWN.
3. The display cycles through one digit at a time in each display, starting from left to right across the panel. Each digit displays the number 8 and the associated decimal point for one second, then turns off as the next one lights up.
4. When this is completed, the LEDs (annunciators) light up individually, starting from the top. The “select” LEDs illuminate first, followed by the “units” LEDs.
5. After the LEDs are tested, all the digits in all three displays simultaneously count up from 0 through 9. (No decimal points are lit up during this count.)

**Key Input Test**

To test the keys on the keypanel:

1. Enter the tech access mode. P000, which indicates that no key is pressed, appears in the SELECT display. (If a key is shorted out, P555 appears.)
2. Refer to Table 4-1 on page 4-3, then press each key in succession to display the appropriate code in the SELECT display. For example, P001 appears when you press START BELT. P000 reappears when you release the key.
3. Exit the tech access mode as described on this page.
Table 4-1. Keystroke Input Test Displays

<table>
<thead>
<tr>
<th>KEY</th>
<th>CODE IN SELECT DISPLAY</th>
</tr>
</thead>
<tbody>
<tr>
<td>No key pressed</td>
<td>P000</td>
</tr>
<tr>
<td>START BELT</td>
<td>P001</td>
</tr>
<tr>
<td>STOP BELT</td>
<td>P002</td>
</tr>
<tr>
<td>FASTER</td>
<td>P003</td>
</tr>
<tr>
<td>SLOWER</td>
<td>P004</td>
</tr>
<tr>
<td>UP</td>
<td>P005</td>
</tr>
<tr>
<td>DOWN</td>
<td>P006</td>
</tr>
<tr>
<td>SELECT</td>
<td>P007</td>
</tr>
<tr>
<td>UNITS</td>
<td>P008</td>
</tr>
<tr>
<td>CLEAR</td>
<td>P009</td>
</tr>
<tr>
<td>Shorted key(s)</td>
<td>P555</td>
</tr>
<tr>
<td>DISPLAY</td>
<td>INDICATION</td>
</tr>
<tr>
<td>---------</td>
<td>------------------------------------------------</td>
</tr>
<tr>
<td>E001</td>
<td>Treadmill Control Unit (TMU) chip failure</td>
</tr>
<tr>
<td>E002</td>
<td>TMU EPROM failure</td>
</tr>
<tr>
<td>E003</td>
<td>TMU interrupt condition</td>
</tr>
<tr>
<td>E004</td>
<td>TMU A/D failure</td>
</tr>
<tr>
<td>E005</td>
<td>TMU communication failure</td>
</tr>
<tr>
<td>E101</td>
<td>Display Processor Unit (DPU) chip failure</td>
</tr>
<tr>
<td>E102</td>
<td>DPU EPROM failure</td>
</tr>
<tr>
<td>E103</td>
<td>DPU interrupt condition</td>
</tr>
<tr>
<td>E104</td>
<td>Interprocessor communication failure</td>
</tr>
<tr>
<td>E201</td>
<td>Grade feedback is outside of 0-15% grade range.</td>
</tr>
<tr>
<td>E202</td>
<td>Speed display error. Displayed speed more than ± 2 mph from optical tach output (speed feedback).</td>
</tr>
<tr>
<td>E203</td>
<td>Drive motor overheating. Motor drawing excessive current, and thermal overload activated.</td>
</tr>
<tr>
<td>E204</td>
<td>Microcontrollers on TMU and DPU Assemblies not communicating</td>
</tr>
<tr>
<td>E205</td>
<td>Tachometer not operational (Voltage output below +3.3 V).</td>
</tr>
<tr>
<td>E206</td>
<td>Noise spike caused TMU microcontroller to reset inadvertently.</td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Table 4-3. Troubleshooting Mechanical Component Noises

<table>
<thead>
<tr>
<th>NOISE</th>
<th>PROBABLE FAULTY COMPONENT</th>
<th>ACTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>Clicking (Constant Speed)</td>
<td>Input shaft assembly transmission bearing</td>
<td>Isolate bearing, then replace input shaft assembly (page 3-9)</td>
</tr>
<tr>
<td>Clicking (Rate increases/decreases with walking belt speed)</td>
<td>Output shaft assembly transmission bearing</td>
<td>Isolate bearing, then replace output shaft assembly (page 3-11)</td>
</tr>
<tr>
<td>Knocking or thumping (Rate increases/decreases with walking belt speed)</td>
<td>Front or rear roller (pulley) assembly bearings</td>
<td>Isolate and replace roller [pulley] (page 3-20)</td>
</tr>
<tr>
<td>High-pitched “singing”</td>
<td>Final drive belt too loose or too tight</td>
<td>Adjust belt tension (page 3-13)</td>
</tr>
<tr>
<td>Squealing (like loose automobile fan belt)</td>
<td>Motor belt (V-belt) loose</td>
<td>Adjust belt tension (page 3-26). Replace belt if necessary.</td>
</tr>
<tr>
<td>Popping (during grade increase or decrease)</td>
<td>Faulty elevation chain alignment</td>
<td>Adjust alignment of sprockets</td>
</tr>
</tbody>
</table>

Table 4-4. Voltage Test Points on TMU Assembly*

<table>
<thead>
<tr>
<th>TEST POINT</th>
<th>EXPECTED VOLTAGE</th>
<th>FUNCTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>TP1</td>
<td>+5 V</td>
<td>Power supply voltages</td>
</tr>
<tr>
<td>TP2</td>
<td>+12 V</td>
<td></td>
</tr>
<tr>
<td>TP3</td>
<td>+26 V</td>
<td></td>
</tr>
<tr>
<td>TP4</td>
<td>Normal: 0 V</td>
<td>Thermal Overload in drive motor. WARNING: High voltage present on TMU when overload condition occurs.</td>
</tr>
<tr>
<td>TP5</td>
<td>Thermal Overload: +110 VAC</td>
<td></td>
</tr>
<tr>
<td>TP6</td>
<td>Between +3.3 V and +5 V</td>
<td>Tachometer HIGH level</td>
</tr>
<tr>
<td>TP7</td>
<td>0 V (low) +5 V (high)</td>
<td>Optical tachometer speed feedback</td>
</tr>
<tr>
<td>TP8</td>
<td>Normal: 0 V Fault: +5 V</td>
<td>Undervoltage indicator</td>
</tr>
<tr>
<td>TP9</td>
<td>Ground</td>
<td>Ground (Return) for TMU Assembly</td>
</tr>
</tbody>
</table>

*All voltages DC unless otherwise indicated.
### Table 4-5. Fuses on TMU PCB

<table>
<thead>
<tr>
<th>FUSE</th>
<th>FUNCTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>F1</td>
<td>Speed change motor</td>
</tr>
<tr>
<td>F2, F3</td>
<td>AC Mains (line) power</td>
</tr>
<tr>
<td>F4, F5</td>
<td>High-speed deceleration circuitry for speed change motor</td>
</tr>
<tr>
<td>F6, F7</td>
<td>Grade change motor</td>
</tr>
</tbody>
</table>

**WARNING:** High voltage may be present on fuses.

*NOTE:* If one fuse of a pair is blown, replace *both* fuses.

![Figure 4-1. Fuses F1-F7 on TMU PCB Assembly](image)

### Table 4-6. Signals on Control Cable Pins

<table>
<thead>
<tr>
<th>PIN NUMBER: TMU (J12)</th>
<th>PIN NUMBER: DPU (J1)</th>
<th>SIGNAL</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>1</td>
<td>T+ (Transmit +)</td>
</tr>
<tr>
<td>2</td>
<td>2</td>
<td>T- (Transmit -)</td>
</tr>
<tr>
<td>3</td>
<td>3</td>
<td>R+ (Receive +)</td>
</tr>
<tr>
<td>4</td>
<td>4</td>
<td>R- (Receive -)</td>
</tr>
<tr>
<td>5</td>
<td>5</td>
<td>GND (Ground)</td>
</tr>
<tr>
<td>6</td>
<td>6</td>
<td>N/C</td>
</tr>
<tr>
<td>7</td>
<td>7</td>
<td>GND (Ground)</td>
</tr>
<tr>
<td>8</td>
<td>8</td>
<td>+12 VDC</td>
</tr>
<tr>
<td>9</td>
<td>9</td>
<td>+12 VDC</td>
</tr>
</tbody>
</table>

*NOTE:* J12 is a D-sub connector; J1 is a MASCON connector.
Table 4-7. Treadmill Does Not Power Up (Display or Reset Light Not Visible)

<table>
<thead>
<tr>
<th>POSSIBLE PROBLEM</th>
<th>ACTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>Treadmill not plugged in</td>
<td>Plug power cord into an appropriate outlet.</td>
</tr>
<tr>
<td>Circuit breaker tripped</td>
<td>Contact building maintenance to reset breaker.</td>
</tr>
<tr>
<td></td>
<td>If breaker trips again:</td>
</tr>
<tr>
<td></td>
<td>1) Check voltage at outlet. If necessary, verify that power at outlet</td>
</tr>
<tr>
<td></td>
<td>and at breaker is rated sufficiently to operate treadmill.</td>
</tr>
<tr>
<td></td>
<td>2) Verify that power cord is not caught in rack gear.</td>
</tr>
<tr>
<td>Power cord cut</td>
<td>Remove cord from outlet and replace.</td>
</tr>
<tr>
<td>Fuse in treadmill blown</td>
<td>Remove power cord and replace fuse (Table 4-4).</td>
</tr>
<tr>
<td></td>
<td>If fuse blows again, isolate mechanical assembly and ensure that no</td>
</tr>
<tr>
<td></td>
<td>parts are jammed (e.g. rack gear in grade change assembly.)</td>
</tr>
<tr>
<td>Limited Access (magnetic control) switch enabled, but</td>
<td>Put Quinton magnet on Quinton logo, then press POWER twice (OFF, then</td>
</tr>
<tr>
<td>magnet not in place</td>
<td>ON again). If you wish, turn the treadmill OFF and disable the limited</td>
</tr>
<tr>
<td></td>
<td>access switch on the bottom of the TMU (Operator Manual, page 4-2).</td>
</tr>
<tr>
<td>Reset button on hood not reconnected after maintenance.</td>
<td>Remove hood cover and fasten connector.</td>
</tr>
<tr>
<td></td>
<td>(Light will not be visible.)</td>
</tr>
<tr>
<td>Control cable between TMU and DPU</td>
<td>Check both PCB Assemblies. Reconnect and tighten screws as required.</td>
</tr>
<tr>
<td>disconnected at either Assembly</td>
<td></td>
</tr>
<tr>
<td>Control cable (including connector pins) between TMU and</td>
<td>Check for bent or broken pins. Replace control cable.</td>
</tr>
<tr>
<td>DPU faulty</td>
<td></td>
</tr>
<tr>
<td>TMU failure</td>
<td>Check power supply power at test points (Table 4-3). If power is</td>
</tr>
<tr>
<td></td>
<td>incorrect, replace TMU Assembly.</td>
</tr>
<tr>
<td>DPU failure</td>
<td>Replace DPU Assembly.</td>
</tr>
</tbody>
</table>

Table 4-8. Treadmill Powers Up, but Belt Does Not Move

<table>
<thead>
<tr>
<th>POSSIBLE PROBLEM</th>
<th>ACTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>Reset button (on hood) lit, and PL05 appears on display.</td>
<td>Ensure nobody is on walking belt, then press Reset button. (Press CLEAR to clear display.)</td>
</tr>
<tr>
<td>Error code appears on display</td>
<td>Refer to Table 5-1. Replace PCB or other assembly as required.</td>
</tr>
<tr>
<td>Contactor (K1) not operational.</td>
<td>Verify that wires are connected, then check power supply voltages</td>
</tr>
<tr>
<td></td>
<td>(208 V at K1 terminals 3,5). Replace K1 as required.</td>
</tr>
<tr>
<td>Drive motor overheated or not operational.</td>
<td>Check test points TP4/TP5 for thermal overload. (See Table 4-3)</td>
</tr>
<tr>
<td></td>
<td>Check voltage from K1 to motor (208 V at K1 terminals 3,5 when K1 is</td>
</tr>
<tr>
<td></td>
<td>activated). Replace motor if required.</td>
</tr>
<tr>
<td>Wires to motor disconnected</td>
<td>Reconnect wires as required.</td>
</tr>
<tr>
<td>Motor noise audible, but walking belt not moving.</td>
<td>Replace broken motor belt.</td>
</tr>
</tbody>
</table>
### Table 4-9. Treadmill Does Not Change Speed

<table>
<thead>
<tr>
<th>POSSIBLE PROBLEM</th>
<th>ACTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>Speed change relays on TMU PCBA loose or not operational</td>
<td>Plug in relays or replace with new ones as appropriate</td>
</tr>
<tr>
<td>Speed change motor burned out or not operational</td>
<td>1) Verify that motor can rotate (i.e. is not jammed)</td>
</tr>
<tr>
<td></td>
<td>2) Test voltage from filter to motor. It should range from 0-90 V (max).</td>
</tr>
<tr>
<td></td>
<td>Replace motor if required.</td>
</tr>
<tr>
<td>Wires poorly connected to (or disconnected from) speed change motor terminals</td>
<td>Crimp terminals and reconnect wires as required.</td>
</tr>
<tr>
<td>Control cable from TMU to DPU defective or not fully connected</td>
<td>Check for bent or broken pins. Replace or reconnect cable as required.</td>
</tr>
<tr>
<td>Fuse F1 on TMU blown</td>
<td>Isolate problem and replace fuse.</td>
</tr>
<tr>
<td>Speed change motor brushes worn</td>
<td>Check brushes. Replace as required.</td>
</tr>
<tr>
<td>Speed change spindle jammed</td>
<td>Remove and replace spindle assembly (Refer to Input Shaft Removal, Section 3)</td>
</tr>
<tr>
<td>Input shaft assembly moveable sheave jammed</td>
<td>Remove and replace input shaft assembly</td>
</tr>
<tr>
<td>Output shaft assembly moveable sheave jammed</td>
<td>Remove and replace output shaft assembly</td>
</tr>
</tbody>
</table>

### Table 4-10. Treadmill will Not Elevate

<table>
<thead>
<tr>
<th>POSSIBLE PROBLEM</th>
<th>ACTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>Grade change motor burned out or not operational</td>
<td>Test motor. Replace if required.</td>
</tr>
<tr>
<td>Wires poorly connected to (or disconnected from) terminals</td>
<td>Crimp terminals and reconnect wires as required.</td>
</tr>
<tr>
<td>Control cable from TMU to DPU defective or not fully connected</td>
<td>Check for bent or broken pins. Replace or reconnect cable as required.</td>
</tr>
<tr>
<td>Fuses F6 and F7 on TMU blown</td>
<td>Isolate problem and replace fuses.</td>
</tr>
<tr>
<td>Grade change motor brushes worn</td>
<td>Check brushes. Replace as required</td>
</tr>
<tr>
<td>Elevation microswitch out of adjustment</td>
<td>Adjust microswitch as required (Section 3)</td>
</tr>
<tr>
<td>Rack gear jammed</td>
<td>Check and free gear (Section 3)</td>
</tr>
<tr>
<td>Grade pot out of adjustment</td>
<td>Adjust pot (Section 3)</td>
</tr>
<tr>
<td>Elevation relays on TMU defective</td>
<td>Replace TMU</td>
</tr>
</tbody>
</table>
### Table 4-11. Walking Belt Slipping or Not Tracking

<table>
<thead>
<tr>
<th>POSSIBLE PROBLEM</th>
<th>ACTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>Walking belt slipping</td>
<td>Adjust belt tension (page 3-23)</td>
</tr>
<tr>
<td>Belt not tracking:</td>
<td></td>
</tr>
<tr>
<td>Tracking adjusted incorrectly</td>
<td>Adjust tracking (page 3-24)</td>
</tr>
<tr>
<td>Walking belt worn out</td>
<td>Replace belt (page 3-21)</td>
</tr>
<tr>
<td>Walking deck (slider bed) worn</td>
<td>Replace deck (page 3-21)</td>
</tr>
<tr>
<td>out</td>
<td></td>
</tr>
</tbody>
</table>

### Table 4-12. Internal Belt Slippages

<table>
<thead>
<tr>
<th>SYMPTOMS</th>
<th>POSSIBLE PROBLEM</th>
<th>ACTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>1) Squealing sound like automobile fan belt, and 2) Walking belt slows</td>
<td>Motor drive belt (V-belt) slipping</td>
<td>Adjust belt tension (page 3-26)</td>
</tr>
<tr>
<td>as user’s foot strikes the deck</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Walking belt slows as user’s foot strikes the deck.</td>
<td>Transmission belt slipping</td>
<td>Check pulley sheaves for grease or oil. Clean as required.</td>
</tr>
</tbody>
</table>
NOTE

Do not force the set collars tightly against the headframe. Verify that the pinion shaft will turn freely when the set collars are in place.

10. Align the grade potentiometer sprocket, then tighten its setscrew.

11. Align the elevation sprocket and grade motor sprocket, then tighten the setscrew on the sprocket.

12. Reassemble the siderails, uprights, and walking belt as described on page 3-21.

13. Reassemble the rack gear as described on page 3-16.

14. Tension the walking belt as described on page 3-23.

15. Calibrate the grade potentiometer as described on page 3-25.

16. Test the treadmill elevation. Verify that:
   a. it operates over the full range of 0-15%.
   b. there is no binding when it moves up or down.
   c. the elevation pot chain is aligned correctly.
   d. the grade motor chain is also aligned correctly. A “popping” sound in the chain indicates that it is misaligned.

17. Unplug treadmill and replace the hood. Be sure to reconnect the reset switch.

Adjusting the Elevation Microswitches

The two elevation microswitches, one on each side of the treadmill, are mounted on brackets attached to the front of the headframe (Figure 3-26). When a roller on the microswitch reaches a detent that is cut into each rack gear, a lever arm travels outward, opening the microswitch and stopping the elevation motor. The microswitches prevent overtravel if the treadmill exceeds its preset electronic grade limits.

NOTE

Microswitch settings are preset at the factory and normally do not require adjustment.

1. Remove the hood (page 3-1).

2. Loosen, but do not remove, the two Phillips screws which secure each snap-action microswitch to the mounting plate (bracket).

3. Pivot the switch on the upper screw both toward and away from the rack gear. You should hear an audible click as the switch opens or closes.

4. Pivot the switch toward the rack gear until it just clicks, then stop and tighten both screws.

5. If required, repeat Steps 2-4 for the other microswitch.

6. Replace the treadmill hood.

7. Operate the treadmill to verify that it reaches the upper and lower elevation limits (15% and 0%).
Figure 3-27. Walking Deck Assembly

WALKING DECK ASSEMBLY

Figure 3-27 is an overview of the walking deck assembly.

Removing the Front (Drive) Roller or the Idler (Rear) Roller

1. Remove the hood (page 3-1).

NOTE
When replacing the screws in Step 2, note that the gap between the siderail cover and the head of each screw must be 0.050" ±0.010", approximately the thickness of a dime. See Figure 3-19 on page 3-12.

2. Remove the two Phillips screws from the siderails. These screws attach the hood to the siderails at the rear of the hood.

3. Remove both end caps, located on either side of the belt at the rear of the walking platform.

4. Grasp the top of the left side rail cover at the rear of the treadmill, then pull it up and away from the treadmill to roll the cover off. Repeat for the right cover. (The covers, which are made of flexible plastic, snap into place.)

6. Remove the four 1/2" hex bolts (two on each side) that secure the two front drive roller retainers to the frame siderail. One retainer is on each side of the drive roller assembly (Figure 3-19 on page 3-12.).

7. Slide the drive roller assembly to the left, then remove the timing belt from the right side of the roller.

8. Lift the roller assembly out from under the walking belt.

9. Pull the walking belt towards the rear of the deck, then slide the rear roller assembly out from between the side-rails toward the rear of the treadmill.

10. Replace the rollers and reassemble the treadmill following Steps 1-9 in reverse order.
11. Adjust the walking belt tension following the procedure on page 3-23.


Replacing the Walking Belt

Figure 3-27 on the previous page shows the walking deck assembly.

NOTES

- All orientations are given as if you were walking on the treadmill.
- A new slider bed is recommended when you install a new walking belt. The slider bed is reversible.

1. Raise the treadmill to its maximum height, then remove the hood as described on page 3-1.

2. Remove the drive (front) roller and the idler (rear) roller assemblies as described in Steps 2-8 of the previous paragraph.

3. Remove the 7/16" hex-head nut which fastens the rear of the drive roller cover to the treadmill siderail. It is located under the treadmill (Figure 3-22 on page 3-14).

4. Remove 12 Phillips screws that secure the treadmill slider bed to the siderails (Figure 3-27).

5. Lift the slider bed and slip off the belt.

NOTE

When you install a new belt, verify that the closed end of the splice on the walking belt hits the roller first as the belt rotates. See Figure 3-28.

6. Install a new belt and reassemble the treadmill following Steps 1-5 in reverse order.

7. Tension the belt following the procedure on page 3-23.

8. Adjust belt tracking following the procedure on page 3-24.

Removing the Slider Bed

Figure 3-28. Replacing Walking Belt

NOTE

The slider bed is reversible. You can turn it over if one side should wear out.

1. Follow Steps 1-5 in the previous paragraph to remove and replace the slider bed. Refer to the note following Step 6 when replacing the belt.

2. Tension the belt following the procedure on page 3-23.

3. Adjust the belt tracking following the procedure on page 3-24.

CONTROL PANEL AND DPU ASSEMBLY PROCEDURES

The operator control panel includes the treadmill control assembly, the display/keypanel, and the display processor unit (DPU) PCB Assembly.

Removing the Treadmill Control Panel Assembly

1. Turn the treadmill power off and disconnect the power cord from the socket.

2. Use a 5/32" Allen wrench to remove the eight socket screws that fasten the control enclosure to the upright assembly (Figure 3-29).

CAUTION

Ensure that the control panel assembly does not fall from the uprights while performing Steps 3-8.
3. Use a 1/8" Allen wrench to remove the eight socket screws that fasten the rear cover of the controller to the assembly (Figure 3-29).

