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Moving Rehabilitation Forward

Intelect® Transport 2 Ultrasound and Combo Service Manual Repair and Maintenance Instructions for 4782, 4738, 4776 and 4778

SP-47978 REV D

1.1 FORWORD

This manual is exclusively intended for the service centers with the DJO agreement to repair the Intelect® Transport 2. It contains general information on operation, precautionary practices, and maintenance.
To maximize use, efficiency, and the life of the system, please read the User and the Service Manual thoroughly and become familiar with the controls, as well as the accessories before operating the system.
This manual contains care and installation instructions for the optional 6-bin cart, Stim lead wires/ electrodes and Ultrasound applicators.
Specifications put forth in this manual were in effect at the time of publication. However, owing to DJO's policy of continual improvement, changes to these specifications may be made at any time without notification on the part of DJO.
Read, understand, and follow the Safety Precautions and all other information contained in this manual.

This manual contains the necessary safety and field service information for those field service technicians, certified by DJO, LLC, to perform field service on the Intelect® Transport Therapy System.

At the time of publication, the information contained within this manual is current. However, due to continual technological improvements and increased clinical knowledge in the field of electrotherapy, as well as DJO, LLC's policy of continual improvement, DJO, LLC reserves the right to make periodic changes and improvements to their equipment and documentation without any obligation on the part of DJO, LLC. As significant changes occur to the Intelect® Transport 2 Therapy System, service bulletins may be made available on our web site (chattgroup.com) in lieu of reprinted manuals.

Technicians repairing the Intelect® Transport 2 Therapy System agree to assume all risk and liability associated with this process.

1.2 INTENDED USER PROFILE

This system is to be used only under the supervision of a licensed practitioner.
The intended user of this device is a licensed medical professional. The user should be able to:

- Read and understand the operator's manual, warnings, cautions and dangers.
- Sense auditory and visual signals.
- Read and understand cautions and contraindications of the device

1.3 INTENDED ENVIRONMENT FOR USE

The device is intended to be operated in the clinical setting including chiropractic clinics, physical **therapist clinics or other rehabilitation settings.**

1.4 INTENDED USE

The Intelect® Transport 2 device will be used to deliver Ultrasound and electrical stimulation therapy either as stand-alone treatments or in combination.

2.1 PRECAUTIONARY INSTRUCTIONS

Before administering any treatment, the users of this equipment should read, understand, and follow the information contained in the User manual for each mode of treatment available, as well as the indications, contraindications, warnings, and precautions. Consult other resources for additional information regarding the application of electrotherapy and ultrasound.

2.2 PRECAUTIONARY SYMBOL DEFINITIONS

The precautionary instructions found in this manualare indicated by specific symbols. Understand these symbols and their definitions before operating or servicing this equipment. The definitions of these symbols are as follows:

A. CAUTION

Text with a “CAUTION” indicator will explain possible safety infractions that have the potential to cause minor to moderate injury ordamage to equipment.

B. WARNING

Text with a “WARNING” indicator will explain possible safety infractions that will potentiallycause serious injury and equipment damage.

C. DANGER

Text with a “DANGER” indicator will explain possible safety infractions that are imminentlyhazardous situations that would result in deathor serious injury.

D. DANGEROUS VOLTAGE

Text with a “Dangerous Voltage” indicator serves to inform the user of possible hazards resulting in the electrical charge delivered to thepatient in certain treatment configurations of TENS waveforms.

E. CORROSIVE HAZARD (LI-ION BATTERY)

Text with a “Corrosive Hazard” indicator willexplain possible safety infractions if the chemical components of this product areexposed to air, skin, or other materials.

F. NOTE:

Throughout this manual “NOTE” may be found.These Notes are helpful information to aid in the particular area or function being described

2.3 SAFETY PRECAUTIONS

⚠CAUTION

- Read, understand, and practice the precautionary and operating instructions. Know the limitations and hazards associated with using any electrical stimulation or ultrasound device. Observe the precautionary and operational decals placed on the unit
- The unit should be routinely checked before each use to determine that all controls function normally; especially that the intensity control properly adjusts the intensity of the electrotherapy and ultrasonic power output in a stable manner. Also, determine that the treatment time control terminates electrotherapy and ultrasonic power output when the timer reaches zero.
- This unit should be operated in temperatures between 41° F and 104° F (5° C and 40° C), with relative humidity ranging from 15% - 90%, and where the atmospheric pressure is between 70 k Pa and 106 kPa.
- This unit should be transported and stored in temperatures between 41° F and 104° F (-20° C and 60° C), with relative humidity ranging from 10%-90%, and where the atmospheric pressure is between 50 kPa and 106 kPa.
- DO NOT disassemble, modify, or remodel the unit or accessories. This may cause unit damage, malfunction, electrical shock, fire, or personal injury.
- DO NOT use sharp objects such as a pencil point or ballpoint pen to operate the buttons on the control panel.
- DO NOT permit any foreign materials including, but not limited to, liquids such as water and cleaning agents, inflammables, and metallic objects to enter the unit. To prevent unit damage, malfunction, electrical shock, fire, or personal injury.
- DO NOT remove cover. There are no user-serviceable parts inside the unit. If a malfunction occurs, discontinue use immediately and consult the dealer for repair service.

- Before each use inspect cables and connectors.
- Handle the applicator with care. Inappropriate handling of the applicator may adversely affect its characteristics.
- Do not drop the applicator on hard surfaces. This is likely to damage the ultrasound head crystal. Damage resulting from this condition is not covered under the warranty.
- Before each use, inspect the applicator for cracks, which may allow the ingress of conductive fluid.
- Electrotherapy output current density is inversely related to electrode size. Always exercise caution with current densities more than 2mA/cm2. Improper application may result in patient injury. If any question arises as to the proper electrode size, consult a licensed practitioner prior to therapy session.
- For waveforms with a DC component:
  - » Do not shave electrodes application area
  - » Warn the patient that tingling sensation under electrodes is normal and it is not linked to burn risk.
  - » Rinse thoroughly treatment area with tap water immediately after the treatment
- Where the integrity of the external protective earth conductor arrangement is in doubt, equipment shall be operated from its internal electrical power source, the battery.
- The battery pack should be removed when storing the unit for extended periods of time.
- Using a high intensity electrotherapy setting in conjunction with high intensity ultrasound setting may cause the unit to reset.
- Failure to use and maintain the Intelect® Transport 2 device and its accessories in accordance with the instructions outlined in this manual will invalidate your warranty.

⚠WARNING

- U.S.A. Federal Law restricts these devices to sale by, or on the order of, a physician or licensed practitioner. This device should be used only under the continued supervision of a physician or licensed practitioner.

- Make certain the unit is electrically grounded by connecting only to a grounded electrical service receptacle conforming to the applicable national and local electrical codes.
- Transport 2 devices are designed to comply with electromagnetic safety standards. However,

Transport 2 devices generate, use, and can radiate radio frequency energy and, if not installed and used in accordance with instructions for use, may cause harmful interference to other devices in the vicinity. Harmful interference to other devices can be determined by turning this equipment on and off. Try to correct the interference using one or more of the following:
  - » Reorient or relocate the receiving device
  - » Increase the separation between the equipment
  - » Connect the equipment to an outlet on a different circuit from that to which the other device(s) are connected
  - » Consult your authorized DJO dealer for help.
- Do not use Transport 2 device in conjunction with electronic monitoring equipment (such as ECG monitors and ECG alarms). Electronic monitoring equipment may not operate properly when electrical stimulation is in use.
- DO NOT operate Transport 2 in an environment where other devices are being used that intentionally radiate electromagnetic energy in an unshielded manner. For example
  - » DO NOT operate the Intelect® Transport 2 within the vicinity or environment of an ultrasonic diathermy system.
  - » DO NOT operate the Intelect® Transport 2 within the vicinity or environment of any microware and RF shortwave diathermy system.
- The energy from above systems can be transferred to patients with an implanted neurostimulation device causing tissue damage and resulting in severe injury or death even if the implanted neurostimulation system is turned “off.”
- Portable RF communications equipment should be used no closer than 30 cm (12 inches) to any part of the Intelect® Transport 2, including cables specified by the manufacturer. Otherwise, degradation of the performance of this equipment could result.
- Simultaneous connection of a PATIENT to a high frequency surgical ME EQUIPMENT may result in burns at the site of the STIMULATOR electrodes and possible damage to the STIMULATOR.
- DO NOT operate the Intelect® Transport 2 unit when connected to any unit other than DJO devices or accessories specifically described in this IFU as part of Transport 2 system or that have been specified as being compatible with the Transport 2. The use of other companies’ accessories, transducers or cables may result in increased emissions or decreased immunity of Transport
2 devices and resulting improper operations. DJO, LLC is not responsible for any consequence resulting from using products manufactured by other companies.
- DO NOT apply stimulation over the anterior neck or mouth. Severe spasm of the laryngeal and pharyngeal muscles may occur, and the contractions may be strong enough to close the airway or cause difficulty in breathing.
- DO NOT apply stimulation transthoracically because the introduction of electrical current into the heart may cause cardiac arrhythmia.
- DO NOT apply stimulation over swollen, infected, and inflamed areas or skin eruptions, e.g., phlebitis, thrombophlebitis, varicose veins, etc.
- DO NOT apply stimulation over, or in proximity to, cancerous lesions.
- DO NOT use contaminated, electrodes, lead wires, and gel which can lead to infection.
- DO NOT use electrode on multiple patients can lead to infection.
- Keep electrodes separated during treatment. Electrodes in contact with each other could result in improper stimulation or skin burns.
- The Intelect® Transport 2 may be susceptible to Electro-Static Discharge (ESD) at greater than ±6 kV when first grasping the Ultrasound applicator. In the event of such a discharge, the Intelect® Transport 2 may display a permanent error. The Intelect® Transport 2 will terminate all active outputs (stim, ultrasound,), automatically place the unit in a safe state. Do not turn the unit on or off while it is connected to the patient.
- To prevent Electro-Static Discharge (ESD) at greater than ±6 kV:
  - » Grasp and hold the Ultrasound prior to starting treatment. If the applicator must be put down prior to completion of treatment, stop the current treatment first and then place the applicator in the holder.
  - » Maintain humidity in the use environment to at least 50% relative humidity.
  - » Floors should be wood, concrete, or ceramic tile. If floors are covered with synthetic material, DJO recommends implementing additional controls

to maintain relative humidity to at least 50%.
» Communicate these ESD-precautionary procedures to healthcare staff, contractors, visitors, and patients.
• In the event that an Error message or Warning appears beginning with a 2 or 3, immediately stop all use of the unit and contact the dealer or DJO, LLC for service. Errors and Warnings in these categories indicate an internal problem with the unit that must be tested by DJO, LLC or a Field Service Technician certified by DJO, LLC before any further operation or use of the system.
>> Use of a unit that indicates an Error or Warning in these categories may pose a risk of injury to the patient, user, or extensive internal damage to the system.
and battery before attempting any maintenance, installation, removal, or replacement

