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E821/E825/E830 Elliptical Trainer Repair Manual



SPORTS ART INDUSTRIAL CO., LTD.

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1.E821 Elliptical Trainer Unit Picture



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2.E825 Elliptical Trainer Unit Picture



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3.E830 Elliptical Trainer Unit Picture

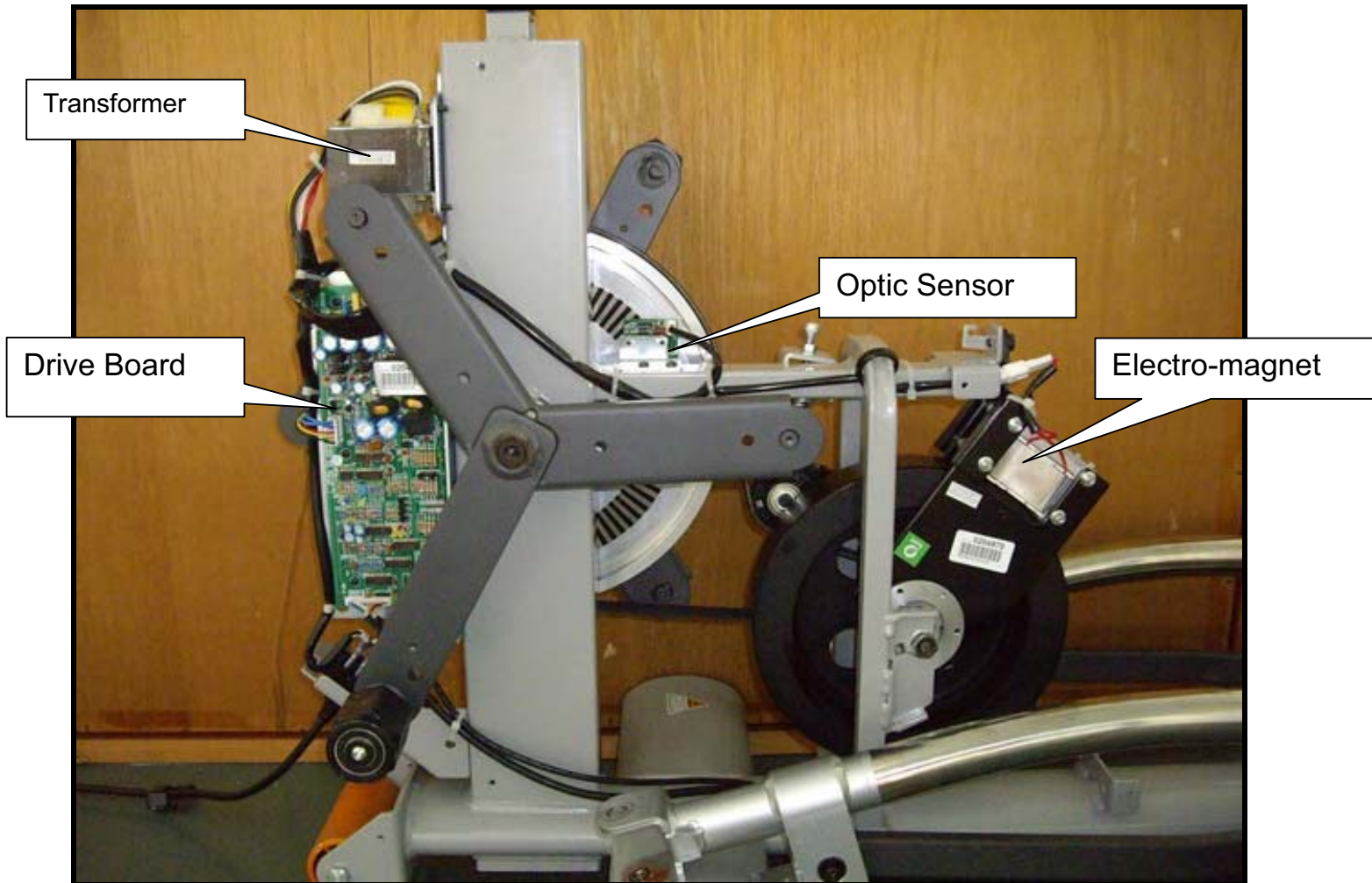


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4.E821/E825/E830 Components — (1) Display Area



5.E821/E825/E830 Components – (2) Back Area Components



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3.E821/E825/E830 Components – Display Board (Front)



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3.E821/E825/E830 E870 Components – Display Board (Back)





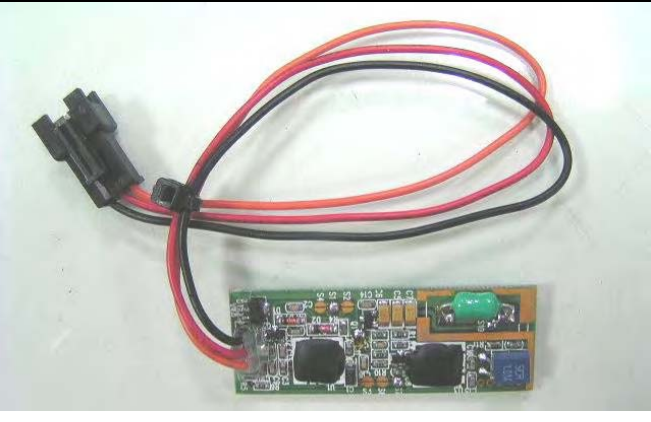

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3.E821/R825/R830 Components – Drive Board



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3.E821/E825/E830 Components - Others

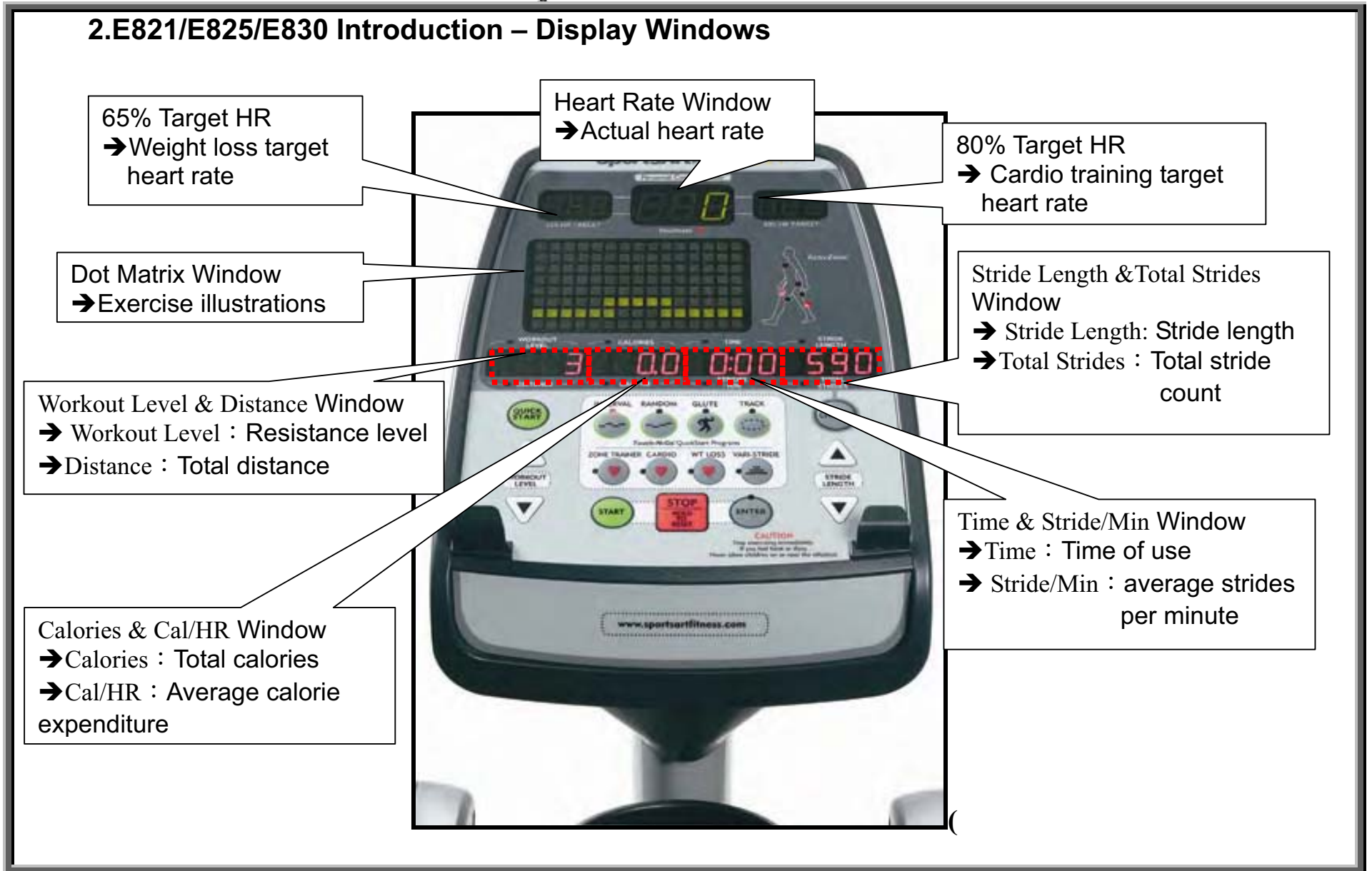
Part Name	Optic Sensor	Part Name	HTR Board
			
Part Name	HRC Board	Part Name	Transformer
			

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1.E821/E825/E830 Specification Chart

Specification	Contents			Notes
	E821	E825	E830	
Power	AC 110V/220V			
Main Window	1.HRC window: 65%, 80%, Heartrate 2.Workout level, Calories , Time , Stride Length , 3.Distance, Cal/HR, Strides/MIN, Total Strides			
Illustration Window	5X8 Bi-color LED dot matrix 16 set			
Setting Window	1 set of four 8-character seven segment character displays			
Resistance	1~20			
STRIDE LENGTH	17~26inch/450~650mm		17~29inch/450~730mm	
Heart Rate Detection	Telemetry (wireless) heart rate reception	HTR (contact) and telemetry (wireless) heart rate reception		
KPH/MPH Setting	Determined by the IC program			
Workout Programs	Track Glute, Random , Interval, Vari-Stride WT Loss, Cardio, Zone Trainer			

2.E821/E825/E830 Introduction – Display Windows



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3. E821/E825/E830 Introduction – Display Keys and Indicators



Flashing indicates heart rate reception

Exercise Program Keys
→ Lit indicates Track, Glute, Random, Interval, VARI-STRIDE Vari-Stride, WT Loss, Cardio, ZONE TRAINER 模式

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4.E821/E825/E830 Introduction – Display Keys (Continued)

Quick Start Key

→ Press to operate in Quick Start mode (does not require user)

運動目標按鍵

→ 選擇運動目標

Exercise Program Keys

→ Press to select exercise

Track, Glute, Random, Interval, VARI-STRIDE, Vari-Stride, WT Loss, Cardio,

Display Lock/Unlock Key and Indicator

→ Press to select active feedback

Workout Level Key

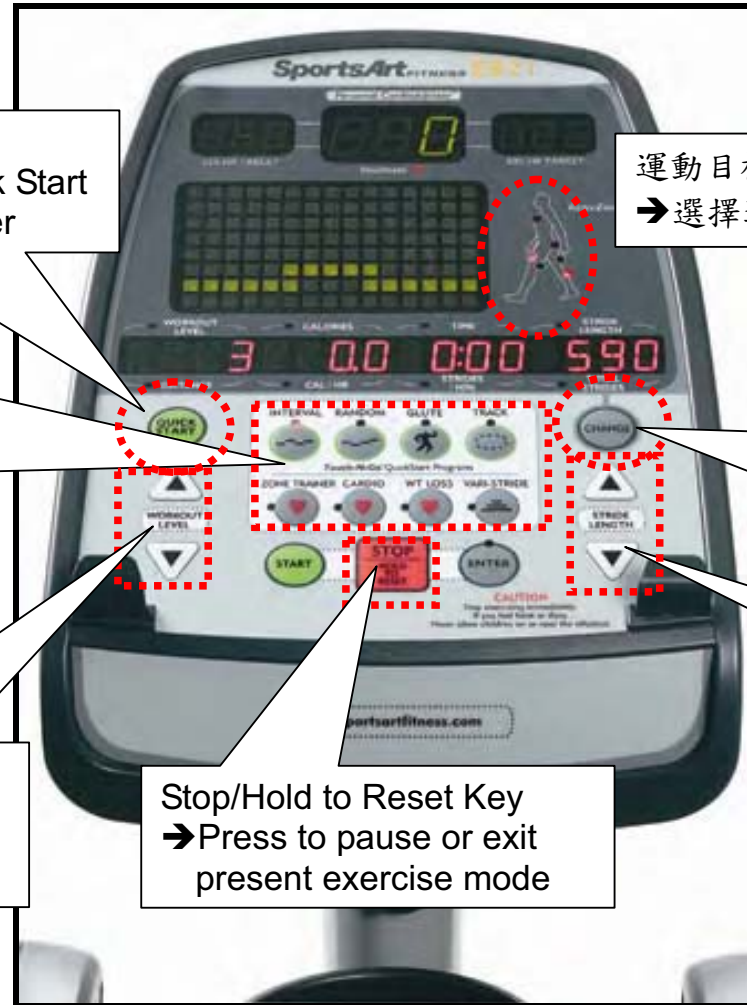
→ Press to increase or decrease resistance

Stop/Hold to Reset Key

→ Press to pause or exit present exercise mode

Stride Length Key

→ Press to increase or decrease stride length



E821/E825/E830 Operation

1. Start Up

Function: Turn and start operating unit.

Operation: (1) Turn on unit. Display shows **"SPORTSART – E8XX"**.

After 6 seconds, **"PRESS START"** scrolls across the display.

Press the QUICK START key to directly begin exercising, or press the PROGRAM key to establish user settings.

(2) The PROGRAM indicator flashes.

After a program key is pressed, the associated LED lights. The feedback window shows characters 2 seconds. Press the <RANDOM> key. The RANDOM LED lights. The feedback window shows **"RANDOM"**.

(3) Age and Weight Setting

When the screen shows **"ENTER AGE"**, enter age value, then press the <ENTER> key to confirm your choice.

When the display shows **"ENTER WEIGHT-KG"OR"LB"**, enter your weight value, then press the <ENTER> key to confirm your choice.

(4) The unit can now be operated.

2. Workout Level Key

Function: Set resistance level

Operation: (1) Press the LEVEL <▲> key. The value in the Workout Level window increases.

Actual resistance increases.

(2) Press LEVEL <▼> key. The value in the Workout Level window decreases.

Actual resistance decreases.

(3) Workout level range: 1~20.

3. Stride Length Key

Function: Set stride length

Operation: (1) Press the Stride Length <▲> key. The value in the Stride Length window increases.

The stride motor operates up. Stride length increases.

(2) Press the Stride Length <▼> key. The value in the Stride Length window decreases.

The stride motor operates down. Stride length decreases.

(3) Stride length range: E821/E825 KPH setting: 450-650 mm; MPH setting: 17~26 inches.

E830 KPH setting: 450-730 mm; MPH setting: 17~29 inches.

4. Stop Key

Function: Exit an exercise program

Operation: (1) In exercise mode, press the <STOP> key to exit the exercise program and return to user setup.

(2) At any time, press the <STOP> key for two seconds to leave the present mode and return to the start up screen.

5. Display Lock/Unlock Key

Function: Toggle between two rows of exercise feedback information

Operation: (1) Press the <Display Lock/Unlock> key during exercise to toggle between exercise feedback views.

Corresponding indicators light. Top row: calories, distance, time, strides/minute. Bottom row: Cal/hr, stride length, Watts, total strides.

(2) In scan mode (the SCAN indicator lights); the display view toggles between the two rows of feedback every six seconds. In scan mode, press the <Display Lock/Unlock> key again to cancel scan mode (the SCAN indicator extinguishes) and keep viewing the present row of feedback. Press the <Display Lock/Unlock> key again to return to scan mode.

6. Program Key

Function: Set an exercise program.

Operation: (1) Press any exercise PROGRAM key. The corresponding indicator lights.

(2) Program keys include TRACK · GLUTE · RANDOM · INTERVAL · VARI-STRIDE · weight loss heart rate control, cardio heart rate control, and custom heart rate control.

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7. Basic Settings

Function: (1) KM/MILE setting, total distance, time, display and drive board versions.

Operation: (1) Press and hold the <ENTER> key for three seconds to enter the setting mode.

Unit settings appear. American standard appears as **"UNIT - ML"**. Metric standard appears as **"UNIT - KM"**.

Press the <▲/▼> keys to toggle between settings. Press the <ENTER> key or press the <STOP> key to exit this setting.

(2) Press the <ENTER> key to confirm your choice and view total time of operation: **"TIME – XXXXXX HOUR"**.

(3) Press the <ENTER> key to proceed to the next step and view total mileage. In the American standard setting, **"DIST – XXX ML"** appears. In the metric setting, **"DIST – XXXX KM"** appears. Press <▲/▼> keys to toggle between the two settings.

(4) Press the <ENTER> key to confirm your choice and proceed to the USER setting. The feedback window shows **"PRESS UP/DN TO ACTIVATE OR DEACTIVATE 4 USER SETTING"**. Press the <▲/▼> keys to toggle between the following: **"USER ID - ON"** (allows 4 user settings); **"USER ID - OFF"** (deactivates user settings).

(5) Press the <ENTER> key to proceed to see the display version. The feedback window shows **"E8XXH-XX"**.

(6) Press the <ENTER> key to complete settings and return to the start up screen.

8. Stride Motor Lubrication Procedure

Function: (1) Lubricate the stride motor.

- Operation: (1) As **“SPORTSART-E8XX”** scrolls across the display, simultaneously press and hold <STRIDE LENGTH▲>+<STRIDE LENGTH▼>+<INTERVAL> keys for three seconds to enter the lubrication procedure.
- (2) Upon entering the lubrication mode, the stride motor immediately operates, aligning itself with the oil hole. **“FILLING WITH LUBRICANT”** scrolls across the display. Prior to entering the lubrication mode, the stride adjustment arm appears as shown in Fig. 1. After the stride motors move to the lubrication position, the stride adjustment arm appears as shown in Fig. 2.
- (3) Insert a grease gun onto the Zirc fitting in the product. Squeeze the grease gun two to three times. After applying lubricant, press the <STOP> key to exit the lubrication mode and return to the start up screen.