4. Slide the cover down the uprights to expose the DPU.

5. Disconnect the controller cable, located on the left side of the DPU. See Figure 3-30.

6. Remove the hex nut that secures the ground wires to the chassis, then remove the wire.

7. Cut the cable tie that connects the cable to the control panel.

8. Lift the entire control panel assembly clear of the uprights.

9. Reassemble the assembly following Steps 2-8 in reverse order.

Replacing the DPU PCB Assembly

1. If possible, raise the treadmill to maximum height (15% elevation).

2. Turn the treadmill off and disconnect the power cord from the socket.

3. Use a 1/8" Allen wrench to remove the eight screws that secure the DPU enclosure rear cover (Figure 3-29).

4. Slide the rear cover down the uprights.

5. Remove the hex nut that attaches the DPU ground wire, then remove the wire.

6. Unplug the control cable from the DPU.

7. Remove the eight Phillips screws that attach the DPU to the key panel.

8. Lower the DPU, then unplug the ribbon cable connecting it to the key panel.

9. Remove the DPU from the enclosure.

10. Replace the DPU and reassemble following Steps 3-8 in reverse order.

Treadmill Control Unit Disassembly

You may either remove or the DPU PCB Assembly or leave it in place prior to removing the keypanel.
1. Remove the DPU following the procedure in the previous paragraph.
2. Remove the ten hex nuts that secure the keyboard to the control panel enclosure.
3. Lift the keyboard off of the enclosure.

Replacing the Controller (DPU-to-TMU) Cable
1. Remove the hood (page 3-1).
2. Remove the control panel assembly as described on page 3-21.
3. Cut any cable ties that fasten the controller cable to the wire harness.
4. Remove the Phillips screw which fastens the cable ground wire to the left side of the headframe, near the rack gear. See Figure 3-15 on page 3-8.
5. Pull the cable up through the left upright to remove it.
6. Install a new cable following Steps 1-5 in reverse order.

WALKING BELT ADJUSTMENT PROCEDURES

Walking Belt Tension
Adjust the walking belt tension:
- whenever the belt slips or moves unsteadily during operation.
- after installing a new walking belt.
- each time you remove or replace the walking belt.
- whenever specified in the procedures in this Section.

Two adjustment methods are specified. Method 1 is preferred, but two belt tension calipers (Quinton p/n 030113-001) are required.

NOTE
Both adjustment screws must be completely slack before starting this procedure.

Figure 3-31. Adjusting Walking Belt Tension

Method 1 (Calipers available)
1. Thread both tension adjustment screws in until most of the slack is removed from the belt (Figure 3-31).

NOTE
Do not stretch the walking belt at this point.

2. Position one caliper on each side of the belt, approximately 18" from the rear roller assembly.
3. Grasp the belt with one caliper clamp.
4. Pull the slack between the clamps out of the belt with your fingers, then grasp the belt with the second clamp.
5. Repeat Steps 3 and 4 on the other side of the belt using the other caliper.
6. Zero out the dials of both calipers.
7. Alternately tighten each tension adjustment screw in 0.1% increments until both sides read 0.4%. Ensure that the pointer reads exactly on the line increment of the dial for each setting.
5. Remove the tape, if used in Step 2.

6. Adjust the walking belt tracking using the procedure in the following paragraph.

Walking Belt Tracking

Perform this procedure:

- whenever the belt moves to one side or the other.
- after installing a new walking belt.
- each time you remove or replace the walking belt.
- each time you adjust the walking belt tension.
- whenever specified in the procedures in this Section.

Stay off the belt when adjusting the tracking.

1. Tension the walking belt using either Method 1 or Method 2 in the previous paragraph.

WARNING

Do not start the treadmill when someone is on the walking belt. The belt starts moving immediately, and the sudden start and subsequent loss of balance could cause serious personal injury.

2. Start the treadmill and let it run for at least one minute at minimum speed and grade.

3. Make the following adjustment to the right adjustment screw only:
   a. If the belt moves to the right, turn the screw 1/4 turn clockwise.
   b. If the belt moves to the left, turn the screw 1/4 turn counterclockwise.

Figure 3-31 shows the location of the adjustment screws.

4. After making an initial adjustment, run the treadmill for at least one minute to observe how the belt tracks. Adjustments to belt tracking take some time to become apparent.

5. Repeat Steps 3 and 4 as required.

CAUTION

Do not overtighten the adjustment screw. Overtightening may damage the walking belt and assemblies.
Quinton®
ClubTrack™ 3.0
TREADMILL
Service Manual and
Schematics Package

PN 000335 (CT 3.0)
PN 000333 (CT 3.0+)

Quinton instrument co.
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SECTION 1. INTRODUCTION

SCOPE
This manual contains the theory of operation, troubleshooting information, maintenance procedures, and the drawing package for the Quinton® ClubTrack™ 3.0 (Quinton part number 000335) and the Clubtrack™3.0 Plus (p/n 000333) treadmills. It is intended for Quinton-trained service personnel.

NOTES
Do not use this Manual to service the following treadmills:

- Q50 (Quinton part number 000259)
- Q55 (p/n 000208)
- Q55XT (p/n 000264)
- Q65 (p/n 000307)

Refer to Quinton Service Manual p/n 000298-830 for information and schematics on the above treadmills.

Also, use Quinton Service Manual p/n 000313-830 to service ClubTrack 3.0 p/n 000313.

The Manual is divided into five sections:

- Section 1 includes a product description, a list of accessories and options, the specifications, and the power requirements for the various treadmills.
- Section 2 is a detailed theory of operation for the electronic and mechanical components of the treadmills. This section is primarily intended for reference and training.
- Section 3 is the troubleshooting and maintenance guide for the treadmills. It includes the assembly/disassembly, adjustment, and calibration procedures.
- Section 4 is a detailed troubleshooting guide in table format. It includes:
  - error codes.
  - test points.
  - speed, grade, power-up, and belt problems.
  - noise analysis.
- Section 5 is the drawing package. It includes the assembly drawings, parts lists, and schematics.

DESCRIPTION
The treadmills are available in a number of models, differing in maximum speed and power requirements. The specifications and power options are described in Tables 1-1 and 1-2 on the following pages.

Each treadmill includes a controller and display, so no external controller is required. The treadmill cannot be controlled by another device.

ACCESSORIES AND OPTIONS
An Operator Manual and a Service Manual are shipped with each treadmill.

Side handrail assemblies are available. To order any item, or for more information on any of Quinton's line of medical and fitness products, contact your sales representative or call the Quinton Customer Service Department toll-free at 1-800-426-0327.

SPECIFICATIONS
Table 1-1 lists the performance specifications, physical characteristics, and environmental requirements for the treadmill. Table 1-2 details the single-phase power options for each model.

INSTALLATION AND CHECKOUT
The complete receiving, installation, and checkout instructions are included with each treadmill. Refer to them when setting up the treadmill.
### Table 1-1. Specifications

<table>
<thead>
<tr>
<th>PERFORMANCE</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Maximum Rated Load</td>
<td>320 lb (145 kg)</td>
</tr>
<tr>
<td>Belt Speed Range</td>
<td>1.2 - 12 mph</td>
</tr>
<tr>
<td></td>
<td>(Continuously Adjustable) (1.9 - 19.2 km/hr)</td>
</tr>
<tr>
<td>Grade Range</td>
<td>0 - 15%</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>PHYSICAL</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Walking Area (Nominal)</td>
<td>20 x 60 in. (51 x 152 cm)</td>
</tr>
<tr>
<td>Floor Space Required</td>
<td>31 x 87 in. (79 x 221 cm)</td>
</tr>
<tr>
<td>Walking Surface Height</td>
<td>5.9 in. (15 cm)</td>
</tr>
<tr>
<td>Handrail Height above Floor</td>
<td>43.6 in. (110.7 cm)</td>
</tr>
<tr>
<td>Treadmill Weight</td>
<td>450 lb. (205 kg)</td>
</tr>
<tr>
<td>Shipping Weight</td>
<td>650 lb. (295 kg)</td>
</tr>
<tr>
<td>Power Cord Length</td>
<td>10 feet (3 m)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>ENVIRONMENTAL</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Operating Temperature</td>
<td>50° - 122° F (10° - 40° C)</td>
</tr>
<tr>
<td>Storage and Shipping Temperature</td>
<td>-13° - 165° F (-25° - 75° C)</td>
</tr>
<tr>
<td>Humidity (Non-condensing)</td>
<td>3 - 95%</td>
</tr>
</tbody>
</table>

### Table 1-2. Power Options and Requirements

<table>
<thead>
<tr>
<th>Model</th>
<th>Part Number</th>
<th>Voltage (VAC)</th>
<th>Frequency (Hz)</th>
<th>Full-load Current (Amps)</th>
<th>Minimum Branch Circuit Current (Amps)</th>
</tr>
</thead>
<tbody>
<tr>
<td>ClubTrack 3.0*</td>
<td>335-001</td>
<td>220</td>
<td>60</td>
<td>16</td>
<td>20</td>
</tr>
<tr>
<td></td>
<td>335-002</td>
<td>220</td>
<td>50</td>
<td>16</td>
<td>20</td>
</tr>
<tr>
<td></td>
<td>335-003</td>
<td>200</td>
<td>60</td>
<td>16</td>
<td>20</td>
</tr>
<tr>
<td></td>
<td>335-004</td>
<td>200</td>
<td>50</td>
<td>16</td>
<td>20</td>
</tr>
</tbody>
</table>

*NOTE:* ClubTrack 3.0 Plus models (p/n 333-001, -002, -003, and -004) have the same power requirements and options.
SECTION 2  THEORY OF OPERATION

This Section, which is primarily intended for reference and advanced training, describes the mechanical and electronic theory of operation of the treadmills. It is divided into three subsections:

• an overview of treadmill operation.
• the mechanical theory of operation, including the motors, gearing, etc.
• the electronic theory of operation, including a functional description of:
  — the Display Processing Unit PCB Assembly (DPU), located in the Display Panel and
  — the Treadmill Control Unit PCB Assembly (TMU), located under the hood.

OPERATIONAL OVERVIEW

The treadmill includes the following primary assemblies:

• Three motors under the hood:
  — drive motor, which drives the walking belt.
  — speed change motor, which changes the belt speed.
  — grade motor, which changes the treadmill grade.

• input and output shafts, belts, pulleys, and rack and pinion set, which transfer mechanical energy from the motors to operate the walking belt and change the grade.

• speed change motor assembly.
• tachometer assembly.
• grade potentiometer.
• drive motor mercury relay, or contactor.
• the treadmill unit PCB assembly, or TMU, located under the treadmill hood.

Figure 2-1 on the following page is a detailed block diagram of the treadmill. The two PCB Assemblies are indicated by dashed lines.

MECHANICAL THEORY OF OPERATION

Motors

Figure 2-2 on page 2-3, which shows the treadmill with the hood removed, illustrates the layout of the operational components described below.

Drive Motor

The drive motor is a continuous duty, single phase with internal overload protection. It provides the force to turn the treadmill drive pulley and move the walking belt. An arrangement of shafts, belts, and pulleys allows a movable sheave on the input shaft to change the output shaft's rate of rotation, which varies the speed of the walking belt.

Speed Change Motor Assembly

The speed change motor assembly consists of a reversible, variable speed DC gear motor linked by a chain and sprockets to the speed change spindle assembly. The motor moves the speed change spindle assembly and movable sheave laterally along the input shaft to change the speed of the walking belt. A tachometer linked to the output shaft monitors the speed of the walking belt.

The speed change motor cannot be operated unless the drive motor is on.

Grade Motor

The grade motor is a right-angle DC gear motor. The motor shaft is linked to a pinion shaft by a chain and sprockets. The chain turns a sprocket on the pinion shaft to raise and lower the headframe of the treadmill on two parallel rack gears. A grade potentiometer linked to the pinion shaft by sprockets and a chain monitors elevation.
Shafts, Belts, and Pulleys

An input shaft assembly, output shaft assembly, belts, and pulleys function as the transmission. Figure 2-2 illustrates this arrangement.

Input Shaft Assembly

The input shaft includes a machined V-belt pulley, the fixed and movable sheaves that comprise the input pulley, and the speed change spindle assembly. A V-belt links the drive motor output shaft with the input shaft, which turns at a constant speed.

The speed change spindle assembly consists of a fork, a speed change spindle, and a yoke. As the speed change motor turns the spindle, the fork moves laterally on the input shaft, controlling the movable sheave. The speed change spindle assembly positions the movable sheave on the input shaft.

Output Shaft

The output shaft includes a spring, the movable and fixed sheaves that comprise the output pulley, and a timing pulley. The output shaft turns at a variable speed that depends on the pitch diameters of the input and output pulleys.

Variable Speed Belt

A variable speed belt links the input and the output shaft assemblies. The four sheaves are angled, so the variable-speed belt is forced in or out between pairs of sheaves, and therefore increases or decreases pitch diameter.

Spring tension against the movable sheave on the output shaft forces the belt outward, increasing the pitch diameter of the output pulley. When the speed change fork moves the movable sheave on the input shaft inward, the pitch diameter of the input pulley increases, causing a simultaneous decrease in the pitch diameter of the output pulley, which increases the speed of the walking belt.
Figure 2-2. Treadmill (Hood and Uprights Removed)
Treadmill Drive and Idler Pulleys

The timing pulley on the output shaft drives the treadmill drive pulley. The drive pulley drives the walking belt and the treadmill idler pulley.

Pinion Shaft and Rack Gears

The pinion shaft and rack gears allow the entire treadmill to tilt for grade changes. The pinion shaft has machined teeth at both ends to move a parallel pair of rack gears up and down. Factory-set electronic limits establish the 0-15% grade range, and microswitches prevent upward or downward overtravel beyond these limits.

ELECTRONIC THEORY OF OPERATION

The treadmill electronics consists of two PCB Assemblies, as indicated in Figure 2-1:

1. The Display Processing Unit-PCB Assembly is located in the Display Panel. It is called the DPU.
2. The Treadmill Unit PCBA is located under the treadmill hood. It is referred to as the TMU.

The DPU:
- displays speed in mph or km/hr.
- displays grade in per cent (%).
- displays elapsed time, elapsed distance (miles or km), or pace (mph or km/hr).
- displays diagnostic information for the treadmill if an error condition occurs.
- displays cumulative time of use and distance operated, when selected by the service representative.
- performs an electronic self-test when the treadmill is powered up.
- enables a special access mode for manufacturing and service testing.
- includes the circuitry for the magnetic access switch on the key panel.

The TMU has the following functions:
- starts and stops the walking belt.
- increases and decreases belt speed.
- increases and decreases grade.

The TMU operations are enabled via software commands from the DPU to the TMU.

NOTE

When components and pinouts are specified, the component type and number are given first, followed by a hyphen and the pin number. If several pins are referenced, they are separated by commas. For example, “J1-3” refers to “Jack 1, pin 3”, and “P7-4,13” refers to “Plug 7, pins 4 and 13”.

DPU OPERATION

Introduction

Schematic drawing 019027-201 at the end of this Manual shows the electronic layout of the Display Processor Unit (DPU). The design is based on a single chip microcontroller, U9.

- U9 communicates with the TMU via a built-in serial communications port that connects to J1.
- U9 uses external ROM device U10 for program storage.

A single programmable and display interface device (U12) polls the key panel switches, sending an interrupt to the microcontroller if a switch is depressed. All switches are then polled and debounced in software.

NOTE

Microcontroller U9, external ROM U10, and interface device U12 share a common data bus.

U12 also decodes the seven-segment display data for each display module. Each module is strobed at a 200 Hz rate. Outputs SLO through SL3 provides the code for which module is being strobed. U13 drives the display LED segments, while U1 and U2 decode the strobe data.

A +5 V monitor circuit (U8) resets the microcontroller in the event of power failure. If a reset occurs, counter U17 times out, causing the displays to be blanked.

There are two common power supplies on the DPU:
- +12 V, which is used for the displays. It is routed from the TMU to the DPU.
• +5 V, which is used for everything else. VR1, a linear regulator, generates the +5V supply.

Input and Output Signals

Switch Inputs

The user presses the appropriate switch on the control panel to enter these signals:
• START BELT
• STOP BELT
• CLEAR (erases the previous user data)
• SELECT (User chooses TIME, DISTANCE, PACE, or SCAN on the display)
• FASTER
• SLOWER
• UP
• DOWN
• UNITS: English (mi, mph, lb) or metric (km, km/hr, kg)

Treadmill Inputs

The TMU sends the following to the DPU in the Control Panel:
• Receive Data (serial data, 2400 baud, differentially driven)
• Power (+12 V regulated, 3 A maximum)

Display Outputs

This data can appear at the controller LED outputs:
• Speed
• Grade
• Time, distance, or pace (user selectable)
• Self-test data
• Error codes and service information.

In addition, the service representative can display:
• Total hours of treadmill use
• Total treadmill mileage

Interface Signals

Table 2-1 on page 2-7 describes the signal on each pin of connector J1 on the DPU, which is cabled to J12 on the TMU.

TMU THEORY OF OPERATION

Schematic drawing 030650-201 at the end of this Manual shows the electronic layout of the Treadmill Unit (TMU). Like the DPU, the design of the TMU is based on a single-chip microcontroller.

Power Distribution

(Refer to schematic drawing 030650-201, Sheet 1, at the end of this Manual, and to Figure 2-3 on the following page.) All onboard electronics are powered by three common voltage sources:
• +26 VDC @ 1 Amp max load
• +12 VDC @ 2 Amp max load
• + 5 VDC @ 1 Amp max load

Isolation transformer T1, which is fused at 0.5 Amp, steps down 230 V AC to 25 V AC. After full-wave rectification, the 25 V AC is filtered by capacitors C6 and C29 to generate approximately +35 VDC. Two switchmode power supplies transform +35 VDC to +26 VDC and +12 VDC.

• +26 VDC is generated with a regulator control device, flyback diode CR13, filter elements L1, C22, and C23, and other devices, including:
  – Q1, which serves as a crowbar to shut down the supply in the event of an overvoltage condition.
  – C16 and C1, which allow a gradual soft start to prevent inductor saturation and limit the average short circuit current.
  – R9 and C14, which set the switching frequency of approximately 100 kHz.
  – other resistors and capacitors that are used for network timing, feedback, and compensation.
Figure 2-3. TMU Power Generation and Distribution

TMU
019765-XXX

T1
208Vac
25Vac
8:1

J2-3

J2-4

+26V
POWER
SUPPLY

26V

J12

+12V
POWER
SUPPLY

12V

+5V
POWER
SUPPLY

5V

019238-001 CABLE ASSY.

DPU
019027-001

+5V
POWER
SUPPLY

12V

5V

019027-001 CABLE ASSY.
Table 2-1. Treadmill Interface Signals

<table>
<thead>
<tr>
<th>J1 on DPU and J12 on TMU</th>
<th>SIGNAL NAME</th>
<th>DESCRIPTION/FUNCTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>tdh</td>
<td>Transmit data from controller to treadmill. Differentially driven. 2400 baud.</td>
</tr>
<tr>
<td>2</td>
<td>tdl</td>
<td>Differentially driven. 2400 baud.</td>
</tr>
<tr>
<td>3</td>
<td>rdh</td>
<td>Receive data from treadmill to controller. Differentially driven. 2400 baud.</td>
</tr>
<tr>
<td>4</td>
<td>rdl</td>
<td>No connection</td>
</tr>
<tr>
<td>5</td>
<td>N/C</td>
<td>Hardwired run command</td>
</tr>
<tr>
<td>6</td>
<td>run</td>
<td>System ground</td>
</tr>
<tr>
<td>7</td>
<td>power</td>
<td>Regulated 12 volts (3 Amps max)</td>
</tr>
</tbody>
</table>

Table 2-2. TMU Microprocessor (U15) Signal Outputs

<table>
<thead>
<tr>
<th>SIGNAL NAME</th>
<th>FUNCTION</th>
<th>STATE</th>
</tr>
</thead>
<tbody>
<tr>
<td>start</td>
<td>Controls the drive motor</td>
<td>Active state HIGH (+5 V)</td>
</tr>
<tr>
<td>sp run</td>
<td>pwm signal to speed change driver</td>
<td>Active state HIGH (+5 V)</td>
</tr>
<tr>
<td>sp dir</td>
<td>Controls speed change direction</td>
<td>HIGH indicates positive speed change</td>
</tr>
<tr>
<td>hs op</td>
<td>Controls high speed deceleration relay</td>
<td>Active state LOW (0 V)</td>
</tr>
<tr>
<td>direction</td>
<td>Controls grade direction</td>
<td>Low signal causes grade to increase</td>
</tr>
<tr>
<td>change</td>
<td>Controls grade change</td>
<td>Active state LOW (0 V)</td>
</tr>
</tbody>
</table>

- +12 VDC is generated in the same way as the +26 VDC, with changes to the resistor feedback network.
- +5 VDC is generated by a linear regulator off the +12 VDC supply.

Microcontroller

(Refer to schematic drawing 019765-201, Sheet 2.) The microcontroller (U15) sends and receives commands to and from the DPU concerning:
- treadmill speed
- treadmill grade
- error conditions
- start/stop status.

U15 sends treadmill status messages and any error conditions that might be detected back to the DPU for display. The microcontrollers (U15 on the TMU, U9 on the DPU) communicate via serial ports J12 (on the TMU) and J1 (on the DPU), using the RS-422 data transmission protocol. The treadmill will shut down if this communication link is broken: when TMU microcontroller U15 fails to detect a data transmission, it sends a shutdown signal to all mechanical devices on the treadmill.

TMU microcontroller support devices include:
- 256 bytes of onboard RAM memory.
- Differential line receiver U17, located between U15 and J12, which amplifies both transmitted and received signals.
- EPROM memory device U18, which stores the firmware.
- Oscillator Y1, the heartbeat of the microcontroller. The 16.38 MHz crystal oscillator output is divided by external ripple counter U12 to provide 4 msec interrupts.

A power supply monitor chip (U16) continually checks the status of the +5 V supply and resets U15 if the monitor detects a fault condition.
- If a power fault occurs, flip-flop U14-8 is set, which turns on the treadmill RESET indicator through buffer U5.
- If a drive motor thermal overload occurs, an internal switch in the motor connected to J5-3,4 opens, activating optical coupler U6. This sets flip-flop U14-6, which also turns on the RESET indicator via U5.

Table 2-2 on page 2-7 lists the microcontroller outputs, while grade and speed inputs to the microcontroller are discussed on the next page.

Microprocessor Verification of Optical Tachometer Operation

Microcontroller U15 uses serial input data from J8, while peak detector U11B/CR18 and comparator U10A analyze the upper threshold voltage of this signal to verify that the optical tach is functioning correctly. If the light intensity in the optical interrupter circuit is not sufficient, an error signal is sent to U15 that:

1. shuts down mechanical operation of the treadmill.
2. generates the appropriate error code for display on the Controller.