• Disconnect the system from the power source procedures to prevent electrical shock and possible damage to system. or use of the system.
>> Use of a unit that indicates an Error or Warning in these categories may pose a risk of injury to the patient, user, or extensive internal damage to the system.
• Disconnect the system from the power source and battery before attempting any maintenance, installation, removal, or replacement procedures to prevent electrical shock and possible damage to system.

• Device is not designed to be used in oxygen rich environment, Explosion hazard if the device is used in the presence of flammable anesthetic mixture with air, oxygen, or nitrous oxide.
• Do not reverse the polarity of the battery pack. Doing so can increase the individual cell temperature and cause cell rupture or leakage

3.1 OVERVIEW

The Intelect® Transport 2 Therapy System is comprised of several PC board assemblies housed within a common enclosure. These assemblies each support a distinct function in the product. The basic elements are the User Interface, Control Board, Stim Boards, Ultrasound Board, Ultrasound Applicator, and Power Supply Circuits.

3.2 POWER SUPPLY CIRCUIT

A universal 75-Watt input power supply provides the system with the required 24 volts DC. The spply is connected to the mains at all times when the Mains Power Cord is attached and plugged into an outlet supplying 100 - 240 VAC. The 24 V supply is regulated locally at each PC board as required.

3.3 CONTROL BOARD

The Control Board controls the operation of the Stim Boards, Ultrasound Board, User Interface, and Accessories. The Control Board communicates to the Stim Boards and Ultrasound Board through a proprietary bus. The Control Board drives the display. The Control Board reads the menu buttons. The Control Board also reads the amplitude and the Contrast Control on the systems. Sound outputis generated by the Control Board and routed to an internal speaker.

3.4 STIM BOARDS

The Stim Boards create all muscle stimulation output. Communication to the Stim Boards is via a proprietary bus. A Processor on each Stim Board acts on messages passed to it by the Control Boardto set up waveforms and adjust output amplitude. Information can likewise be passed from each Stim Board back to the Control Board for monitoring current, etc. If a Stim Board does not respond as expected to a command from the Control Board, output is stopped, and an Error Message is generated.

3.5 ULTRASOUND BOARD AND APPLICATOR

The Ultrasound Board generates the 1 or 3.3 MHz output to drive the Sound Head of the Applicator. The Ultrasound Board is accessed through the proprietary bus by the Control Board. It can provide current and voltage information about the ultrasound output of the board. The calibration data for the Sound Head is passed through the Ultrasound Board from the Applicator to the Control Board. By storing the calibration data in the Applicator there is no calibration necessary for the Ultrasound Board and any calibrated Chattanooga Intelect® Transport 2 Ultrasound Applicator can be connected and operated to provide accurate output

3.6 USER INTERFACE AND ACCESSORIES

The LCD display panel provides the operator visible feedback in the way of menu choices. Pressing the User Interface buttons makes selections from the menus. The Control Board interprets these user inputs andresponds accordingly. Audible feedback is given for such events as key presses and end of treatment.

3.7 LI_ION BATTERY (OPTIONAL)

When the battery is installed, the PC Board monitors the Battery Charge Level. The Battery Pack supplies the required 24 VDC to the systemwhich is then distributed to the respective PCB's through the Universal Power Supply. The Battery Pack is interfaced with the system via a Wire Harness that facilitates communication with the Control Board and delivery of power to the Therapy System. When the Therapy System is connectedto a Mains Power Supply via the Mains Power Cord, the Li-ion Battery Pack will charge. Once the Battery Pack is fully charged, the software will stop the charging process, eliminating the possibility of overcharging. Battery power is used only when the Therapy System is not connected to a Mains Power Supply.

3.8 CIRCUIT DIAGRAMS AVAILABLE UPON REQUEST

4.1 COMPONENTS AND CONTROLS

The descriptive graphics below Figure 4.1,indicates the general locations of the exterior components of the Intelect® Transport 2 System.

Know the components and their functions before performing any operation of or service to the Intelect® Transport 2 System.

7.

10. Battery Access Door

Lead wire connectors for electro stimulation
Bule: Channel 1
Green: Channel 2

Ultrasound applicator connectors

Figure 4.1

Intensity and Time Ramp Characteristics

Single short key presses result in step up of 0.1 or 5 unit values depending on the waveform for intensity and one (1) minute units for Time. When the "+" or "-" key is pressed and held down, there is an acceleration factor to go faster and to take less time to get to the desired value. For intensity and time, the longer the button is held, the faster the ramp up or down. Here is a chart showing the values

Intensity increase /decrease:

Length of time button is held	Increment value multiplier
100ms	1
1s	2
2s	4
3s	8
4s	14
>5s	20

Time:

Length of time button is held	increment value multiplier
>500ms	2

4.2 HARDWARE AND SOFTWARE SYMBOL DEFINITIONS

The symbols below are found on the system as well as within the software. These symbols are defined for the purpose of recognition and functionality when operating or performing service on the Intelect® Transport 2 therapy System.

Know the symbols and their definitions before performing any operation of or service to the Intelect® Transport 2 therapy System.

Intelect® Transport 2 therapy System Hardware Symbols

Refer to Instructional Manual Booklet	
Warning, Caution, or Danger	
Electrical Type BF Equipment	
Electrical Type B Equipment	
Ultrasound	
Stim	
Clinical library	
Increase for time or intensity	+
Decrease for time or intensity	-
ON/OFF	
Manufacturer	
Date and country of manufacture	
Catalogue number	REF
Serial number	SN
Fragile, handle with care	
This end up	
Keep dry	
Temperature Range	

Relative Humidity Range	
Atmospheric Pressure Range	
Test agency	
Alternating current	
IP21	IP21
WEEE Directive conformity	
Shelf life	
Batch number	LOT
US amplitude modulated	
MD	MD
Start	
Stop	
Pause	
Parameter Display/Enter	
Back	
Up Arrow	
Down Arrow	
Battery Indicator	
Charge Indicator	

ETL CLASSIFIED c ETL us Intertek 5023416	The presence of this label indicates the machine was certified by ETL with the Statement: COMFORMS TO AAMI STD ES 60601-1, IEC STD 60601-1-6, 60601-2-5, 60601-2-10 CERTIFIED TO CSA STD C22.2 NO. 60601-1, No. 60601-1-6, No. 60601-2-5, No. 60601-2-10

5.1 INTELECT® TRANSPORT 2 SYSTEM

Figure 5.1 below provides physical details of the Intelect® Transport 2. This section also provides waveform specifications to aid in troubleshooting.

Refer to this section when performing troubleshooting, replacement, and repair of the Intelect® Transport 2 System.

Intelect® Transport 2 Combination Therapy System Physical Specifications

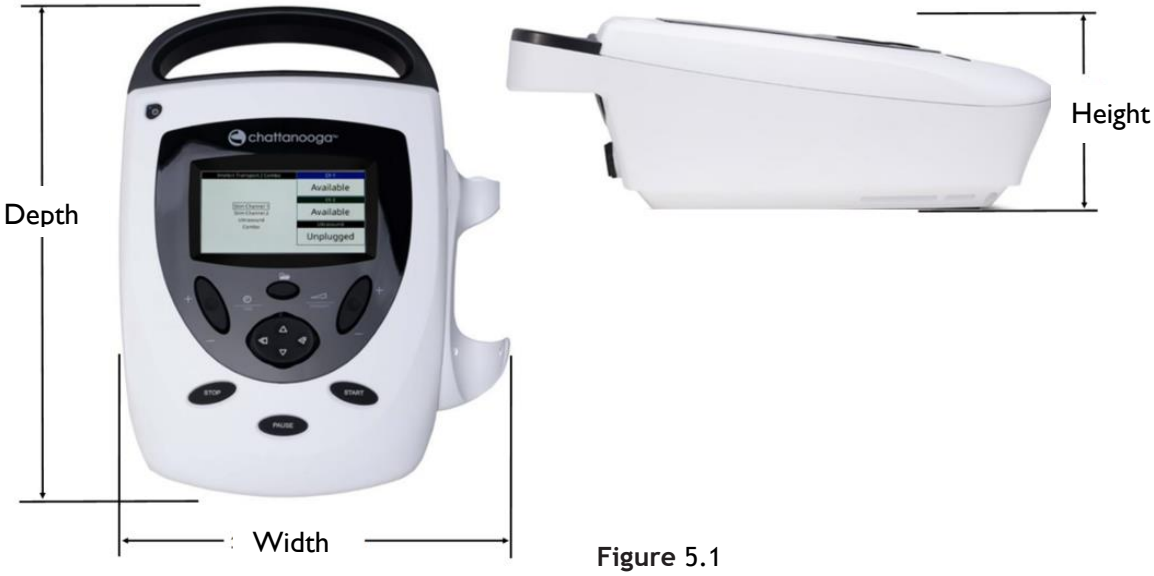


Figure 5.1

Dimension
Width..... 25.0 cm
Height..... 11.9 cm
Depth..... 34.6 cm

Weight
Combo (w/o battery)..... 2.2 kg
Ultrasound..... 1.9 kg
Battery Pack..... 0.25 kg

Power
Input..... 100 - 240 VAC, 1.0 A, 50/60 Hz 100 W Max
Output..... +24 V, 3.125 A
Fuses..... 3.15 A Time Lag (not user serviceable)
Electrical Class..... CLASS I

Electrical Type
Ultrasound TYPE B.....
Electrotherapy TYPE BF .....