Fig. 1. Normal stride motor operation position

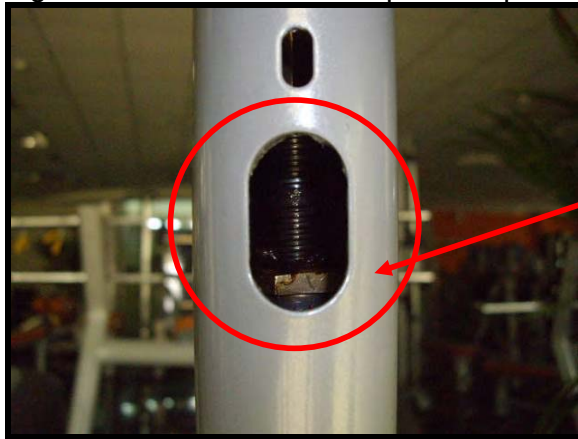
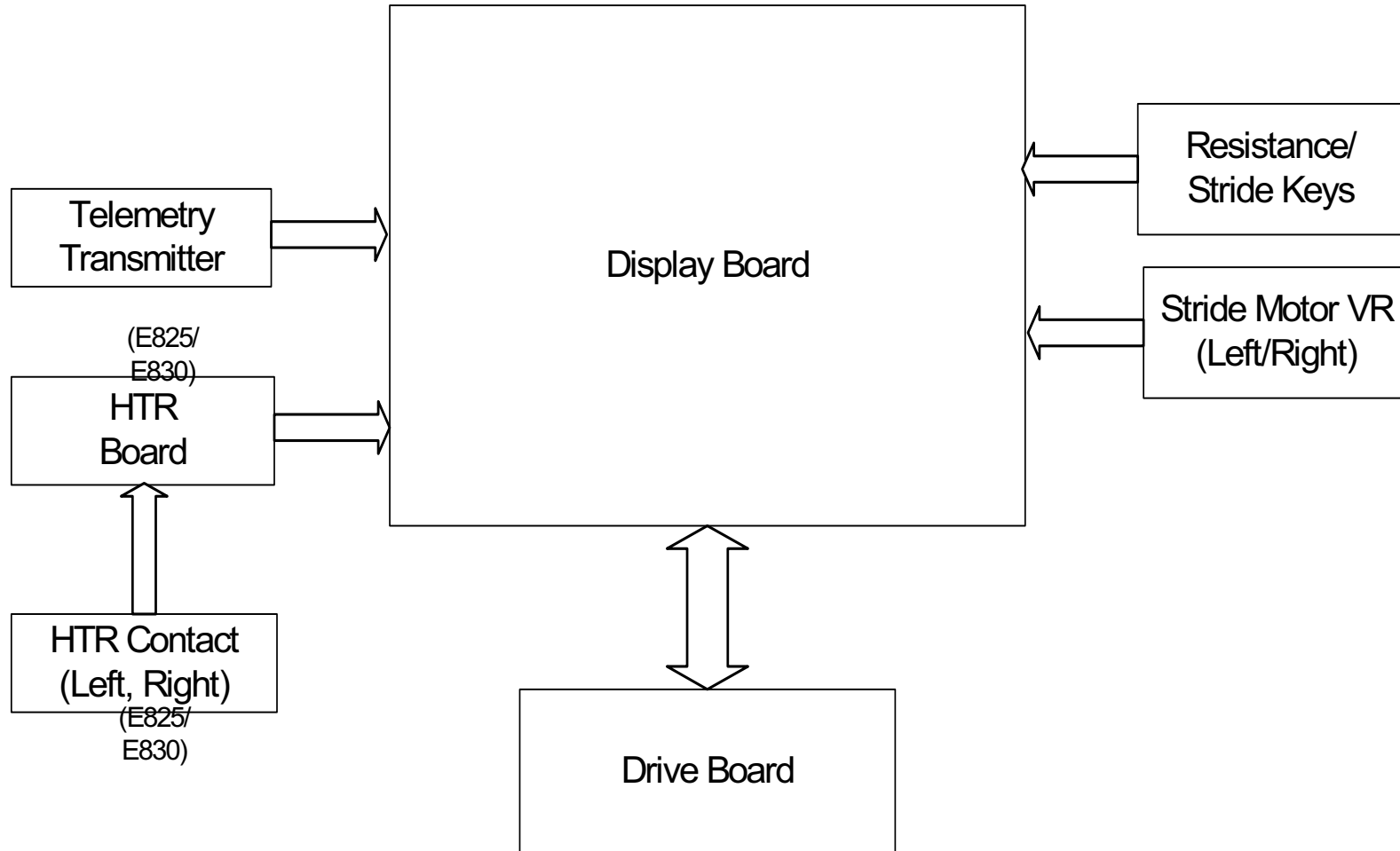


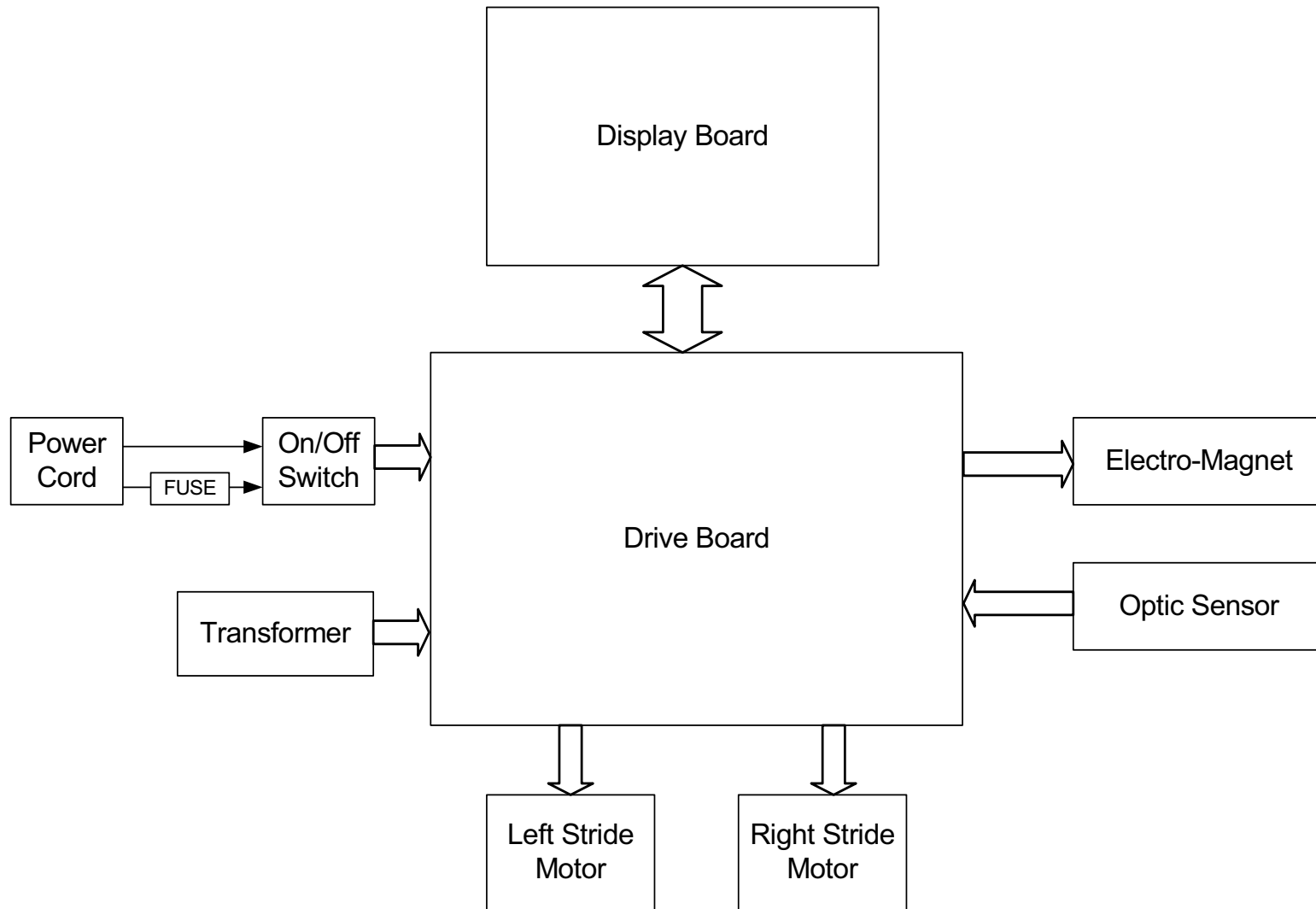
Fig. 2. Lubrication mode stride motor position



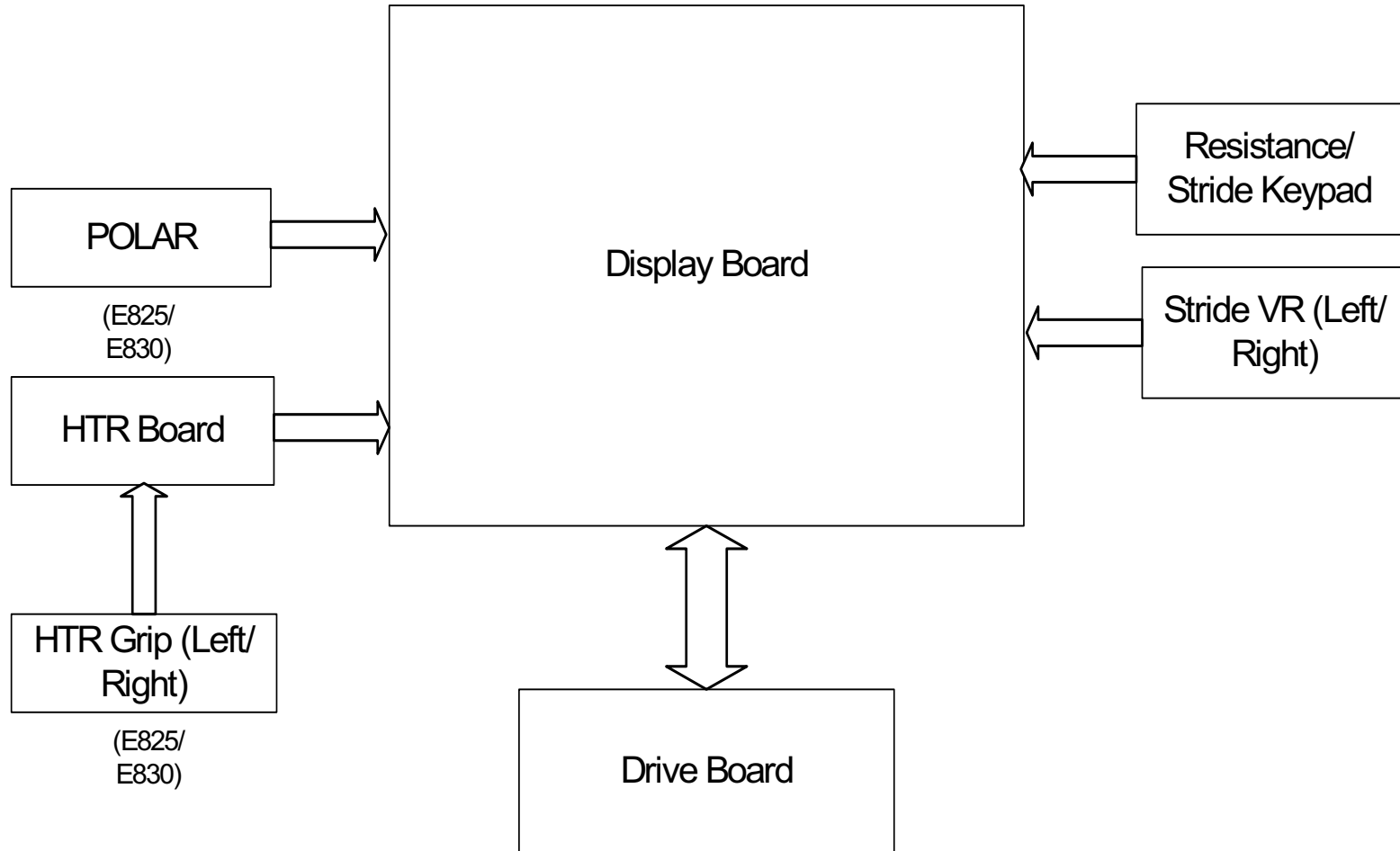
1. E821/E825/E830 Display Board Cable Connection Block Diagram



2. E821/E825/E830 Drive Board Cable Connection Block Diagram



1. E821/E825/E830 Display Board Wire Connections



2. E821/E825/E830 Display Board Component Placement

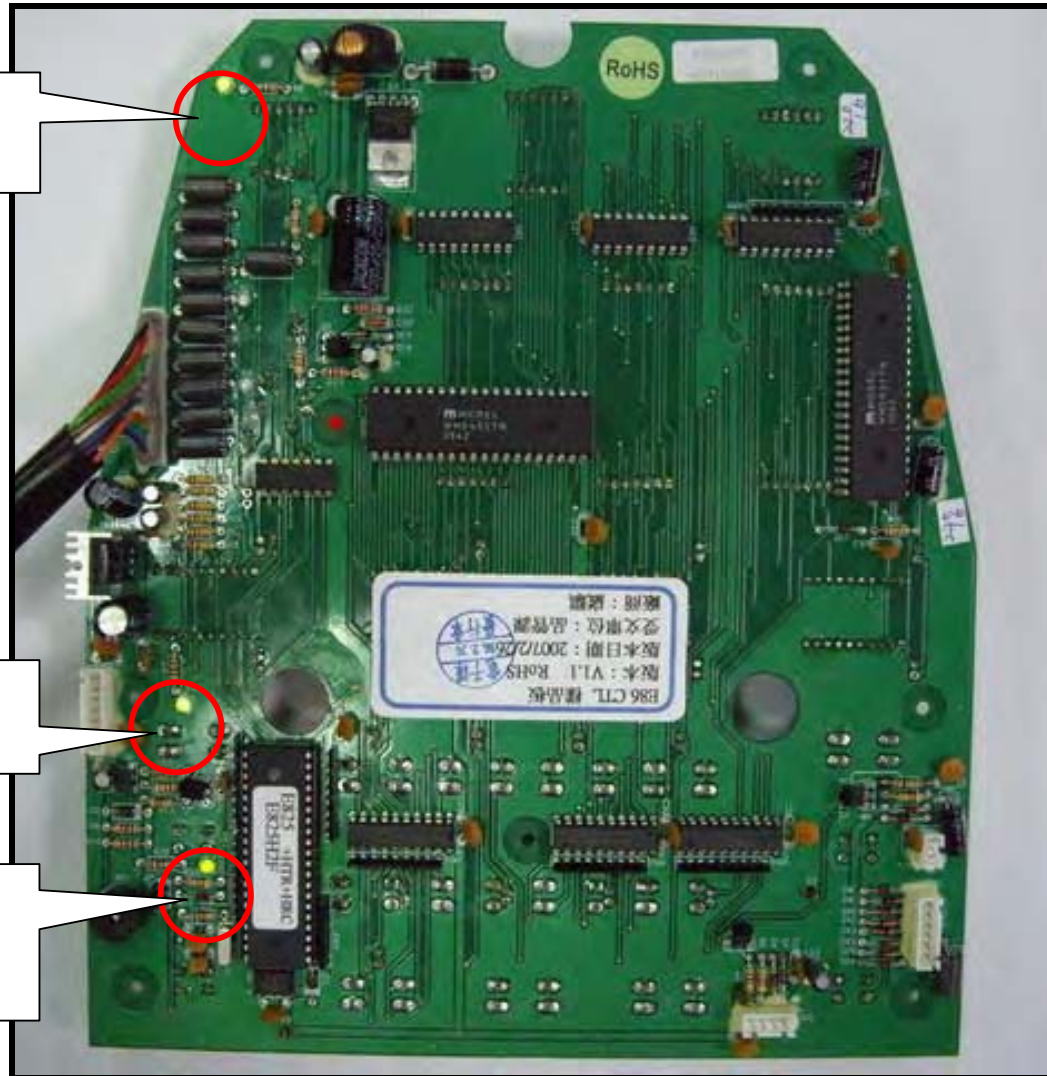


3. E821/E825/E830 Display Indicator LEDs

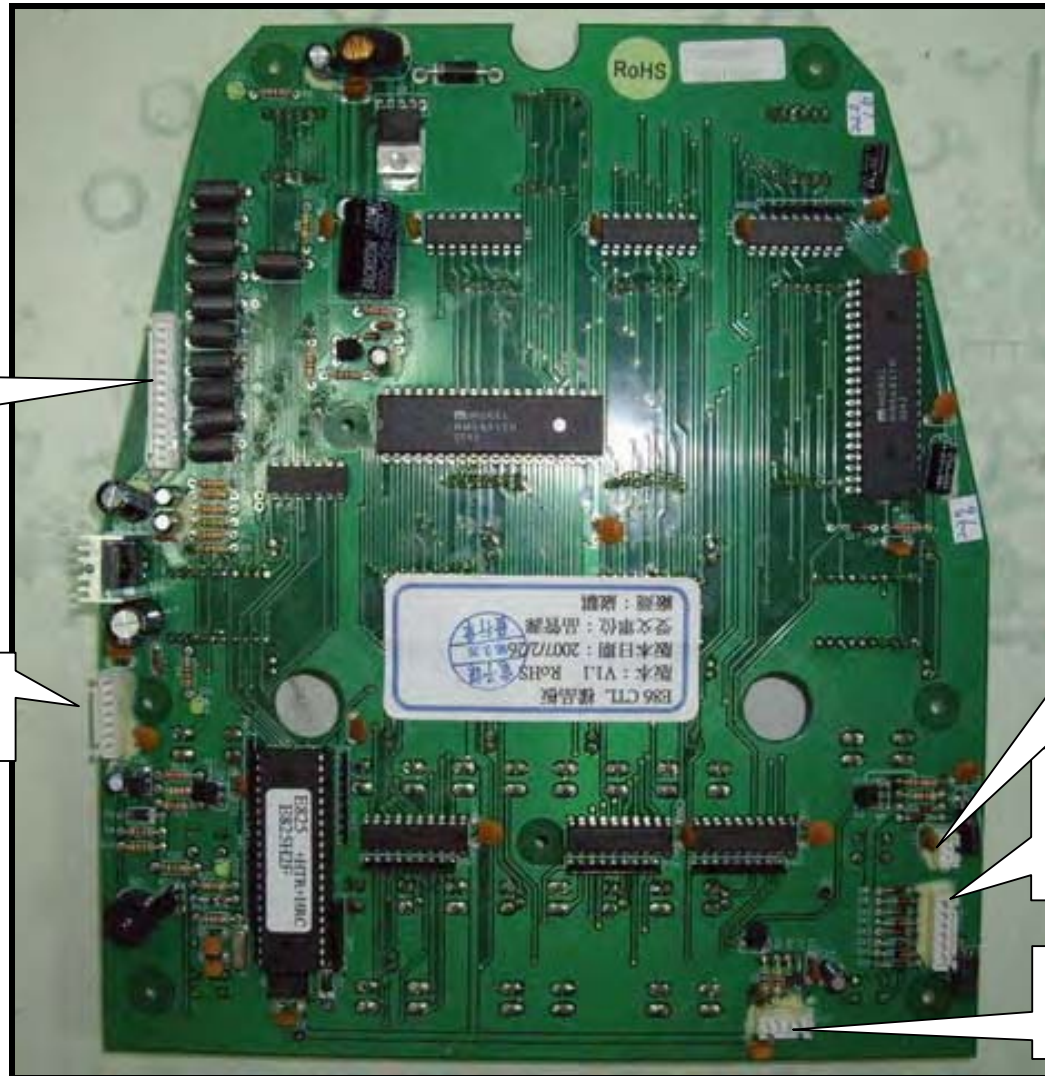
LED2 5 VDC Indicator
→ Lit = 5 VDC

LED1 POWER Indicator
→ Lit = Power Voltage

LED27 NC Indicator
→ Not lit = Program
Malfunction



4. E821/E825/E830 Display Cable Connections



CON1
→ To drive board

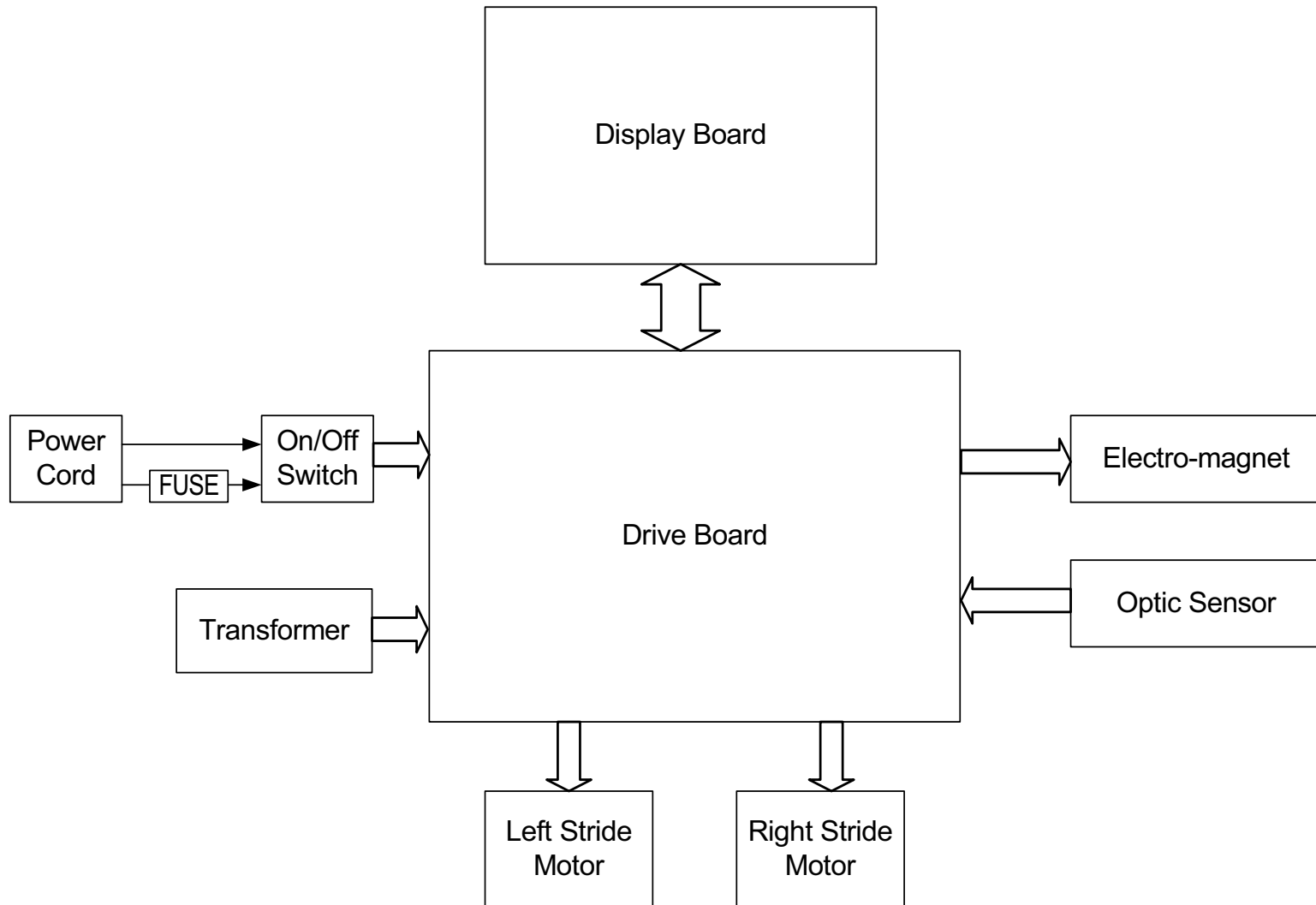
CON3
→ To HRC board

CON5
→ To stride VR (L&R)