NOTE

Dirt accumulating in the slot between the photoemitter and the phototransistor may block some of the light and cause an error message.

GRADE MOTOR OPERATION

(Refer to schematic drawing 019765-201, Sheet 1.) Microcontroller U15 sends grade change and direction signals to the grade motor, and receives grade feedback via connector J10. U15 reads the analog signal from the tap of the grade potentiometer, then performs an analog-to-digital conversion to determine the current grade. (The level of the 0- to +5-volt signal is proportional to the grade.) When the voltage reaches the appropriate level, U15 switches the grade motor off.

The grade motor is controlled by K3 and K4, two solid-state relays that half-wave rectify the AC line voltage. (Each relay is a single SCR with an isolated driver.) 208–230 VAC is routed via J3 through 2 Amp fuses F6 and F7. The voltage leaves the TMU via J4-7,8, enters isolation transformer T2 where it is stepped down to half-wave rectified 115 VAC, then returns on J4-5,6.
- K3 drives the treadmill grade down.
- K4 drive the grade up.

The treadmill grade decreases if relay K3 is activated. Current flows:

1. through the SCR within the relay during the negative half-cycle of the AC waveform,
2. through the down limit switch SW2 via J6, then
3. back to the grade motor via J4-2,4, lowering the treadmill.

Limit switch SW2 protects against negative overtravel by cutting off current to the grade motor if the grade pot malfunctions.

Positive grade change occurs in the same way when relay K4 is activated, and limit switch SW1 protects against positive overtravel.

U7, U8, and U9 (Sheet 2) are the interface between the U15 and K3/K4: they process the microcontroller grade change and direction commands. U8 serves both as a discriminator and a relay driver. The change command enables the drivers.
SPEED CHANGE OPERATION

There are two modes of speed change: normal speed change and high speed deceleration. The position of relay K1, which is controlled by the “hs op” output from microcontroller U15, determines the mode.

Normal Mode

Speed change is in normal mode when relay K1 is in its normal position. The normal speed change circuitry consists of an H-Bridge (U1), flyback diodes CR7 through CR10, sense resistor R2, an overcurrent comparator, and the logic interface from the microcontroller.

- The “sp run” output from U15 is a pulse-width modulated signal proportional to the desired speed change motor speed.
- The “sp dir” signal specifies the direction of the speed change motor. A +5V (high) increases the speed, while 0V (low) decreases it.
- R2 senses the instantaneous motor current.

- The comparator output on U11A disables “sp run” and turns U1 off if the instantaneous current detected by R2 exceeds 2 Amps.
- RC network R31-C39, which has an 80 μsec time constant, filters the comparator output. Should a short circuit occur, the network limits the average current and protects U1.

Speed Deceleration

The high speed deceleration mode directs full-wave rectified 110 V AC to the speed change motor. Normally, relay K2 is on when the drive motor is on. However, when the treadmill is in high speed deceleration mode, K1 switches. When the belt speed reaches 2.4 mph, microcontroller U15 turns the drive motor off and switches K2 before turning off K1. K2 shorts the speed change motor leads across R1 when the drive motor is not running. Therefore, all the energy that was stored in the speed change motor is routed through K2 and dissipated by R1, a 560 Ω, 5 Watt power resistor.
SECTION 3 ASSEMBLY, DISASSEMBLY, AND REPLACEMENT PROCEDURES

INTRODUCTION
This section contains the following maintenance procedures:
- repair, replacement, disassembly and reassembly
- mechanical adjustment and alignment
- calibration
- post-maintenance test
Since the treadmill control unit (TMU) and display processor controller unit (DPU in the ClubTrack) or master control unit (MCU in the ClubTrack Plus) PCB Assemblies are field-replaceable modules, no procedures are included for component-level repair.

WARNING
Observe the following precautions when servicing the treadmill:
- Do not start the walking belt when someone is on the treadmill. The belt starts moving immediately, and the sudden start and subsequent loss of balance could cause serious personal injury.
- Do not wear loose clothing around rotating machinery.
- High voltage is present when the treadmill hood is removed and the treadmill is plugged in. Unplug the power cord every time you remove the hood to prevent high voltage electrical shock.

NOTE
All instructions are oriented as if you were exercising on the treadmill.

HOOD AND POWER INPUT ASSEMBLIES

Removing Treadmill Hood

1. If possible, elevate the treadmill to its maximum height.
2. Unplug the treadmill from its power source.
3. Use a 5/32" Allen wrench to remove the two buttonhead screws at the lower front of the treadmill hood cover. These fasten the hood cover to the frame.
4. Use a Phillips screwdriver to remove the two #8 Phillips-head screws located near the bottom of the ClubTrack 3.0 decal.
5. Grasp the hood cover at the top and bottom center, then lift and pull back to remove. See Figure 3-1 on page 3-2.
6. Disconnect the reset switch connector inside of the hood (Figure 3-2).
7. Use a Phillips screwdriver to remove the two screws that fasten the front of the hood to the siderails. The screws are inside the hood at the front of the treadmill.
8. Gently tap the hood 1/2" towards the rear until the rear screws are disengaged from the key slots.
9. Spread the sides of the hood slightly apart to clear the uprights, then tilt the front of the hood up, slide it back, and lift it off the treadmill. See Figure 3-3.
10. To replace the hood, follow steps 3-9 in reverse order. Take care not to damage the reset switch wiring.

Replacing the Power Cord
1. Remove the hood as described above.
2. Verify that you have removed the power cord from the outlet.
Figure 3-1. Removing Treadmill Hood Cover

Figure 3-2. Reset Switch and Connector

Figure 3-3. Hood Removal

Figure 3-4. Ground Connections to Frame
3. Remove the Phillips screw which attaches the power cord ground wire to the headframe. It is located on the left side of the headframe, near the rack gear. See Figure 3-4 on the following page.

4. Remove the screws which attach the power leads to mercury relay K1. Note the wire colors and connection points (Figure 3-6).

5. Cut the cable ties which secure the power cord leads to the wire harness.

6. Remove the screw which attaches the cable clamp to the headframe.

7. Use strain relief pliers to remove the strain relief, which is located at the bottom of the treadmill headframe.

8. Attach the new power cord following Steps 2-7 in reverse order. Refer to drawing 030650 for the wiring diagram. Be sure to:
   a. install a strain relief and clamp
   b. tie-wrap the power cord and wire harness as you found them.

9. Replace the hood assembly as described on page 3-1.

Replacing the Reset Switch

NOTE
The walking belt and speed change motor are not operational if the reset switch is disconnected. However, both the DPU Assembly and the elevation motor continue to operate.

1. Remove the hood and disconnect the reset switch connector (page 3-1).  
2. Push the red reset switch out from inside of the hood. It fits tightly, so you may need to rock it up and down to loosen it.
3. Push the new switch straight into the hole until it is firmly seated.
4. Replace the hood assembly (page 3-1). Be sure to reconnect the reset switch.

Recovering the Drive Motor

MOTOR ASSEMBLIES
Grade motor removal and replacement is described under elevation system maintenance (page 3-14).

Drive Motor
Replace the drive motor when:
- The internal overload protector fails.
- The motor start switch (centrifugal switch) fails.
- The motor burns out.
1. Remove the treadmill hood (page 3-1).
2. Remove the cable ties that secure the motor wires.
3. Disconnect the wires from mercury relay K1. Figure 3-5 shows the drive motor, while Figure 3-6 on page 3-4 shows the relay.
4. Unplug the following wires:
   a. the motor connection to the TMU PCB Assembly.
   b. the motor connection from the transformer at the quick-disconnect (if applicable).
5. Remove one clamp on each side of the drive motor. These two clamps secure it to the motor base plate.

6. Slip the V-belt off the motor pulley, then lift the drive motor off the base plate.

7. Install a new drive motor following Steps 5-6 in reverse order.

**CAUTION**

*To avoid damage to the TMU Assembly, be sure to tighten the clamps that secure the drive motor to the motor base.*

8. Check the V-belt tension per Quinton drawing 030650, Note 12. If required, adjust the tension following the procedure on page 3-26 of this Manual.

9. Attach the electrical connectors and reassemble the treadmill following Steps 2-4 in reverse order. The wires are color-coded.

10. Replace the hood cover. *Be sure to reconnect the reset switch.*

---

**Figure 3-6. Drive Motor (Mercury) Relay (K1)**

**Figure 3-7. Speed Change Motor**

**Drive Motor (Mercury) Relay K1 Replacement**

1. Remove the treadmill hood as described on page 3-1.

2. Note the color and arrangement of wires to the mercury relay. See Figure 3-6.

3. Remove the wires to the relay:
   a. Two wires to motor.
   b. Two wires to power cord.
   c. Two wires to connector P11.
   d. Three wires to connector P3.

4. Replace with a new relay, then reconnect the color-coded wires you removed in Step 3. Drawing 030650 indicates the connection point reference.

5. Replace the hood and cover. *Be sure to reconnect the reset switch.*

6. Restore power and test the treadmill.

**Speed Change Motor**

Replace the speed change motor if the gears break or if the motor burns out.
1. Remove the treadmill hood as described above.

2. Unplug the quick disconnects from the line filter (Figure 3-7).

3. Loosen the four screws and washers that hold the speed change motor to the bracket (Figure 3-14 on page 3-8).

4. Slip the chain off the sprocket, then remove the sprocket from the motor.

5. Remove the four screws you loosened in Step 3, then remove the speed change motor.

6. Replace with a new speed change motor, following Steps 3-5 in reverse order.

7. Attach the electrical connectors and reassemble the treadmill following Steps 2-4 in reverse order. The wires are color-coded.

**NOTE**

Be sure to take the slack out of the motor chain when you replace it.

8. Replace the hood cover. *Be sure to reconnect the reset switch.*

9. Restore power to the treadmill and test the speed limits.

**TACHOMETER ASSEMBLY**

**Optical Sensor Replacement**

1. Remove the treadmill hood as described on page 3-1.

2. Remove cable ties to connector J8 at the lower left corner of the TMU, then unplug this connector. See Figure 3-8.

**CAUTION**

*To prevent damage to the beam chopper, lift the tachometer bracket straight up to remove it. Verify that the tachometer optical sensor is securely mounted before operating the treadmill.*

3. Remove two screws on the top of the tachometer optical sensor bracket, then lift the bracket straight up. See Figure 3-9.

4. Remove and save the two screws and spacers that hold the small circuit.
Figure 3-10. Cleaning the Optical Sensor

board in place on the bracket, then remove and discard the old board.

5. Install a new small circuit board using the screws and spacers from Step 4.
6. Reinstall the tach bracket onto the top of the bearing cap.
7. Align the tachometer beam chopper per the procedure on page 3-6.
9. Tie down the wire harness with cable ties.

Cleaning the Optical Sensor and LED

Dust or dirt on the surface of the sensor and LED may cause the tach to fail because it will not be able to detect light passing through notches in the chopper wheel. This will cause the (undetected) feedback speed to differ from the value displayed on the control panel, which in turn will cause the TMU to generate error code E202 on the display. To clean the sensor assembly, follow these steps:

1. Remove the optical sensor following Steps 1-3 of the “Optical Sensor Replacement” paragraph on page 3-5.
2. Moisten a cotton swab with alcohol, then gently rub it between the sensor and the LED to remove any dirt (Figure 3-10).
3. Allow the alcohol to dry.
4. Replace the optical sensor, then align the beam chopper as described on this page.
5. Replace the hood cover.
6. Power up the treadmill, and increase belt speed to 5 mph. If error code E202 appears on the display again, refer to Table 4-1 in Section 4.

Beam Chopper Replacement

1. Remove the hood as described on page 3-1.
2. Remove the two screws that hold the tachometer optical sensor in place, then move the sensor out of the way. See Figure 3-9 on page 3-5.
3. Remove the beam chopper. Use a 1/8" Allen wrench to remove the bolt and the chopper wheel from the end of the output shaft.
4. Replace with a new beam chopper.
5. Replace the tachometer optical sensor on the bearing cap.
6. Align the beam chopper wheel per the procedure in the following paragraph.

Beam Chopper Wheel Alignment

1. Unplug the treadmill, then remove the hood as described on page 3-1.
2. Center the beam chopper wheel by sliding it along shaft with a screwdriver and checking its relationship to the tachometer LED.
3. Move the beam chopper until it is in the exact center of the gap.
REPLACING THE TREADMILL PCB ASSEMBLY (TMU PCBA)

NOTES

- Place a clean sheet of cardboard or a clean rag on the treadmill deck before starting this procedure.
- To change fuses, refer to Table 4-4 on page 4-5.

1. Remove the hood (page 3-1).
2. Remove one clamp from each side of the drive motor that secure it to the motor base plate (Figure 3-5 on page 3-3).
3. Slip the V-belt off the motor pulley, then lift the drive motor off the base plate and set it down on the walking deck.
4. Remove the six 1/2" hex-head fasteners that attach the cross brace to the uprights, then remove the cross brace.

WARNING
To prevent the uprights from falling on the deck in Step 4, support them

with your hand when removing the final fasteners.

4. Remove the six 5/16" hex-head fasteners (three per side) that allow the control panel assembly uprights to pivot down on the treadmill deck, then carefully lower them onto the deck (Figure 3-11.)

5. Unplug all electrical connectors to the TMU PCB Assembly (Figure 3-8).

6. Remove the nine hex nuts that attach the TMU to the mounting bracket, then remove the TMU.

7. Replace with a new TMU assembly and attach all electrical connectors.

NOTE
No calibration is required after TMU installation.

8. Reassemble the treadmill following Steps 2-7 in reverse order.

9. Replace the hood cover. Be sure to reconnect the reset switch.
Figure 3-13. Loosening Variable Speed Belt

Figure 3-14. Speed Change Motor Mounting

Figure 3-15. Upright Ground Wire Connection

Figure 3-16. "T" Stamp Shows Bearing Cap Orientation
INPUT SHAFT ASSEMBLY PROCEDURES

Input Shaft Assembly and Speed Change Assembly Removal

NOTE
Special adhesives and a ratchet wrench with a long extension are required to remove and install a new assembly. Read all removal and replacement instructions before continuing.

1. Remove the treadmill hood as described on page 3-1. Figure 3-12 on page 3-7 shows the input shaft assembly.

CAUTION
Be careful not to damage the bearings and caps on the input shaft. If the shaft is scarred or if the movable sheave is frozen on the input shaft, the entire shaft assembly must be replaced.

WARNING
To prevent the uprights from falling on the deck, support them with your hand when removing the final fasteners in Step 2.

2. Remove the six 5/16" hex-head fasteners (three per side) that allow the control panel assembly uprights to pivot down on the treadmill deck, then carefully lower them onto the deck (Figure 3-11).

3. Place a rope or flexible belt around the variable speed belt, then pull straight up to loosen belt. See Figure 3-13.

4. Remove the V-belt from the machined input shaft pulley.

5. Unplug the quick disconnects from the two speed change motor leads. See Figure 3-7 on page 3-4.

6. Loosen, but do not remove, the four screws that hold the speed change motor to the bracket (Figure 3-14).

7. Slacken the chain and disconnect the master link, then remove the chain from the sprocket.

8. Unplug the control cable from the TMU PCB Assembly (Figure 3-8).

9. Remove the Phillips screw which attaches the controller's ground wire to the headframe (Figure 3-15).

10. Use a 3/16" Allen wrench to remove both upright pivot bolts, then carefully move the upright toward the back of the treadmill until it is out of the way.

11. Use a ratchet wrench with a long extension to remove the four bolts that hold the bearing caps in place (Figure 3-16).

12. Carefully remove the speed change motor and bracket, saving the hardware.

13. Lift the entire input shaft assembly straight up and back towards the deck, then slip the sheave out of the transmission belt.

14. Remove the internal retaining ring that holds the speed change spindle assembly in place. The ring is located in the headframe casting on the right-hand side. Be sure to replace the shims under the ring during reassembly.
15. Pull the spindle assembly to the left until it clears the headframe, then lift it from the headframe (Figure 3-17 on page 3-9).

Input Shaft Assembly Replacement

CAUTION

Read these instructions completely before starting this procedure!
Loctite Primer T, Loctite 660, and Loctite RC 680 are required to install a new shaft assembly. The input shaft bearing caps and pulley must be bonded to the shaft assembly before use, and the adhesive requires a minimum cure time of two hours before operating the treadmill.

1. Remove the speed change motor, bracket, and input shaft assembly from the treadmill following the procedure described on page 3-7.

2. Align the speed change fork with the pin on the base of the headframe, then insert the spindle bearing into the bore provided in the headframe (Figure 3-17 on page 3-9.)

3. Pull the transmission belt to the bottom of the transmission output pulley assembly and spread the output assembly sheaves apart to create slack in the belt.

NOTE

Perform the following step only if you are installing a new input shaft assembly. Otherwise, go to Step 5.

4. If you are installing a new shaft assembly, prepare the bearing caps and the input assembly following the gluing procedures in drawing 030650, notes 6 and 14. The dimension for the input pulley location appears on Sheet 3, Zone C-6.

5. Put the end of the input shaft assembly through the slack in the transmission belt, then insert the movable sheave’s bearing cap into the fork on the speed change spindle assembly. The rounded end of the cap faces pp (Figure 3-17).

NOTE

Verify that the “T” (top) stamp on each bearing cap faces up. See Figure 3-16 on page 3-8.

6. Reinstall the speed change motor and bracket by reversing Steps 5-9 in the previous paragraph (“Input Shaft Assembly and Speed Change Assembly Removal”).

7. Insert the mounting bolts through the bearing caps, then complete the assembly per drawing 030650, note 6.

8. Install the V-belt between the motor pulley and transmission pulley. Verify that the alignment is correct, then tighten the setscrews on the input pulley.

CAUTION

Do not test or use the treadmill until the adhesive has cured. See Step 9 and notes 5 and 13 on drawing 030650.

9. If you installed a new assembly, wait two hours for the adhesive to cure before testing the treadmill.

10. Attach the electrical connectors and reassemble the treadmill as required. The wires are color-coded.

11. Check the V-belt tension per Quinton drawing 030650, Note 13. If required, adjust the tension following the procedure on page 3-26 of this Manual.

12. Replace the hood cover. Be sure to reconnect the reset switch.

13. After the adhesive has cured (Step 9), replace the hood, restore power to the treadmill, and test the operation of the new input shaft. Verify that the treadmill operates through its full speed range.
OUTPUT SHAFT ASSEMBLY PROCEDURES

Output Shaft Assembly Removal

NOTE

Special adhesives and a ratchet wrench with a long extension are required to remove and replace the assembly. Read all removal and replacement instructions before continuing.

CAUTION

Be careful not to damage the bearings and caps on the output shaft. If the shaft is scarred or if the movable sheave is frozen on the shaft, the entire shaft assembly must be replaced.

1. Remove the treadmill hood as described on page 3-1.

2. Remove the two screws that secure the tachometer optical sensor bracket, then lift the sensor and bracket straight up to remove it from the bearing cap. Lifting it straight up will avoid damage to the beam chopper. See Figure 3-9 on page 3-5.

3. Use a 1/8" Allen wrench to remove the tachometer beam chopper.

4. Use a ratchet wrench with a long extension to remove the four bolts that hold the bearing caps in place.

5. Slip the output shaft assembly out of the variable speed belt and the final drive belt, then remove it (Figure 3-18).

Output Shaft Assembly Replacement

CAUTION

Read these instructions completely before starting this procedure! Loctite Primer T and Loctite RC 680 are required to install a new shaft assembly. The output shaft bearing caps must be bonded to the shaft assembly before use, and the adhesive requires a minimum cure time of two hours before operating the treadmill.

1. Remove the output shaft assembly as described in the previous paragraph.

NOTE

Perform the following step only if you are installing a new output shaft assembly. Otherwise, go to Step 5.

2. If you are installing a new shaft assembly, prepare the bearing caps and the output assembly following the gluing procedures in drawing 030650, note 6.

3. Slip the output shaft assembly through the variable speed belt. See Figure 3-18.

4. Slip the final drive belt over the timing sprocket on the shaft assembly.

5. Spread the pulley sheaves apart slightly to seat the variable speed belt in the sheaves, then install the output shaft by placing the bearing caps on the head frame mounting pads.

NOTE

Be sure that the bearing cap with the threaded holes on top is installed on the left side of the shaft assembly.
6. Verify that the "T" (top) stamp on each bearing cap faces up, then use a ratchet wrench with a long extension to tighten the bolts. See Figure 3-16 on page 3-8.

7. Install the tachometer beam chopper.

8. Replace the tachometer optical sensor on top of the bearing cap, then verify that the beam chopper is aligned (page 3-6).

**CAUTION**

*Do not test or use the treadmill until the adhesive has cured. See Step 9 and note 5 on drawing 030650.*

9. If you installed a new assembly, wait *two hours* for the adhesive to cure before testing the treadmill.

10. After the adhesive has cured, install the hood, restore power to the treadmill and test the operation of the new output shaft. Verify that the treadmill operates through its full speed range.

**Replacing the Variable Speed Belt**

1. Remove the input shaft assembly as described on page 3-9.

2. Remove the output shaft assembly (page 3-11).

3. Remove the variable speed belt. (Figure 3-18 on page 3-11).

4. Replace the variable speed belt.

5. Replace the output shaft assembly.

6. Replace the input shaft assembly.

**Replacing the Final Drive Belt**

1. Remove the hood (page 3-1).

2. Remove the bolts which secure the output shaft assembly.

3. Remove the two Phillips screws from the siderails. These screws attach the hood to the siderails at the rear of the hood. See Figure 3-19.

**NOTE**

When replacing the screws, note that the gap between the siderail cover and the head of each screw must be
4. Use a 1/2" socket wrench to remove both end caps, located on either side of the belt at the rear of the walking platform. See Figure 3-20 on page 3-12.

5. Grasp the top of the left side rail cover at the rear of the treadmill, then pull it up and away from the treadmill to roll the cover off (Figure 3-20). Repeat for the right cover. (The covers, which are made of flexible plastic, snap into place.)

6. Remove the four 5/16" hex bolts that secure the two front (drive) roller retainers to the frame. There are two on each side of the drive roller assembly (Figure 3-19 on page 3-12.)