Battery Type..... Lithium Ion

Operating Environment
Temperature..... 5° and 40° C
Relative Humidity.....15%-90%
Atmospheric Pressure..... 70 – 106 KPa

Comply with
UL/IEC/EN 60601-1
IEC/EN 60601-1-2
IEC 60601-2-10
IEC 60601-2-5

5.2 INTELECT® TRANSPORT 2 ELECTROTHERAPY WAVEFORM SPECIFICATIONS

The specifications found in this section provide the necessary waveform specifications to aid in troubleshooting. A waveform graphic from an oscilloscope is also provided for clarification.
Refer to this section when performing troubleshooting, replacement, and repair of the Intelect® Transport 2 System.

NOTE: The software includes a Dynamic Output feature to ensure that the electrotherapy output to the patient adheres to the limits specified in IEC 60601-2-10:2012 section 201.12.4.104 which specifies the maximum RMS current allowed to the patient.

The software achieves this limitation by performing the following whenever the user changes the desired output intensity:

The software will calculate the RMS current that would be delivered to the patient using the newly set parameters (i.e. desired output intensity, phase duration, frequency, etc.).
If this calculated RMS current value exceeds the maximum allowed for the current waveform (defined in IEC 60601-2-10:2012 section 201.12.4.104 Table 201.101) then the user will not be allowed to set the intensity to this new value.

A. High Voltage Pulsed Current (HVPC)-Figure 5.2 (Factory Default Setting)

The High Voltage Pulsed Current (HVPC) has a very brief pulse duration characterized by 2 distinct peaks delivered at high voltage. The waveform is monophasic (current flows in one direction only). The high voltage causes a decreased skin resistance, making the current comfortable and easy to tolerate.

Output Mode..... Electrodes
Amplitude..... 0-500 V*
Polarity..... Positive or Negative (Negative)
Ramp..... 0.5 sec, 1 sec, 2 sec, 5 sec (2 sec)
Display..... Peak Current or Volts (Volts)
Sweep..... Off, 80/120 pps, 1/120 pps, 1/10 pps (Off)
Frequency . . . . . 10-120 pps (100 pps)
Cycle Time..... 5/5, 4/12, 10/10, 10/20, 10/30,10/50, & Continuous (Continuous)
Constant Mode..... CV (only)** (CV)
Treatment Time..... 1-60 Minutes (20 min)

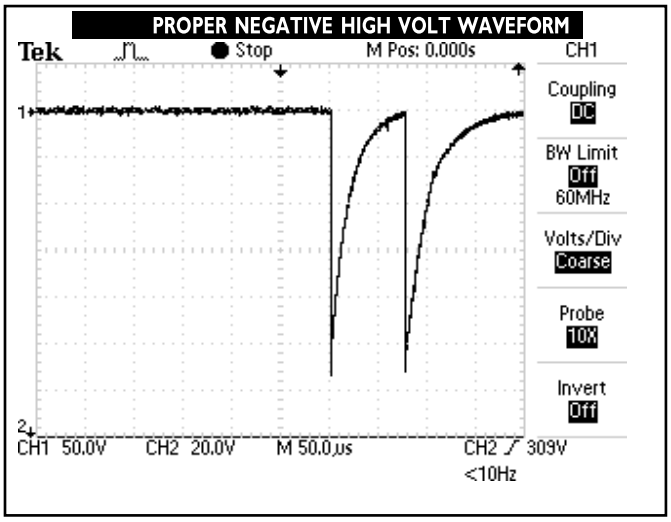


Figure 5.2

5.2 INTELECT® TRANSPORT 2 ELECTROTHERAPY WAVEFORM SPECIFICATIONS (COUNTINUED)

INTELECT® TRANSPORT 2 ELECTROTHERAPY WAVEFORM SPECIFICATIONS (CONTINUED)

A. IFC Interferential (4 Pole) - Figure 5.5 (Factory DefaultSetting)

Interferential Current is a medium frequency waveform. Current is distributed from two channels **Figure 5.5 a** (four electrodes). The currents cross in the body within the area being treated. The two currents interfere with each other at this crossing point, resulting in a modulation of theintensity **Figure 5.5 b** (the current intensity increases and decreases at a regular frequency).

Output Mode.....Electrodes

Amplitude.....0-100 mA*

Carrier Frequency. . . . . 2500 - 5000 Hz **(4000 Hz)**

Vector Scan..... Manual, Automatic 40%, 100% **(Manual)**

Vector Position..... 0 - 90 Degrees **(45˚)**

Sweep.....On, 1-200 HzBeat Low (On)

Frequency.....1-199 Hz **(80Hz)**

Beat High Frequency.....2-200 Hz **(150Hz)**

Constant Mode..... CC or CV** **(CC)**

Treatment Time..... 1 -60 minutes **(20 min)**

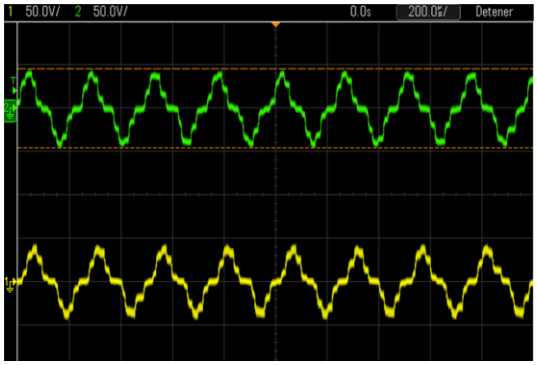


Figure 5.5 a

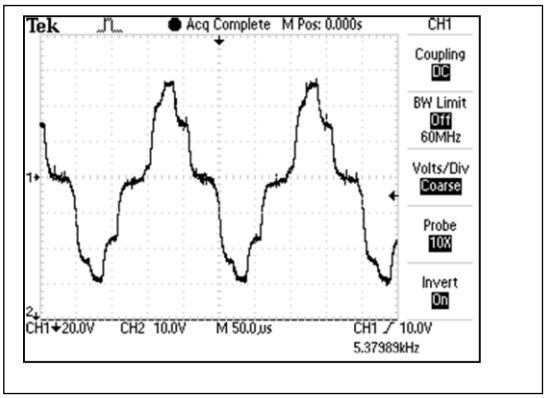


Figure 5.5 b

B. Russian- Figure 5.6 (Factory Default Setting)

Russian Current is a sinusoidal waveform delivered in bursts or series of pulses. This method was claimed by its author (Kots) to produce maximal muscle strengthening effectswithout significant discomfort to the patient.

Output Mode..... Electrodes

Amplitude..... 0-100 mA*

Channel Mode..... 10%, 20%, 30%, 40%, and 50% (50)

Constant Mode..... CC or CV** **(CC)**

Cycle Time..... .....5/5, 4/12, 10/10, 10/20, 10/30,10/50, and Continuous **(10/50)**

Ramp.....0.5 sec, 1 sec, 2 sec and 5 sec **(2 sec)**

Carrier Frequency ....2500 Hz **(2500 Hz)**

Burst Frequency . . . . . 20 -100 Hz **(50 Hz)**

Treatment Time ....1 -60 minutes **(20 min)**

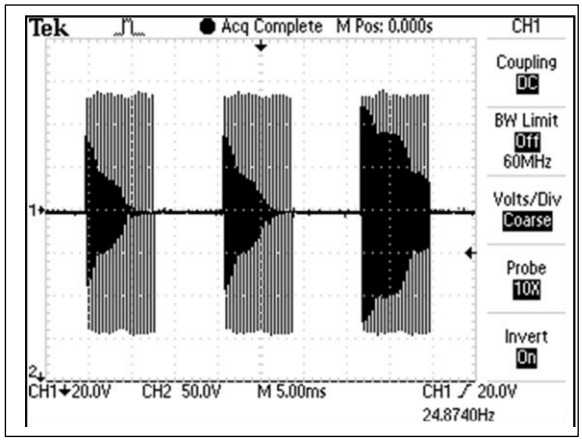


Figure 5.6

Below waveforms only available on EU MDR certified devices (4776 and 4778)

F. Microcurrent (Figure 5.7)

Microcurrent is a monophasic waveform of very low intensity.The literature reports beneficial effects of this waveform in the treatment of wounds. The physiological working mechanism of this effect is as yet not clearly understood. It is thought to stimulate tissue healing by stimulating the 'current of injury', a current which naturally occurs in healing tissue.