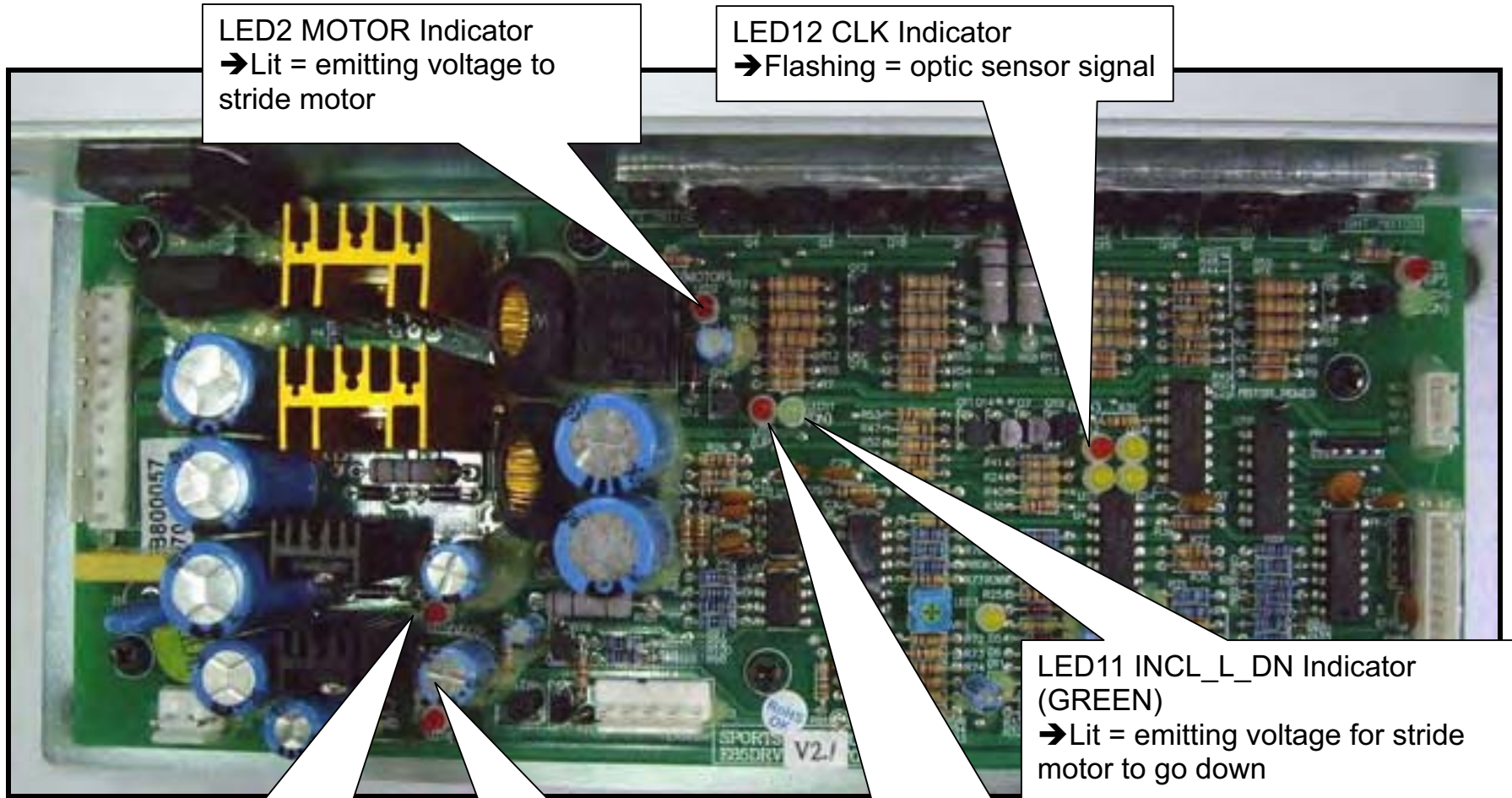
CON4
→ To resistance & stride keys

CON2
→ To HTR board

1. E821/E825/E830 Drive Board Operation Flow Chart



2. E821/E825/E830 Drive Board Indicator LED Placement and Definitions



LED2 MOTOR Indicator
→ Lit = emitting voltage to stride motor

LED12 CLK Indicator
→ Flashing = optic sensor signal

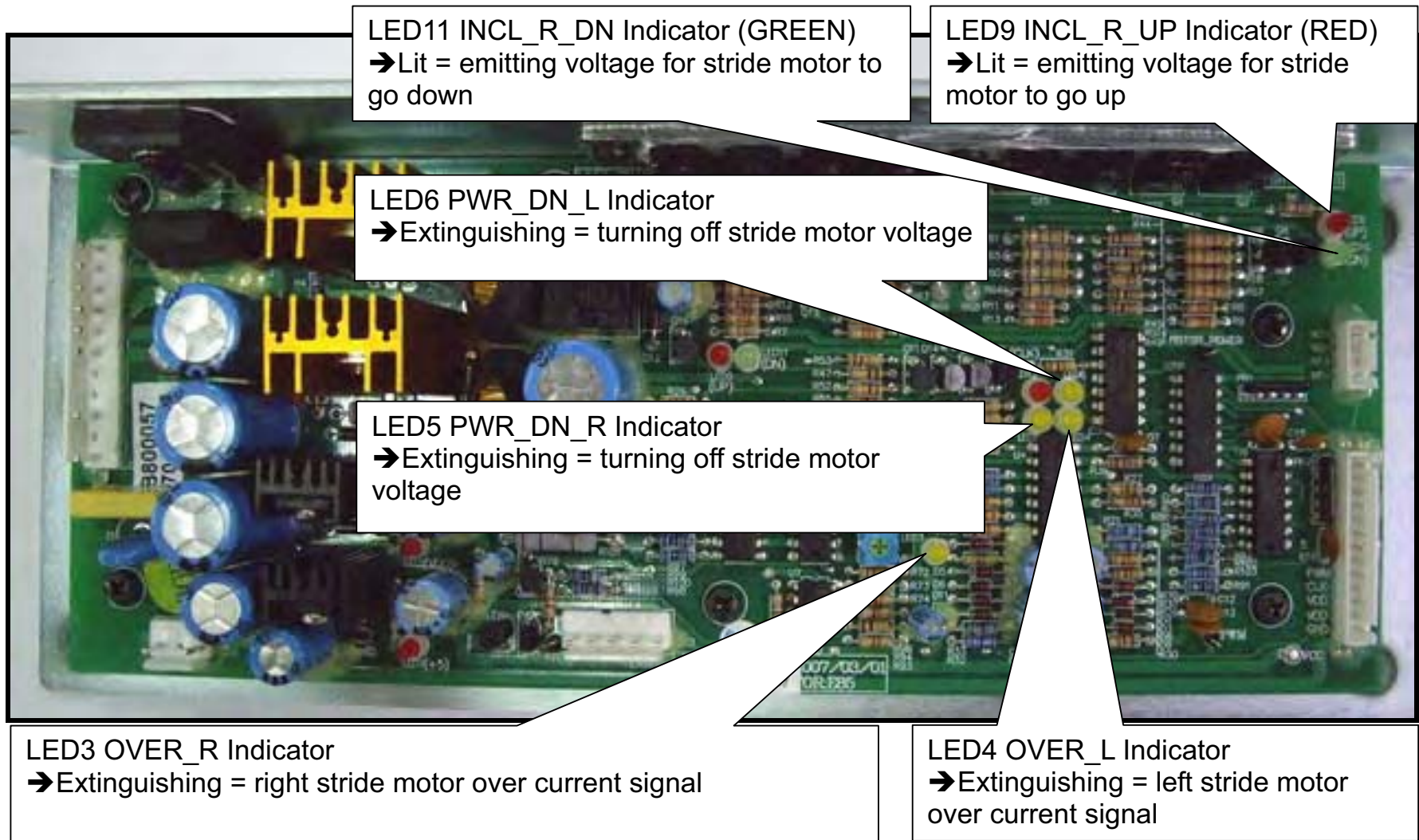
LED11 INCL_L_DN Indicator (GREEN)
→ Lit = emitting voltage for stride motor to go down

LED1 VDD Indicator
→ Lit = emitting voltage to electro-magnet

LED7 VCC Indicator
→ Lit = power source voltage

LED9 INCL_L_UP Indicator (RED)
→ Lit = emitting voltage for stride motor to go up

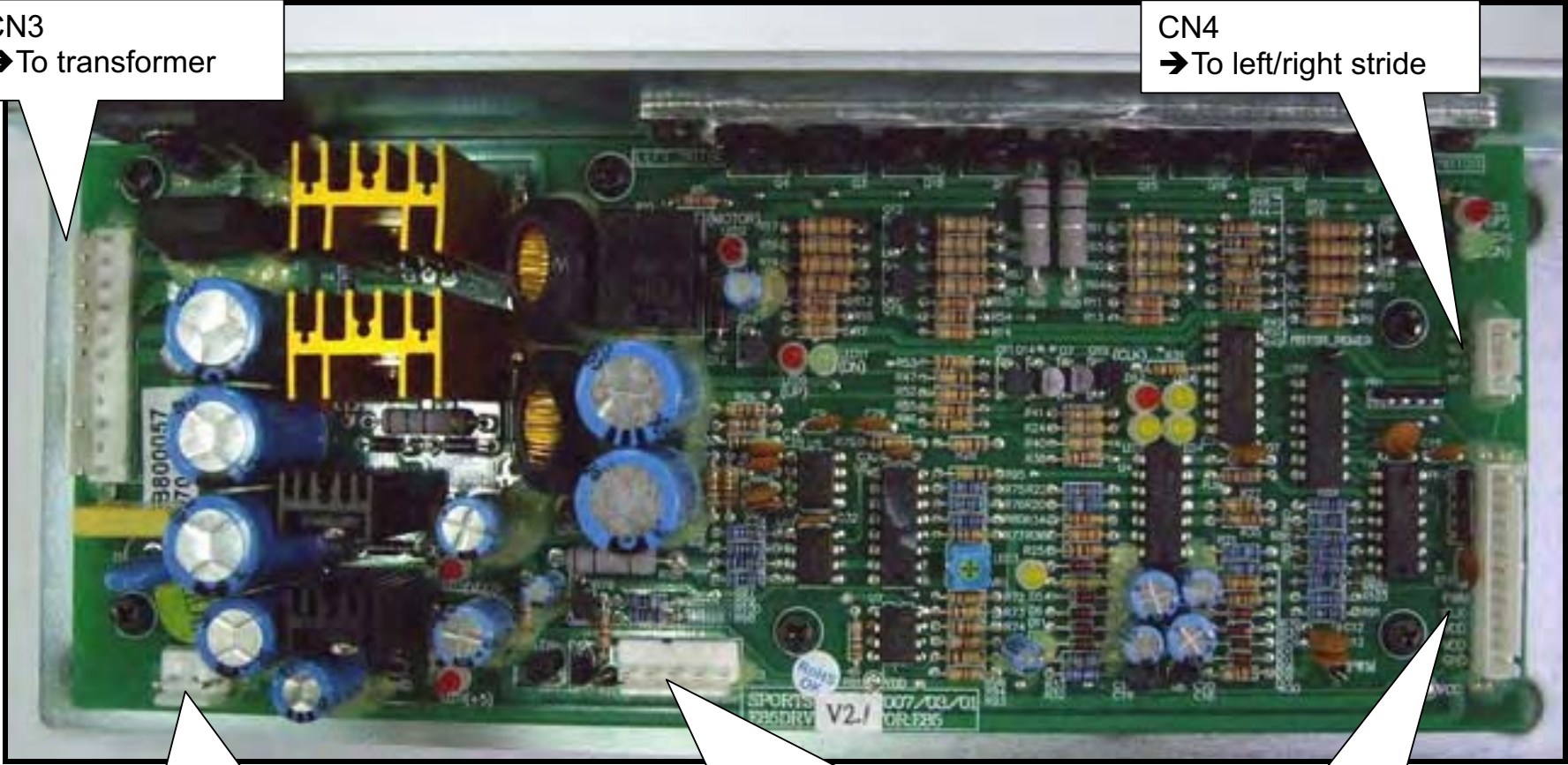
3. E821/E825/E830 Drive Board Indicator LED Placement and Definitions



4. E821/E825/E830 Drive Board Wire Connection Placement and Definitions

CN3
→ To transformer

CN4
→ To left/right stride



CN2
→ To on/off switch

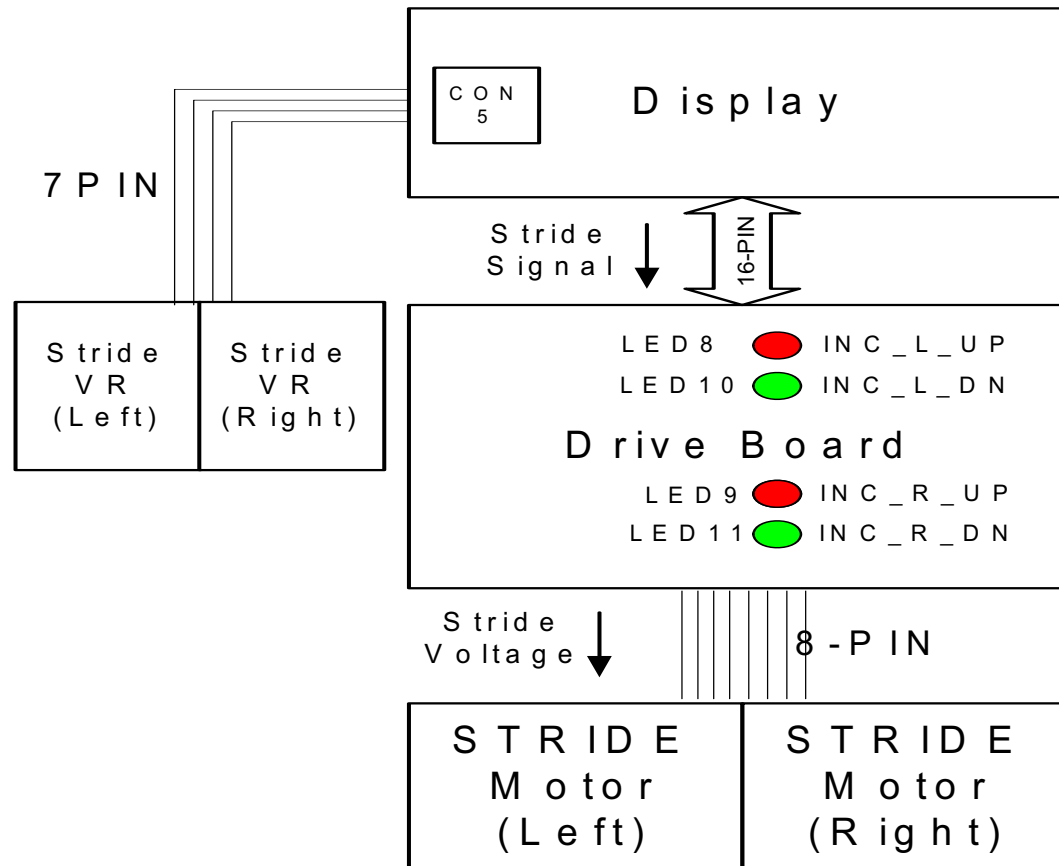
CN3
→ To electro-magnet and optic sensor

CN5
→ To display board

E821/E825/E830 Error Message: ERR 7

- 1. Definition:** (1) The display CPU has not read the STRIDE VR1, VR2 voltage value.
(2) Stride motor VR1, VR2 voltage exceeds the range of 0.5 to 4.5 VDC.

2. Block Diagram



3. Operation

Order	Part	Explanation
1	Left/Right Stride Motor	1. STRIDE motor operates up or down.
2	8-PIN Cable	1. Voltage travels via the cable to the stride motor.
3	Drive Board	1. Provides 22 VDC to the stride motors.
4	16-PIN Cable	1. STRIDE setting travels the cable to the drive board. 2. Drive board M1_P, M2_P (VR) travels to the display board.
5	Left/Right Stride VR	1. STRIDE motor movement changes the VR signal.
6	7-PIN Cable	1. VR signal travels the cable to the display board.
7	Display Board	1. After turning on the unit, display CPU reads the stride VR M1_P, M2_P value. 2. If the VR value is not read, "ERR7" appears for two seconds.

4 Troubleshooting

Press the Quick Start key or start exercising,

- (1) If the right stride motor VR signal is not read or exceeds the range, "ERR-7, PLEASE CHECK STRIDE 1" appears.
- (2) If the left stride motor VR signal is not read or exceeds the range, "ERR-7, PLEASE CHECK STRIDE 2" appears.
- (3) If both stride motor VR signals are not read or exceed range, "ERR-7, PLEASE CHECK STRIDE 1&2" appears.