7. Slide the drive roller assembly to the left, then remove the final drive belt from the right side of the roller.

8. Slip the final drive belt under the output shaft assembly bearing cap.

9. Replace with a new belt, then remount the front drive roller assembly and output shaft assembly.

10. Assemble the treadmill following Steps 1-7 in reverse order. Be sure to read the note below Step 3.

11. Adjust the walking belt tension following the procedure on page 3-23.


13. Check and adjust the final drive belt tension following the procedure in the next paragraph.

Adjusting the Final Drive Belt Tension

Perform this procedure as required after installing a new timing belt, or after removing and replacing the siderails.

1. Remove the hood (page 3-1).

2. If necessary, perform Steps 3-5 in the previous paragraph.

CAUTIONS

Do not perform Step 3 if you have already removed the slider bed.

If the slider bed is still in place, verify that the Phillips screws attaching it to
the siderails are tight before loosening the bolts in Step 3. Failure to tighten these screws may cause misalignment in the front roller.

3. Use a 9/16" socket wrench with a 6" extension to loosen the four hex-head bolts which fasten the siderails to the headframe (Figure 3-21 on page 3-13). Access the bolts through holes in the siderail, but do not remove the bolts.

4. Loosen, but do not remove, the two 7/16" hex-head bolts that fasten the front of the drive roller cover to the treadmill headframe. They are located beneath the treadmill (Figure 3-22).

5. Loosen, but do not remove, the two rear drive motor mount screws that fasten the left side of the cover to the headframe.

6. Set the belt tension so that an 0.11" deflection can be measured at midspan when a 2.00 lb ±0.25 lb load is applied perpendicular to the belt at midspan.
   a. To loosen the belt, move the headframe towards the deck assembly.
   b. To tighten the belt, move the headframe away from the deck assembly.

7. Reassemble the treadmill following Steps 1-4 in reverse order.

GRADE CHANGE (ELEVATION) SYSTEM

Grade Motor

NOTE

Place a clean sheet of cardboard or a clean rag on the treadmill deck before starting this procedure.

1. Block the treadmill headframe securely with 6-inch wooden blocks to ensure that the treadmill will not drop when you remove the grade motor or chain.

2. Remove the hood (page 3-1). However, do not elevate the treadmill.

3. Remove the cable ties that secure the grade motor wires, then disconnect the wires from the wire harness connectors. See Figure 3-23.

4. Loosen the set screw that secures the grade potentiometer (pot) pinion shaft.
sprocket, then verify that the sprocket turns easily on the shaft. This will avoid damage to the pot (Figure 3-24).

5. Remove the fasteners and adapters that attach the PCB mounting bracket to the grade motor.

6. Loosen, but do not remove, the lower right-hand screw that attaches the grade motor to the headframe. See Figure 3-23.

7. Remove the remaining three screws that attach the grade motor to the headframe, then remove the motor.

8. Replace with a new grade change motor, following Steps 3-7 in reverse order. The wires are color-coded. Refer to Quinton drawing 030650 for wiring details.

**CAUTION**

To avoid damaging the TMU PCB Assembly when you replace the drive motor, be sure to tighten the clamps that secure the drive motor to the motor base.

**WARNINGS**

*Do not wear loose clothing around rotating machinery.*

*High voltage is present when the treadmill is plugged in.*

10. Restore power to the treadmill and test the new grade motor. (The grade motor will operate without reconnecting the reset switch. The walking belt, however, is inoperable.)

11. Follow the procedure on page 3-25 to calibrate the grade pot.

12. Test the treadmill elevation. Verify that:
   a. it operates over the full range of 0-15%.
   b. there is no binding when it moves up or down.
   c. the elevation pot chain is aligned correctly.

---

**Figure 3-24. Grade Pot and Pinion Shaft**

- d. the grade motor chain is also aligned correctly. A "popping" sound in the chain indicates that it is misaligned.

13. Turn the treadmill power off, remove the power cable from the outlet, then reinstall the hood. Be sure to reconnect the reset switch.

**Grade Potentiometer (Pot) Replacement**

**WARNING**

*Do not wear loose clothing around rotating machinery.*

*High voltage is present when the treadmill is plugged in.*

1. Remove the treadmill hood as described on page 3-1.

2. With the hood removed, restore power to the treadmill and turn the grade motor on until the setscrew on the grade pot pinion shaft sprocket is visible. See Figure 3-24.

3. Unplug the treadmill.

4. Release the setscrew.
5. Hand-turn the grade pot until the steel setscrew on the potentiometer sprocket is visible.

6. Release the steel setscrew.

7. Push the whole sprocket-and-chain assembly away from the grade pot.

8. Remove the 1/2-inch brass nut and the cable tie. The pot will come off.

9. Cut the cable ties and disconnect plug P10 from the TMU PCB assembly.

10. Replace with a new potentiometer, then reassemble following Steps 3-9 in reverse order.

11. When the grade pot, wires, and setscrews are in place, calibrate the pot by following the procedure on page 3-25.

Removing the Rack Gears

1. If the treadmill will change grade, take grade to approximately 12% (6-7°).

2. Lower the front of the headframe on 6-inch wooden blocks to take the weight off the wheels.

3. Unplug the treadmill, then remove the hood (page 3-1).

4. If the rack gear is completely jammed, replace as described on page 3-17.

 WARNINGS

 Do not wear loose clothing around rotating machinery.

 High voltage is present when the treadmill power cord is plugged in.

5. Decrease the grade until wheels raise about 1/2" off the floor.

6. Remove the two 9-16" hex-head bolts holding the wheels to the rack gears. Note the arrangement of washers used as spacers.

7. Loosen the set screw that secures the grade potentiometer (pot) pinion shaft sprocket, if it is not already loose, then verify that the sprocket turns easily on the shaft. This will avoid damage to the pot (Figure 3-24).

8. Simultaneously press STOP, FAST, and SLOW on the control panel to place the treadmill in the technician access mode.

9. Rotate the elevation pot until a positive number appears in the grade display window. (Step 10 will not work until the number is positive.)

10. Decrease grade until rack gears start bouncing on the pinion shaft. Hold the limit switches closed to allow the rack gear to travel beyond its normal limits.

11. Unplug treadmill.

12. Lift rack gears straight out top.

Reassembling the Rack Gear

1. If the rack gear is completely jammed, remove as described below. Otherwise, remove rack gears as described above.

2. Install new rack gears simultaneously so that they will be parallel.

 WARNINGS

 Do not wear loose clothing around rotating machinery.

 High voltage is present when the treadmill power cord is plugged in.

3. Restore power to the treadmill.

4. Loosen the set screw that secures the grade potentiometer (pot) pinion shaft sprocket, if it is not already loose, then verify that the sprocket turns easily on the shaft. This will avoid damage to the pot. See Figure 3-24 on page 3-15.

5. Decrease the grade until the gears bounce two or three times, then increase the grade. This should cause both rack gears to mesh in exactly the same place.

 NOTE

 When performing the next step, it may be necessary to turn the grade pot slightly to keep the elevation motor running.

6. Run the rack gears down past the bottom of the headframe. Hold the limit switches closed to allow the rack gear to travel beyond its normal lower limits.
7. Check under the bottom of the headframe to verify that the rack gears are meshing properly. The gears should protrude an equal distance.

8. Run the rack gears down until there is enough room to replace wheels.

9. Replace the two bolts that hold the wheels to the rack gears. Be sure to:
   a. replace washers used as spacers in the correct arrangement.
   b. torque the bolts tightly to 46 ft-lb ±4 ft-lb.

10. Increase the grade until the wheels touch the floor.

11. Grease rack gears with wheel bearing grease.

12. Remove the blocks that support the headframe.

13. Calibrate the grade potentiometer by following the procedure on page 3-25.

14. Turn the treadmill power off, remove the cable from the outlet, then reinstall the hood. Be sure to reconnect the reset switch.

**Replacing a Jammed Rack Gear**

1. If the rack gear is not completely jammed, follow the instructions in the previous paragraph to replace it.

2. Unplug treadmill.

3. Remove the hood (page 3-1).

4. Securely block the front and rear of the headframe with 6-inch wooden blocks to take the weight off the wheels, then raise the wheels 1/4" to 1/2" off the floor.

5. Shake each gear lightly at the top to determine which rack gear is jammed. If there is no play in a rack gear, it is jammed.

6. Remove the upright assembly:
   a. Unbolt the six hex-head fasteners which allow the treadmill uprights to pivot (Figure 3-11 on page 3-7).

7. Remove the treadmill walking belt and slider bed as described on page 3-21.

**CAUTION**

*Before loosening the bolts in Step 8, scribe a mark on each siderail at its junction with the headframe, to mark their relative positions (Figure 3-25). Carefully realign these marks when reinstalling the siderail. Failure to do so will cause poor belt tracking.*

8. Use a 9/16" socket wrench with a 6" extension to remove the two hex-head bolts securing each siderail to the headframe. Access the bolts through holes in the siderail (Figure 3-21 on page 3-13).

**NOTE**

If you are replacing only one rack gear, it is only necessary to remove the siderail closest to that gear.

9. Remove the four bolts that hold the rack gear cover plate in place.

10. Slide the rack gear out sideways.

11. Inspect the gear on the pinion shaft. If it is damaged, replace both the rack gear and the pinion shaft (as described on the following page.)

12. Bolt the rack gear cover plate back into place.

13. Reassemble the siderails, upright assembly, and walking belt.

14. Loosen the set screw that secures the elevation potentiometer (pot) pinion shaft sprocket, if necessary, then verify
that the sprocket turns easily on the shaft. This will avoid damage to the pot. See Figure 3-24 on page 3-15.

**WARNINGS**

Do not wear loose clothing around rotating machinery.

*High voltage is present when the power cord is plugged in.*

5. Restore power and decrease the grade to run the other rack gear out the top.

6. Reassemble the rack gear as described above.

7. Calibrate the grade potentiometer as described on page 3-25.

8. Test the treadmill elevation. Verify that:
   a. it operates over the full range of 0-15%.
   b. there is no binding when it moves up or down.
   c. the elevation pot chain is aligned correctly.
   d. the grade motor chain is also aligned correctly. A “popping” sound in the chain indicates that it is misaligned.

19. Turn the treadmill off and unplug it.

20. Replace the hood. Be sure to reconnect the reset switch.

**Replacing the Pinion Shaft**

1. Remove the right siderail, then remove the rack gear as described in the previous paragraph, Steps 1-10.

   **WARNINGS**

   Do not wear loose clothing around rotating machinery.

   *High voltage is present when the power cord is plugged in.*

2. Restore power to the treadmill, then use the grade motor to turn the shaft until the setscrew on the elevation sprocket is visible (Figure 3-24 on page 3-15.)

3. Loosen, but do not remove, the setscrews from:
   a. the elevation sprocket (Figure 3-23 on page 3-14),
   b. the grade potentiometer pinion sprocket (Figure 3-24 on page 3-15), and
   c. the two pinion shaft set collars (Figure 3-24).

4. Unplug the treadmill.

5. Slide the pinion shaft out.

6. While sliding a new pinion shaft in, place the elevation sprocket, the set collars, and the grade potentiometer sprocket on the shaft.

7. Replace the rack gear cover plate you removed in Step 5.

8. Before performing Step 10, verify that neither end of the pinion shaft touches the rack gear cover plates.

9. Tighten the setscrews on the set collars.
NOTE

Do not force the set collars tightly against the headframe. Verify that the pinion shaft will turn freely when the set collars are in place.

10. Align the grade potentiometer sprocket, then tighten its setscrew.
11. Align the elevation sprocket and grade motor sprocket, then tighten the setscrew on the sprocket.
12. Reassemble the siderails, uprights, and walking belt as described on page 3-21.
13. Reassemble the rack gear as described on page 3-16.
14. Tension the walking belt as described on page 3-23.
15. Calibrate the grade potentiometer as described on page 3-25.
16. Test the treadmill elevation. Verify that:
   a. it operates over the full range of 0-15%.
   b. there is no binding when it moves up or down.
   c. the elevation pot chain is aligned correctly.
   d. the grade motor chain is also aligned correctly. A "popping" sound in the chain indicates that it is misaligned.
17. Unplug treadmill and replace the hood. Be sure to reconnect the reset switch.

Adjusting the Elevation Microswitches

The two elevation microswitches, one on either side of the treadmill, are mounted on brackets attached to the front of the headframe (Figure 3-26). When a roller on the microswitch reaches a detent that is cut into each rack gear, a lever arm travels outward, opening the microswitch and stopping the elevation motor. The microswitches prevent overtravel if the treadmill exceeds its preset electronic grade limits.

NOTE

Microswitch settings are preset at the factory and normally do not require adjustment.

1. Remove the hood (page 3-1).
2. Loosen, but do not remove, the two Phillips screws which secure each snap-action microswitch to the mounting plate (bracket).
3. Pivot the switch on the upper screw both toward and away from the rack gear. You should hear an audible click as the switch opens or closes.
4. Set the switch wheel on a flat part of the rack gear, then pivot the switch toward the rack gear until it just clicks, then stop and tighten both screws.
5. If required, repeat Steps 2-4 for the other microswitch.
6. Replace the treadmill hood.
7. Operate the treadmill to verify that it reaches the upper and lower elevation limits (15% and 0%).
Figure 3-27. Walking Deck Assembly

WALKING DECK ASSEMBLY
Figure 3-27 is an overview of the walking deck assembly.

Removing the Front (Drive) Roller or the Idler (Rear) Roller

1. Remove the hood (page 3-1).

NOTE
When replacing the screws in Step 2, note that the gap between the siderail cover and the head of each screw must be 0.050" ±0.010", approximately the thickness of a dime. See Figure 3-19 on page 3-12.

2. Remove the two Phillips screws from the siderails. These screws attach the hood to the siderails at the rear of the hood.

3. Remove both end caps, located on either side of the belt at the rear of the walking platform.

4. Grasp the top of the left side rail cover at the rear of the treadmill, then pull it up and away from the treadmill to roll the cover off. Repeat for the right cover. (The covers, which are made of flexible plastic, snap into place.)

6. Remove the four 5/16" hex bolts (two on each side) that secure the two front drive roller retainers to the frame siderail. One retainer is on each side of the drive roller assembly (Figure 3-19 on page 3-12.).

7. Slide the drive roller assembly to the left, then remove the timing belt from the right side of the roller.

8. Lift the roller assembly out from under the walking belt.

9. Pull the walking belt towards the rear of the deck, then slide the rear roller assembly out from between the side-rails toward the rear of the treadmill.

10. Replace the rollers and reassemble the treadmill following Steps 1-9 in reverse order.
11. Adjust the walking belt tension following the procedure on page 3-23.


Replacing the Walking Belt

Figure 3-27 on the previous page shows the walking deck assembly.

NOTES
- All orientations are given as if you were walking on the treadmill.
- A new slider bed is recommended when you install a new walking belt. The slider bed is reversible.

1. Raise the treadmill to its maximum height, then remove the hood as described on page 3-1.

2. Remove the drive (front) roller and the idler (rear) roller assemblies as described in Steps 2-8 of the previous paragraph.

3. Remove the two 7/16" hex-head nuts which fastens the rear of the drive roller cover to the treadmill siderails. They are located under the treadmill (Figure 3-22 on page 3-14).

4. Remove 12 Phillips screws that secure the treadmill slider bed to the siderails (Figure 3-27).

5. Lift the slider bed and slip off the belt.

NOTE
When you install a new belt, verify that the closed end of the splice on the walking belt hits the roller first as the belt rotates. See Figure 3-28.

6. Install a new belt and reassemble the treadmill following Steps 1-5 in reverse order.

7. Tension the belt following the procedure on page 3-23.

8. Adjust belt tracking following the procedure on page 3-24.

Removing the Slider Bed

Figure 3-28. Replacing Walking Belt

NOTE
The slider bed is reversible. You can turn it over if one side should wear out.

1. Follow Steps 1-5 in the previous paragraph to remove and replace the slider bed. Refer to the note following Step 6 when replacing the belt.

2. Tension the belt following the procedure on page 3-23.

3. Adjust the belt tracking following the procedure on page 3-24.

CONTROL PANEL AND DPU/MCU ASSEMBLY PROCEDURES

The operator control panel includes the treadmill control assembly, the display/keypanel, and the display processor unit (DPU) or motivational control unit (MCU) PCB Assembly.

Removing the Treadmill Control Panel Assembly

1. Turn the treadmill power off and disconnect the power cord from the socket.

2. Use a 5/32" Allen wrench to remove the eight socket screws that fasten the control enclosure to the upright assembly (Figure 3-29).

CAUTION
Ensure that the control panel assembly does not fall from the uprights while performing Steps 3-8.
3. Use a 1/8" Allen wrench to remove the eight socket screws that fasten the rear cover of the controller to the assembly (Figure 3-29).

4. Slide the cover down the uprights to expose the DPU.

5. Disconnect the controller cable, located on the left side of the DPU. See Figure 3-30.

6. Remove the hex nut that secures the ground wires to the chassis, then remove the wire.

7. Cut the cable tie that connects the cable to the control panel.

8. Lift the entire control panel assembly clear of the uprights.

9. Reassemble the assembly following Steps 2-8 in reverse order.

**Replacing the DPU PCB Assembly**

1. If possible, raise the treadmill to maximum height (15% elevation).

2. Turn the treadmill off and disconnect the power cord from the socket.

3. Use a 1/8" Allen wrench to remove the eight screws that secure the DPU enclosure rear cover (Figure 3-29).

4. Slide the rear cover down the uprights.

5. Remove the hex nut that attaches the DPU ground wire, then remove the wire.

6. Unplug the control cable from the DPU.

7. Remove the eight Phillips screws that attach the DPU to the key panel.

8. Lower the DPU, then unplug the ribbon cable connecting it to the key panel.

9. Remove the DPU from the enclosure.

10. Replace the DPU and reassemble following Steps 3-8 in reverse order.

**Treadmill Control Unit Disassembly**

You may either remove the DPU PCB Assembly or leave it in place prior to removing the key panel.

1. Remove the DPU following the procedure in the previous paragraph.
2. Remove the ten hex nuts that secure the keyboard to the control panel enclosure.
3. Lift the keyboard off of the enclosure.

Replacing the Controller (DPU-to-TMU) Cable
1. Remove the hood (page 3-1).
2. Remove the control panel assembly as described on page 3-21.
3. Cut any cable ties that fasten the controller cable to the wire harness.
4. Remove the Phillips screw which fastens the cable ground wire to the left side of the headframe, near the rack gear. See Figure 3-15 on page 3-8.
5. Pull the cable up through the left upright to remove it.
6. Install a new cable following Steps 1-5 in reverse order.

WALKING BELT ADJUSTMENT PROCEDURES

Walking Belt Tension
Adjust the walking belt tension:
- whenever the belt slips or moves unsteadily during operation.
- after installing a new walking belt.
- each time you remove or replace the walking belt.
- whenever specified in the procedures in this Section.

Two adjustment methods are specified. Method 1 is preferred, but two belt tension calipers (Quinton p/n 030113-001) are required.

NOTE
Both adjustment screws must be completely slack before starting this procedure.

Figure 3-31. Adjusting Walking Belt Tension

Method 1 (Calipers available)
1. Thread both tension adjustment screws in until most of the slack is removed from the belt (Figure 3-31).

NOTE
Do not stretch the walking belt at this point.

2. Position one caliper on each side of the belt, approximately 18" from the rear roller assembly.
3. Grasp the belt with one caliper clamp.
4. Pull the slack between the clamps out of the belt with your fingers, then grasp the belt with the second clamp.
5. Repeat Steps 3 and 4 on the other side of the belt using the other caliper.
6. Zero out the dials of both calipers.
7. Alternately tighten each tension adjustment screw in 0.1% increments until both sides read 0.4%. Ensure that the pointer reads exactly on the line increment of the dial for each setting.
CAUTION
Do not overtighten the adjustment screws. Overtightening may damage the walking belt and roller assemblies.

8. Remove both gauges.
9. Adjust the walking belt tracking following the procedure on this page.

Method 2 (Calipers not available)

CAUTION
Both adjustment screws must be completely slack before starting this procedure.

Use this method only if two belt adjustment calipers are not available. However, an accurate measuring device is required.

1. Thread both tension adjustment screws in until most of the slack is removed from the belt. Figure 3-31 on page 3-23 shows where the screws are located.

NOTE
Do not stretch the walking belt at this point.

2. Place two pieces of masking tape or two light pencil marks on the right edge of the belt exactly 50.000" apart.
3. Repeat Step 2 on the left edge of the belt.
4. Alternately turn the left and right adjustment screws one-half turn each time until the distance between the tape (or pencil marks) is 50.203" ±0.016" on both sides.

CAUTION
Do not overtighten the adjustment screws. Overtightening may damage the walking belt and roller assemblies.

5. Remove the tape, if used in Step 2.
6. Adjust the walking belt tracking using the procedure in the following paragraph.

Walking Belt Tracking
Perform this procedure:
- whenever the belt moves to one side or the other.
- after installing a new walking belt.
- each time you remove or replace the walking belt.
- each time you adjust the walking belt tension.
- whenever specified in the procedures in this Section.

Stay off the belt when adjusting the tracking.
1. Tension the walking belt using either Method 1 or Method 2 in the previous paragraph.

WARNING
Do not start the treadmill when someone is on the walking belt. The belt starts moving immediately, and the sudden start and subsequent loss of balance could cause serious personal injury.

2. Start the treadmill and let it run for at least one minute at minimum speed and grade.
3. Make the following adjustment to the right adjustment screw only:
   a. If the belt moves to the right, turn the screw 1/4 turn clockwise.
   b. If the belt moves to the left, turn the screw 1/4 turn counterclockwise.

   Figure 3-31 shows the location of the adjustment screws.

4. After making an initial adjustment, run the treadmill for at least one minute to observe how the belt tracks. Adjustments to belt tracking take some time to become apparent.
5. Repeat Steps 3 and 4 as required.

CAUTION
Do not overtighten the adjustment screw. Overtightening may damage the walking belt and assemblies.
Figure 3-32. Grade Pot

6. Increase the speed to 8 mph, then repeat Steps 3 and 4 as required.

7. Press STOP BELT to stop the treadmill, then press POWER to turn it off.

CALIBRATION AND ADJUSTMENT PROCEDURES

NOTE
Open-loop mode is available for the ClubTrack Plus. Refer to page 4-3 in Section 4.

Speed and Grade Calibration
The microcontroller-based circuitry in the treadmill is self-calibrating for both speed and grade. No calibration adjustments are required.