Output Mode…… Electrodes
Available on channels…….. 1, 2
Treatment Time…… 1-60 Min
Mode Selection …… CC
Output Intensity …… 0-1,000 µA
Duty Cycle …… 50%
Frequency …… 0.1-1,000 pps
Polarity …… Positive, Negative, or Alternating
IRMS …… 0- 1mA
DC component …… No

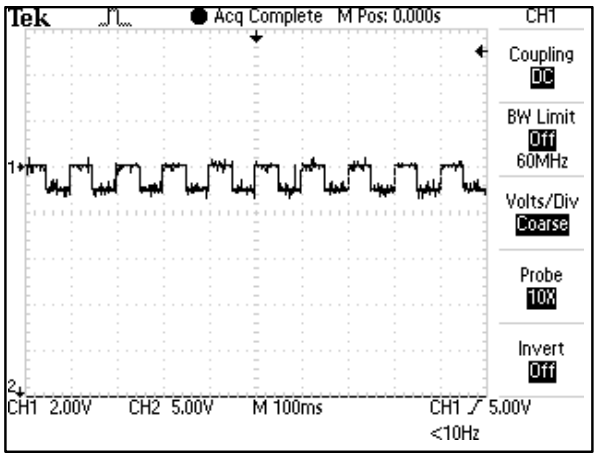


Figure 5.7

G. TENS- ASYMMETRICAL BIPHASIC (Figure 5.8)

The Asymmetrical Biphasic waveform has a short pulse duration. It is capable of strong stimulation of the nerve fibers in the skin as well as of muscle tissue. This waveform is often used in TENS devices. Because of its short pulse, the patient typically tolerates the current well, even at relatively high intensities.

Output Mode …….. Electrodes
Output Intensity ……. 0-140 mA (CC) 0-140 V (CV)
Available on Channel …… 1,2
Treatment Time (Stim)…… 1-60 minutes
Treatment Time (Combo) …… 1-30 minutes
Mode Selection (Stim) …… CC or CV
Mode Selection (Combo) …… CV
Amplitude Modulation …… 0% (off) to 100% on 10% steps
Burst Frequency …… 0-10 bps
Cycle Time …… Continuous or User Defined
Frequency …… 1-200 pps
Frequency Sweep …… On/Off
Phase Duration…… ……. 30-400 µsec
Sweep time …… 14 sec
Sweep Low Frequency …… 1-199 pps
Sweep High Frequency …… 2-200 pps
IRMS…… 0-50mA
DC component …… No

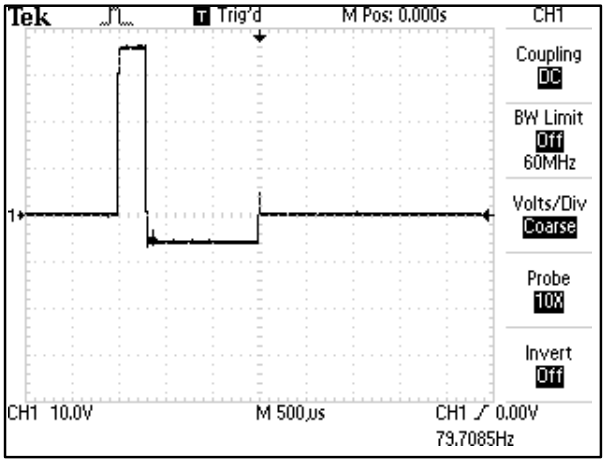


Figure 5.8

H. TENS- SYMMETRICAL BIPHASIC (Figure 5.9)

The Symmetrical Biphasic waveform has a short pulse duration and is capable of strong stimulation of nerve fibers in the skin and in muscle. This waveform is often used in portable muscle stimulation units, and some TENS devices.

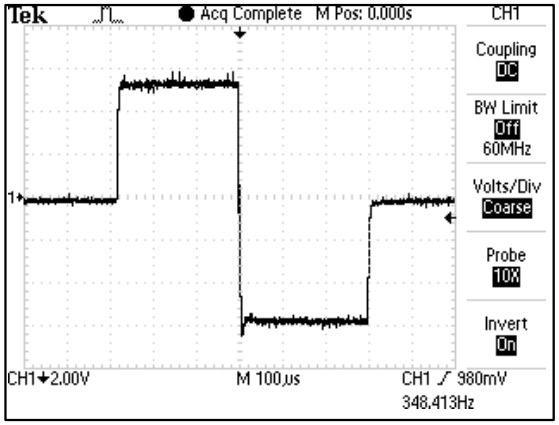


Figure 5.9

Output Mode ..... Electrodes
Available on Channel 1,2
Treatment Time (Stim) ..... 1-60 min
Treatment Time (Combo) ..... 1-30 minutes
Mode Selection (Stim) ..... CC or CV
Mode Selection (Combo..... CV
Output Intensity .... 0-140 mA (CC) 0-140 V (CV)
Amplitude Modulation ..... 0% (off) to 100% on 10% steps
Burst Frequency ..... 0-10 bps
Cycle Time ..... Continuous or User Defined
Frequency ..... 1-200 pps
Frequency Sweep ..... On/Off
Phase Duration ..... 30-400 µsec
Ramp ..... 0-5 sec
Sweep Time 14sec
Sweep Low Frequency ..... 1-199 pps
Sweep High Frequency..... 2-200 pps
IRMS 0-50mA
DC component ..... No

I. GALVANIC: CONTINUOUS(Figure 5.10)

Galvanic Current is a direct current flowing in one direction only. The current can be continuous or interrupted.

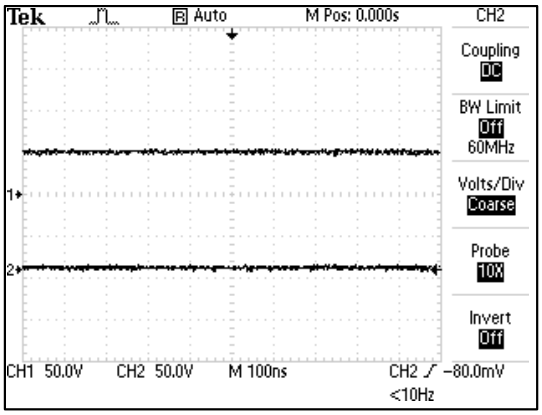


Figure 5.10

Output Mode ..... Electrodes
Available on Channels 1, 2
Treatment Time ..... 1-60 min
Mode Selection CC
Output Intensity ..... 0-40 mA (CC)
Cycle Time ..... Continuous, or User Defined
Polarity Reversal ..... On or Off
With Polarity Reversal On, Polarity will change in the middle of the treatment time.
IRMS 0-44mA
DC component .....Yes

J. TRÄBERT (ULTRAREIZ) (Figure 5.11)

The Träbert Current is a monophasic waveform with a phase duration of 2 ms and a pause of 5 ms resulting in a frequency of approximately 143Hz.

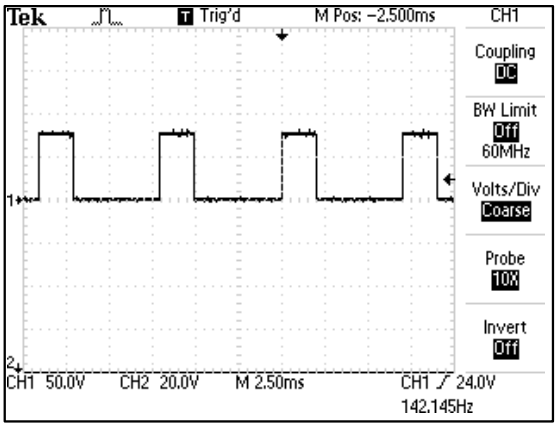


Figure 5.11

Output Mode ..... Electrodes
Available on Channels 1, 2
Treatment Time ..... 1-60 min
Mode Selection CC
Output Intensity ..... 0-80 mA (CC)
Frequency ..... 143 pps
Polarity Reversal ..... On or Off
With Polarity Reversal On, Polarity will change in the middle of the treatment time.
Phase Duration ..... 2 ms
IRMS 0-47mA
DC component ..... Yes

K. GALVANIC: INTERRUPTED (Figure 5.12)

Galvanic Current is a direct current flowing in one direction only.The current can be continuous or interrupted.

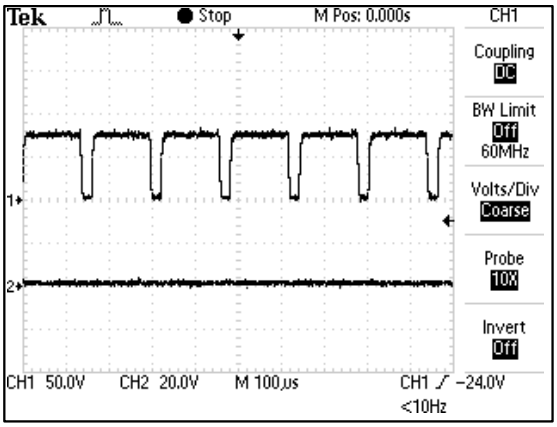


Figure 5.12

Output Mode ..... Electrodes
Available on Channels 1, 2
Treatment Time ..... 1-60 min
Mode Selection CC
Output Intensity ..... 0-40 mA (CC)
Pulse Duration ..... 136 µsec
Phase Interval ..... 25 usec
Polarity Reversal ..... On or Off
With Polarity Reversal On, Polarity will change in the middle of the treatment time.
Polarity Reversal Ramp ..... 1 sec
IRMS 0-41mA
DC component ..... Yes

L. MONOPHASIC TRIANGULAR PULSED (Figure 5.13)

The Monophasic Triangular Pulsed waveform is an interrupted unidirectional current with a triangular pulse shape.

Output Mode ..... Electrodes
Available on Channels 1, 2
Treatment Time ..... 1-60 min
Mode Selection CC
Output Intensity ..... 0-60 mA (CC)
Phase Duration ..... 0.1-1,000 ms
Phase Interval ..... 5-5,000 ms
IRMS 0-27mA
DC component..... Yes

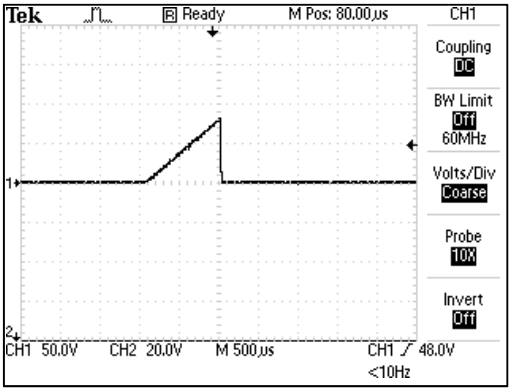


Figure 5.13

M. MONOPHASIC RECTANGULAR PULSED (Figure 5.14)

The Monophasic Rectangular Pulsed waveform is an interrupted unidirectional current with a rectangular pulse shape.