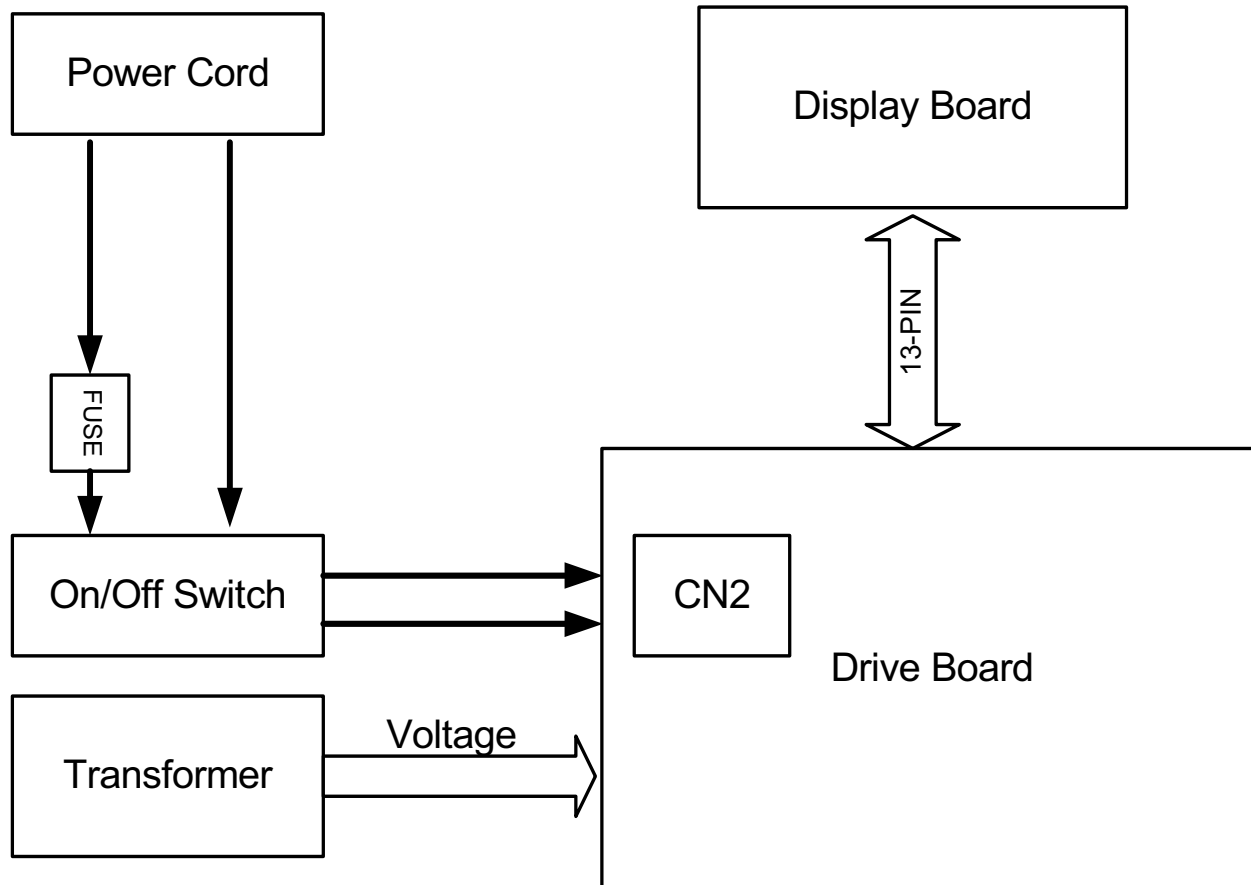
5. Troubleshooting

Order	Part	Troubleshooting
1	Left/Right Stride Motor	<ol style="list-style-type: none"> 1. When drive board LED8, LED10 lights but the left stride motor does not operate, inspect the left stride motor. When drive board LED9, LED11 lights and the right stride motor does not operate, inspect the right stride motor. 2. If not as above, inspect the VR cables for an electrical short or open. 3. Replace the stride motor as a test.
2	8-PIN Cable	<ol style="list-style-type: none"> 1. Inspect whether the cable is connected properly.
3	Drive Board	<ol style="list-style-type: none"> 1. Inspect drive board CN4, CN5 cable connection. 2. Replace the drive board as a test.
4	16-PIN Cable	<ol style="list-style-type: none"> 1. Inspect the cable connection.
5	Left/Right Stride Motor VRs	<ol style="list-style-type: none"> 1. Inspect the VR cable connection. 2. Inspect whether VR1 or VR2 voltage is within the range of 0.6-4.45 VDC. 3. Replace the stride VR as a test.
6	7-PIN Cable	<ol style="list-style-type: none"> 1. The VR signal travels the cable to the drive board.
7	Display Board	<ol style="list-style-type: none"> 1. Inspect display board CON1, CN5 cable connections. 2. Inspect whether display board U4 program IC is inserted properly. Replace as a test. 3. Replace the display as a test.

E821/E825/E830 Error Message: Unit Does Not Turn On

1. Circumstance of Malfunction: 1. Turn on unit on/off switch. Display does not beep. Display shows no reaction.

2. Block Diagram



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3. Operation

Step	Part	Explanation
1	Power Cord	1. The power cord provides power from the wall outlet.
2	Fuse and Fuse Holder	1. The fuse protects the drive board. When current is too high, the fuse burns, making an electrical open. Unit operation ends.
3	On/Off Switch	1. When the on/off switch is pressed to "0", the drive board receives no power and cannot operate. 2. When the on/off switch is pressed to "1", power is provided via AC1, AC2 to the drive board.
4	Transformer	1. The transformer provides power to components on the drive board.
5	Drive Board	1. After stabilizing power from the transformer, the drive board provides VBB and VCC power.
6	13-PIN Cable	1. Drive board VBB voltage travels to the display board.
7	Display Board	1. VBB voltage is stabilized to become VCC voltage. 2. Once the display has VCC voltage, the display operates.

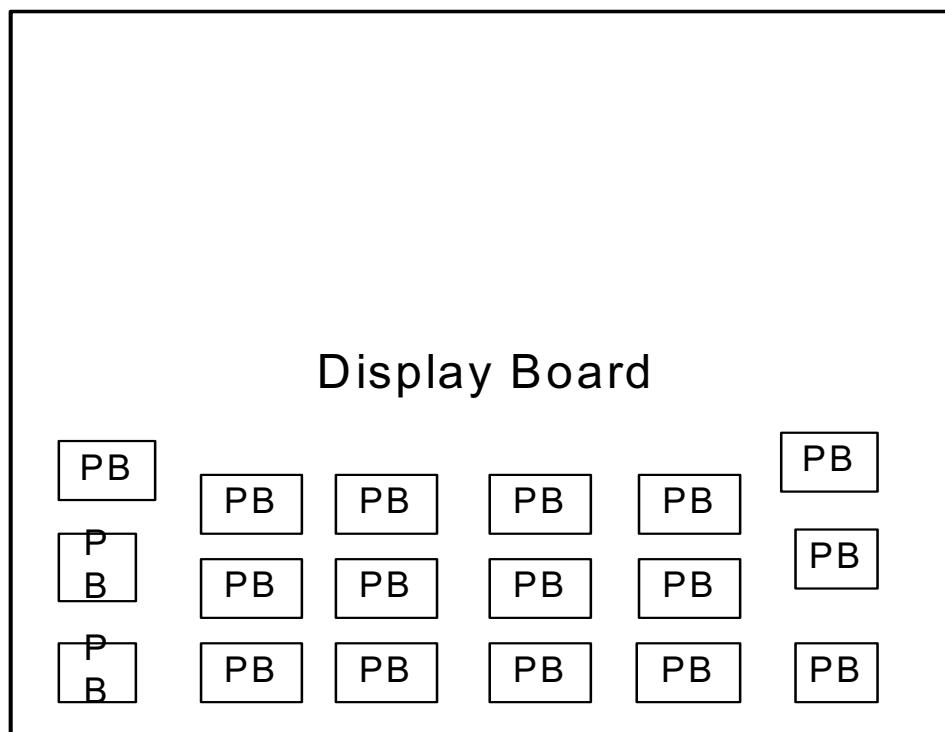
4. Troubleshooting

Order	Part	Troubleshooting
1	Power Cord Plug	1. Inspect whether the power cord is plugged in properly.
2	Fuse and Fuse Holder	1. Inspect the fuse holder wire connections. 2. Inspect the householder spring connection. 3. Inspect the fuse.
3	On/Off Switch	1. When the on/off switch is set to "1", does it light? 2. If not, inspect the cord and EMI filter wire connections. 3. Replace the on/off switch.
4	Power Cord Wire Connections	1. Inspect power cord wire connections.
5	Transformer	1. Inspect the transformer wire connections. 2. Inspect the transformer output voltage.
6	Drive Board	1. Inspect whether drive board LED2, LED7 indicators light. 2. If not, inspect CON2 cable connections. 3. Inspect transformer CON1 connections.
7	13-PIN Cable	1. Inspect the cable and its connections.
8	Display Board	1. Inspect CON1 cable connections. 2. Inspect whether indicator LED1 lights. If not, U2 SK8051S is malfunctioning. 2. Inspect whether indicator LED2 lights. If not, U3 SK8051S is malfunctioning. 3. If LED1 lights, re-insert U6 program IC.

E821/E825/E830 Error Message: Key Does Not Operate

- 1. Malfunction:** (1) Turn on unit. Do not press any keys. Keys operate as if they had been pressed.
(2) Press keys. Keys do not operate. There's no reaction whatsoever.

2. Block Diagram



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3. Operation

Order	Part	Explanation
1	Display Board	1. Display CPU reads the key signal. 2. Display operates.

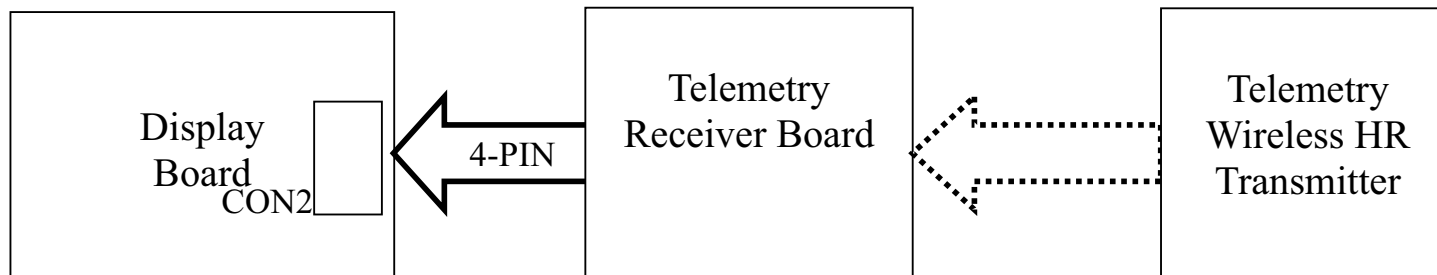
4. Troubleshooting

Step	Part	Troubleshooting
1	Display Board	1. Inspect the key function of every PB point. 2. Replace the display as a test.

E821/E825/E830 Error Message: Telemetry Heart Rate Malfunction

1. **Circumstance of Malfunction:** (1) No heart rate appears.
(2) Heart rate value differs from actual heart rate.

2. Block Diagram



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3. Operation

Order	Part	Operation
1	Telemetry HR Transmitter	1. Telemetry receiver detects heart rate and transmits the heart rate signal to the receiver board.
2	Telemetry HR Receiver Board	1. The telemetry receiver board receives the heart rate signal from the transmitter.
3	3-PIN Cable	1. 5 VDC travels from the display to the receiver board. 2. Telemetry heart rate signal travels from the receiver board to the display board.
4	Display Board	1. The CPU detects the heart rate signal. 2. Display shows heart rate value in the heart rate window.

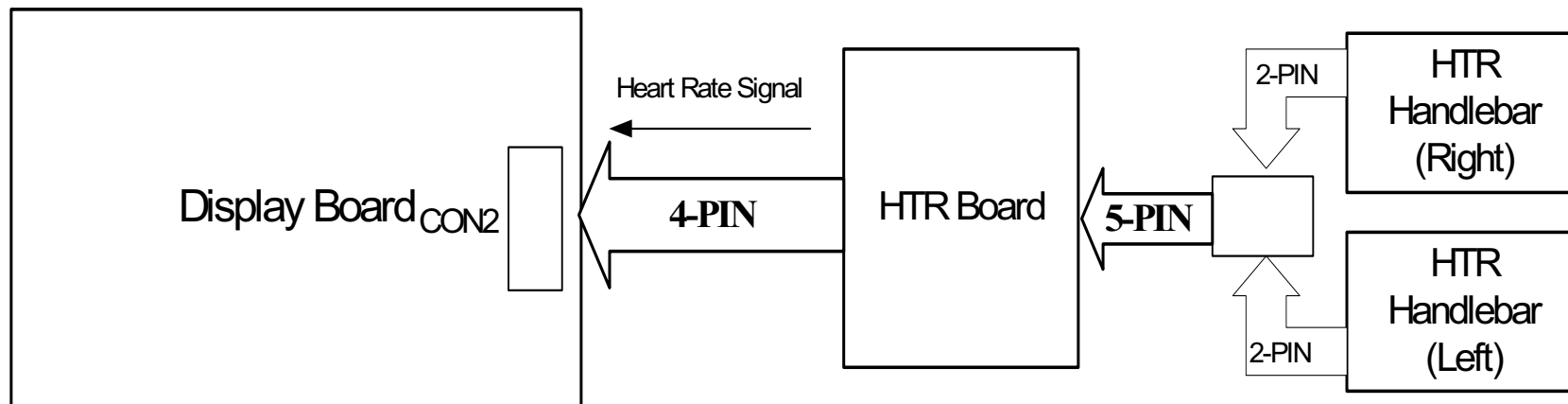
4. Troubleshooting

Order	Part	Troubleshooting
1	Telemetry HR Transmitter	1. Inspect whether the telemetry transmitter battery has less than 3 VDC. 2. Replace the telemetry transmitter as a test.
2	Telemetry HR Receiver Board	1. Inspect placement of the telemetry receiver board. 2. Inspect whether component connections for cold or false solder. 3. Replace the telemetry receiver board as a test.
3	3-PIN Cable	1. Inspect the cable connection.
4	Display Board	1. Inspect CON3 connection. 2. Inspect whether IC U4 on the display is connected properly. 3. Replace the display as a test.

E825/E830 Error Message: HTR Heart Rate Malfunction

- 1. Circumstance of Malfunction:** (1) Place both hands on the HTR contact pads.
No heart rate value appears on the display.
(2) Do not touch HTR contact pads. Display shows heart rate value.

2. Block Diagram



3. Operation

Order	Part	Explanation
1	HTR Handlebar	1. HTR handlebar contact pads detect the human heart rate.
2	2-PIN Cable	1. Left/right handlebar HTR signals travel toward the display board.
3	5-PIN Cable	1. 2-pin cables connect to the 5-pin cable, which connects to the HTR board.
4	HTR Board	1. The HTR board reads signals from the HTR contacts. 2. The HTR board transmits HR signals to the display board.
5	4-PIN Cable	1. The HTR board signals travel to the display. 2. VCC power travels from the display to the HTR board.
6	Display Board	1. Display board shows heart rate value.

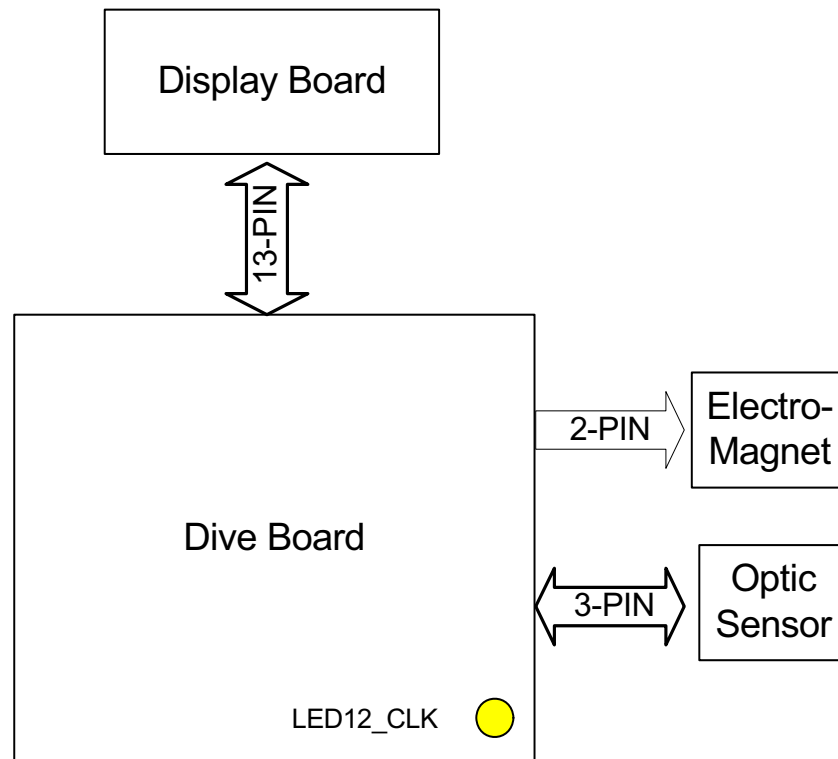
4. Troubleshooting

Order	Part	Troubleshooting
1	HTR Handlebars	1. Clean HTR contact pads on the handlebars. 2. Test HTR cables.
2	2-PIN Cable	1. Inspect cables and their connections.
3	5-PIN Cable	1. Inspect cables and their connections.
4	HTR Board	1. Inspect 4-pin cable connections from the HTR board to the display board. 2. Replace the HTR board as a test.
5	4-PIN Cable	1. Inspect the cables and its connections.
6	Display Board	1. Inspect the display board CON2 cable connections. 2. Inspect the connection of U4 program IC on the display board. 3. Replace the display board as a test.

E821/E825/E830 Error Message: Resistance Malfunction

- 1. Circumstance of Malfunction:** (1) Turn on unit. Exercise. Press LEVEL ▲/▼ keys. Resistance is too high or too low.
(2) Turn on unit. Resistance is too high. Pedals won't move.

2. Block Diagram



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3. Operation

Order	Part	Explanation
1	Electro-magnet	1. In operation the electro-magnet produces magnetism, causing resistance on the flywheel.
2	2-PIN Cable	1. The drive board provides voltage to the electro-magnet.
3	Optic Sensor	1. During use, the optic sensor produces a CLK signal.
4	3-PIN Cable	1. Power from the drive board travels to the optic sensor. 2. The optic sensor CLK signal travels to the drive board.
5	Drive Board	1. The drive board deciphers and processes the CLK signal.
6	13-PIN Cable	1. The signal processed by the drive board travels to the display board. 2. The display LEVEL signal travels to the drive board.
7	Display Board	1. The display sets the LEVEL value. 2. The display compares the resistance signal from the drive board to the level setting.

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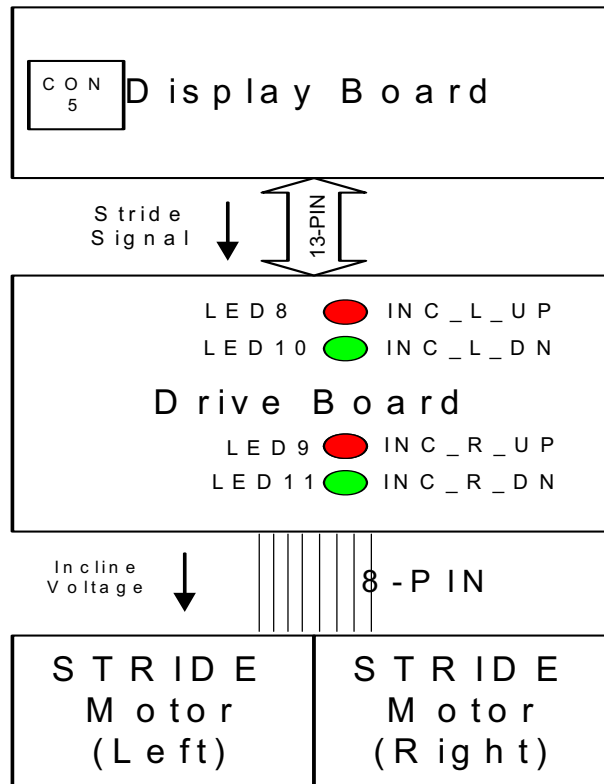
4. Troubleshooting

Order	Part	Troubleshooting
1	Electro-magnet	<ol style="list-style-type: none">1. Inspect whether there is resistance during operation.2. Inspect whether the electro-magnet is an electrical short or open.3. Replace the electro-magnet as a test.
2	2-PIN Cable	<ol style="list-style-type: none">1. Inspect the cable and its connections.
3	Optic Sensor	<ol style="list-style-type: none">1. Inspect whether the CLK indicator lights during operation.2. Inspect the optic sensor cable and its connections.3. Replace the optic sensor as a test.
4	3-PIN Cable	<ol style="list-style-type: none">1. Inspect the cable and its connections.
5	Drive Board	<ol style="list-style-type: none">1. Inspect drive board CN2, CN3 cable connections.2. Inspect whether drive board F1 2A fuse is blown.3. Inspect whether drive board U8 program IC is inserted properly.4. Replace the drive board as a test.
6	13-PIN Cable	<ol style="list-style-type: none">1. Inspect the cable and its connections.
7	Display Board	<ol style="list-style-type: none">1. Inspect the display board CN1 cable connections.2. Inspect the display U2 program IC. Replace as a test.3. Replace the display board as a test.