Grade Potentiometer (Pot) Calibration
Calibrate the grade pot whenever specified in the procedures in this Section. Figure 3-32 shows the location of the pot.

1. Remove the hood (page 3-1).

WARNINGS
Do not wear loose clothing around rotating machinery.

Figure 3-33. V-Belt and Drive Motor

High voltage is present when the power cord is plugged in.

2. Restore power to the treadmill.

3. Lower the elevation until the treadmill is level. Measure from the bottom of the siderail to the floor at both the front and rear of the treadmill. Adjust the grade until both measurements are identical.

4. Simultaneously press STOP BELT, FASTER, and SLOWER on the display to enter Technician Access Mode.

5. Loosen the setscrew which secures the grade pot sprocket to the pinion shaft (Figure 3-32).

6. Rotate the sprocket either forward or backward until the elevation display reads 0.0.

7. Tighten the setscrew you loosened in Step 5 and verify that the display still reads 0.0.

8. Simultaneously press STOP BELT, FASTER, and SLOWER to exit Technician Access Mode and return to operating mode.
Perform this adjustment procedure each time you replace or install the V-belt, which connects the drive motor to the input shaft assembly. Figure 3-33 on page 3-25 shows its location.

**NOTE**
Place a clean sheet of cardboard or a clean rag on the treadmill deck before starting this procedure.

1. Remove the hood (page 3-1).
2. Remove cable ties that secure the drive motor wires.
3. Remove one clamp from either side of the drive motor that secure it to the motor base plate.
4. Slip the V-belt off the motor pulley, then lift the drive motor off the base plate. Set it down carefully on the walking deck.
5. Use a pencil to scribe a mark along the edge of the motor base to the the headframe.
6. Loosen, but do not remove, the four 7/16" hex-head bolts which secure the motor mounting base to the headframe location.

**NOTE**
In the following step, move the base in 1/8" increments.

7. Adjust the belt as follows:
   a. To loosen the belt, move the motor mounting base towards the front of the treadmill.
   b. To tighten the belt, move the motor mounting base away from the front of the treadmill.
8. Verify that the edge of the motor base is parallel to the mark which was scribed on the headframe in Step 5, then tighten all four bolts. The right side of the base should be closer to the rear of the treadmill than the left side.
9. Place the drive motor on the motor base, then loop the V-belt over the motor pulley and the input shaft pulley.
10. Verify that the treadmill operates through its full elevation range (0-15%).

CAUTION
Tighten the motor clamps securely when you replace the motor to avoid damage to the TMU Assembly.

10. Check the V-belt tension per Quinton drawing 030650, Note 12.
   a. If the tension is incorrect, repeat Steps 3-10.
   b. When the tension is correct, replace the treadmill hood (page 3-1).

**Final Drive Belt Adjustment**
Refer to page 3-13 for this procedure.

**DETERMINING CUMULATIVE USAGE**
You can view either the cumulative mileage or the number of hours of operation on the treadmill display.

**Distance**
To determine the total distance, follow these steps:
1. Power up the treadmill.
2. Simultaneously press STOP and SLOWER on the display panel.
3. Multiply the number that appears in the center (SELECT) display by 10 to obtain the total distance in miles.
   
   Miles = Number in SELECT display x 10.
4. Record the mileage and the date for your service records.
5. Press CLEAR to clear the display for operation.

**Time**

To determine the total operational time for the treadmill operation, follow these steps:

1. Power up the treadmill.
2. Simultaneously press STOP and FASTER on the display panel.
3. Multiply the number that appears in the center (SELECT) display by 10 to obtain the total number of hours of operation.
   \[ \text{Hours} = \text{Number in SELECT display} \times 10. \]
4. Record the total time for your service records.
5. Press CLEAR to clear the display for operation.

**NOTE**

The cumulative time and distance are stored in the TMU PCBA and cannot be reset. Both values are zero if a new TMU is installed.

**ENABLING AND DISABLING THE "LIMITED ACCESS" SWITCH**

If the limited access switch on the DPU assembly is set, the treadmill will not operate until the user places the magnetic logo on the Quinton logo on the control panel. The treadmill is shipped with the switch disabled. To enable this magnetic control, follow these steps:

1. Verify that treadmill power is off.
2. Step to the front of the treadmill, then bend down so you can see inside the control panel. You should see a small white switch approximately 3 inches inside one of the ventilation holes (Figure 3-34).
3. Use a small, flat-bladed screwdriver to flip the switch DOWN. Do not push hard; it will move into position easily.
4. The limited access feature is now turned on, and the user must place the Quinton logo on the corresponding logo on the control panel to operate the treadmill.
5. To disable this feature, turn the treadmill off, then use a small screwdriver to flip the switch UP. The Quinton Logo magnet is not required when the switch is off.

**CLEANING THE TREADMILL SURFACES**

Follow these steps to clean the treadmill after servicing or as required:

- Clean the treadmill exterior with a damp sponge. Do not use detergents or cleaning agents.
- Clean the control panel with a mild non-abrasive liquid cleaner, then rinse it with a damp (not wet) cloth.
REPLACING THE COMPRESSION MOUNTS (MODELS -005 THROUGH -008)

Treadmills with part numbers 000333-005 through -008 and 000335-005 through -008 feature the TripleFlex™ deck. The TripleFlex hardware spares kit (p/n 033343-001) includes the rubberized compression mounts that support the walking deck. To replace the mounts, follow these steps:

1. Remove the slider bed as described on page 3-21.
2. Refer to dwg 000335, Revision AA, sheet 9, sections M-M and N-N, to locate the compression mounts on the inside of the siderails. On each siderail, there are:
   a. five long mounts (item 73, p/n 032235-001).
   b. three short mounts (item 74, p/n 032235-002).
3. Unscrew the mounts from each siderail, then replace with new ones from the spares kit. (If Loctite® 242 adhesive is available, apply it to the screw threads on each mount.)
4. Replace the slider bed as described on page 3-21.
This Section consists of several tables that isolate most problems that could occur during treadmill operation, and provide a variety of suggestions for onsite repair. The tables include:
1. error codes.
2. mechanical noises.
3. test points on the TMU.
4. fuses.
5. control cable pinouts (for continuity and signal testing).
6. power-up problems.
7. failure to start.
8. speed change problems.
9. elevation problems.
10. walking belt not tracking correctly.
11. belt slippages.
12. bearing and other treadmill noises.

In addition, this Section includes:
- a discussion of the error codes that can appear on the display.
- troubleshooting techniques for bearing problems.
- the information and tests available in Technician Access mode.
- specific information for the ClubTrack 3.0 Plus motivational controller.

**ERROR CODES**

The treadmill performs an electronic self-test each time that it is powered up. If a problem is detected during either power-up or operation, an error code appears on the display.

**WARNING**

When PLOS appears on the display, ensure that nobody is on the walking belt when you press the red Reset button. The belt starts moving immediately, and the sudden start and subsequent loss of balance could cause serious personal injury.

PL05 indicates a power interrupt. Ensure that nobody is on the walking belt, then press the red Reset button on the hood.
- The belt will move momentarily, then stop.
- The red Reset light is extinguished.
- You must press CLEAR to remove PL05 from the display and return it to normal.

The treadmill is then ready for use.

If an error code consisting of the letter E followed by three numbers appears, such as E101, refer to Table 4-2 on page 4-4. If you replace a faulty PCB Assembly, please return it to the factory and note the error code.

**TROUBLESHOOTING BEARING PROBLEMS**

**WARNING**

Observe the following precautions when servicing the treadmill:
- Do not start the walking belt when someone is on the treadmill. The belt starts moving immediately, and the sudden start and subsequent loss of balance could cause serious personal injury.
- High voltage is present when the treadmill hood is removed and the treadmill is plugged in.
- Do not wear loose clothing around rotating machinery.
- Never place your fingers near rotating parts.

All bearings are sealed and permanently lubricated, so maintenance is not required. The following information is provided to assist in diagnosing and trouble-shooting bearing failures.

Most failures cause clicking or knocking noises that are heard during treadmill operation. Determining the type and the rate of bearing
noise can help establish which bearing is at fault. Table 4-3 on page 4-5 is a diagnostic summary of bearing noises, along with other noises that may indicate problems.

- Transmission bearings generally click when they fail.
  - The input shaft assembly rotates at a constant speed, so the rate of the bearing noise (i.e. the number of clicks per minute) remains constant regardless of the walking belt speed.
  - The speed of the output shaft assembly varies with the treadmill speed, so the rate of the bearing noise (i.e. the number of clicks per minute) increases or decreases along with the walking belt speed.

- Front and rear roller assembly bearings tend to knock when they fail. (There are exceptions, however.) Also, the rate of the bearing noise (number of knocks per minute) varies with treadmill speed, because the roller speeds increase or decrease as belt speed changes.

A stethoscope with an open or tube end, or a piece of hose about two feet long, is useful for isolating bearing problems. (Hold one end of the hose near the suspected bearing, and the other end near your ear.) Compare several bearings to determine the sound of a faulty one. Read the warning on page 4-1 first before attempting this!

SERVICE ACCESS MODE
The treadmill is equipped with a privileged service access mode to aid in troubleshooting the controller and display.

- To enter service access mode, simultaneously press and release STOP BELT, FASTER, and SLOWER.
  (You may remain in service access mode to perform all tests. It is not necessary to exit and re-enter the mode.)
  - P000, which indicates that no key is pressed, appears in the SELECT display.
  - The word SERVICE scrolls across the ClubTrack Plus tri-color display.

- To exit service access mode, press and release the same three keys simultaneously.

Firmware Revision Numbers
To display the firmware revision levels of the ClubTrack DPU and ClubTrack Plus MCU PCB assemblies:
1. Enter the service access mode.
2. Simultaneously press STOP BELT and GRADE UP. The firmware revision level of the DPU or MCU appears in the SELECT display.
3. Simultaneously press STOP BELT and GRADE DOWN. The TMU revision level appears in the SELECT display.

Display Tests
To test the displays on the keypanel:
1. Enter the service access mode.
2. Simultaneously press STOP BELT, GRADE UP, and GRADE DOWN.

3. The display cycles through one digit at a time in each display, starting from left to right across the panel. Each digit displays the number 8 and the associated decimal point for one second, then turns off as the next one illuminates.

4. When this is completed, the LEDs (annunciators) light up individually, starting from the top. The "select" LEDs illuminate first, followed by the "units" LEDs.

5. After the LEDs are tested, all the digits in all three displays simultaneously count up from 0 through 9. (No decimal points are illuminated during this count.)

Key Input Test
To test the keys on the keypanel:
1. Enter the service access mode. P000, which indicates that no key is pressed, appears in the SELECT display. (If a key is shorted out, P555 appears.)

2. Refer to Table 4-1 on page 4-4, then press each key in succession to display the appropriate code in the SELECT display.
To enter open-loop speed mode:

-2.6% to 15.5%: to. I %.

This mode can be used to verify treadmill speed or grade, or to test the transmission.

0.7 to 13.0 mph ±0.1 mph.

In open-loop mode, the display will indicate the instantaneous treadmill speed or grade, rather than the target speed or grade. The approximate speed and grade range is:

- 0.7 to 13.0 mph ±0.1 mph.
- -2.6% to 15.5% ±0.1%.

This mode can be used to verify treadmill speed or grade, or to test the transmission.

To enter open-loop speed mode:

1. Enter the service access mode (page 4-2).

2. Simultaneously press RESUME COURSE, FASTER, and SLOWER.

3. Exit the service access mode (page 4-2).

4. Make sure that nobody is standing on the walking belt, then press START BELT.

5. Press FASTER or SLOWER to change speed. It changes only when you hold down either key.

6. To return to normal operation, press CLEAR or cycle the power.

To enter open-loop grade mode:

1. Enter the service access mode (page 4-2).

2. Simultaneously press NEXT STAGE, GRADE UP, and GRADE DOWN until the test starts.

a. First, vertical columns on the tri-color display light red, green, then yellow for one second each. The columns move from left to right until all display LEDs have been tested.

b. Then, horizontal columns light red, green, then yellow for one second each. The columns move from top to bottom until all LEDs have been tested.

3. Exit the service access mode (page 4-2).

4. Press UP or DOWN to change grade. It changes only when you hold down either key.

5. To return to normal operation, press CLEAR or cycle the power.

To enter open-loop grade mode:

1. Enter the service access mode (page 4-2).

2. Simultaneously press RESUME COURSE, UP, and DOWN.

3. Exit the service access mode (page 4-2).

4. Make sure that nobody is standing on the walking belt, then press START BELT.

5. Press FASTER or SLOWER to change speed. It changes only when you hold down either key.

6. To return to normal operation, press CLEAR or cycle the power.

NOTE

The ClubTrack Plus can be in both open-loop speed and open-loop grade modes simultaneously.

PROGRAM LOOP MODE (CLUBTRACK 3.0 PLUS ONLY)

Program loop mode, which is primarily intended for factory testing, runs and repeats a selected program indefinitely.

WARNINGS

*Block off the treadmill and hang a warning sign on it before using this mode. The treadmill will change speed and/or grade without warning!*

You must cycle power to exit Program Loop mode.

To enter program loop mode:

1. Enter the service access mode (page 4-2).

2. Simultaneously press RESUME COURSE and START PROGRAM.
<table>
<thead>
<tr>
<th>KEY</th>
<th>CODE IN SELECT DISPLAY</th>
</tr>
</thead>
<tbody>
<tr>
<td>No key pressed</td>
<td>P000</td>
</tr>
<tr>
<td>START BELT</td>
<td>P001</td>
</tr>
<tr>
<td>STOP BELT</td>
<td>P002</td>
</tr>
<tr>
<td>FASTER</td>
<td>P003</td>
</tr>
<tr>
<td>SLOWER</td>
<td>P004</td>
</tr>
<tr>
<td>UP</td>
<td>P005</td>
</tr>
<tr>
<td>DOWN</td>
<td>P006</td>
</tr>
<tr>
<td>SELECT</td>
<td>P007</td>
</tr>
<tr>
<td>UNITS</td>
<td>P008</td>
</tr>
<tr>
<td>CLEAR*</td>
<td>P009</td>
</tr>
<tr>
<td>RESUME COURSE**</td>
<td>P009</td>
</tr>
<tr>
<td>CLEAR**</td>
<td>P010</td>
</tr>
<tr>
<td>COOL DOWN**</td>
<td>P011</td>
</tr>
<tr>
<td>NEXT STAGE**</td>
<td>P012</td>
</tr>
<tr>
<td>Shorted key(s)</td>
<td>P555</td>
</tr>
</tbody>
</table>

*ClubTrack only
**ClubTrack Plus only

3. Exit the service access mode (page 4-2).
4. Select or design a program, press START BELT, then press START PROGRAM. The program runs automatically and repeats continuously.
5. Press STOP BELT to end the program.
6. Press POWER twice to cycle power and exit program loop mode.
Table 4-2. Error Codes

<table>
<thead>
<tr>
<th>DISPLAY</th>
<th>INDICATION</th>
<th>RECOMMENDED ACTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>PLOS</td>
<td>Power Interruption</td>
<td>Ensure that no one is on belt, then press Reset.</td>
</tr>
<tr>
<td>E001</td>
<td>Treadmill Control Unit (TMU) chip failure</td>
<td>Replace TMU. Return defective PCB to factory. Please note error code on return paperwork.</td>
</tr>
<tr>
<td>E002</td>
<td>TMU EPROM failure</td>
<td>Replace TMU. Return defective PCB to factory. Please note error code on return paperwork.</td>
</tr>
<tr>
<td>E003</td>
<td>TMU interrupt condition</td>
<td>Replace DPU (ClubTrack) or MCU (ClubTrack Plus). Return defective PCB to factory. Please note error code on return paperwork.</td>
</tr>
<tr>
<td>E004</td>
<td>TMU A/D failure</td>
<td>Replace DPU (ClubTrack) or MCU (ClubTrack Plus). Return defective PCB to factory. Please note error code on return paperwork.</td>
</tr>
<tr>
<td>E005</td>
<td>TMU communication failure</td>
<td>Replace DPU (ClubTrack) or MCU (ClubTrack Plus). Return defective PCB to factory. Please note error code on return paperwork.</td>
</tr>
<tr>
<td>E101</td>
<td>Chip failure on Display Processor Unit (DPU on the ClubTrack) or Motivational Control Unit (MCU on the ClubTrack Plus)</td>
<td>1) Press FASTER/SLOWER/STOP BELT simultaneously to enter Service Access mode. 2) Press NEXT STAGE/COOL DOWN simultaneously to load and test the NVRAM. 3) Wait approximately 10 seconds. when the top center 7-segment LEDs display a 4-digit alphanumeric number, the NVRAM load is complete. 4) Press FASTER/SLOWER/STOP BELT simultaneously to exit Service Access mode. 5) If error persists, replace MCU. Please note error code on return paperwork.</td>
</tr>
<tr>
<td>E102</td>
<td>DPU or MCU EPROM failure</td>
<td>1) Press FASTER/SLOWER/STOP BELT simultaneously to enter Service Access mode. 2) Press NEXT STAGE/COOL DOWN simultaneously to load and test the NVRAM. 3) Wait approximately 10 seconds. when the top center 7-segment LEDs display a 4-digit alphanumeric number, the NVRAM load is complete. 4) Press FASTER/SLOWER/STOP BELT simultaneously to exit Service Access mode. 5) If error persists, replace MCU. Please note error code on return paperwork.</td>
</tr>
<tr>
<td>E103</td>
<td>DPU or MCU interrupt condition</td>
<td>1) Press FASTER/SLOWER/STOP BELT simultaneously to enter Service Access mode. 2) Press NEXT STAGE/COOL DOWN simultaneously to load and test the NVRAM. 3) Wait approximately 10 seconds. when the top center 7-segment LEDs display a 4-digit alphanumeric number, the NVRAM load is complete. 4) Press FASTER/SLOWER/STOP BELT simultaneously to exit Service Access mode. 5) If error persists, replace MCU. Please note error code on return paperwork.</td>
</tr>
<tr>
<td>E104</td>
<td>Interprocessor communication failure</td>
<td>1) Press FASTER/SLOWER/STOP BELT simultaneously to enter Service Access mode. 2) Press NEXT STAGE/COOL DOWN simultaneously to load and test the NVRAM. 3) Wait approximately 10 seconds. when the top center 7-segment LEDs display a 4-digit alphanumeric number, the NVRAM load is complete. 4) Press FASTER/SLOWER/STOP BELT simultaneously to exit Service Access mode. 5) If error persists, replace MCU. Please note error code on return paperwork.</td>
</tr>
<tr>
<td>E105</td>
<td>MCU Display Controller NV RAM failure (ClubTrack Plus only)</td>
<td>1) Press FASTER/SLOWER/STOP BELT simultaneously to enter Service Access mode. 2) Press NEXT STAGE/COOL DOWN simultaneously to load and test the NVRAM. 3) Wait approximately 10 seconds. when the top center 7-segment LEDs display a 4-digit alphanumeric number, the NVRAM load is complete. 4) Press FASTER/SLOWER/STOP BELT simultaneously to exit Service Access mode. 5) If error persists, replace MCU. Please note error code on return paperwork.</td>
</tr>
<tr>
<td>E106</td>
<td>MCU Display Controller Graphic RAM failure (ClubTrack Plus only)</td>
<td>See error codes E101-E104</td>
</tr>
<tr>
<td>E201</td>
<td>Grade feedback is outside of 0-15% grade range.</td>
<td>1) Press FASTER/SLOWER/STOP BELT simultaneously to enter Service Access mode. 2) Press NEXT STAGE/COOL DOWN simultaneously to load and test the NVRAM. 3) Wait approximately 10 seconds. when the top center 7-segment LEDs display a 4-digit alphanumeric number, the NVRAM load is complete. 4) Press FASTER/SLOWER/STOP BELT simultaneously to exit Service Access mode. 5) If error persists, replace MCU. Please note error code on return paperwork.</td>
</tr>
<tr>
<td>E202</td>
<td>Speed display error. Displayed speed more than ± 2 mph from optical tach output (speed feedback).</td>
<td>1) If belt moves but does not change speed, check fuses on TMU (Table 4-4). 2) Verify proper operation of speed change mechanism (Table 4-9). 3) Check tach voltage at test point TP7 on TMU (TP9 is ground). Slowly rotate transmission output assembly by hand. Voltage should toggle between 0 V and +5 V (+0 V, -1.7 V). If not, replace tach.</td>
</tr>
<tr>
<td>E203</td>
<td>Drive motor overheating. Motor drawing excessive current, and thermal overload activated.</td>
<td>Allow motor to cool for 15 minutes, then restart. 1) If error message appears immediately, replace TMU. 2) If treadmill starts, then error message appears during operation, replace drive motor. Also see Table 4-5, TP4/TP5.</td>
</tr>
</tbody>
</table>

(Continued on page 4-6)
Table 4-2 (Continued). Error Codes

<table>
<thead>
<tr>
<th>DISPLAY</th>
<th>INDICATION</th>
<th>RECOMMENDED ACTION</th>
</tr>
</thead>
</table>
| E204    | Microcontrollers on TMU and DPU (or MCU) Assemblies not communicating | 1) Verify control cable connections at TMU and DPU (or MCU).  
2) Check for bent or broken pins on control cable plugs. Replace if required.  
3) If error message persists, replace TMU or DPU (or MCU) as required. |
| E205    | Tachometer not operational (Voltage output below +3.3 V). | Voltage at TMU test point TP6 should be +5V (+0 V, -1.7 V) [TP9 is ground]. If not:  
1) Clean tach LED and photocell (Section 3).  
2) Replace tachometer assembly (Section 3).  
3) Replace TMU. |
| E206    | Noise spike caused TMU microcontroller to reset inadvertently. | 1) Verify that drive motor is electrically isolated from headframe. (Use VOM to verify infinite resistance.) If not, replace grounding hardware, located between motor mounting base and headframe mounting.  
2) Verify that drive motor is not touching or otherwise grounding against TMU Assembly.  
3) If error message persists, replace TMU. |

Table 4-3. Troubleshooting Mechanical Component Noises

<table>
<thead>
<tr>
<th>NOISE</th>
<th>PROBABLE FAULTY COMPONENT</th>
<th>ACTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>Clicking (Constant Speed)</td>
<td>Input shaft assembly</td>
<td>Isolate bearing, then replace input shaft assembly (page 3-9)</td>
</tr>
<tr>
<td></td>
<td>transmission bearing</td>
<td></td>
</tr>
<tr>
<td>Clicking (Rate increases/decreases with walking belt speed)</td>
<td>Output shaft assembly transmission bearing</td>
<td>Isolate bearing, then replace output shaft assembly (page 3-11)</td>
</tr>
<tr>
<td>Knocking or thumping (Rate increases/decreases with walking belt speed)</td>
<td>Front or rear roller (pulley) assembly bearings</td>
<td>Isolate and replace roller [pulley] (page 3-20)</td>
</tr>
<tr>
<td>High-pitched “singing”</td>
<td>Final drive belt too loose or too tight</td>
<td>Adjust belt tension (page 3-13)</td>
</tr>
<tr>
<td>Squealing (like loose automobile fan belt)</td>
<td>Motor belt (V-belt) loose</td>
<td>Adjust belt tension (page 3-26). Replace belt if necessary.</td>
</tr>
<tr>
<td>Popping (during grade increase or decrease)</td>
<td>Faulty elevation chain alignment</td>
<td>Adjust alignment of sprockets</td>
</tr>
</tbody>
</table>
Table 4-4. Voltage Test Points on TMU Assembly*

<table>
<thead>
<tr>
<th>TEST POINT</th>
<th>EXPECTED VOLTAGE</th>
<th>FUNCTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>TP1</td>
<td>+5 V</td>
<td>Power supply voltages</td>
</tr>
<tr>
<td>TP2</td>
<td>+12 V</td>
<td></td>
</tr>
<tr>
<td>TP3</td>
<td>+26 V</td>
<td></td>
</tr>
<tr>
<td>TP4</td>
<td>Normal: 0 V</td>
<td>Thermal Overload in drive motor. <strong>WARNING:</strong> High voltage present on TMU when overload condition occurs.</td>
</tr>
<tr>
<td>TP5</td>
<td>Thermal Overload: +110 VAC</td>
<td></td>
</tr>
<tr>
<td>TP6</td>
<td>Between +3.3 V and +5 V</td>
<td>Tachometer HIGH level</td>
</tr>
<tr>
<td>TP7</td>
<td>0 V (low) +5 V (high)</td>
<td>Optical tachometer speed feedback</td>
</tr>
<tr>
<td>TP8</td>
<td>Normal: 0 V Fault: +5 V</td>
<td>Undervoltage indicator</td>
</tr>
<tr>
<td>TP9</td>
<td>Ground</td>
<td>Ground (Return) for TMU Assembly</td>
</tr>
</tbody>
</table>

*All voltages DC unless otherwise indicated.