Output Mode ..... Electrodes
Available on Channels 1, 2
Treatment Time ..... 1-60 min
Mode Selection CC
Output Intensity ..... 0-60 mA (CC)
Phase Duration ..... 0.1-1,000 ms
Phase Interval ..... 5-5,000 ms
IRMS 0-47mA
DC component ..... Yes

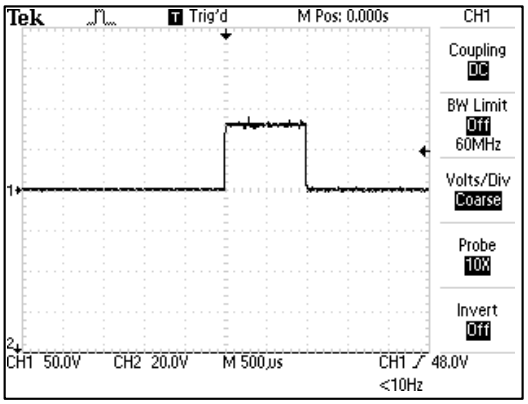


Figure 5.14

N. DIADYNAMIC WAVEFORMS (Figure 5.15)

The Diadynamic waveforms are rectified alternating currents. The alternating current is modified (rectified) to allow the current to flow in one direction only.

Output Mode ..... Electrodes
Available on channels 1, 2
Treatment Time ..... 1-60 min
Mode Selection CC
Output Intensity ..... 0- 60 mA
MF (Monophase Fixe) - Frequency of 50 Hz: phase duration of 10 ms followed by a pause of 10 ms.
IRMS [mA] ..... 0-33 mA
DF - Frequency of 100 Hz: phase duration of 10 ms
CP - 1 s of MF followed abruptly by 1 s of DF.
LP - Rhythmical fluctuation between 2 MF currents
CP-iso - A combination of MF and DF waveforms. CP-id: Same as CP-iso.
IRMS 0-47mA
DC component ..... Yes

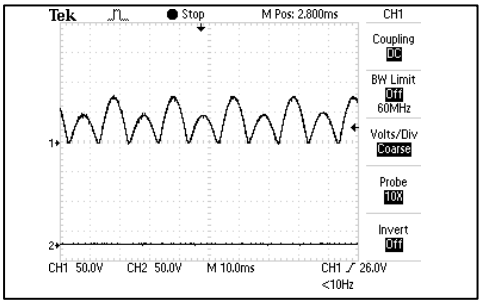


Figure 5.18

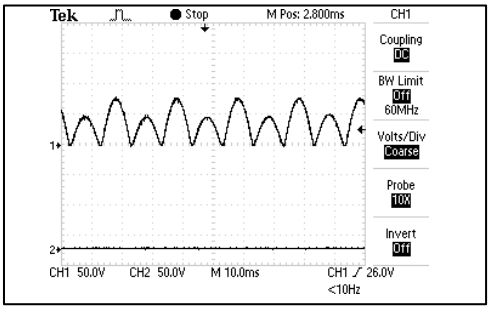


Figure 5.19

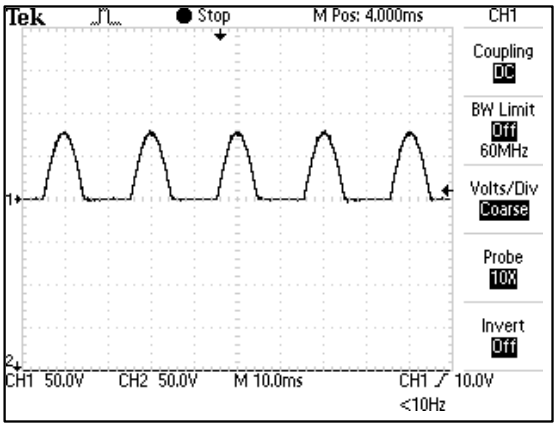


Figure 5.15

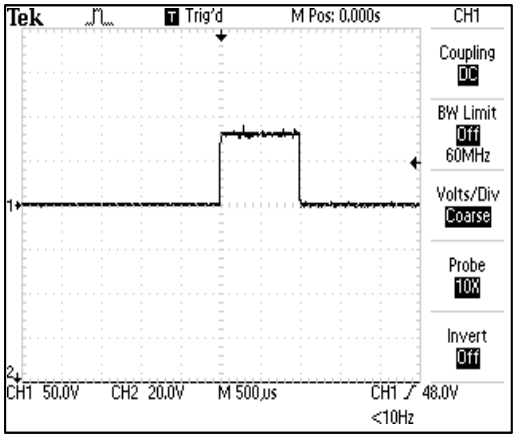


Figure 5.16

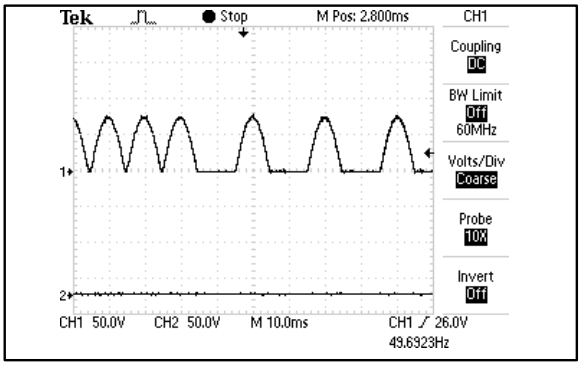


Figure 5.17

5.2 INTELECT® TRANSPORT 2 THERAPY SYSTEM ULTRASOUND SPECIFICATIONS

This section provides the necessary Ultrasound Specifications to aid in troubleshooting. Refer to these specifications as necessary when troubleshooting the Ultrasound PC Board and Applicators.

A. Ultrasound

Frequency..... 1 MHz, ± 5%; 3.3 MHz, ±5%
Duty Cycles..... 10%, 20%, 50%, and Continuous
Pulse Frequency..... 100 Hz
Pulse Duration... 1 mSec, ±20%; 2 mSec, ±20%
5 mSec, ±20%
Temporal Peak to Average Ratios:
2:1, ± 20%, at 50% Duty Cycle
5:1, ± 20%, at 20% Duty Cycle
10:1, ± 20%, at 10% Duty Cycle
Beam Non uniformity Ratio.....6.0 : 1 maximum
Beam Type..... Collimating
Treatment Time..... 1-30 Minutes

US applicator Frequency	2cm^2		5cm^2		10cm^2	
	1MHz	3.3MHz	1MHz	3.3MHz	3.3MHz	1MHz
Effective Radiating Area ERA INTL (cm^2)	1.5	1.5	3.0	3.0	5.8	5.8
Max Output power in Continuous mode	3W	3W	6W	6W	12.7 W	6.9W
Max Output power in Pulsed mode	4.5W	4.5W	9W	9W	17.4 W	13.9W
Max Intesnity in Continuous mode	2W / cm 2	2W / cm 2	2W / cm 2	2W / cm 2	2.2W / cm^2	1.2W/ cm^2
Max Intesnity in Pulsed mode (	3W / cm 2	3W / cm 2	3W / cm 2	3W / cm 2	3W / cm 2	2.4W/ cm^2

6.1 INTELECT® TRANSPORT 2 THERAPY SYSTEM ERROR MESSAGES

A. The following information is provided as an aid in defining the Software Error Messages ofthe Intelect® Transport 2 Therapy System. Once a particular Error Message is defined, the information will also list probable causes and possible remedies. Once the problem area is determined, subsequent tests for verification will be necessary to determine a "Bad Board". All Troubleshooting and tests will be to validate a "Bad Board" only. No component level troubleshooting information is or will beprovided by DJO, LLC for field troubleshootingof board components.

B. Once a particular PC Board has been determined as bad, refer to the appropriate Removal and Replacement Section for the board affected and follow the instructions forreplacement of the board.

ERROR CODE	ERROR TYPE	DEFINITION	PROBABLE CAUSES	POSSIBLE REMEDY
		USER CORRECTABLE WARNING MESSAGES		
100 101	WARNING WARNING	Ultrasound Applicator became unplugged Ultrasound Applicator unplugged	Ultrasound Applicator was unplugged while an Ultrasound treatment was running User attempted to start an Ultrasound treatment, but noUltrasound Applicator was plugged into unit	Plug Ultrasound Applicator into proper receptacle on unit making certain it is completely seated
102	WARNING	Ultrasound Applicator not calibrated	The Ultrasound Applicator plugged into the unit needs tobe calibrated	Contact dealer or Chattanooga for service.
103 104 105	WARNING WARNING WARNING	Ultrasound Channel not availableStim Channel not available Stim Channel not available	User attempted to select Combo treatment, but theUltrasound Channel was already in use User attempted to select Combo treatment, but theUltrasound Channel was already in use User attempted to select a two channel Electrotherapy treatment, but at least one of the two stim channels werealready in use	Wait until Ultrasound treatment is completed or stop Ultrasound treatment and try again
106	WARNING	Over current	Stim channel has exceeded allowed current level and thetreatment has been stopped	Reset treatment parameters and attempt session again
107	WARNING	Bad Contact Quality	Electrode contact is poor	Apply new electrodes to the treatment area
108	WARNING	Shorted Lead Wires	Lead Wires are bad	Replace with new lead wires
109	WARNING	Power Supply current limit	User attempted to start two channels of Electrotherapy while running an Ultrasound treatment with a 10 cm^2 Ultrasound Applicator and Ultrasound Output is currently set to greater than 15 Watts.	Wait until Ultrasound treatment is completed or stop Ultrasound treatment and try again or decrease ultrasoundoutput to less than 15 Watts

6.1 INTELECT® TRANSPORT THERAPY SYSTEM ERROR MESSAGES (CONTINUED)

WARNING

If an Error message or appears beginning with a 2 or 3, immediately stop all use of the unit and contact the dealer or Chattanoogafor service. Errors and Warnings in these categories indicate an internal problem with the unit that must be tested by DJO, LLC or a Field Service Technician certified by DJO, LLC before any further operation or use of the unit. Use of a unit that indicates an Error or Warning in these categories may pose a risk of injury to the patient, user, or may cause extensive internal damage to the unit.