E821/E825/E830 Error Message: No Stride Operation

1. **Circumstance of Malfunction:** Press Stride ▲/▼ key. Stride length on the display changes. Stride length does not change.

2. Block Diagram



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3. Operation

Order	Part	Explanation
1	Stride Motor (Left/Right)	1. Stride motors operate up and down, changing the stride length. 2. Motor movement moves the VR, changing the VR output signal.
2	8-PIN Cable	1. 22 VDC travels the cable to the incline motor. 2. The VR signal travels to the drive board.
3	Drive Board	1. The drive board provides 22 VDC voltage to the stride motor. 2. The drive board transmits the VR signal to the display board.
4	13-PIN Cable	1. The VR command signal travels to the drive board.
5	Display Board	1. After turning on the unit, the display CPU reads the VR signal. 2. If the display does not read the VR signal, "ERR7" appears two seconds. 3. The display determines VR command signal.

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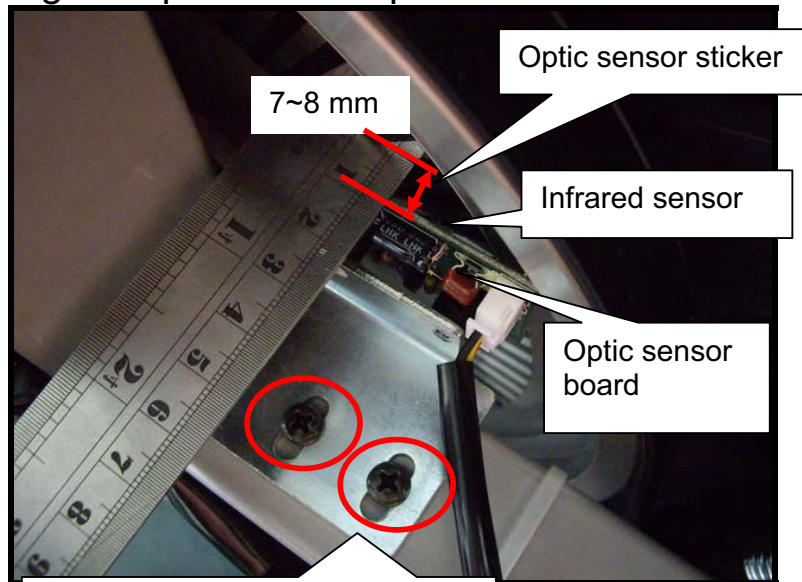
4. Troubleshooting

Order	Part	Troubleshooting
1	Stride Motor (Left/Right)	<ol style="list-style-type: none">1. Inspect the cables and their connections.2. Inspect whether the drive board provides voltage the stride motors after one presses stride keys.3. Replace the stride motor as a test.
2	8-PIN Cable	<ol style="list-style-type: none">1. Inspect the cable and its connections.
3	Drive Board	<ol style="list-style-type: none">1. Inspect CN3, CN4, CN5 cables and their connections.2. Inspect whether the drive board LED8(L_UP) 、 LED9(R_UP) 、 LED10(L_DN) 、 LED11(R_DN) light after stride keys are pressed.3. Replace the drive board as a test.
4	13-PIN Cable	<ol style="list-style-type: none">1. Inspect the cables and their connections.
5	Display Board	<ol style="list-style-type: none">1. Inspect display CN1 cable and its connections.2. Inspect whether U4 program IC is inserted properly. Replace as a test.3. Replace the display board as a test.

E821/E825/E830 Optic Sensor Test

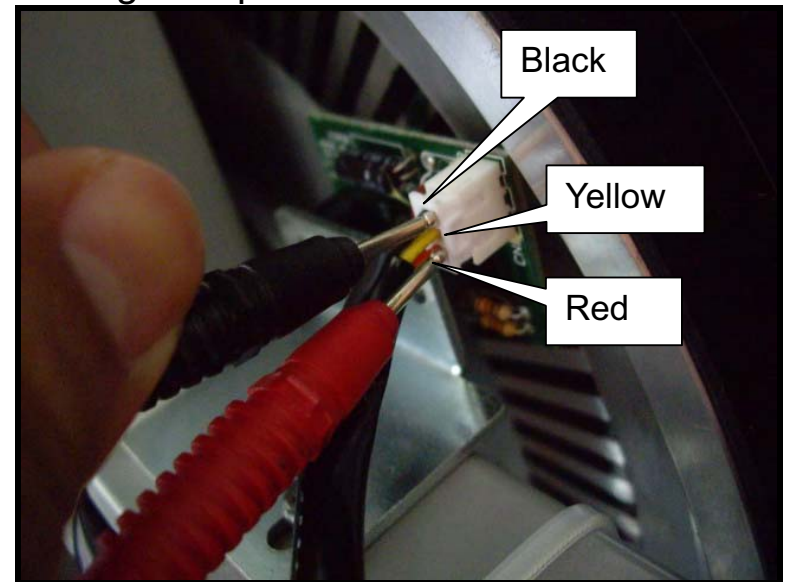
1. Test Configuration

Fig. 1. Optic sensor/optic sticker distance



Optic sensor bracket screws are in the middle of the bracket.

Fig. 2. Optic sensor wire test



2. Test Configuration

- (1) Optic sensor/optic sensor sticker distance test
Inspect the distance from the infrared optic sensor board to the optic sensor sticker.
Normal distance: 7-8mm. See illustration.
- (2) Optic sensor signal test
Put voltmeter to the 20 VDC setting. Probes as shown. Operate unit. See Fig. 2 for normal readings.
- (3) If there is no optic sensor signal when unit is in use, the STEPS window shows "0".

Fig. 2

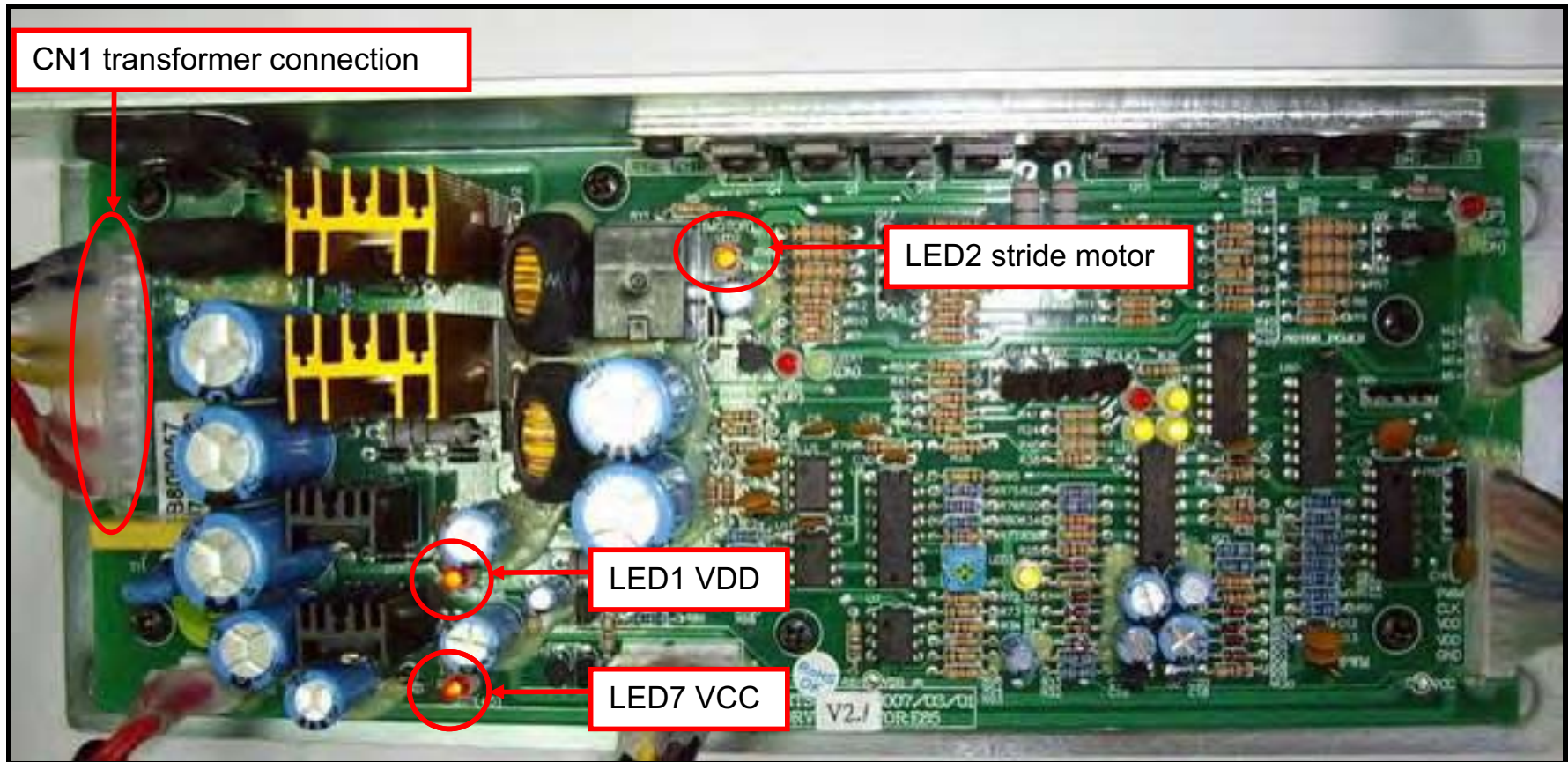
Wires	Normal Voltage
Red-Black	5V (VCC)
Yellow-Black	2.0-3.0V(CLK)

3. Troubleshooting

- (1) Inspect whether drive board is providing power to the optic sensor.
- (2) Replace the optic sensor as a test.
- (3) Replace the drive board as a test.

E821/E825/E830 Transformer Test at Drive Board

1. Test Configuration



2. Test Procedure

1. Connect the transformer to the drive board CN1 connector.
2. Set voltmeter to the 200 VAC (or 6000 VAC) setting.
3. Turn on power. Insert meter probes separately to contact both red wire (blue wire in 220V markets) pins as shown.
4. Test result: AC 110V (or 220V, in 220V markets).
5. Test secondary wires in the same way. Normal test results appear below.



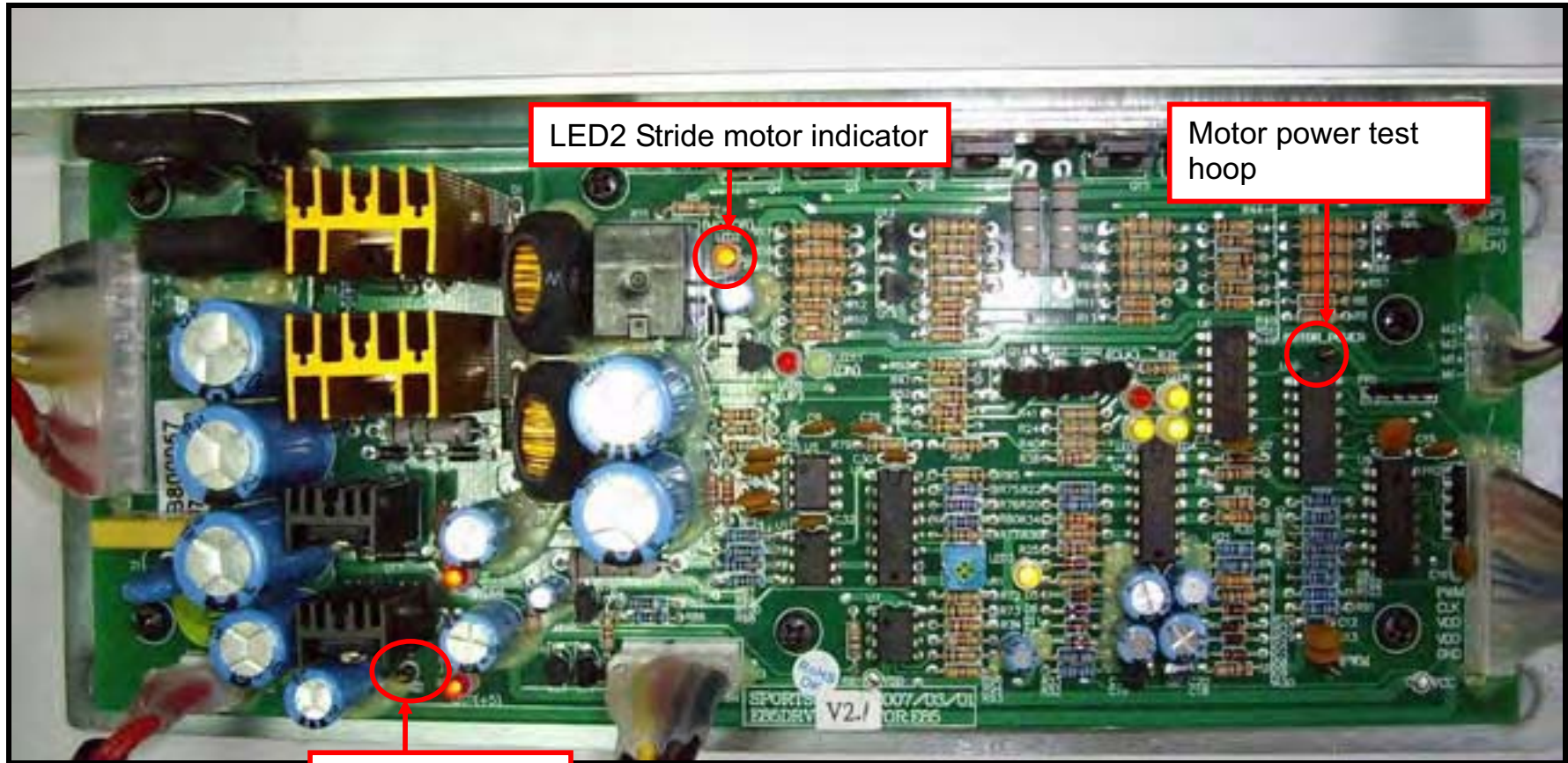
Transformer Connectors		Voltage (AC)
Red Probe	Black Probe	
RED/(BLUE)	RED/(BLUE)	110V (red) /220V (blue)
YELLOW	YELLOW	10~11V
WHITE	WHITE	23~24V
BLACK	BLACK	25~26V

3. Troubleshooting

1. If there is no voltage across the red (or blue) primary wires, inspect the unit fuse.
2. If there is no voltage across any same-color secondary wires, the transformer internal wires are broken. Replace the transformer.

E821/E825/E830 Drive Board Stride Motor Voltage Test

1. Test Configuration



Ground terminal

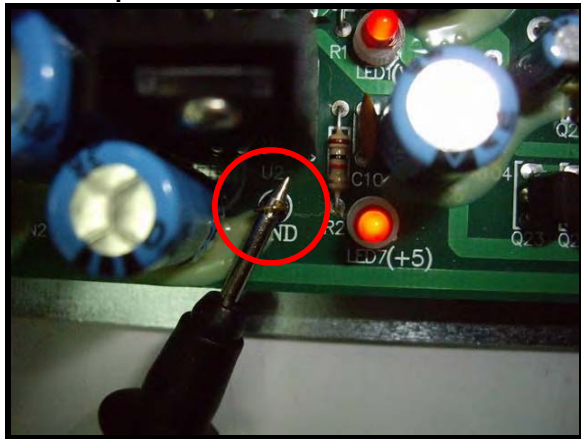
LED2 Stride motor indicator

Motor power test hoop

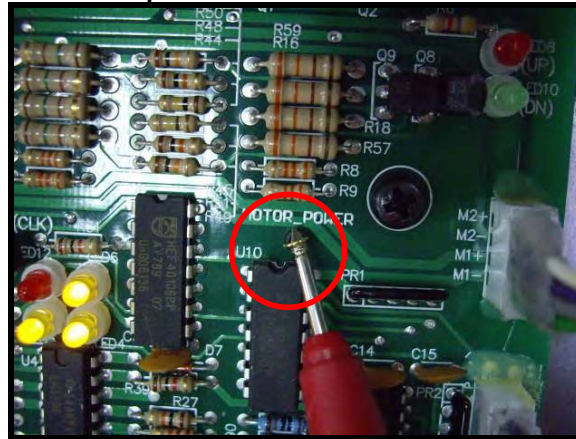
2. Test Procedure

- (1) Put voltmeter to the 200 VDC setting. Place meter probes separately on the MOTOR POWER and GND hoops on the drive board.
- (2) Normal reading: 22 ± 0.1 VDC.
- (3) If the drive board is not emitting any voltage, the stride motor will not operate.

Black probe on the GND test hoop



Red probe on MOTOR POWER hoop Voltage reading

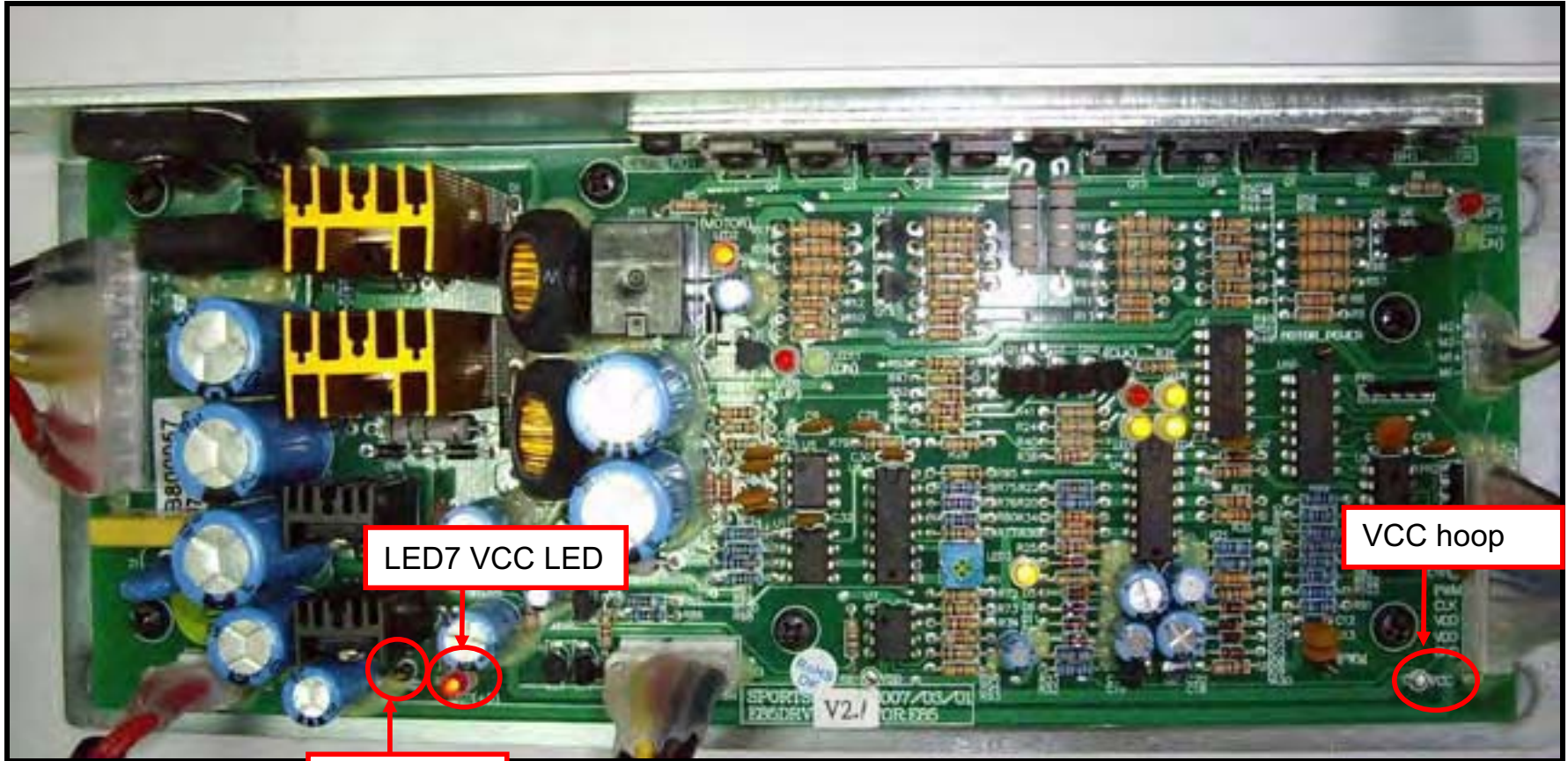


3. Troubleshooting

- (1) If the stride motor does not move, inspect the following:
 - a. Whether LED2 on the drive board is lit. If not, the drive board is not providing power for the motor.
 - b. Inspect AC1 and AC2 power cord and transformer wire connections.
 - c. Replace D1 UF5406 or U3 LM2578BT as a test.
 - d. Replace the drive board as a test.