Table 4-5. Fuses on TMU PCB Assembly

<table>
<thead>
<tr>
<th>FUSE</th>
<th>FUNCTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>F1</td>
<td>Speed change motor</td>
</tr>
<tr>
<td>F2, F3*</td>
<td>AC Mains (line) power</td>
</tr>
<tr>
<td>F4, F5*</td>
<td>High-speed deceleration circuitry for speed change motor</td>
</tr>
<tr>
<td>F6, F7*</td>
<td>Grade change motor</td>
</tr>
</tbody>
</table>

**WARNING:** High voltage may be present on fuses.

*NOTE: If one fuse of a pair is blown, replace both fuses.
Table 4-6. Signals on Control Cable Pins

<table>
<thead>
<tr>
<th>PIN NUMBER: TMU (J12)</th>
<th>PIN NUMBER: DPU (J1)</th>
<th>SIGNAL</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>1</td>
<td>T+ (Transmit +)</td>
</tr>
<tr>
<td>2</td>
<td>2</td>
<td>T- (Transmit -)</td>
</tr>
<tr>
<td>3</td>
<td>3</td>
<td>R+ (Receive +)</td>
</tr>
<tr>
<td>4</td>
<td>4</td>
<td>R- (Receive -)</td>
</tr>
<tr>
<td>5</td>
<td>5</td>
<td>GND (Ground)</td>
</tr>
<tr>
<td>6</td>
<td>6</td>
<td>N/C</td>
</tr>
<tr>
<td>7</td>
<td>7</td>
<td>GND (Ground)</td>
</tr>
<tr>
<td>8</td>
<td>8</td>
<td>+12 VDC</td>
</tr>
<tr>
<td>9</td>
<td>9</td>
<td>+12 VDC</td>
</tr>
</tbody>
</table>

NOTE: J12 is a D-sub connector; J1 is a MASCON connector.

Table 4-7. Treadmill Does Not Power Up (Display or Reset Light Not Visible)

<table>
<thead>
<tr>
<th>POSSIBLE PROBLEM</th>
<th>ACTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>Treadmill not plugged in</td>
<td>Plug power cord into an appropriate outlet.</td>
</tr>
<tr>
<td>Circuit breaker tripped</td>
<td>Contact building maintenance to reset breaker. If breaker trips again: 1) Check voltage at outlet. If necessary, verify that power at outlet and at breaker is rated sufficiently to operate treadmill. 2) Verify that power cord is not caught in rack gear.</td>
</tr>
<tr>
<td>Power cord cut</td>
<td>Remove cord from outlet and replace.</td>
</tr>
<tr>
<td>Fuse in treadmill blown</td>
<td>Remove power cord and replace fuse (Table 4-4). If fuse blows again, isolate mechanical assembly and ensure that no parts are jammed (e.g. rack gear in grade change assembly.)</td>
</tr>
<tr>
<td>Limited Access (magnetic control) switch enabled, but magnet not in place</td>
<td>Put Quinton magnet on Quinton logo, then press POWER twice (OFF, then ON again). If you wish, turn the treadmill OFF and disable the limited access switch on the bottom of the TMU (Operator Manual, page 4-2).</td>
</tr>
<tr>
<td>Reset button on hood not reconnected after maintenance. (Light will not be visible.)</td>
<td>Remove hood cover and fasten connector.</td>
</tr>
<tr>
<td>Control cable between TMU and DPU disconnected at either Assembly.</td>
<td>Check both PCB Assemblies. Reconnect and tighten screws as required.</td>
</tr>
<tr>
<td>Control cable (including connector pins) between TMU and DPU faulty</td>
<td>Check for bent or broken pins. Replace control cable.</td>
</tr>
<tr>
<td>TMU failure</td>
<td>Check power supply power at test points (Table 4-8). If power is incorrect, replace TMU Assembly.</td>
</tr>
<tr>
<td>DPU failure</td>
<td>Replace DPU Assembly.</td>
</tr>
</tbody>
</table>
### Table 4-8. Treadmill Powers Up, but Belt Does Not Move

<table>
<thead>
<tr>
<th>POSSIBLE PROBLEM</th>
<th>ACTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>Reset button (on hood) lit, and PL05S appears on display.</td>
<td>Ensure nobody is on walking belt, then press Reset button. (Press CLEAR to clear display.)</td>
</tr>
<tr>
<td>Error code appears on display</td>
<td>Refer to Table 5-1. Replace PCB or other assembly as required.</td>
</tr>
<tr>
<td>Contactor (K1) not operational.</td>
<td>Verify that wires are connected, then check power supply voltages (208 V at K1 terminals 3,5). Replace K1 as required.</td>
</tr>
<tr>
<td>Drive motor overheated or not operational.</td>
<td>Check test points TP4/TP5 for thermal overload. (See Table 4-3)</td>
</tr>
<tr>
<td>Wires to motor disconnected.</td>
<td>Reconnect wires as required.</td>
</tr>
<tr>
<td>Motor noise audible, but walking belt not moving.</td>
<td>Replace broken motor belt.</td>
</tr>
</tbody>
</table>

### Table 4-9. Treadmill Does Not Change Speed

<table>
<thead>
<tr>
<th>POSSIBLE PROBLEM</th>
<th>ACTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>Speed change relays on TMU PCBA loose or not operational,</td>
<td>Plug in relays or replace with new ones as appropriate</td>
</tr>
<tr>
<td>Speed change motor burned out or not operational</td>
<td>1) Verify that motor can rotate (i.e. is not jammed)</td>
</tr>
<tr>
<td>Wires poorly connected to (or disconnected from) speed</td>
<td>2) Test voltage from filter to motor. It should range from 0-90 V</td>
</tr>
<tr>
<td>change motor terminals</td>
<td>(maximum). Replace motor if required.</td>
</tr>
<tr>
<td>Control cable from TMU to DPU defective or not fully</td>
<td>Check for bent or broken pins. Replace or reconnect cable as required.</td>
</tr>
<tr>
<td>connected</td>
<td></td>
</tr>
<tr>
<td>Fuse F1 on TMU blown</td>
<td>Isolate problem and replace fuse.</td>
</tr>
<tr>
<td>Speed change motor brushes worn</td>
<td>Check brushes. Replace as required.</td>
</tr>
<tr>
<td>Speed change spindle jammed</td>
<td>Remove and replace spindle assembly (Refer to Input Shaft Removal, Section 3)</td>
</tr>
<tr>
<td>Input shaft assembly moveable sheave jammed</td>
<td>Remove and replace input shaft assembly</td>
</tr>
<tr>
<td>Output shaft assembly moveable sheave jammed</td>
<td>Remove and replace output shaft assembly</td>
</tr>
</tbody>
</table>
### Table 4-10. Treadmill will Not Elevate

<table>
<thead>
<tr>
<th>POSSIBLE PROBLEM</th>
<th>ACTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>Grade change motor burned out or not operational</td>
<td>Test motor. Replace if required.</td>
</tr>
<tr>
<td>Wires poorly connected to (or disconnected from) Crimp terminals</td>
<td>Crimp terminals and reconnect wires as required.</td>
</tr>
<tr>
<td>Control cable from TMU to DPU defective or not fully connected</td>
<td>Check for bent or broken pins. Replace or reconnect cable as required.</td>
</tr>
<tr>
<td>Fuses F6 and F7 on TMU blown</td>
<td>Isolate problem and replace fuses.</td>
</tr>
<tr>
<td>Grade change motor brushes worn</td>
<td>Check brushes. Replace as required.</td>
</tr>
<tr>
<td>Elevation microswitch out of adjustment</td>
<td>Adjust microswitch as required (Section 3)</td>
</tr>
<tr>
<td>Rack gear jammed</td>
<td>Check and free gear (Section 3)</td>
</tr>
<tr>
<td>Grade pot out of adjustment</td>
<td>Adjust pot (Section 3)</td>
</tr>
<tr>
<td>Elevation relays on TMU defective</td>
<td>Replace TMU</td>
</tr>
</tbody>
</table>

### Table 4-11. Walking Belt Slipping or Not Tracking

<table>
<thead>
<tr>
<th>POSSIBLE PROBLEM</th>
<th>ACTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>Walking belt slipping</td>
<td>Adjust belt tension (page 3-23)</td>
</tr>
<tr>
<td>Belt not tracking:</td>
<td></td>
</tr>
<tr>
<td>Tracking adjusted incorrectly</td>
<td>Adjust tracking (page 3-24)</td>
</tr>
<tr>
<td>Walking belt worn out</td>
<td>Replace belt (page 3-21)</td>
</tr>
<tr>
<td>Walking deck (slider bed) worn out</td>
<td>Replace deck (page 3-21)</td>
</tr>
</tbody>
</table>

### Table 4-12. Internal Belt Slippages

<table>
<thead>
<tr>
<th>SYMPTOMS</th>
<th>POSSIBLE PROBLEM</th>
<th>ACTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>1) Squealing sound like automobile fan belt,</td>
<td>Motor drive belt (V-belt) slipping</td>
<td>Adjust belt tension (page 3-26)</td>
</tr>
<tr>
<td>and</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2) Walking belt slows down as</td>
<td></td>
<td></td>
</tr>
<tr>
<td>user's foot strikes the deck</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Walking belt slows as user's foot strikes the</td>
<td></td>
<td></td>
</tr>
<tr>
<td>deck.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Walking belt slows as user's foot strikes the</td>
<td></td>
<td></td>
</tr>
<tr>
<td>deck.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Transmission belt slipping</td>
<td></td>
<td>Check pulley sheaves for grease or oil. Clean as required.</td>
</tr>
</tbody>
</table>
Table 5-1 lists the most commonly referenced part numbers for the treadmills, and Table 5-2 on the following page lists the assembly drawings and schematics that are included in this Section. (The drawings appear in numerical order.) Refer to the assembly drawings for a complete list of treadmill parts.

### Table 5-1. Commonly Referenced Part Numbers

<table>
<thead>
<tr>
<th>COMPONENT</th>
<th>DESCRIPTION</th>
<th>PART NUMBER</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>MOTORS</strong></td>
<td>Drive Motor Assembly</td>
<td>30648-001</td>
</tr>
<tr>
<td></td>
<td>Elevation Motor Assembly</td>
<td>19933-001</td>
</tr>
<tr>
<td></td>
<td>Elevation Motor Brushes (Bison Motor)</td>
<td>30259-001*</td>
</tr>
<tr>
<td></td>
<td>Elevation Motor Brushes (Bodine Motor)</td>
<td>30259-002*</td>
</tr>
<tr>
<td></td>
<td>Speed Change Motor Assembly</td>
<td>19130-002</td>
</tr>
<tr>
<td></td>
<td>Speed Change Motor Brushes</td>
<td>30260-001*</td>
</tr>
<tr>
<td><strong>TRANSMISSION</strong></td>
<td>Input Shaft Assembly</td>
<td>15273-002</td>
</tr>
<tr>
<td></td>
<td>Output Shaft Assembly</td>
<td>15313-001</td>
</tr>
<tr>
<td></td>
<td>Speed Change Spindle Assembly</td>
<td>18290-001</td>
</tr>
<tr>
<td><strong>BELTS</strong></td>
<td>Walking Belt</td>
<td>19019-001</td>
</tr>
<tr>
<td></td>
<td>V-Belt (Drive Motor to Input Shaft Assembly)</td>
<td>15241-001</td>
</tr>
<tr>
<td></td>
<td>Final Drive Belt (Output Shaft Assembly to Front Drive Roller)</td>
<td>12957-002</td>
</tr>
<tr>
<td></td>
<td>Transmission Variable Speed Belt</td>
<td>13062-001</td>
</tr>
<tr>
<td><strong>WALKING DECK</strong></td>
<td>Front (Drive) Roller Assembly</td>
<td>19137-002</td>
</tr>
<tr>
<td></td>
<td>Rear (Idler) Roller Assembly</td>
<td>19138-001</td>
</tr>
<tr>
<td></td>
<td>Slider Bed</td>
<td>19017-001</td>
</tr>
<tr>
<td></td>
<td>TripleFlex Hardware Spares Kit</td>
<td>033343-001</td>
</tr>
<tr>
<td><strong>ELECTRONIC</strong></td>
<td>TMU PCB Assembly</td>
<td>30556-001</td>
</tr>
<tr>
<td></td>
<td>MCU PCB Assembly (ClubTrack 3.0 Plus)</td>
<td>30441-001</td>
</tr>
<tr>
<td></td>
<td>DPU PCB Assembly (ClubTrack 3.0)</td>
<td>19027-001</td>
</tr>
<tr>
<td></td>
<td>Key Panel (ClubTrack 3.0)</td>
<td>19186-001</td>
</tr>
<tr>
<td></td>
<td>Key Panel (ClubTrack 3.0 Plus)</td>
<td>30546-001</td>
</tr>
<tr>
<td></td>
<td>Control Cable (DPU-to-TMU)</td>
<td>19238-001</td>
</tr>
<tr>
<td></td>
<td>Power Cord</td>
<td>30611-002</td>
</tr>
<tr>
<td></td>
<td>Drive Motor Relay (K1)</td>
<td>14486-001</td>
</tr>
<tr>
<td></td>
<td>Reset Switch</td>
<td>19089-002</td>
</tr>
<tr>
<td></td>
<td>Tachometer Pickup PCBA</td>
<td>13075-001</td>
</tr>
<tr>
<td></td>
<td>Beam Chopper Wheel</td>
<td>06875-001</td>
</tr>
<tr>
<td></td>
<td>Grade Pot Assembly</td>
<td>13089-001</td>
</tr>
</tbody>
</table>

*Not shown in assembly drawing. Available as replacement part only.

**NOTE**

Treadmill part numbers 000333-005 through -008 and 000335-005 through -008 include the TripleFlex deck design. Please refer to the appropriate drawing (immediately following this section) for the correct parts list.
Table 5-2. Assembly Drawings

<table>
<thead>
<tr>
<th>DRAWING NO.</th>
<th>DRAWING TITLE</th>
</tr>
</thead>
<tbody>
<tr>
<td>00333</td>
<td>Clubtrack Plus Final Assembly</td>
</tr>
<tr>
<td>00335</td>
<td>Clubtrack Final Assembly</td>
</tr>
<tr>
<td>19089</td>
<td>Reset Switch Assembly</td>
</tr>
<tr>
<td>13077</td>
<td>Tachometer Pickup Assembly</td>
</tr>
<tr>
<td>13089</td>
<td>Grade Pot (Potentiometer) Assembly</td>
</tr>
<tr>
<td>30198</td>
<td>Transformer Assembly</td>
</tr>
<tr>
<td>14486</td>
<td>Relay, Mercury</td>
</tr>
<tr>
<td>30648</td>
<td>Drive Motor Assembly</td>
</tr>
<tr>
<td>15273</td>
<td>Input Shaft Assembly</td>
</tr>
<tr>
<td>15313</td>
<td>Output Shaft Assembly</td>
</tr>
<tr>
<td>18290</td>
<td>Speed Change Spindle Assembly</td>
</tr>
<tr>
<td>19027</td>
<td>Control PCB Assembly, DPU</td>
</tr>
<tr>
<td>19027-201</td>
<td>Schematic Diagram, DPU</td>
</tr>
<tr>
<td>19130</td>
<td>Speed Change Motor Assembly</td>
</tr>
<tr>
<td>19137</td>
<td>Drive Pulley Assembly</td>
</tr>
<tr>
<td>19138</td>
<td>Rear Pulley Assembly</td>
</tr>
<tr>
<td>19186</td>
<td>Control Keyboard Assembly</td>
</tr>
<tr>
<td>19248</td>
<td>Control Panel Assembly (Upright Assembly)</td>
</tr>
<tr>
<td>19620</td>
<td>Control Panel Assembly</td>
</tr>
<tr>
<td>30262</td>
<td>Speed Change Spindle Assembly</td>
</tr>
<tr>
<td>30650</td>
<td>Headframe Assembly*</td>
</tr>
<tr>
<td>30912</td>
<td>Headframe Assembly*</td>
</tr>
<tr>
<td>30556</td>
<td>Treadmill Control PCB Assembly (TMU)</td>
</tr>
<tr>
<td>30556-201</td>
<td>Schematic Diagram, TMU</td>
</tr>
<tr>
<td>19933</td>
<td>Grade Motor Assembly</td>
</tr>
<tr>
<td>30658</td>
<td>Drive Motor Assembly (50 HZ, 230 V)</td>
</tr>
<tr>
<td>30659</td>
<td>Drive Motor Assembly (50 HZ, 200 V)</td>
</tr>
</tbody>
</table>

NOTES:
1. Assembly drawings may be in a different order than those listed above.
2. Multiple drawings of the same assembly allow support for different models of the treadmill.