ERROR CODE	ERROR TYPE	DEFINITION	PROBABLE CAUSES	POSSIBLE REMEDY
ERROR MESSAGES (200-213) REQUIRING TECHNICAL ASSISTANCE				
200	ERROR	Error while attempting to save UltrasoundApplicator Calibration Data	Could not save the Calibration Data to the UltrasoundApplicator	**1.** Replace the Ultrasound Applicator with a known good Ultrasound Applicator **2.** Replace Ultrasound Board **3.** Replace Control Board
201	ERROR	Error Applicator not calibrated OK.	Could not calibrate Ultrasound Applicator	**4.** Attempt to calibrate again **5.** Replace the Ultrasound Applicator with a known good Ultrasound Applicator **6.** Replace Ultrasound Board **7.** Replace Control Board
202	ERROR	Timed out while saving the UltrasoundApplicator Calibration Data.	Could not save the Calibration Data to theUltrasound Applicator	**1.** Replace the Ultrasound Applicator with a known good Ultrasound Applicator **2.** Replace Ultrasound Board **3.** Replace Control Board
203	ERROR	Error reading Protocol.	Error reading a Protocol from the EEPROM	Restore Factory Settings, restore Factory Protocols andrebuild all User Protocols
204 205 206 207 208	ERROR ERROR ERROR ERROR ERROR	Main Software Flash Erase Error Main Software Flash Echo Main Software CRC Error Main Software Program Flash Error Main Software Acknowledge Error	Stim Main Software upgrade Error Stim Main Software upgrade Error Stim Main Software upgrade ErrorStim Main Software upgrade Error Stim Main Software upgrade Error	**1.** Replace appropriate Stim Board **2.** Replace Control Board
209	ERROR	Software CRC Acknowledge Error.	Software upgrade Error	Replace Control Board
210 211 212 213 214	ERROR ERROR ERROR ERROR ERROR	Channel Software Flash Erase Error Channel Software CRC Error Channel Software Program Flash Error Channel Software Acknowledge Error Channel Software CRC Acknowledge Error	Stim Channel Software upgrade Erro. Stim Channel Software upgrade Error Stim Channel Software upgrade Error Stim Channel Software upgrade Error Stim Channel Software upgrade Error	**1.** Replace appropriate Stim Board **2.** Replace Control Board
216	ERROR	Control board reported overtemperature	Device overheating. Can be various reasons	1. Further investigation needed

6.1 INTELECT® TRANSPORT THERAPY SYSTEM ERROR MESSAGES (COUNTINUED)

WARNING

If an Error message or appears beginning with a 2 or 3, immediately stop all use of the unit and contact the dealer or Chattanoogafor service. Errors and Warnings in these categories indicate an internal problem with the unit that must be tested by DJO, LLC or a Field Service Technician certified by DJO, LLC before any further operation or use of the unit. Use of a unit that indicates an Error or Warning in these categories may pose a risk of injury to the patient, user, or may cause extensive internal damage to the unit.

ERROR CODE	ERROR TYPE	DEFINITION	PROBABLE CAUSES	POSSIBLE REMEDY
CRITICAL ERRORS (300-314) DEMANDING TECHNICAL SERVICE				
300	CRITICAL ERROR	Unit CFG Critical Error.	Error communicating with Stim Board on Powerup.	**1.** Replace appropriate Stim Board. **2.** Replace Control Board.
301	CRITICAL ERROR	No Stim Board Critical Error.	Error detecting Stim Board on Powerup.	**1.** Replace appropriate Stim Board. **2.** Replace Control Board.
302	CRITICAL ERROR	No Ultrasound Board Critical Error.	Error detecting Ultrasound Board on Powerup.	**1.** Replace Ultrasound Board. **2.** Replace Control Board.
303	CRITICAL ERROR	EEPROM Critical Error.	Error reading EEPROM on Powerup.	Replace Control Board.
304	CRITICAL ERROR	Ultrasound Board Critical Error.	Error communicating with the Ultrasound Board.	**1.** Replace Ultrasound Board. **2.** Replace Control Board.
305	CRITICAL ERROR	Ultrasound Board Write Critical Error.	Error communicating with the Ultrasound Board.	**1.** Replace Ultrasound Board. **2.** Replace Control Board.
306	CRITICAL ERROR	Ultrasound Board Read_Write Critical Error.	Error communicating with the Ultrasound Board.	**1.** Replace Ultrasound Board. **2.** Replace Control Board.
307	CRITICAL ERROR	Ultrasound Board Reset Critical Error.	Ultrasound Board Reset Error.	**1.** Replace Ultrasound Board. **2.** Replace Control Board.
308	CRITICAL ERROR	Ultrasound Board Read Critical Error.	Error communicating with the Ultrasound Board.	**1.** Replace Ultrasound Board. **2.** Replace Control Board.
309	CRITICAL ERROR	Ultrasound Board Calibration Critical Error.	Error calibrating Ultrasound Board.	**1.** Replace Ultrasound Board. **2.** Replace Control Board.
310	CRITICAL ERROR	Stim Board Write Critical Error.	Error communicating with Stim Board.	**1.** Replace appropriate Stim Board. **2.** Replace Control Board.
311	CRITICAL ERROR	Stim Board Bad Data Read Critical Error.	Error communicating with Stim Board.	**1.** Replace appropriate Stim Board. **2.** Replace Control Board.
312	CRITICAL ERROR	Stim Board Main UP Reset Critical Error.	Error communicating with Stim Board.	**1.** Replace appropriate Stim Board. **2.** Replace Control Board.
313	CRITICAL ERROR	Stim Board Channel 1 UP Reset Critical Error.	Error communicating with Stim Board.	**1.** Replace appropriate Stim Board. **2.** Replace Control Board.
314	CRITICAL ERROR	Stim Board Channel 2 UP Reset Critical Error.	Error communicating with Stim Board.	**1.** Replace appropriate Stim Board. **2.** Replace Control Board.
315	CRITICAL ERROR	Stim Board Reset Critical Error.	Stim Board Reset Error.	**1.** Replace appropriate Stim Board. **2.** Replace Control Board.
316	CRITICAL ERROR	Stim Powerup Test Failed Critical Error.	Stim Board failed its Self Test on Powerup.	**1.** Replace appropriate Stim Board. **2.** Replace Control Board.

6.2 INTELECT® TRANSPORT 2 SYSTEM TESTING

A. General

1. The following information is intended to aid in troubleshooting the major components of the Intelect® Transport 2 Therapy System to "Board Level" only. These tests are FACTORY standard testing procedures and methods used at the factory before shipment of any Intelect® Therapy System.
2. Due to the complex nature of the technology utilized by DJO, LLC, the recommended troubleshooting techniques are to determine "Bad Board" and board replacement only. No board component level troubleshooting is recommended, nor will information or parts be supplied by DJO, LLC. Any board component level troubleshooting performed will be at sole risk and liability of the Service Technician performing such troubleshooting techniques.
3. Once a particular PC Board has been determined as bad, refer to the appropriate Removal and Replacement Section of this

B. Special Tools, Fixtures, & Materials Required

1. Certain tests require the use of special tools and fixtures. These will be listed at the particular tests where they are required. Testing with any other special tool or fixture other than those stated could give erroneous readings or test results. Always perform the tests exactly as stated to ensure accurate results.
2. Scope and other standard test equipment settings will be listed for each test performed to aid in performing the test to FACTORY standards and ensure proper readings.
3. The troubleshooting and repair of the Intelect®Transport 2 Therapy Systems and Accessories should be performed only by authorized technicians trained and certified by DJO, LLC.

C. Equipment Required

1. Oscilloscope and Probes
2. ESTI-2 Load Test Fixture
3. Digital Multi meter
4. Intelect® Transport 2 Applicators (Accessories)
5. Dielectric Withstand (Hi-Pot) and ground resistance tester

NOTE:
Adjust Dielectric Withstand tester to indicatefault with 120 k Ohm Load across the outputwhen at specified test voltage.

6. Milliohm Meter
7. 10k Resistor
8. Ohmic Instruments UPM DT 10 or DT100 Ultrasound Power Meter
9. Dissolved Oxygen Test Kit used to testoxygen level of Degassed Water
10. Degassed Water (<5 ppm) for Ultrasound Power Meter Recipe(s) for Degassed Water
    1) Boil Distilled Water for 30 Minutes. Place water in a canning jar, and cover. Allow to cool to room temperature of approximately 70 °F (21 °C). May be refrigerated to aid cooling time.

       Or

    2) Bring Distilled Water to a boil. Place the container under vacuum for 5 to 10Minutes.

NOTE:
Canning jars are ideal storage and transport containers for Degassed Water. To minimize aeration of Degassed Water during transport, fill to a positive meniscus and slide the lid over the surface. Seal tightly.

When pouring Degassed Water into and out of containers pour slowly down the side of the container to minimize aeration.

Do not use Tap Water or Distilled Water in the Ultrasound Power Meter. Use only Degassed Water inorder to obtain correct test results. The chart below illustrates the oxygen content of Degassed, Tap, and Distilled Water.