E821/E825/E830 Drive Board VCC Voltage Test

1. Test Configuration



LED7 VCC LED

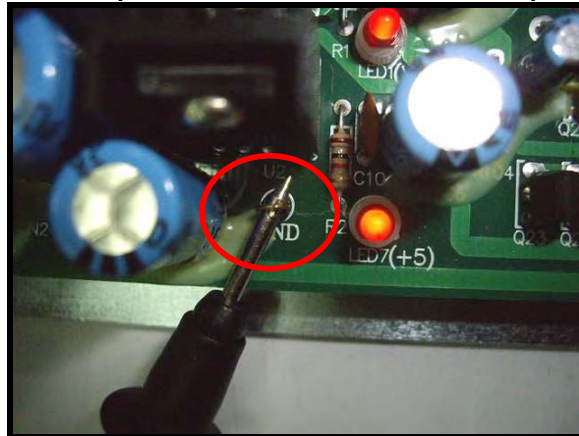
VCC hoop

GND hoop

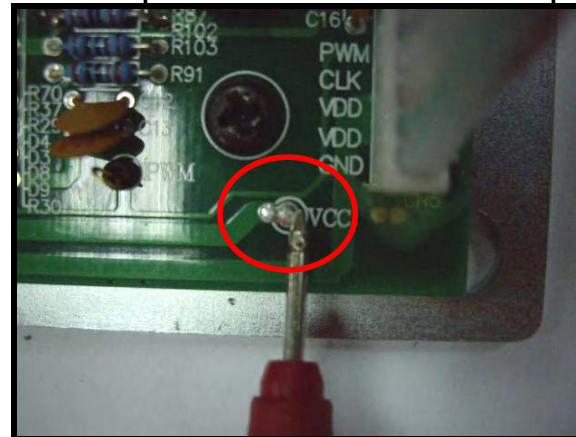
2. Test Procedure

- (1) Put the voltmeter at the 20 VDC setting. Place probes separately on the VCC and GND test hoops on the drive board.
- (2) Normal reading: 5 ± 0.1 VDC.

Black probe on GND test hoop



Red probe on VCC test hoop



Normal reading

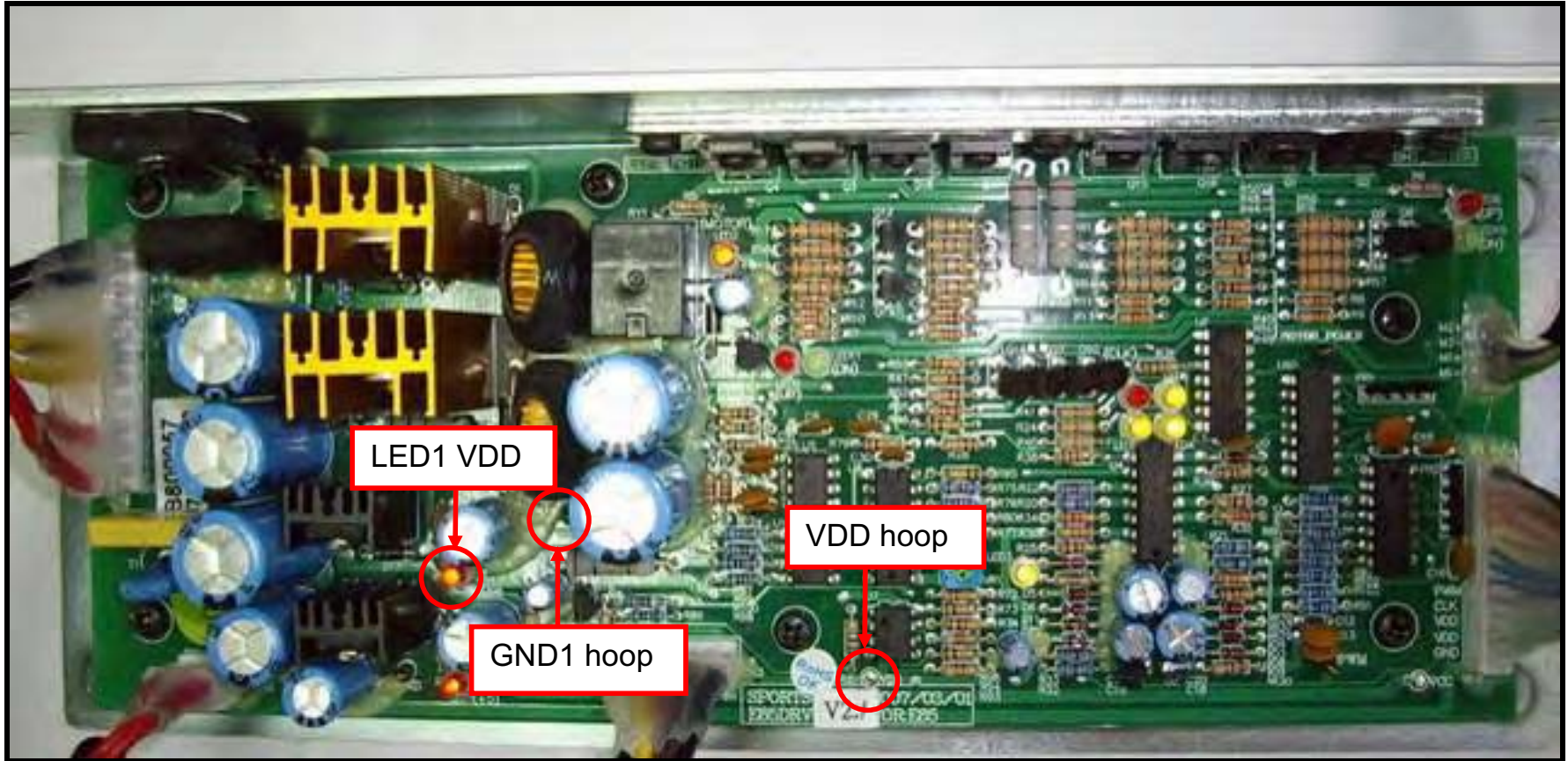


3. Troubleshooting

- (1) If the drive board LED7 VCC indicator does not light, inspect the following:
 - a. AC1, AC2, and the transformer wire connections on the drive board.
 - b. Replace U2 7805 or BR2 2W06M as a test.
 - c. Replace the drive board as a test.

E821/E825/E830 Drive Board VDD Voltage Test

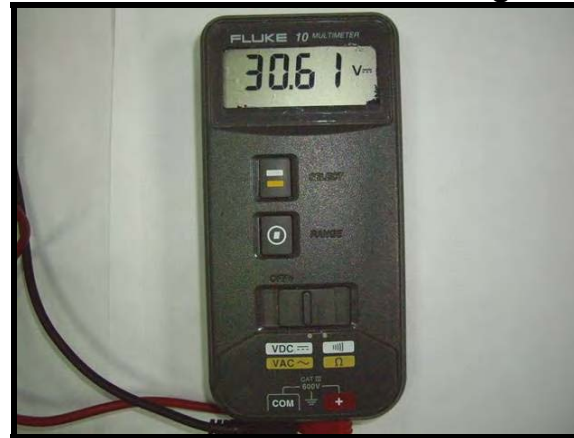
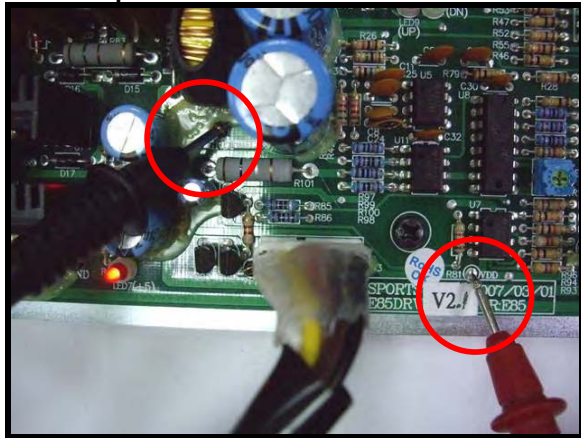
1. Test Configuration



2. Test Procedure

- (1) Put voltmeter to the 200 VDC setting. Place probes separately on VDD and GND1 hoops.
- (2) Normal reading: 30~31 VDC.

Black probe on GND1 terminal; Red probe on VDD. Normal reading is shown below.

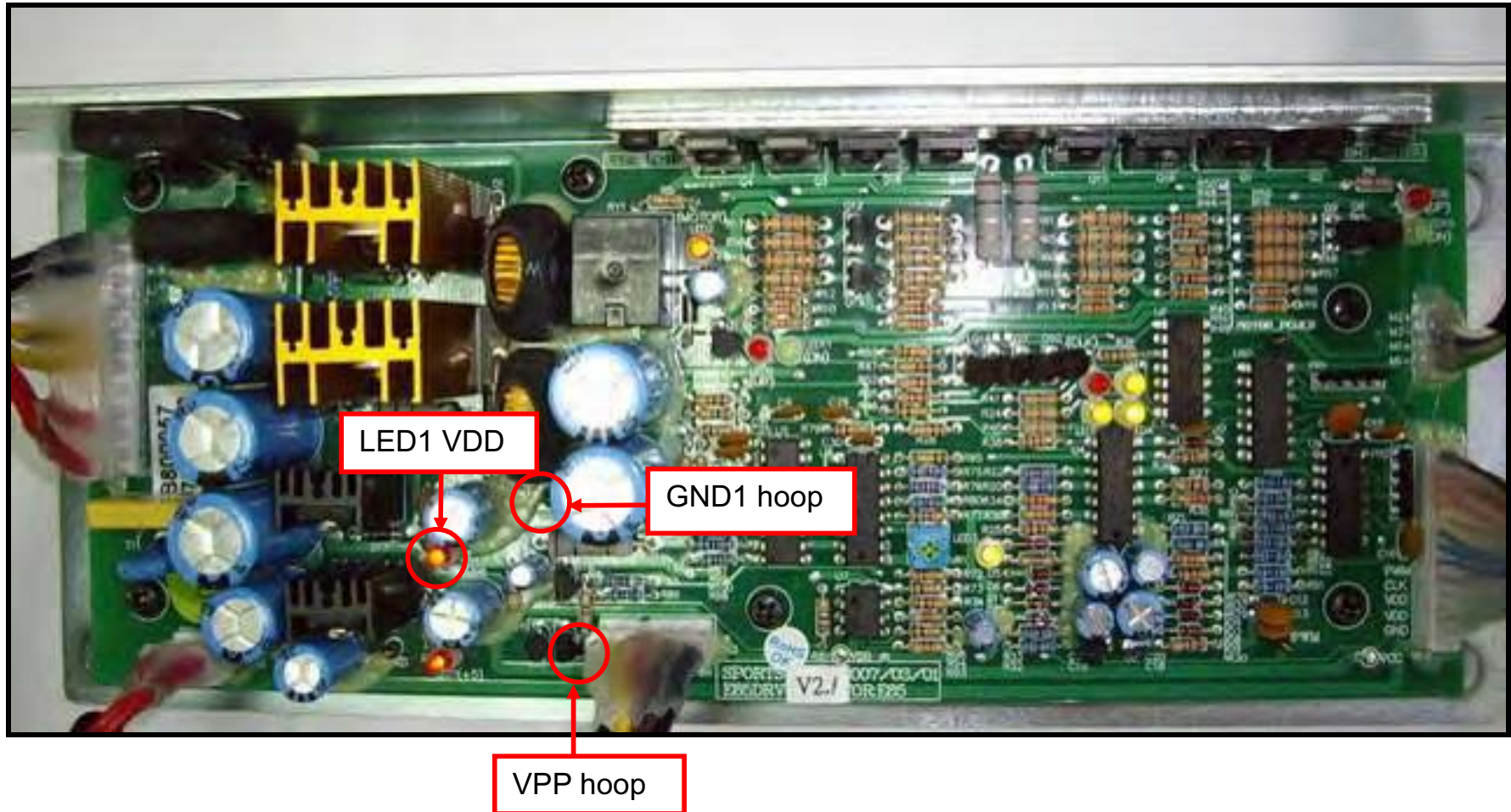


3. Troubleshooting

- (1) If there is no resistance, inspect the following:
 - a. Is LED1 on the drive board lit? If not, there is no voltage to the electro-magnet.
 - b. AC1, AC2, and the transformer wire connections to the drive board.
 - c. Replace BR1 KBU1006 as a test.
 - d. Replace the drive board as a test.

E821/E825/E830 Electro-Magnet Voltage Test at Drive Board

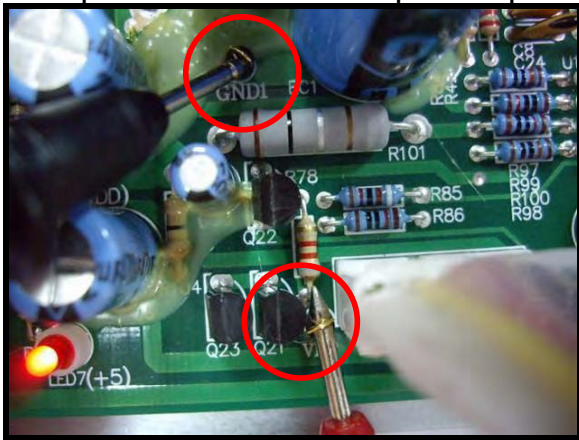
1. Test Configuration



2. Test Procedure

- (1) Put voltmeter to the 200 VDC setting. Place probes separately on VPP and GND1 hoops on the drive board.
- (2) Normal reading: 28 ± 0.1 VDC.

Block probe on GND1 hoop. Red probe on VPP hoop. Normal reading.

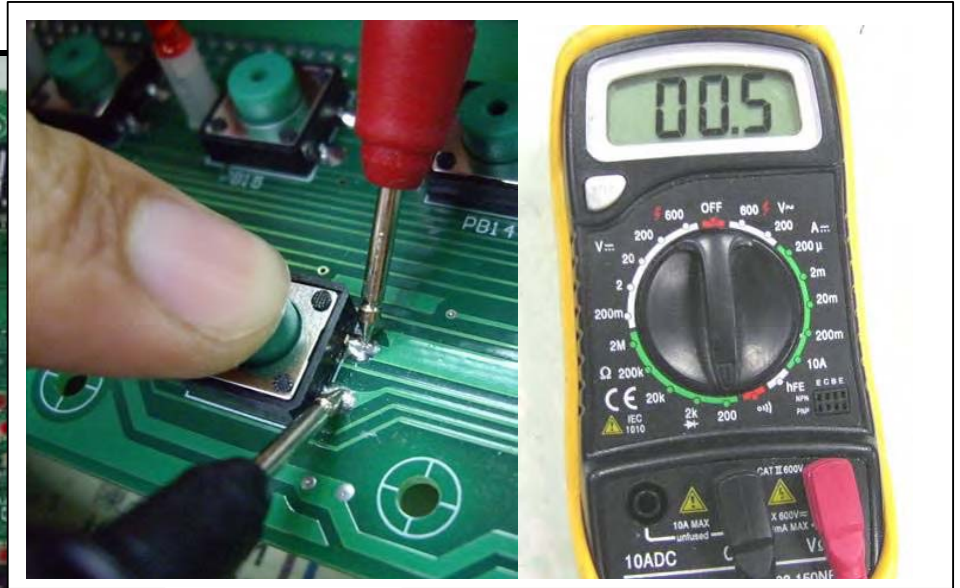
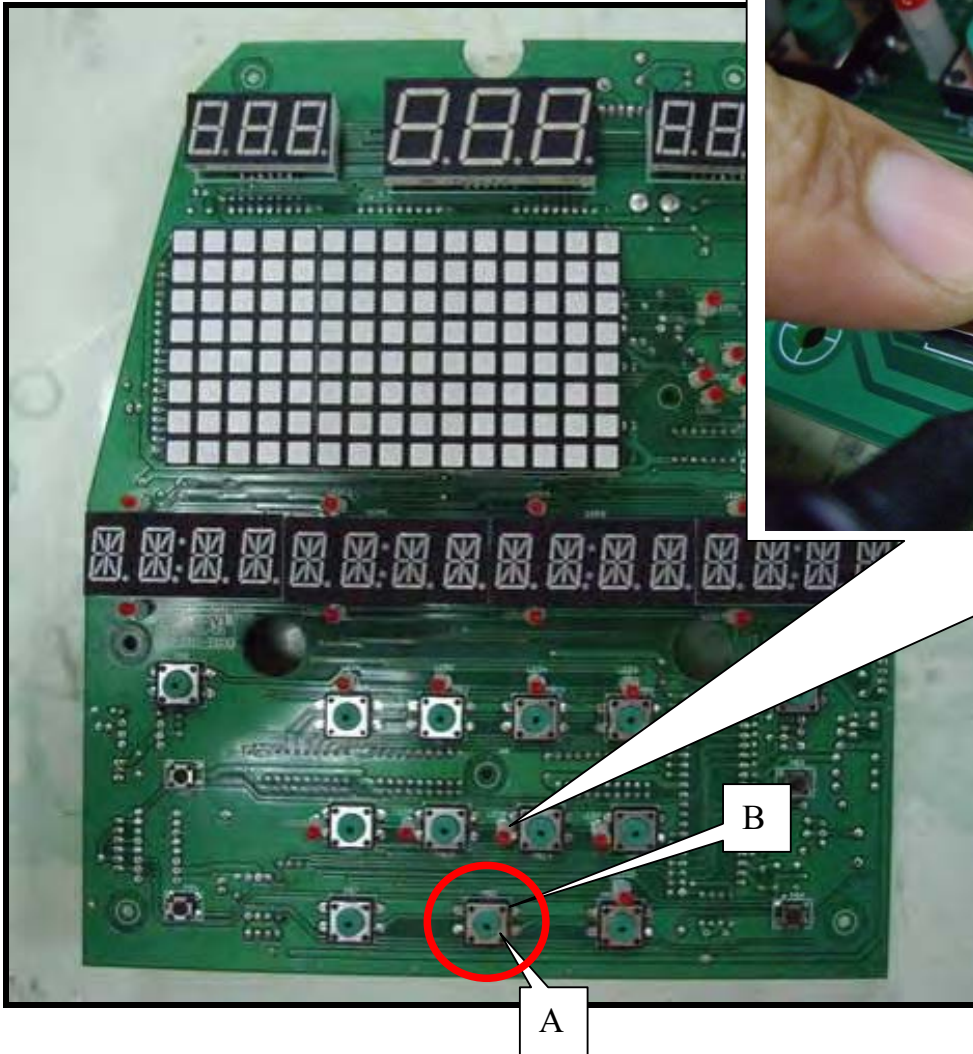


3. Troubleshooting

- (1) If there is no resistance, inspect the following:
 - a. Drive board LED1 is lit. If not, there is no voltage to the electro-magnet.
 - b. AC1, AC2, and the transformer wire connections at the drive board.
 - c. Replace D13 UF5406 or Q20 IRF9540 as a test.
 - d. Replace the drive board as a test.