*If the treadmill has two transformers, use headframe assembly drawing number 30650.
If the treadmill has one transformer, use drawing number 30912.
### TABLE I NAMEPLATE INFORMATION

<table>
<thead>
<tr>
<th>PART NO.</th>
<th>MODEL NO.</th>
<th>SERIAL NO.</th>
<th>VOLS</th>
<th>FL AMPS</th>
<th>FREO</th>
<th>PHASE</th>
<th>CIRCUIT CONDITIONS</th>
</tr>
</thead>
<tbody>
<tr>
<td>000333-001</td>
<td>CLUBTRACK 333-001-XXX</td>
<td>208/230</td>
<td>16</td>
<td>60HZ</td>
<td>1</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>000333-002</td>
<td>CLUBTRACK 333-002-XXX</td>
<td>230</td>
<td>16</td>
<td>50HZ</td>
<td>1</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>000333-003</td>
<td>CLUBTRACK 333-003-XXX</td>
<td>200</td>
<td>16</td>
<td>60HZ</td>
<td>1</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>000333-004</td>
<td>CLUBTRACK 333-004-XXX</td>
<td>200</td>
<td>16</td>
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<td>2</td>
<td></td>
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<td>208/230</td>
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<td>2</td>
<td></td>
</tr>
<tr>
<td>000333-006</td>
<td>CLUBTRACK 333-006-XXX</td>
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<td>16</td>
<td>50HZ</td>
<td>1</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>000333-007</td>
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<td>200</td>
<td>16</td>
<td>60HZ</td>
<td>1</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>000333-008</td>
<td>CLUBTRACK 333-008-XXX</td>
<td>200</td>
<td>16</td>
<td>50HZ</td>
<td>1</td>
<td>2</td>
<td></td>
</tr>
</tbody>
</table>

### TABLE II INDEX OF OPTIONS

<table>
<thead>
<tr>
<th>Dwg No.</th>
<th>Dash No.</th>
<th>Option Type</th>
<th>Required Regulatory Labels</th>
</tr>
</thead>
<tbody>
<tr>
<td>000333-001</td>
<td>.001</td>
<td>0.00</td>
<td>208/230 60HZ</td>
</tr>
<tr>
<td>030005</td>
<td>-002</td>
<td>RH SIDE HANDR</td>
<td></td>
</tr>
<tr>
<td>030005</td>
<td>-003</td>
<td>U &amp; RH SIDE HANDR</td>
<td></td>
</tr>
<tr>
<td>000333</td>
<td>-002</td>
<td>230V 50HZ</td>
<td>ITEMS 58, 60, 63</td>
</tr>
<tr>
<td>000333</td>
<td>-003</td>
<td>200V 60HZ</td>
<td>ITEMS 58, 60, 63</td>
</tr>
<tr>
<td>000333</td>
<td>-004</td>
<td>200V 50HZ</td>
<td>ITEMS 58, 60, 63</td>
</tr>
</tbody>
</table>

### TABLE III PARTS LIST

<table>
<thead>
<tr>
<th>PART</th>
<th>DESCRIPTION</th>
<th>QTY</th>
</tr>
</thead>
<tbody>
<tr>
<td>010835-192</td>
<td>SCREW, TRUSS HEAD PHPS REC-R-33UNC-2A X .375L</td>
<td>50</td>
</tr>
<tr>
<td>010827-204</td>
<td>SCREW, MACH. PHM PH-10-33UNF-2A X .500L</td>
<td>54</td>
</tr>
<tr>
<td>010829-009</td>
<td>WASHER, LOCK, INTERNAL STAR-250</td>
<td>53</td>
</tr>
<tr>
<td>030108-001</td>
<td>SHIPPING CRATE, CLUBTRACK</td>
<td>51</td>
</tr>
<tr>
<td>000333-350</td>
<td>UNPACKING &amp; INSTALL</td>
<td>50</td>
</tr>
<tr>
<td>000333-640</td>
<td>CLUBTRACK 3.0 OPR MNL</td>
<td>48</td>
</tr>
<tr>
<td>03012-004</td>
<td>HEADFRAME ASS'Y, TREADMILL-200V. 50HZ</td>
<td>47</td>
</tr>
<tr>
<td>03012-003</td>
<td>HEADFRAME ASS'Y, TREADMILL-200V. 50HZ</td>
<td>47</td>
</tr>
<tr>
<td>03012-002</td>
<td>HEADFRAME ASS'Y, TREADMILL-200V. 50HZ</td>
<td>47</td>
</tr>
<tr>
<td>010011-029</td>
<td>LABEL, ADH-BACKED AL FOIL, RESET SWITCH</td>
<td>46</td>
</tr>
<tr>
<td>010634-185</td>
<td>SCREW, TRUSS HEAD, PH REC-200-20UNC-2A X 1.250L</td>
<td>44</td>
</tr>
<tr>
<td>011881-026</td>
<td>NUT, LOCK-200-20UNC-2B</td>
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<td>010819-223</td>
<td>SCREW, CAP, HEX HEAD-200-20UNC-2A X .625L</td>
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<td>COVER, DRIVEN PULLEY-250</td>
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<td>030202-011</td>
<td>LABEL, FITNESS LOGO-200V, 50HZ</td>
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<td>LABEL, CLUBTRACK 3.0 PLUS</td>
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<td>010011-104</td>
<td>LABEL, ADH-BACKED AL FOIL, WARNING</td>
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<td>010011-103</td>
<td>LABEL, ADH-BACKED AL FOIL, NAMEPLATE</td>
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<td>030032-001</td>
<td>PLATE, ROLLER-200V, 60HZ</td>
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<td>010808-002</td>
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<td>030108-026</td>
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<td>030110-010</td>
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<td>010819-226</td>
<td>SCREW, MACH. PHM PH-313-18UNC-2A X .625L</td>
<td>21</td>
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<td>030110-075</td>
<td>WASHER, FLAT-313-18UNC-2A X .500L</td>
<td>20</td>
</tr>
</tbody>
</table>
NOTES:

A. APPLY ADHESIVE (ITEM 97) TO SCREW THREADS.

B. ASSEMBLY TOLERANCES 30-70 in-lb.

C. ASSEMBLE PER CHART 10 WORKSHOP STANDARDS AND PROCEDURES.

D. WITH THE THREADMILL IN THE ELEVATED POSITION AND BEFORE HOOD INSTALLATION (ITEM 84), LOOSEN 2 SCREWS ON THE UNDERSIDE OF THE HEADFRAME (ITEM 16) WHICH HOLD THE SPEED ADJUSTMENT BRACKET. ADJUST THE SPEED CHANGE

ADJUSTMENT BRACKET TOWARD THE SLIDER OF THE THREADMILL AS FAR AS POSSIBLE AND TIGHTEN THE TWO SCREWS HOLDING IT DOWN.

E. RECORD THE PRODUCTS POWER REQUIREMENTS ON TAG (ITEM 34) PER TABLE 1 AND ATTACH THE TAG TO THE POWER CORD.

F. ATTACH LABELS AS REQUIRED PER TABLE 11 FOLLOWING THE ACCEPTANCE OF ALL PRODUCTION TESTS AND ASSURANCE PROCEDURES.

G. INSTALL HOLD DOWN SCREWS (ITEM 2A) PRIOR TO HOOD INSTALLATION (ITEM 8). INSTALLATION SCREW HEAD MUST MAKE A 0.00 TO 0.01 GAP BETWEEN THE SIDE RAIL COVER AND THE SCREW HEAD. AFTER HOOD INSTALLATION THE TWO FORWARD SCREWS MUST BE TIGHTENED.

H. LOCATE PRODUCT IDENTIFIER (ITEM 31) AS SHOWN CENTERED HORIZONTALLY AND FLUSH WITH Bottom EDGE OF THE HOOD COVER (ITEM 9).

I. PERFORM CALIBRATION AND FINAL ACCEPTANCE.

J. FILL IN NAMEPLATE INFORMATION PER TABLE 1.

K. ALIGN LABEL (ITEM 36) WITH EDGE OF VENT SLOTS AS SHOWN IN B.

L. ADJUST THE TIMING BELT (PART OF ITEM 1) TENSION SO THAT A .11 INCH DEFLECTION CAN BE MEASURED AT MID SPAN WITH A 2.00 ± .50 Lb. LOAD APPLIED PERPENDICULAR TO THE BELT AT THE MID SPAN LOCATION.

M. SET THE TIMING BELT TENSION TO .4% STRETCH.

N. THE FOLLOWING ITEMS MUST BE PACKAGED IN A SEPARATE BAG (PROVIDED).

(1) CHAIN, Manual (ITEM 50).
(2) END CAP, LH (ITEM 15).
(3) END CAP, RH (ITEM 16).
(4) SCREW, BUTTON HEAD, SOCKET (ITEM 30).

O. WASHER, FLAT (ITEM 20).
(2) SCREW, CAP, RH, HEAD (ITEM 21).
(2) WASHER, SPLICE LOOP (ITEM 22).
(2) KEY ASSEMBLY, MAGNET (ITEM 25).
(2) SCREW, TRUSS HD, PHILLIPS (ITEM 24).
(2) WASHER, LOCK, M12 STAR (ITEM 25).
(2) SCREW, TRUSS HD, PHILLIPS (ITEM 56).

P. APPLY ADHESIVE (ITEM 97) TO SCREW THREADS.

---

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RECORD THE PRODUCTS POWER REQUIREMENTS ON TAG (ITEM 34) PER TABLE 1 AND ATTACH THE TAG TO THE POWER CORD.

ATTACH LABELS AS REQUIRED PER TABLE 11 FOLLOWING THE ACCEPTANCE OF ALL PRODUCTION TESTS AND ASSURANCE PROCEDURES.

INSTALL HOLD DOWN SCREWS (ITEM 2A) PRIOR TO HOOD INSTALLATION (ITEM 8). INSTALLATION SCREW HEAD MUST MAKE A 0.00 TO 0.01 GAP BETWEEN THE SIDE RAIL COVER AND THE SCREW HEAD. AFTER HOOD INSTALLATION THE TWO FORWARD SCREWS MUST BE TIGHTENED.

LOCATE PRODUCT IDENTIFIER (ITEM 31) AS SHOWN CENTERED HORIZONTALLY AND FLUSH WITH BOTTOM EDGE OF THE HOOD COVER (ITEM 9).

PERFORM CALIBRATION AND FINAL ACCEPTANCE.

FILL IN NAMEPLATE INFORMATION PER TABLE 1.

ALIGN LABEL (ITEM 36) WITH EDGE OF VENT SLOTS AS SHOWN IN B.

ADJUST THE TIMING BELT (PART OF ITEM 1) TENSION SO THAT A .11 INCH DEFLECTION CAN BE MEASURED AT MID SPAN WITH A 2.00 ± .50 Lb. LOAD APPLIED PERPENDICULAR TO THE BELT AT THE MID SPAN LOCATION.

SET THE TIMING BELT TENSION TO .4% STRETCH.

THE FOLLOWING ITEMS MUST BE PACKAGED IN A SEPARATE BAG (PROVIDED):

(1) CHAIN, Manual (ITEM 50).
(2) END CAP, LH (ITEM 15).
(3) END CAP, RH (ITEM 16).
(4) SCREW, BUTTON HEAD, SOCKET (ITEM 30).

WASHER, FLAT (ITEM 20).
(2) SCREW, CAP, RH, HEAD (ITEM 21).
(2) WASHER, SPLICE LOOP (ITEM 22).
(2) KEY ASSEMBLY, MAGNET (ITEM 25).
(2) SCREW, TRUSS HD, PHILLIPS (ITEM 24).
(2) WASHER, LOCK, M12 STAR (ITEM 25).
(2) SCREW, TRUSS HD, PHILLIPS (ITEM 56).

APPLY ADHESIVE (ITEM 97) TO SCREW THREADS.

---
NOTES:

- Apply adhesive (Item 57) to screw threads.
- Assemble torque 30 ± 5 IN-LB.
- Assemble per procedure 000335-880
- With the treadmill in the elevated position and before hood installation (Items 6 & 9), loosen 2 screws on the underside of the headframe (Item 1) which hold the speed adjustment bracket. Adjust the speed change adjustment bracket toward the center of the treadmill as far as possible and tighten the two screws holding it down.
- Record the product's power requirements on tag (Item 34) per Table 1 and attach the tag to the power cord.
- Attach labels as required by Table 8 following the acceptance of all production tests and assurance procedures.
- Install hold down screws (Item 24) prior to hood installation (Item 8 & 9). Installation: screw head must have a 0.250 to 0.370 gap between the side rail cover and the screw head. After hood installation, the two forward screws must be tightened.
- Locate product label (Item 32 or 74) as shown centered horizontally and flush with bottom edge of the hood cover (Item 9).
- Deleted.
- Fill in nameplate information per Table 1.
- Align label (Item 35) with edge of vent slots as shown ± 0.13.
- Adjust the walking belt (Part of Item 1) tension so that a 1 INCH deflection can be measured at mid span with a 2.00 ± 0.50 LB load applied perpendicular to the belt at the mid span location.
- Set the walking belt tension to ± 5% stretch.
- The following items must be packaged in a separate bag (provisional):
  1. Axles manual: (Item 50)
  2. End cap RH: (Item 15)
  3. End cap LH: (Item 10)
  4. Screw, Mach. Pin, PH: (Item 30)
  5. Warranty flag: (Item 20)
  7. Washer, Lock, Int. Star: (Item 23)
  8. Screw, Truss HD: (Item 56)
- Apply adhesive (Item 57) to screw threads.
- Install spacer (Item 27) between side rail weldment (Item 2) and headframe assembly (Item 1).
- These items available as a spare hardware kit. Order part no. 003350-001.

PRODUCTION

(Continued on Sheet 2)
REVISIONS

DART: IC444 -

DART: IC444 -

NOTES:

LABEL WITH PART NO. AND REV LETTER TO WHICH MFG, AND LOT CODE OF OPTICAL INTERRUPTER.

FILE OFF PROTRUSION ON PCB (ITEM 3 OR 4) EDGE.
NOTES: UNLESS OTHERWISE SPECIFIED
1. COVER TERMINAL (PART OF ITEM 1) AND X END OF WIRE SET (ITEM 8 OR ITEM 10) USING HEAT SHRINK TUBING (ITEM 6) PER DETAIL A.
2. FOR ALTERNATE SOURCE POTentiOMETER, SEE DETAIL B.
3. DO NOT IMMERSE POT ASSY IN ANY SOLVENT OR CLEANING SOLUTION.

DETAIL A
ROTATED 50°
3 PLACES

DETAIL B
3 PLACES
ALTERNATE POTentiOMETER

Schematic Diagram
(Ref. Only)

PRODUCTION
REVISIONS

-001  001

DESCRIPTION:

1) ADDED: -002  (Shift 2, 3) CLASSIFIED -001
2) D cod. 029.2:3:2; cod. = 15/32, 0.242
3) WM 0.25, RUBBER 0.25, 4.00 WPG TO RUBBER
SURFACE. EFF PT: 24 (D)-15/32, NEW COATING
4) BEAM Wy 0.65

PARTS LIST

<table>
<thead>
<tr>
<th>PART NO</th>
<th>DESCRIPTION</th>
<th>MFG PART NO.</th>
<th>MFG CODE</th>
</tr>
</thead>
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<td>RELAY, MERCURY</td>
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<td>014486</td>
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<tr>
<td>-001</td>
<td>WM 35 AA-24V</td>
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</table>

UNIT OF MEASURE: EACH

ALL DIMENSIONS ARE IN INCHES.

PARTS-cont.

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<th>DESCRIPTION</th>
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<th>MFG CODE</th>
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<td>RELAY, MERCURY</td>
<td>4021744</td>
<td>014486</td>
</tr>
<tr>
<td>-001</td>
<td>WM 35 AA-24V</td>
<td>4021744</td>
<td>014486</td>
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UNIT OF MEASURE: EACH

ALL DIMENSIONS ARE IN INCHES.

PARTS-cont.

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<th>MFG CODE</th>
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<tr>
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<td>RELAY, MERCURY</td>
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<tr>
<td>-001</td>
<td>WM 35 AA-24V</td>
<td>4021744</td>
<td>014486</td>
</tr>
</tbody>
</table>
ASSEMBLE ITEM 6 TO ITEM 1 OVER END 'B', UP TO ITEM 2.

PLACE ITEMS IN KEY GROOVE OF ITEM 1. SLIDE ITEM 4 OVER END 'A' OF ITEM 1. FITTING KEY GROOVE OF ITEM 4 OVER ITEM 5.

SOAK OIL WICK (ITEM 8) IN CYLINDER OIL (ITEM 13) BEFORE INSERTING INTO ITEM 8.

SLIDE ITEMS 8, 9, 10, OVER END 'B' OF ITEM 1.

GUIDE ITEM 6 ONTO ITEM 1 AND APPLY ADHESIVE ITEM 7 TO THREADS OF ITEM 1 PRIOR TO THREADING ITEM 2 AND END 'B' OF ITEM 1.

TO INSTALL BEARING (1), TEAR, TO SHAFT WITH LESS THAN ONE CLEARANCE DECREASE THE SHAFT, ITEM 1, AND BEARING. ITEM 2, E.G., PRIME BOTH SURFACES WITH LOC TITE PRIMER T, TEUY 14, AND FIT THE PARTS TOGETHER USING LOC TITE. ITEM 15, DO NOT MOVE PARTS FOR 2 HOURS AFTER ASSEMBLY.

END ITEM 11.

APPLICATION

PART NUMBER DESCRIPTION MATERIAL SPECIFICATION

014479-001 WICK OIL 130X75

012023-001 ADHESIVE LOC TITE 342

012024-001 DETAINING CURING LOC TITE 406

014479-001 DETAINING CURING LOC TITE 406

014479-001 DETAINING CURING LOC TITE 406

DO NOT SCALE DRAWING PRINTS

DO NOT SCALE DRAWING PRINTS
NOTES:
1. FRONT FROM NSL.

SECTION A-A

1. ASSEMBLE SPROCKET (ITEM 1-001, ITEM 2-002) TO SPINDLE (ITEM 1).
   A. THOROUGHLY CLEAN SPINDLE KEYWAY AREA, WOODRUFF KEY, AND SPROCKET KEYWAY AREA, WITH SOLVENT (ITEM 17).
   B. INSERT WOODRUFF KEY INTO SPINDLE KEYWAY. APPLY ADHESIVE (ITEM 19) TO KEY AND SPROCKET KEYWAY.
   C. ASSEMBLE SPROCKET ONTO SPINDLE. TIGHTEN SET SCREWS (ITEM 18).
   D. ALLOW ASSEMBLY TO SET 20 MINUTES MINIMUM.

2. APPLY GREASE (ITEM 2) TO THREADS OF SPINDLE (ITEM 1).

SECTION B-B
(ITEMS 9, 10 AND 11 NOT SHOWN)

SCALE: 1/8

PRODUCTION

SPINDLE ASSEMBLY, SPEED CHANGE
<table>
<thead>
<tr>
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<th>SPECIFICATION REFERENCE</th>
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<td>RESISTOR NETWORK, SIP</td>
<td>2.2K, 2%</td>
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<td>001164-001</td>
<td>WASHER, FLAT</td>
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<td>016344-001</td>
<td>ADHESIVE, ACCUMULATOR</td>
<td></td>
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<tr>
<td>017683-001</td>
<td>ADHESIVE, QUICK GEL</td>
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<td>012270-001</td>
<td>WIRE, INSULATED</td>
<td>26 AWG, BLK</td>
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<td>012913-003</td>
<td>TERMINAL, TEST POINT</td>
<td>TP1-TP5</td>
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<td>DIODE, SCHOTTKY</td>
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<td>CAPACITOR, DIP CERAMIC</td>
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<td>C20</td>
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<td>020248-001</td>
<td>IC, FRAME</td>
<td>(27C256)</td>
<td>U10</td>
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<td>C18, C19</td>
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<td>012183-042</td>
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<td>015800-018</td>
<td>IC, HCMOS</td>
<td>74HCT32</td>
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<td>01301-009</td>
<td>IC, CMOS</td>
<td>74CS040</td>
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<td>018197-001</td>
<td>NUT, HEX, SMALL PATTERN</td>
<td>6-32 UNC-2B</td>
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<td>010511-005</td>
<td>WASHER, SPLIT, LOCK</td>
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<tr>
<td>010527-202</td>
<td>SCREW, MACH, PH, RH</td>
<td>6-32 UNC-2A X 500L</td>
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</tbody>
</table>
1. APPLY ADHESIVE (ITEM 11) TO ALL THREADED FASTENERS.
2. CABLE ASSY (ITEM 9) NOT INSTALLED ON -002 AND -003.
3. TORQUE THE SET SCREWS (ITEM 8) TO 20±5 IN-#BS

AFTER APPLYING LOCTITE (ITEM 11).

NOTES: UNLESS OTHERWISE SPECIFIED

- APPLY ADHESIVE (ITEM 11) TO ALL THREADED FASTENERS.
- CABLE ASSY (ITEM 9) NOT INSTALLED ON -002 AND -003.
- TORQUE THE SET SCREWS (ITEM 8) TO 20±5 IN-#BS

AFTER APPLYING LOCTITE (ITEM 11).
### TABLE 1

<table>
<thead>
<tr>
<th>WIRE NO.</th>
<th>LENGTH</th>
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<th>ITEM</th>
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<td>W1</td>
<td>8.00 ± .50</td>
<td>.34 ± .05</td>
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<tr>
<td>W2</td>
<td>8.00 ± .50</td>
<td>.34 ± .05</td>
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</tr>
<tr>
<td>W3</td>
<td>8.00 ± .50</td>
<td>.34 ± .05</td>
<td>10</td>
</tr>
</tbody>
</table>

- **001** SHOWN
- **002** & **003** AS NOTED

---

**PRODUCTION**
NOTES:

1. PRESS BALL BEARINGS (ITEM 5) INTO ROLLER (ITEM 1) THROUGH THE OUTER RACE OF THE BEARING ONLY.

2. USE ARBOR SHIMS (ITEMS 7 & 8) AS REQUIRED TO ACHIEVE .002 TO .005 AXIAL CLEARANCE BETWEEN BEARING (ITEM 5) AND RETAINING RING (ITEM 1).

3. APPLY ADHESIVE (ITEM 14) TO SET SCREW (ITEM 4) IN TIMING SPROCKET (ITEM 13). ASSEMBLY torque: 40-114 IN-LBS.

4. TAG WITH PART NUMBER AND REVISION LETTER TO WHICH FIT.

5. THE SET SCREW (ITEM 4) WILL NOT ALIGN IN THE AXIAL DIRECTION, WITH THE WOODRUFF KEY (ITEM 12) FOR -.002 CONFIGURATION.

6. ASSEMBLE PER ASSEMBLY PROCEDURE 09/07-85C.

- .001 SHOWN
- .002 AS NOTED

PRODUCTION
NOTES:

- Press the ball bearings (item 3) and the roller (item 2) through the outer race of the bearing only.

- Use arbor shim (items 6 & 7) as required to achieve .005 to .015 endplay.

- Mark or tag with part no. and rev ltr to which MFD.

- Assemble per assembly procedure 01/13/88.

PRODUCTION
16. COLOR, TEXT AND GRAPHIC LAYOUT SHALL BE APPROVED BY QUINN PRIOR TO START OF INITIAL PRODUCTION.

17. INSTALL SCREW (ITEM 5) WITH HEAD INTO COUNTERSUNK HOLE PRIOR TO BONDING SWITCH PANEL ONTO ALUMINUM SUBPANEL. SEE SECTION 6-15. SCREW MUST BE MAGNETIC.

18. ITEMS SHALL BE SUITABLY PACKAGED FOR ACCEPTANCE BY COMMON CARRIER FOR SURFACE AND AIR TRANSPORTATION, HANDLING AND STORAGE WITHOUT DENTAL EFFECTS TO THE ITEMS.

19. SWITCH PACKET TO COME WITHIN .025 OF THE EDGE OF PANEL WINDOW. NO ADHESIVE ON THIS AREA. 3 PLACES.

20. TRIANGULAR AREA SHOWN TO BE "ACTIVE", THE "SPACER" OPENING IS TO BE A .70 X 2.00 RECTANGLE AS PER THE PHANTOM LINE SHOWN.

21. .025 WIDE LINE, COLOR MATCHED TO PANTONE 260C.

22. ALL DEPRESSIONS OR BULGES IN THE TOP LAMINATE FROM WHERE THE RIBBON CABLE ENTERS THE CONTROL PANEL TO THE NEAREST EDGE ARE ACCEPTABLE. (ROUGHLY AN AREA 1.5 X 2.0 INCHES SQUARE).
<table>
<thead>
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<th>-001 &amp; -002 TEXT</th>
<th>-003 TEXT</th>
<th>TEXT SIZE</th>
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<th>BACKGROUND COLOR</th>
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<tr>
<td>POWER</td>
<td>入/切</td>
<td>FUTURA, MEDIUM, 14 PT</td>
<td>WHITE</td>
<td>GREEN, MUNSELL 2.5G 4/10</td>
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<td>UP</td>
<td>+</td>
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<td>BLACK PANTONE PROCESS</td>
<td>SILVER, PANTONE 877C</td>
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<td>DOWN</td>
<td>-</td>
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<td>FUTURA, MEDIUM, 16 PT</td>
<td>WHITE</td>
<td>BLACK PANTONE PROCESS</td>
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<tr>
<td>SPEED</td>
<td>速度</td>
<td>FUTURA, MEDIUM, 16 PT</td>
<td>WHITE</td>
<td>BLACK PANTONE PROCESS</td>
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<tr>
<td>TIME, DISTANCE,</td>
<td>速度記録件数</td>
<td>FUTURA, MEDIUM, 14 PT</td>
<td>WHITE</td>
<td>BLACK PANTONE PROCESS</td>
</tr>
<tr>
<td>PACE, SCAN</td>
<td>速度，スキャン</td>
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<td>BLACK PANTONE PROCESS</td>
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<tr>
<td>MPH, KM/H</td>
<td>時速/マイル</td>
<td>FUTURA, MEDIUM, 14 PT</td>
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<td>BLACK PANTONE PROCESS</td>
</tr>
</tbody>
</table>

FOR LATEST ARTWORK CONFIGURATION
SEE ARTMASTER: 019186-003 REV: NEW
NOTES: (THIS SHEET ONLY)
1. DEBUR AND BREAK ALL SHARP EDGES, CP 0.010 MAX.
2. FINISH SULFURIC ANODIZE PER MIL-A-8625C, TYPE II. OPTIONAL FINISH HARDICE PER MIL-C-5541.
3. MAXIMUM INSIDE CORNER RADIUS FOR CUTOUTS IS 0.020.
4. REFERENCE: MATERIAL TO BE 0.001 THICK 606-7B ALUMINUM.
NOTES:
1. MARK WITH PART NO AND LETTER TO WHICH MFD.
2. CUT WIRES TO 7.00 INCHES. STRIP BOTH WIRES .548±.000.