WATER TYPE	ppm of OXYGEN
Degassed (per Recipe 1 or 2)	Less than 5 ppm
Tap Water	Up to 35 ppm
Distilled Water	Up to 20 ppm

D. Full Functional Tests

Perform the tests found in this section to verifyFull Functionality of new Therapy System and accessories.

E. Required Hand tools

1. M3 Cross head Screwdriver
2. M4 Cross head Screwdriver
3. Insulated Needle Nose Pliers
4. M3 Nut driver or Wrench

6.3 ELECTRICAL SAFETY

The Intelect® Transport 2 System has beentested to UL 60601-1, Standard for Safety for Medical Equipment.

NOTE:
This device complies with current leakage, ground continuity, and dielectric withstand (Hi-Pot) limits as prescribed by IEC/EN/UL 60601-1 and CSA/CAN 601.1 Medical Electrical,Part 1: General Requirements for Safety.

Facility, local and national limits and test methods may vary.

A. Power Requirements

Model: 4738..... Input: 100-240V
100 VA, 50/60 Hz

6.4 LEAKAGE TESTS

Conduct all necessary leakage tests as required per NFPA 99 (National Fire Protection Association)"Health Care Facility" standards

⚠ WARNING

UNIT FAILING DIELECTRIC WITHSTAND OR LEAKAGE TESTS COULD INDICATE SERIOUS INTERNAL PROBLEMS.

DO NOT PLACE UNIT BACK INTO SERVICE! SEND UNIT TO FACTORY FOR REPAIR! DO NOT ATTEMPT TO REPAIR!

6.5 VISUAL INSPECTION

General

Visually inspect the Intelect® Transport 2 Therapy System. A visual inspection can, to an experiencedtechnician, indicate possible abuse of the unit andinternal problems.

6.6 UNIT STARTUP AND FAN TESTING

A. Test

1. Place unit face up on work surface.

Figure 6.1

2. Connect power cord to unit and plug intoproper power receptacle.
3. Turn system on. Press the Enter button. IFCshould be highlighted. Press the Enter button.
4. Place hand at the back of system to verify fan is blowing out. **See Figure 6.1.**

B. Test Results

1. Unit will not start, unit failed test.
   a) Possible bad Main Power Switch.
   b) Possible bad Power Supply.
   c) Possible bad power outlet or Mains Power Cord.
2. Screen does not display, unit failed test.
   a) Possible bad display.
   b) Possible bad Control Board.
   c) Possible bad Power Supply.
   d) Visually check power LED. LED should illuminate Blue. Turn system off with Power button. Power LED should flash Blue.
   If Power LED illuminates Blue with systemOn and flashes Blue with system Off, thePower Supply is good. Replace Control Board.
3. Fan not blowing outward, Unit failed test
   a) Fan blowing inward.
   Fan wired wrong. Rewire or replace Fan.
   b) Fan not blowing.
      1) Possible bad Fan.
      2) Possible bad Power Supply.
      3) Possible bad Control Board

6.7 ELECTRICAL STIMULATOR TEST SYSTEM SETUP

The following tests for Stimulator Outputs will be performed on Channels 1 and 2.

A. Equipment Required

- ESTI-2 Load Test Box
- Calibrated Oscilloscope and Probes

B. System Set Up

1. Install known good Lead Wires to Channels 1 and 2 on the system. **See Figure 6.2.**
2. Connect Lead Wires from the system to the ESTI-2 Load Test Fixture. Channel 1 to Channel 1 IN and Channel 2 to Channel 2 IN. **See Figure 6.3.**
3. Connect Scope Probes to the Channel 1 To SCOPE and Channel 2 To SCOPE Tabs on the ESTI 2 Load Test Fixture respectively. **See Figure 6.3.**
4. Place ESTI-2 Load Switch in the 1 K position. See **Figure 6.3**.
5. **Install Power Cord into system and plug intoproper Power Supply. Turn system On.**

Figure 6.2

⚠ WARNING

The ESTI - 2 Load Box contains a 10-watt resistor which is not meant for continuous operation. Do not run the ESTI - 2 Load Box continuously.

NOTE:

The ESTI - 2 Load Box, part number 2757, isused to simulate patient resistance when testing waveforms. The ESTI - 2 is set up for both a 1K and 10K load. The 10K load is used for Microcurrent only which is notavailable on this unit. **See Figure 6.4.**

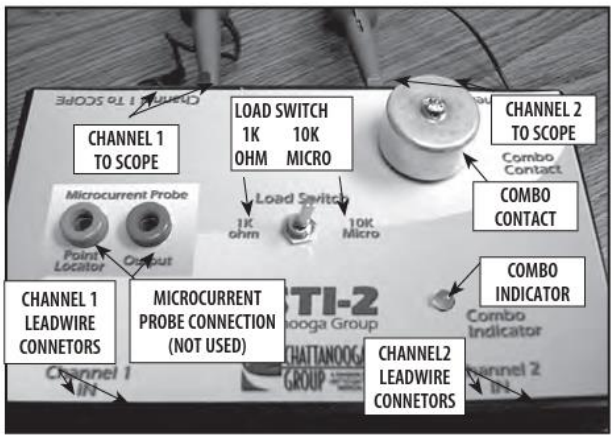


Figure 6.4

6.8 INTERFERENTIAL MODE TEST

It is assumed that the unit is ready for tests as described in **6.7 parts A and B**. If not, set up unitper **6.6 parts A and B** prior to performing tests.

C. Interferential Mode Test Procedures

1. Set Scope; Time- 100 µS, Channel- 20 V, andTrigger- DC.
2. Highlight Stim Channel 1. Press the Enterbutton.
3. Highlight IFC. Press the Enter button.
4. Increase Intensity until 50 is displayed.
5. Press START button.
6. Compare waveform on scope to **Figure 6.5.**
7. Press PAUSE button.
8. Verify that the amplitude displayed belowtimer drops to zero (0).
9. Verify that "Paused" is displayed below thedisplayed amplitude.
10. Press STOP button.

D. Interferential Mode Test Results

1. Waveform is the same between scope and**Figure 6.5**, amplitude dropped to zero when paused and "Paused" displayed below timer.
   Unit passed test.
2. No waveform or considerably differentwaveform.
   Unit failed test. Replace appropriate StimBoard.
3. Amplitude failed to "zero" when paused. Unit failed test. Replace appropriate StimBoard.
4. "Paused" did not display when unit paused.Unit failed test. Replace appropriate Stim Board.

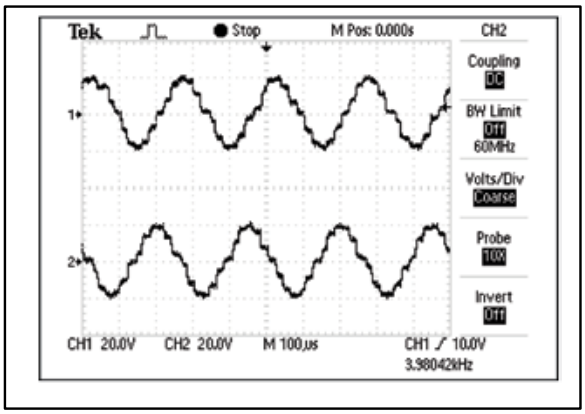


Figure 6.5

6.9 PREMODULATED MODE TEST

Set up System per **6.7 parts A and B** prior to performing test.

C. Premodulated Mode Test Procedures

1. Set Scope; Time- 2.50 mS, Channel- 20 V, and Trigger- DC
2. Highlight Stim Channel 1. Press the Enter button.
3. Highlight Premod. Press the Enter button.
4. Increase Intensity until 50 is displayed.
5. Press START button.
6. Compare waveform on scope to **Figure 6.6.**
7. Press STOP button.
8. Highlight Channel 2 and repeat steps 3 through 7.

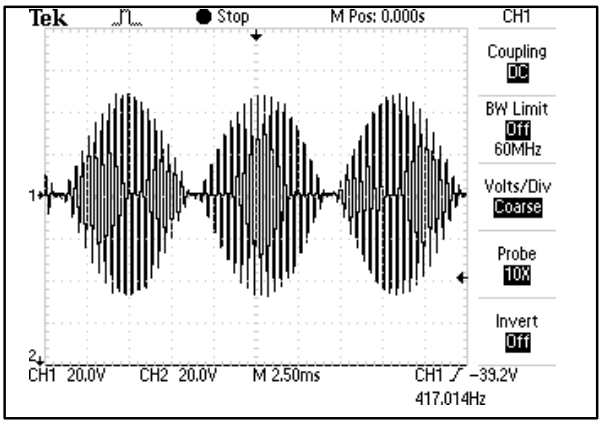


Figure 6.6

D. Premodulated Mode Test Results

1. Waveform is the same between scope and **Figure 6.6**.
   Unit passed test.

6.10 RUSSIAN MODE TEST

Set up System per **6.7 parts A and B** prior to performing test.

C. Russian Mode Test Procedures

1. Set Scope; Time- 5 mS, Channel- 50 V, andTrigger- DC
3. Highlight Stim Channel 1. Press Enterbutton.
4. Highlight Russian. Press Enter button.
5. Highlight Channel Mode. Press the Enterbutton until Co-Contract is displayed.
6. Highlight Cycle Time. Press the Enter button.
7. Highlight Continuous. Press the Enterbutton.
8. Increase Intensity until 100 is displayed.
9. Press START button.
10. Compare waveform on scope to **Figure 6.7.**
11. Verify that both Channels reach 100.
12. Press STOP button.
13. Highlight Channel 2 and repeat steps 4 through 12.