Keypad Test

1. Test Configuration



2. Test Procedure

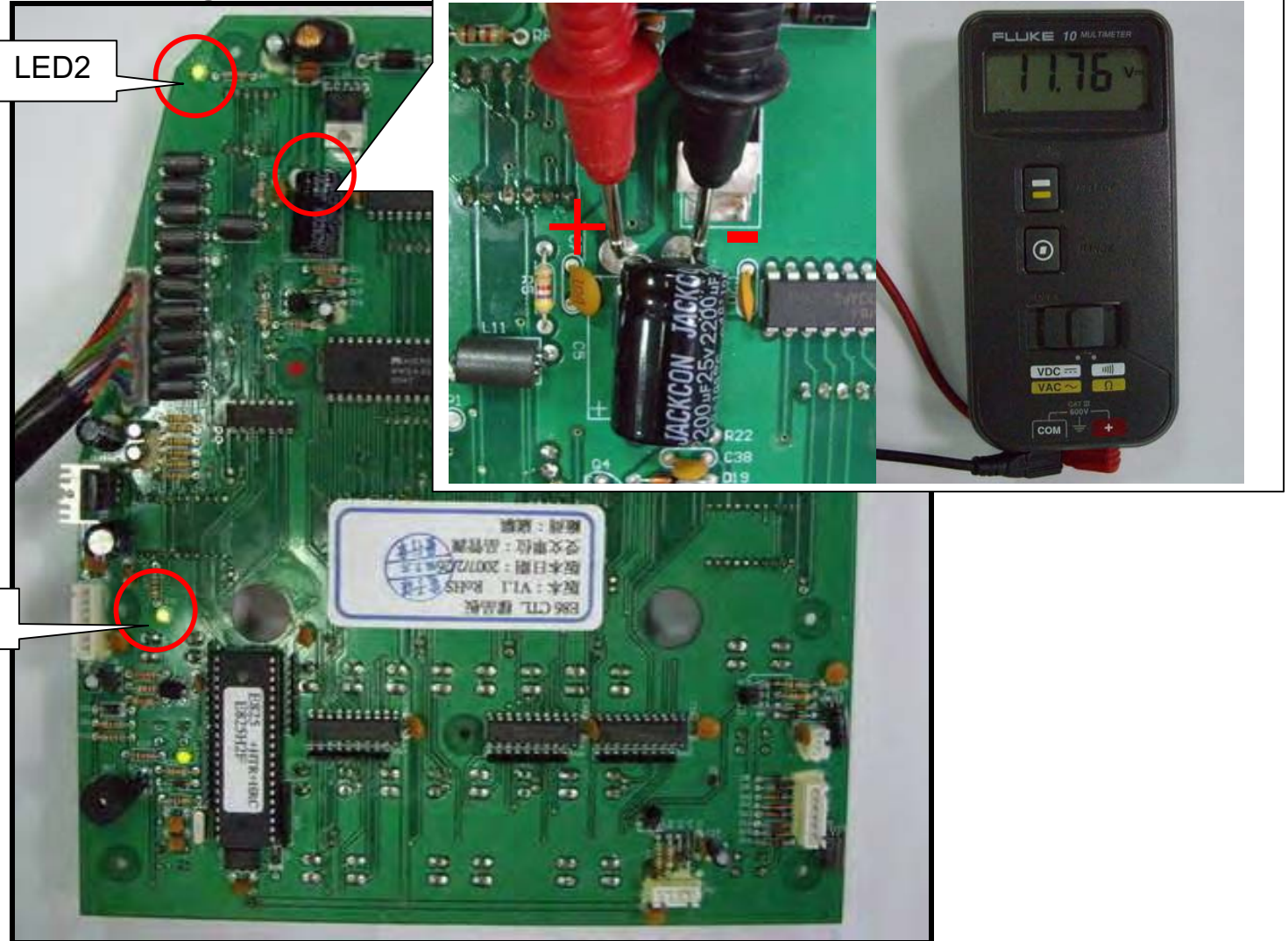
- (1) Put the voltmeter to the 200 ohm setting. Place probes separately on key switch points A and B.
- (2) Do not press any keys. Voltmeter shows no reaction: OL (open line).
- (3) Press a key. Voltmeter shows 0 ohm.

3. Circumstance of Malfunction

- (1) If the key is not pressed and the voltmeter shows 0 ohm, the key switch has a permanent electrical short. Replace it.
- (2) If the key is pressed and the voltmeter shows no reaction, the key switch circuit has a permanent electrical open. Replace it.

E821/E825/E830 VBB Voltage Test at the Display

1. Test Configuration



2. Test Procedure

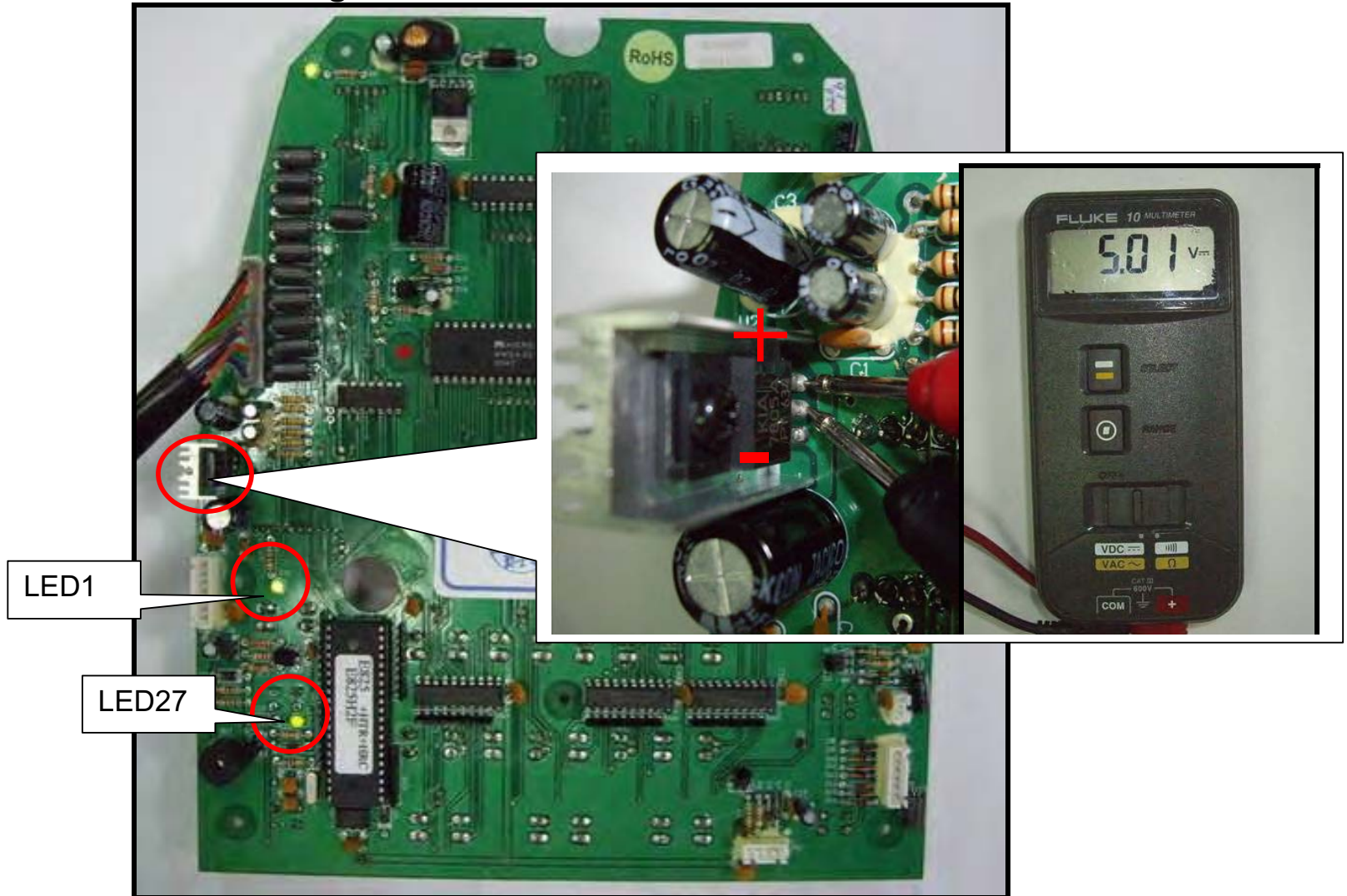
- (1) Turn on unit power. LED1 and LED2 on the display light up.
- (2) Put voltmeter to the 20 VDC or higher setting. Place probes as shown in the test configuration diagram.
- (3) Normal reading: 12 VDC \pm 0.3 VDC.

3. Troubleshooting

If LED1 and LED2 on the drum don't light (voltage test fails to show 12 VDC \pm 0.3 VDC) inspect the following:

- (1) Main data cable and its connections at the drive and display boards.
- (2) The condition of the main data cable.
- (3) Replace BR1 KBU1006 as a test.

E821/E825/E830 VCC Voltage Test at the Display 1. Test Configuration



2. Test Procedure

- (1) Turn on unit power. LED1 and LED27 on the display board light.
- (2) Put voltmeter to the 20 VDC setting. Place probes as shown.
- (3) Normal reading: 5 VDC \pm 0.2 VDC.
- (4) Display beeps once and LEDs light up.

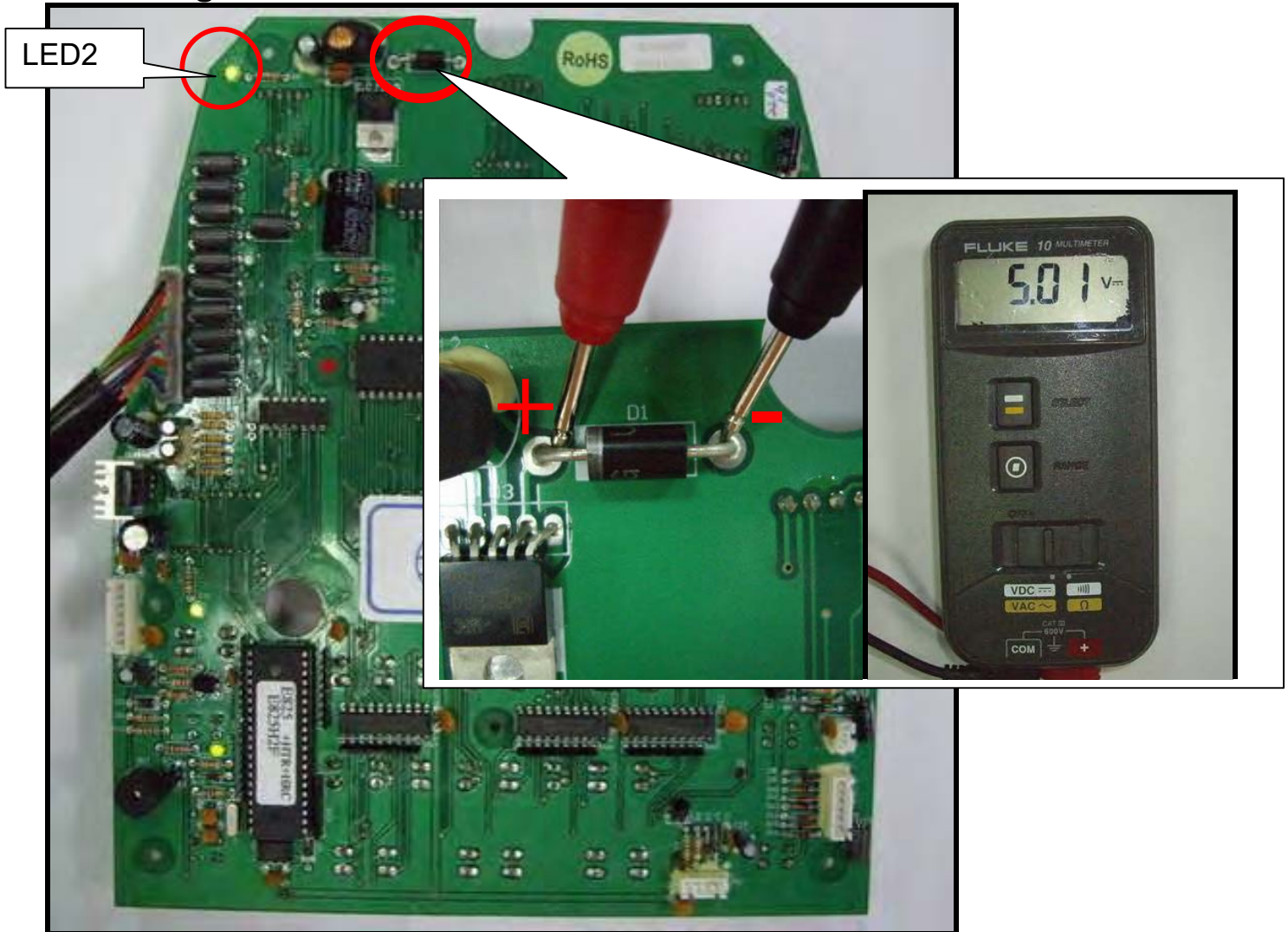
3. Troubleshooting

If after turning on power, LED1 and LED27 on the display do not light, inspect:

- (1) Is there VCC voltage?
- (2) Is there VBB voltage?
- (3) If there is VBB voltage, replace U2 7805A as a test.
If there is no VBB voltage, refer to VBB voltage testing.

E821/E825/E830 Display LED Voltage Test

1. Test Configuration



2. Test Procedure

1. Turn on unit power. LED2 on the display lights up.
2. Put voltmeter to the 20 VDC or higher setting. Place probes as shown.
3. Normal reading: 5 VDC \pm 0.2 VDC.
4. Display beeps once and LEDs light up.

3. Troubleshooting

If after turning on unit power, the display beeps once and lights up but LED2 does not light up,

Then inspect the following;

- (1) Is there VCC voltage?
- (2) Is there VBB voltage?
- (3) If there is VBB voltage, replace U3 SK-8051S as a test.
If there is no VBB voltage, refer to VBB testing.

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E821/E825/E830 Telemetry Heart Rate Receiver Board Test

1. Test Configuration



Heart rate window



Heart rate transmitter

2. Test Procedure

- (1) Put on the heart rate telemetry strap.
- (2) Press the Quick Start key and start exercising.
- (3) Display shows heart rate in the heart rate window.

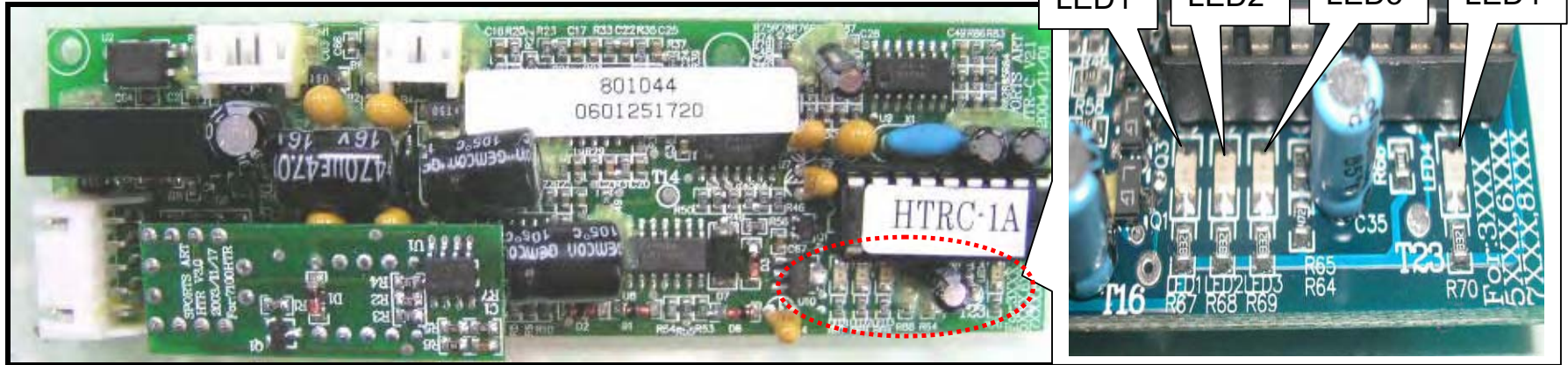
3. Troubleshooting

If there is no heart rate reading, inspect the following.

- (1) Make sure the telemetry strap is connected and worn properly. Straps must touch the skin. They cannot be loose.
- (2) Replace the telemetry strap as a test.
- (3) Test whether the telemetry strap works on another product. If so, replace the receiver board in this product.

E825/E830 Heart Touch Rate (HTR) Board Test

1. HTR board LED placement and definitions



LED Definitions

LED#	Color	Name	Explanation
LED1	Red	Telemetry signal	Flashing indicates reception of telemetry signal
LED2	Orange	HTR grip signal	Lit indicates contact made to HTR grips
LED3	Green	Incoming HR signal	Flashing indicates reception of incoming HTR signal
LED4	Red	Outgoing HR signal	Each flash represents the transmission of a heart rate signal.

2. Test Procedure

The following test results indicate normal operation.

1. No LEDs on the HTR board light when you don't contact the HTR grips.
2. When you contact the HTR grips with both hands, LED2 indicators light.
3. When LED3 flashes, an incoming heart rate signal is being received.
4. When LED4 flashes, an outgoing heart rate signal is being transmitted to the display board.
5. Within ten seconds, the display shows a heart rate value.

3. Troubleshooting

If not as above, refer to the chart below for troubleshooting.

Order	Malfunction	Explanation	Possible Causes of Malfunction
1	LED1 does not light	There is no telemetry signal	Telemetry strap, telemetry receiver board, wire connections
2	LED2 does not light	No contact to HTR grips	HTR grip, wire from grip to board
3	LED3 does not light	No incoming HTR signal	HTR grip, wire from grip to board
4	LED4 does not light	HTR board did not emit HR value signal	HTR board
5	Display fails to show HR value	HTR board signal not received or not shown at display	3-pin cable, display

HTR Cable (2-pin to HTR Left and Right Contacts) Test

Fig. 1: Place black probe as indicated

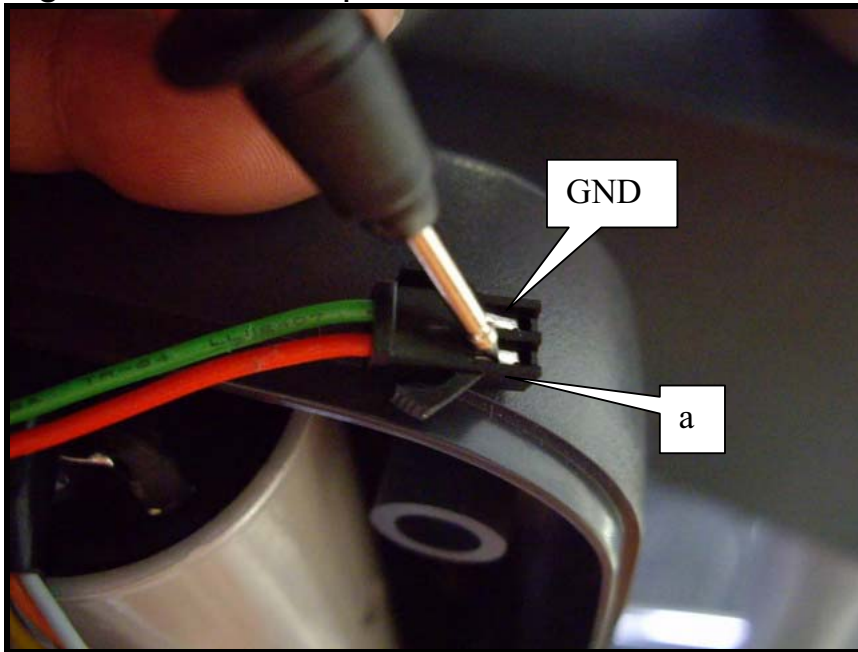
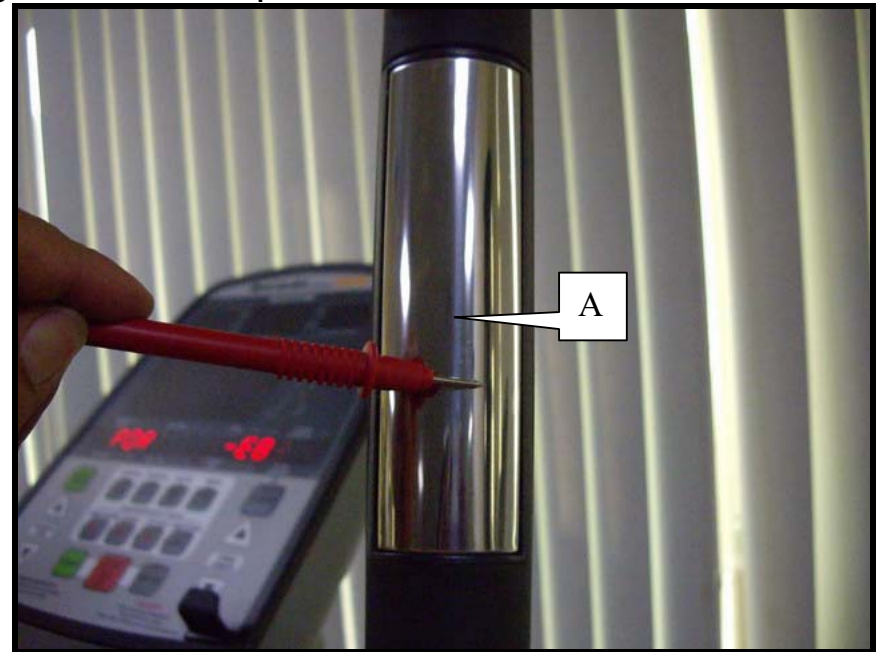


Fig. 2: Place red probe as indicated on HTR contacts



(Note: There are three wires on the HTR board 2-pin cable.)