PRODUCTION
NOTES: UNLESS OTHERWISE SPECIFIED

1. APPLY GREASE (ITEM 17) TO THREADS OF SPINDLE (ITEM 1).

2. APPLY ADHESIVE (ITEM 12) TO SET SCREWS (ITEM 7) AND THREAD SCREWS IN UNTIL 0.020 INCHES ARE Flush WITH SURFACE OF YOKE, FACING SPROCKET. THEN ADJUST ONE SET SCREW AS FOLLOWS:
   1. THREAD SPINDLE UNTIL CAP SCREW (ITEM 9) CONTACTS YOKE. BACK OFF SPINDLE UNTIL CAP SCREW IS JUST PAST FIRST SET SCREW HOLE. SET SCREW IN UNTIL IT PROMPTLY JUS TBEYOND CAP SCREW.
   2. BACK OFF SPINDLE (WITH SPROCKET) ONE REVOLUTION, SO SET SCREW IS IN LINE WITH CAP SCREW. TURN SET SCREW IN UNTIL THERE IS 0.020 - 0.005 CLEARANCE WITH CAP SCREW.

3. LEAVE SECOND SET SCREW FLUSH.

4. APPLY ADHESIVE (ITEM 12) TO FASTENERS INDICATED.

5. ASSEMBLE SPROCKET (ITEM 4, -001)(ITEM 16, -002) TO SPINDLE (ITEM 1) AS FOLLOWS:
   A. THOROUGHLY CLEAN SPINDLE KEYWAY AREA, WOODRUFF KEY AND SPROCKET KEYWAY AREA WITH SOLVENT (ITEM 14).
   B. APPLY PRIMER (ITEM 15) TO SPINDLE KEYWAY AREA.
   C. INSERT WOODRUFF KEY INTO SPINDLE KEYWAY. APPLY ADHESIVE (ITEM 1) TO KEY AND SPROCKET KEYWAY.
   D. ASSEMBLE SPROCKET ONTO SPINDLE. TIGHTEN SET SCREWS (ITEM 13).

6. ALLOW ASSEMBLY TO SET 30 MINUTES MINIMUM.

7. APPLY ADHESIVE (ITEM 19) TO SET SCREWS INDICATED.

8. BAG OR TAG PART AND MARK WITH PART NO. AND REV LETTER TO WHICH WRITTEN.

9. APPLY ADHESIVE (ITEM 19) TO SET SCREWS INDICATED.

10. BAG OR TAG PART AND MARK WITH PART NO. AND REV LETTER TO WHICH WRITTEN.

11. APPLY ADHESIVE (ITEM 19) TO SET SCREWS INDICATED.
PRODUCTION

COMPONENT SIDE

VIEW D-D
2 PLACES (L1 & L2) ROTATED 90° CCW

VIEW E-E
ROTATED 90° CW

VIEW F-F
INSTALL HARDWARE AS SHOWN

VIEW G-G

HEATSINK NOT SHOWN FOR CLARITY

DETAIL A

NOTE TO INSTRUCTORS: SEE DETAIL A FOR CLARITY

COMPONENT SIDE
COMPONENT SIDE
(SILKSCREEN OMITTED FOR CLARITY)

SOLDER SIDE
(COMPONENTS SHOWN HIDDEN FOR CLARITY)

SEE DETAIL H

D I TAL H
SOLDER SIDE SHOWN
(COMPONENTS SHOWN HIDDEN FOR CLARITY)
NOTES:

1. MATERIAL TO BE SUPPLIED BY VENDOR.
2. ALL PARTS MUST BE PER DRAWING RECOMMENDATION.
3. PERMANENTLY MARK WITH QUINTON PART NO., DASH NO., REV LETTER TO WHICH HTS AND VENDOR IDENT IN APPROX LOCATION SHOWN.
4. THIS COMPONENT MUST BE CERTIFIED BY A RECOGNIZED TESTING AGENCY TO COMPLY WITH APPROPRIATE CSA AND UL STANDARDS.
5. MOTOR WIRES P1, P2, T4, T6 SHOULD EXTEND AT LEAST 4 INCHES FROM MOTOR CASE.
6. STRIP LENGTH: .343.
7. INSTALL CONNECTORS PER MANUFACTURERS RECOMMENDATIONS.
8. WIRE INSULATION DIAMETER SHOULD NOT EXCEED MANUFACTURERS RECOMMENDATION FOR ITEM 7.
9. NOT SHOWN.

MOTOR SPECIFICATIONS:

<table>
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<tr>
<th>HP</th>
<th>3</th>
</tr>
</thead>
<tbody>
<tr>
<td>NEMA FRAME</td>
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</tr>
<tr>
<td>ENCLOSURE</td>
<td>OPEN DRIP PROOF</td>
</tr>
<tr>
<td>RPM</td>
<td>3450 @ RATED LOAD</td>
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<tr>
<td>PHASE</td>
<td>SINGLE</td>
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<tr>
<td>FREQUENCY</td>
<td>60 Hz</td>
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<tr>
<td>VOLTAGE</td>
<td>208-230 VRMS</td>
</tr>
<tr>
<td>MOTOR TYPE</td>
<td>400</td>
</tr>
</tbody>
</table>

MAX FULL LOAD AMPS: 14 AMPS
SERVICE FACTOR: 1.12
LOCKED ROTOR TORQUE: 9.11 LB-FT MIN
LOCKED ROTOR AMPS: 63 AMPS MAX
BREAKDOWN TORQUE: 7.81 LB-FT MIN
POWER FACTOR: 0.936
EFFICIENCY: FULL LOAD: 76% MIN
50% LOAD: --

PROTECTOR: AUTO CS330CV

PRODUCTION
VIEW FROM OUTSIDE OF MOTOR AT SWITCH END.
LEAD WIRE INSULATION TO EXTEND MIN OF .25 INCH CONNECTOR INSULATION.

-001 208-230V 60 Hz

SCHEMATIC & WIRING DIAGRAM
-001 208-230V 60Hz

PRODUCTION
NOTES: UNLESS OTHERWISE SPECIFIED

1. MATERIAL TO BE SUPPLIED BY VENDOR.
2. ALL PARTS MUST BE PER DRAWING RECOMMENDATION.
3. PERMANENTLY MARK WITH THE FOLLOWING: QUINN PART NUMBER, DRAW NUMBER, REVISION LETTER TO WHICH MANUFACTURED, VENDOR IDENTIFICATION, RPM, HORSEPOWER, CONSUMPTION, AND THE CABLE CLAMP OF THE TERMINAL. MATERIAL SPEC., FREQUENCY, FULL LOAD AMPS, DUTY CYCLE, MAXIMUM AMBIENT TEMPERATURE, INSULATION CLASS, PHASE, AND THERMAL PROTECTOR.
4. THIS COMPONENT MUST BE CERTIFIED BY A RECOGNIZED TESTING AGENCY TO COMPLY WITH APPROPRIATE CSA AND UL STANDARDS.
5. MOTOR WIRE P1, P2, T4, T8 SHOULD EXTEND AT LEAST 6 INCHES FROM MOTOR CASE.
6. STRIP WIRE TO TERMINAL MANUFACTURERS RECOMMENDATIONS PRIOR TO CRIMPING.
7. INSTALL CONNECTORS PER MANUFACTURERS RECOMMENDATIONS.
8. WIRE INSULATION DIAMETER SHOULD NOT EXCEED MANUFACTURERS RECOMMENDATION FOR ITEM 7.
9. WIRE INSULATION DIAMETER SHOULD NOT EXCEED MANUFACTURERS RECOMMENDATION FOR ITEM 7.
10. NOT SHOWN.
11. DELETED.
12. DELETED.
13. ALL WIRE LENGTHS PER TABLE 1. WIRE WITH TERMINALS ARE MEASURED FROM THE CABLE CLAMP TO THE END OF THE TERMINAL.
14. "X" IS A NON-SIGNIFICANT NUMBER.

PRODUCTION

SOURCE CONTROL DRAWING

15. DELETED
16. DELETED
17. CLAMP, CABLE
18. WIRE, INSULATED, STRANDED
19. WIRE, INSULATED, STRANDED
20. WIRE, STRANDED
21. WIRE, STRANDED
22. TERMINAL, SOLDERLESS
23. TUBING, VINYL (PVC)
24. DRIVE MOTOR

MOTOR SPECIFICATIONS:

- HP
- 3
- NEMA FRAME
- WGF 1: CS6H
- ENCLOSURE
- OPEN Drip Proof
- RPM
- 3450 @ RATED LOAD
- PHASE
- SINGLE
- FREQUENCY
- 60 Hz
- VOLTAGE
- 197-235 VAMS
- MOTOR TYPE
- WGF 1: XD

- MAX FULL LOAD AMPS
- WGF 1: 10.4 AMPS
- SERVICE FACTOR
- 1.15
- LOCKED ROTOR TURNO
- 9.11 LB-FT MIN
- LOCKED ROTOR AMPS
- 65 AMPS MAX
- BREAKDOWN TURNO
- 7.81 LB-FT MIN
- POWER FACTOR
- WGF 1: 0.935
- EFFICIENCY-FULL LOAD
- 75% MIN
- PROTECTOR
- WGF 1: CEJ361X

- AMBIENT
- 40°F MAX
- DUTY CYCLE
- CONT
- TEMPERATURE RISE
- --
- INSULATION
- 60 °C
- ROTATION
- CW OR CCW
- ROTATION
- --
- LOAD END.

- CIRCUIT BREAKER
- MFG 1: CEJ361X
- DESIGN ENCINERING DEPARTMENT
- APPLICATION:
- ALL PARTS MUST BE PER DRAWING RECOMMENDATION.
- DESIGN ENCINERING DEPARTMENT
- APPLICATION:
- THIS COMPONENT MUST BE CERTIFIED BY A RECOGNIZED TESTING AGENCY TO COMPLY WITH APPROPRIATE CSA AND UL STANDARDS.

- POWER FACTOR
- 0.84
- EFFICIENCY
- FULL LOAD 75% MIN
- MAXIMUM AMBIENT TEMPERATURE
- 50°F MAX
- PHASE
- SINGLE
- VOLTAGE
- 197-235 VAMS
- MOTOR SPECIFICATIONS
- WGF 1: XD

- SOURCE:
- MOTOR ASSY, DRIVE
- 3.0 HP, 208-230V, 60HZ

- MOTOR ASSEMBLY,

- DRIVE

- MOTOR ASSY.

- DRIVE

- MOTOR ASSY.

- DRIVE
001 208-230V 60 HZ

VIEW FROM OUTSIDE OF MOTOR AT SWITCH END.
LEAD WIRE INSULATION TO EXTEND MIN OF .25" INTO CONNECTOR INSULATION.

SCHEMATIC & WIRING DIAGRAM
001 208-230V 60HZ

PRODUCTION
1. **PREFIX TO REFERENCE DESIGNATION ON THIS DIAGRAM IS 2.**

2. **ASSEMBLY PER MANUFACTURER'S PROCEDURE 0198037-880.**

   **THese cables have interchangeable leads.**

3. **See sheets 7, 13 for wire routing. Wires must not be subject to pinch or abrasion route away from moving parts and sharp edges. Use cable ties (Item 42) as needed.**

4. **Prime OD of bearings on shaft assemblies (Items 23, 24, 49) and OD of bearing caps (Items 25, 26, 27) with loctite primer (Item 79).**

5. **Coat bearing OD and cap ID with loctite 660 (Item 67).**

6. **Assemble cap over bearing and mount shaft assembly to headframe (Item 10) immediately. "T" stamped on bearing caps (Items 23, 26, 27) must face upwards.**

7. **Rotate shaft assembly by hand before fully tightening screws (Items 15, 57). The bearing on the fixed sheave end of each shaft assembly must be seated in the bearing cap. Do not move or stress the assembly for two hours after torquing the mounting screws.**

8. **Use adhesive (Item 80) on all threaded connections.**

9. **Assemble torque to ± 0.000 INCH-IBS.**

10. **Length of chain should be 88 pitches.**

11. **Press bronze bearing (Item 88) into the machined headframe (Item 69) prior to assembly.**

12. **Do not overtighten. Honing of the mount adapter (Item 51) is unacceptable.**

13. **Assemble torque 45 ± 0.000 INCH-IBS.**

14. **Tension V-Belt (Item 30 or 53) such that a +1/8 inch deflection can be measured at mid span.**

15. **Apply adhesive (Item 80) to the edge of the shaft to the end of the keyway groove.**

16. **Alcohol rinse the input shaft OD, including the keyway groove, from the end of the shaft to the runout of the keyway groove using solvent (Item 104).**

17. **Alcohol rinse the drive pulley bore/keyway area, set screw threaded holes, set screw and key using solvent (Item 104).**

18. **Apply adhesive (Item 80) to input shaft keyway and drive pulley keyway.**

19. **Apply retaining compound (Item 81) to input shaft OD from the end of the shaft to the runout of the keyway groove.**

20. **Apply adhesive (Item 80) to drive pulley set screws.**

21. **Assemble drive pulley and key onto input shaft, align drive belt.**

22. **Secure drive pulley set screws.**

23. **Allow assembly to set a minimum of 30 minutes.**

24. **Install required amount of shims (Item 83) between snap ring (Item 40) and bearing (part of Item 28) to achieve a minimum gap of 0.15 between plastic sprocket (part of Item 22) and closest point of headframe post.**

25. **Leave 0.10 inch of slack in speed change motor leads (part of Item 22) where connected to line filter.**

26. **Torque the two motor resilient mount screws to 25-27 in-lbs.**

27. **Shim here using Item 86 to obtain +10 to +20 endplay of the spindle assembly (Item 42).**

28. **Before assembly, use a male quick disconnect terminal from I0C 95-3.**

29. **Hand tighten Item 65 (2 places, rear location only).**

---

**PRODUCTION**

---

**CONTINUED ON SHEET 2**

---

**HEADFRAME ASSEMBLY, TREADMILL**

---

**PART NUMBER**

---

**QUINTON**

---

**HEADFRAME ASSEMBLY TREADMILL**
### Notes: Unless Otherwise Specified

1. Material to be supplied by vendor.
2. All parts must be per drawing recommendation.
3. Permanently mark with Quinton Part No., Data No., Rev. Letter, to which MFD and vendor ident in approx location shown.
4. This component must be certified by a recognized testing agency to comply with appropriate CSA and UL standards.
5. Motor wires P1, P2, T4, T6 should extend at least 6 inches from motor case.
6. Strip wire per terminal manufacturers recommendations prior to drawing.
7. Install connectors per manufacturers recommendations.
8. Wire insulation diameter should not exceed manufacturers recommendation for Item 1.
9. Wire insulation diameter should not exceed manufacturers recommendation for Item 3.
10. All wire lengths per Table 1. Wires with terminals are measured from the cable clamp to the end of the terminal.
11. X is a non-significant number.

### Motor Specifications:

- **HP**: 3
- **Name Frame**: JOSH2
- **Enclosure**: Open drip proof
- **Input**: 2850 5 rated load
- **Frequency**: 60 Hz
- **Input**: 230/240 VAC
- **Motor Type**: Kd
- **Voltage Range**: 200-264 VAC
- **Max Full Load Amps**: 14-14.3
- **Service Factor**: 1.15
- **Locked Motor Torque**: 8.2 lb-ft
- **Locked Motor Amps**: 71.6
- **Breakdown Torque**: 12.6 lb-ft
- **Power Factor**: 97%
- **Efficiency-Full Load**: 80% Min
- **75% Load**: ---
- **50% Load**: ---
- **Protector**: BEHADDY

### Motor Assembly, Drive

- **Part No.**: 030658
- **Description**: MOTOR ASSY, DRIVE

---

**Source Control Drawing**

<table>
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<tr>
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<th>DESCRIPTION</th>
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<tr>
<td>001030</td>
<td>HOLLINGSWORTH XR1903SN</td>
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<tr>
<td>030850</td>
<td>ASSY, WIRE, INTERMEDIATE, 14 AWG, 600V, UL1015, DRV/71, K3</td>
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<tr>
<td>153056</td>
<td>CLAMP, CABLE</td>
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<td>001010</td>
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<td>143009</td>
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<tr>
<td>D18950</td>
<td>DRIV MONITOR</td>
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</table>

---

**Motor Specifications:**

- **Rating**: 2.0 HP, 230/240 V, 50/60Hz
- **Phase**: Single
- **Service Factor**: 1.15
- **Duty Cycle**: CONT
- **Ambient**: 40°F C Max
- **Circuit Breaker**: 15 A
- **Breakdown Torque**: 12.6 lb-ft
- **Insulation Class**: 80°C
- **Rotation**: CW
- **Drive Motor**: PER SPEC

---

**Motor Assembly, Drive**

- **Part No.**: 030658
- **Description**: MOTOR ASSY, DRIVE

---

**Table 1:**

<table>
<thead>
<tr>
<th>PART NUMBER</th>
<th>DESCRIPTION</th>
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<tr>
<td>030850</td>
<td>ASSY, WIRE, INTERMEDIATE, 14 AWG, 600V, UL1015, DRV/71, K3</td>
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<tr>
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<td>CLAMP, CABLE</td>
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<td>D18950</td>
<td>DRIV MONITOR</td>
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</table>
-001 230/240V 50 HZ

VIEW FROM OUTSIDE OF MOTOR AT SWITCH END.
LOAD WIRE INSULATION TO EXTEND MIN OF .25" INTO CONNECTOR INSULATION.

PRODUCTION
-001 200V 60 Hz

View from outside of motor at switch end.
Lead wire insulation to extend min of .25" into connector insulation.

Schematic & Wiring Diagram
-001 200V 60Hz

Production
Headframe Assembly, Treadmill

**Bill of Material Changes as follows:**

**ADD**

1. 1 1 1 XXX 001100-004 Key, square 1.188 x 1.188 x 0.06

**ITEM 38 WAS**

3 2 3 2 38 001100-002 Key square 1.188 x 1.188 x 1.00

**ITEM 38 IS**

2 1 2 1 38 001100-002 Key square 1.188 x 1.188 x 1.00

**Page 5 of 8 WAS:** zone 45

**Page 5 of 8 IS:** zone 45
SHIM MOUNTING SCREW (ITEM 56) WITH WASHERS (ITEM 59) TO OBTAIN FLUSH TO 6 THREADS PROTRUDING THROUGH THE PNEUMATIC, PART OF PCB BRACKET (ITEM 12).

COVER EDGES OF (ITEM 12) PCB MOUNTING BRACKET WITH TAPE (ITEM 104) WHERE WIRING CROSSES OVER OR AROUND BRACKET.

CUT GREEN/YELLOW WIRE ON DRIVE MOTOR (M2) TWO INCHES FROM END OF NYLON TUBING. CRIMP CLOSED END SPLICE TERMINAL (ITEM 103) ONTO WIRE END.

ALTERNATE, PART NUMBER 030544-001.

INSTALL COVER (ITEM 107) AT FRONT LOCATION ONLY.

MOTOR, PART OF PCB (ITEM 12).

COVER EDGES OF (ITEM 12) PCB MOUNTING BRACKET WITH TAPE (ITEM 104) WHERE WIRING CROSSES OVER OR AROUND BRACKET.

CUT GREEN/YELLOW WIRE ON DRIVE MOTOR (M2) TWO INCHES FROM END OF NYLON TUBING. CRIMP CLOSED END SPLICE TERMINAL (ITEM 103) ONTO WIRE END.

ALTERNATE, PART NUMBER 030544-001.

INSTALL COVER (ITEM 107) AT FRONT LOCATION ONLY.

TERMINAL, SOLDERLESS, CLOSED END SPLICE.

ANUAL WIRE 017210-006 TAPE, FOAM X 150 LG.

TERMINAL ASSY.

PLUG, EXPANSION CUP, STEEL.

COVER, SLOT, HEADFRAME.

WASHER, INSULATING.

TERMINAL, SOLDERLESS, CLOSED END SPLICE.

ANUAL WIRE 017210-006 TAPE, FOAM X 150 LG.

TERMINAL ASSY.

PLUG, EXPANSION CUP, STEEL.

COVER, SLOT, HEADFRAME.

WASHER, INSULATING.

TERMINAL, SOLDERLESS, CLOSED END SPLICE.

ANUAL WIRE 017210-006 TAPE, FOAM X 150 LG.

TERMINAL ASSY.

PLUG, EXPANSION CUP, STEEL.

COVER, SLOT, HEADFRAME.

WASHER, INSULATING.

TERMINAL, SOLDERLESS, CLOSED END SPLICE.

ANUAL WIRE 017210-006 TAPE, FOAM X 150 LG.

TERMINAL ASSY.

PLUG, EXPANSION CUP, STEEL.

COVER, SLOT, HEADFRAME.

WASHER, INSULATING.
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<tr>
<th>TITLE</th>
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<td>D. Colvin</td>
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<tr>
<td>DESIGN IMPROVEMENT</td>
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<td>MFG. IMPROVEMENT</td>
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<td>ITEMS SUBMITTED WITH CHANGE NOTICE</td>
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<tr>
<td>012651-002</td>
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CHANGE NO.: B599 | DISTRIBUTION CODE: 3