2. Test Procedure

- (1) Do not turn on unit power. Remove display cover to access the HTR board 5-pin cable.
- (2) Put voltmeter to the 200 ohm setting. Place probes as shown in Fig. 1 and 2.
Test HTR cable and ground for electrical shorts and opens.
- (3) Test as shown below.

HTR Contact to Connector Test

Test Point	Normal
A-a	continuity

HTR Contact to Ground Test

Test Point	Normal
A-GND	open
Frame to GND	open

3. Troubleshooting

- (1) Inspect the cable from the HTR board to the handlebar HTR contacts.
- (2) Replace the cable or the HTR board as a test.

E821/E825/E830 Transformer Electrical Short/Open Test 1. Test Configuration

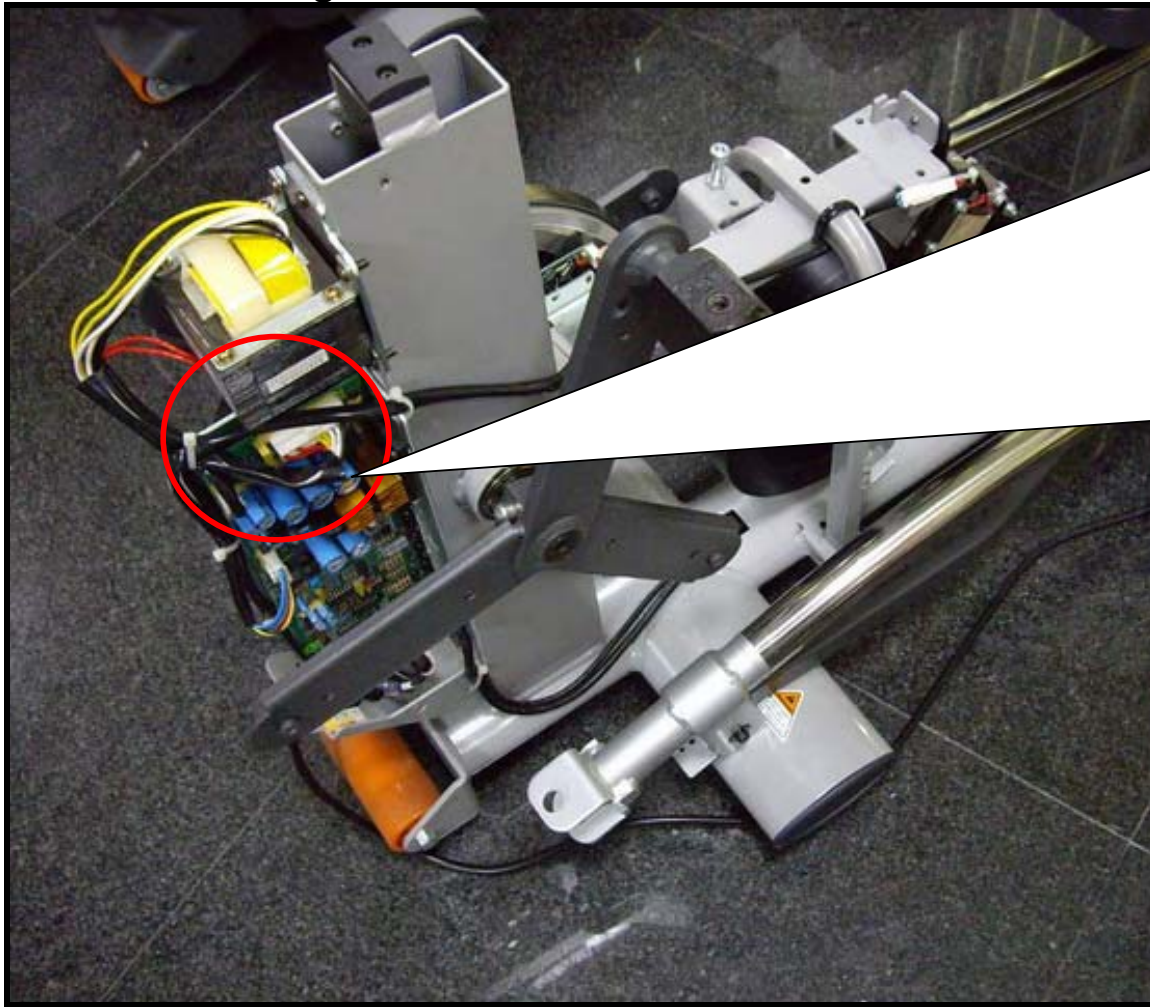


Fig.1 Electrical Open Test



Fig. 2. Electrical Short Test



2. Test Procedure

- (1) Electrical Open Test: Set voltmeter to the 200 Ω setting. Test common colored wires.
See Fig. 1. Normal reading: **<20 Ω** .
- (2) Electrical Short Test: Set voltmeter to the 20 M Ω setting. Test differently colored wires.
See Fig. 2. Normal reading: ∞ , **OL**.

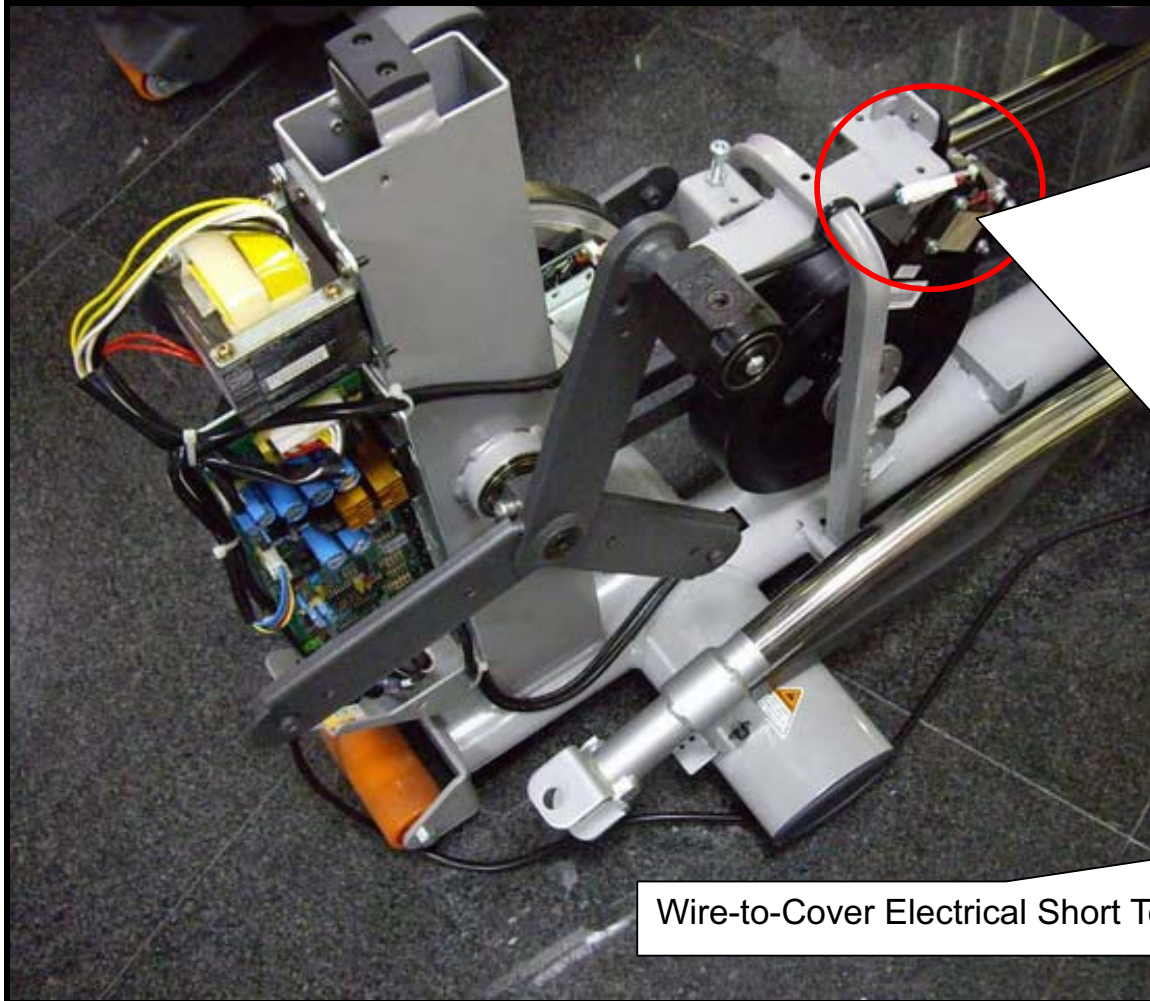
Test Point	Normal Value
Open	<20Ω
Short	∞

3. Troubleshooting

- (1) If not as above, inspect wire connections. Replace the transformer as a test.

E821/E825/E830 Electro-Magnet Electrical Open or Short Test

1. Test Configuration



Wire-to-Cover Electrical Short Test

Fig. 1: Electrical Open Test

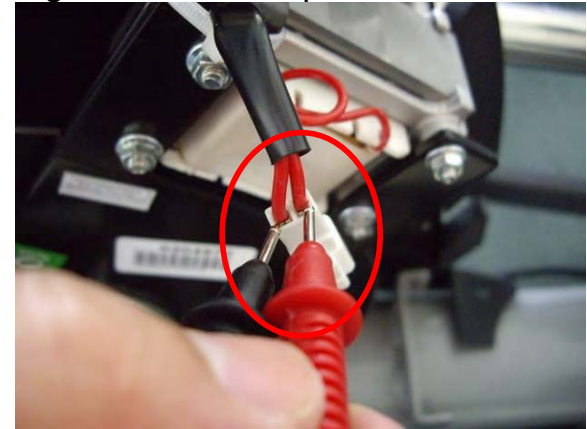
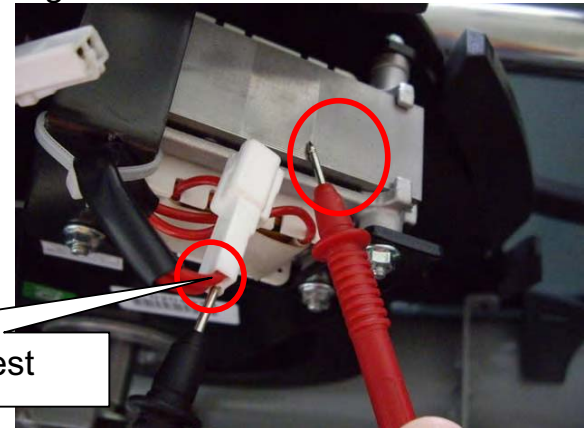


Fig. 2: Electrical Short Test



2. Test Procedure

- (1) Electrical open test: Put voltmeter to the 200 Ω setting. Place probes as shown in Fig. 1. Normal test results are shown below. Note: a reading of just under 20 Ω indicates the electro-magnet is OK.
- (2) Electrical short test: Put voltmeter to the 20 M Ω setting. Place probes as shown in Fig. 2. Normal test results are shown below. Note: a reading other than ∞ indicates continuity -- electro-magnet

windings or cables are contacting the bracket.

Test Results	Resistance Value
Open Test	<20Ω
Short Test	∞

3. Troubleshooting

- (1) If not as above, inspect cable wiring or replace the electro-magnet.

E821/E825/E830 Procedure to Remove Rear Covers



5. Remove upper cover.

6. Remove L/R rear covers.

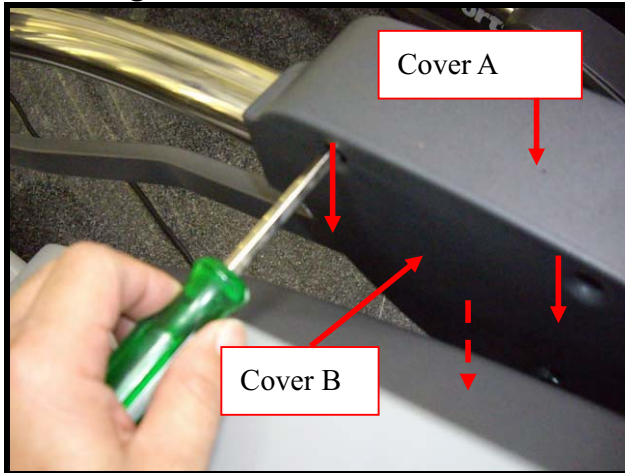
1. Remove L/R glide rail covers.

2. Remove the screw cover strip.

3. Remove the rotating cover.

4. Remove cover screws.

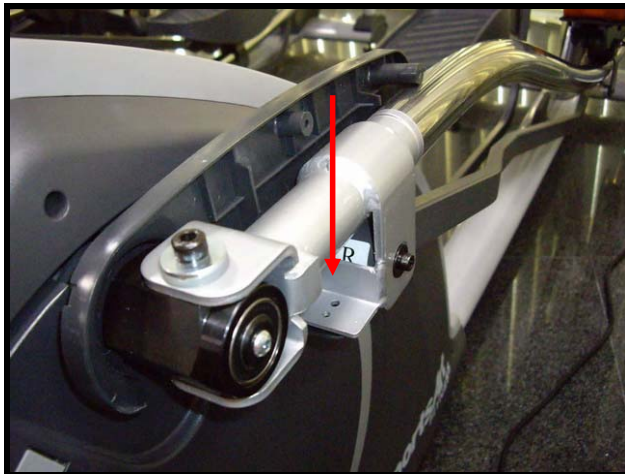
1. Use a Phillips head screwdriver to remove three screws from glide rail cover B.



2. Disconnect cover B from cover A. Remove cover A.



3. Remove cover B by pushing inward and downward.



4. Rotate cover B downward to remove it.



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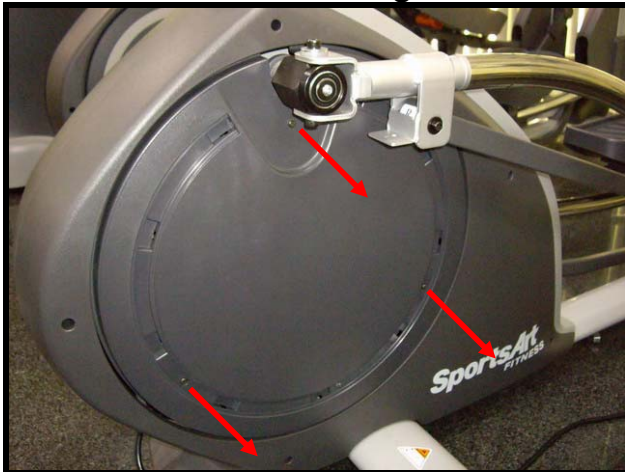
5. Use a flat-head screwdriver to pry up the screw cover strip.



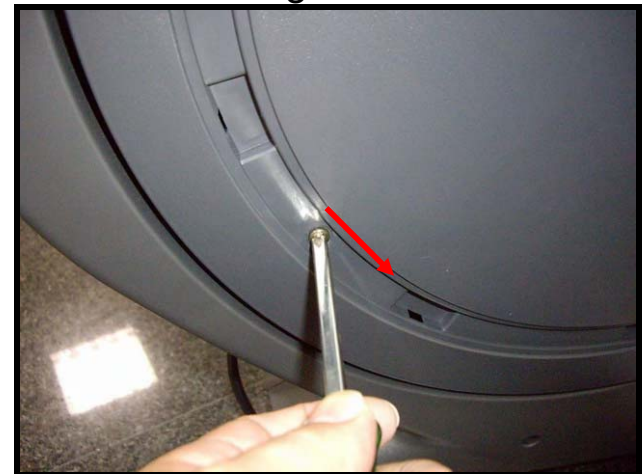
6. Gently pry up the screw cover strip.



7. Locate screws on the rotating cover.

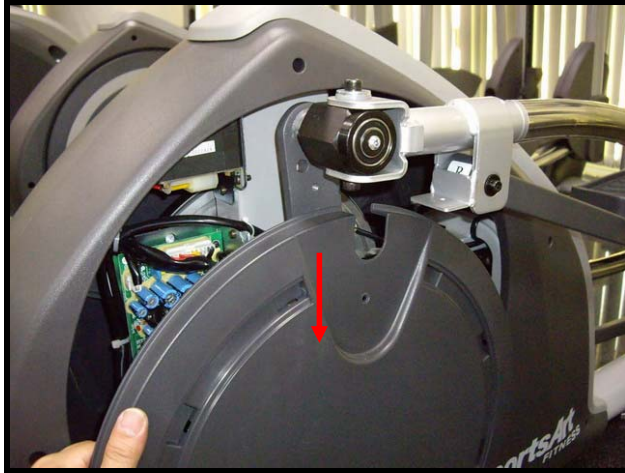


8. Use a Phillips head screwdriver to remove the screws on the rotating cover.

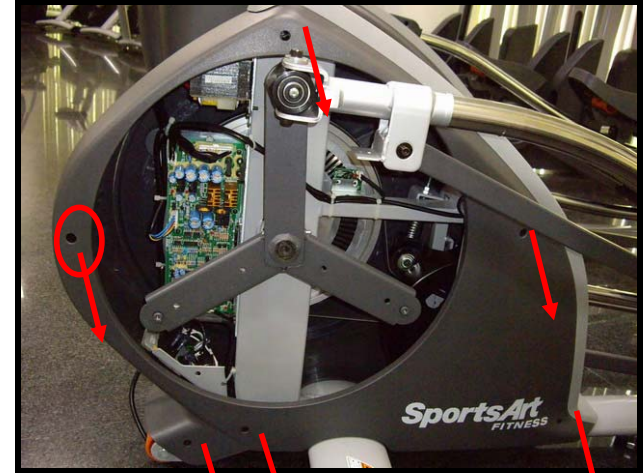


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9. Put the glide rail into the position shown. Pull the rotating cover downward to remove it.



10. Locate screws on left and right sides. Circled screw is accessed from one side only.



11. Use a Phillips head screwdriver to remove these screws.



12. After removing screws, detach the top cover, starting from the top and working your way downward.



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13. After removing screws, covers can be moved forward, allowing access for some jobs.



14. To remove covers, use an M6 Allen wrench to remove the glide rail screw.



15. This illustration shows covers totally removed.



16. Covers can be assembled in the same order they were removed.

17. Before assembling covers, make sure that the glide rail upper (see step 14) and lower hardware are in place and are lubricated with bearing grease. This hardware includes a T-shaped spacer on top and a thick washer-like spacer on bottom.