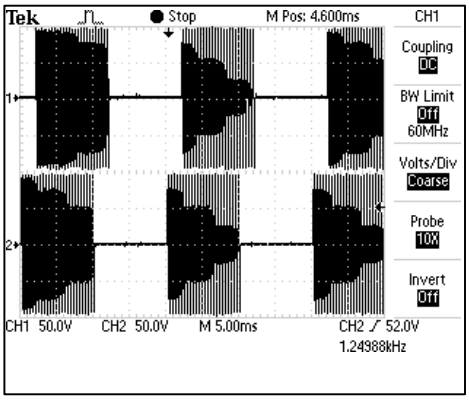


Figure 6.7

D. Russian Mode Test Results

1. Waveform is the same between scope and **Figure 6.**7 and amplitude reached 100 voltspeak.
   Unit passed test.
2. No waveform or considerably different waveform.
   Unit failed test. Replace appropriate StimBoard.
3. Amplitude failed to reach 100 volts peak onboth Channels.
   Unit failed test. Replace appropriate StimBoard.

6.11 HIGH VOLTAGE PULSED CURRENT (HVPC) MODE TEST

Set up unit per **6.7 parts A and B** prior to performing tests.

C. High Voltage Pulsed Current (HVPC) Mode Test Procedures

1. Set Scope; Time- 25 µS, Channel- 50 V, and Trigger- DC
2. Highlight Stim Channel 1. Press the Enter button.
3. Highlight High Volt. Press the Enter button.
4. Increase Intensity until 250 V is displayed.
5. Highlight Display and press the Enter button until Peak Current is displayed. Press the Enter button.
6. Press START button.
7. Compare waveform on scope to **Figure 6.8.**
8. Highlight Polarity. Press the Enter buttonuntil Positive is displayed.
9. Compare waveform form on scope to **Figure 6.9**.
10. The numbers displayed for amplitude must not exceed 1.5 Amps. **See Figure 6.10.**
11. Press STOP button.
12. Highlight Channel 2.
13. Press the Enter button and repeat steps 3 through 12.

D. High Voltage Pulsed Current (HVPC) Mode Test Results

1. Waveforms on scope the same as **Figures 6.8 and 6.9.** Amps do not exceed 1.5.

   Unit passed test.
2. No waveform or considerably different waveforms.

   Unit failed test. Replace appropriate Stim Board.
3. Amps exceed 1.5.

   Unit failed test. Replace appropriate Stim Board.

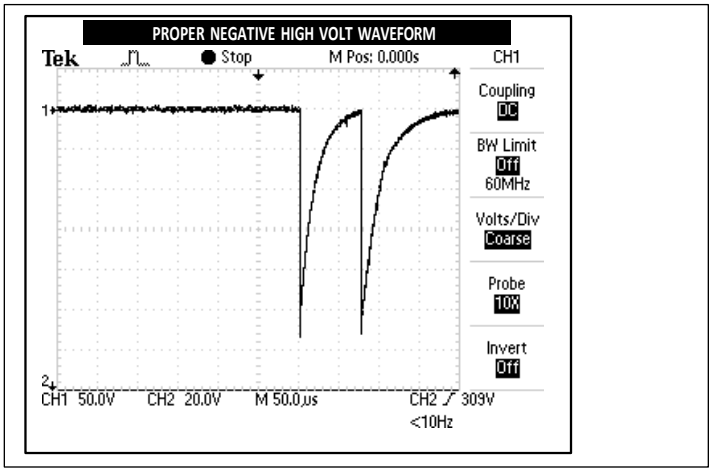


Figure 6.8

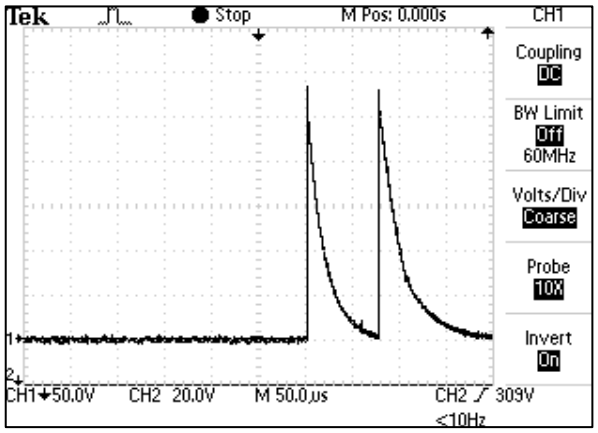


Figure 6.9

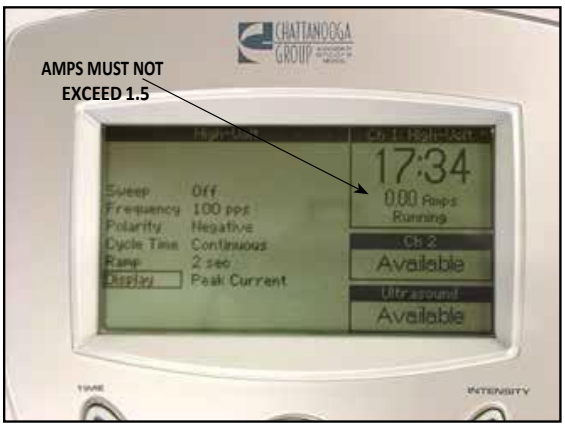


Figure 6.10

6.12 VMS MODE TEST

Set up unit per 6.7 parts A and B prior to performing tests.

C. VMS Mode Test Procedures

1. Set Scope; Time- 100 µS, Channel- 20 V, and Trigger- DC.
2. Highlight Stim Channel 1. Press the Enter button.
3. Highlight VMS. Press the Enter button.
4. Increase Intensity until 50 is displayed.
5. Press START button.
6. Compare waveform on scope to Figure 6.11a.
7. Press PAUSE button.
8. Verify that the amplitude displayed below timer drops to zero (0).
9. Verify that Paused is displayed below the displayed amplitude.
10. Press STOP button.

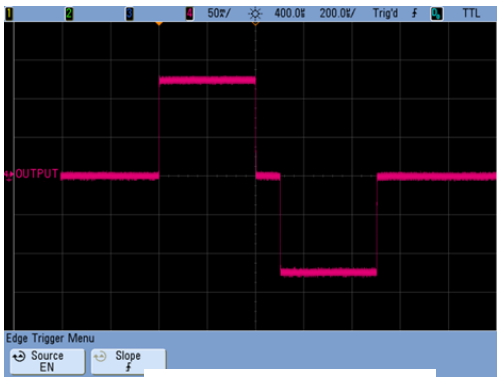


Figure 6.11 a

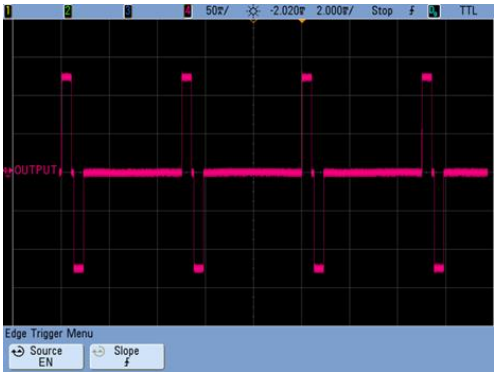


Figure 6.11 b

D. VMS Mode Test Results

1. Waveform is the same between scope and Figure 6.11 b, amplitude dropped to zero when paused and "Paused" displayed below timer.

   Unit passed test.

2. No waveform or considerably different waveform.

   Unit failed test. Replace appropriate Stim Board.

3. Amplitude failed to "zero" when paused. Unit failed test. Replace appropriate Stim Board.

4. "Paused" did not display when unit paused. Unit failed test. Replace appropriate Stim Board.

6.13 MICROCURRENT MODE TEST

1. Set up System per 5.6 parts A and B prior to performing test.
2. Place ESTI-2 Load Switch in the 10 K Micro position only for the Microcurrent Mode Tests. **See Figure 6.12**.

A. Microcurrent Mode Test Procedures

1. Set Scope; Time- 250 µS, Channel- 5.0 V, and Trigger- DC
2. Highlight Stim Channel 1. Press the Enter button.
3. Highlight Microcurrent. Press the Enter button.
4. Highlight Frequency.
5. Press the Up or Down Arrow button until 1000.0 Hz is displayed.
6. Press the Enter button.
7. Highlight Polarity. Press the Enter button until Alternating is displayed beside Polarity.

NOTE:
The Frequency value will continue to Ramp and rotate due to Alternating Polarity being selected. This is normal.

NOTE:
The Frequency value will continue to Ramp and rotate due to Alternating Polarity being selected. This is normal.

8. Increase Intensity until 1000 uA is displayed.
9. Press START button.
10. Compare waveform on scope to **Figure 6.13 and Figure 6.14.**

NOTE:
The output will alternate between positive and negative on the scope.

11. Press STOP button.
12. Highlight Stim Channel 2. Press the Enter button and repeat steps 3 through 11.

B. MicroCurrent Mode Test Results

1. Waveform is the same between scope and Figure 5.10 and **Figure 6.14**.
   Unit passed test.
2. No waveform or considerably different waveform. Unit failed test. Replace appropriate Stim Board.

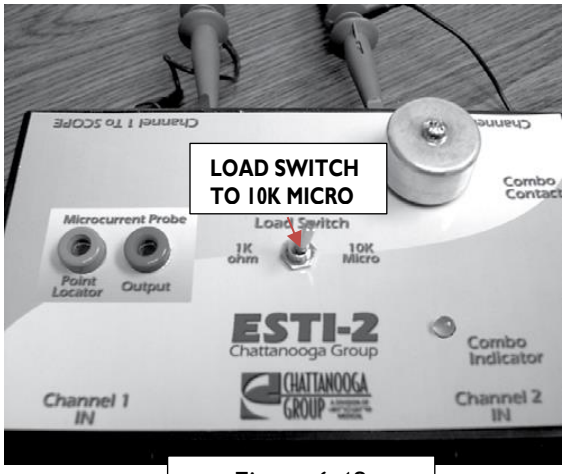


Figure 6.12

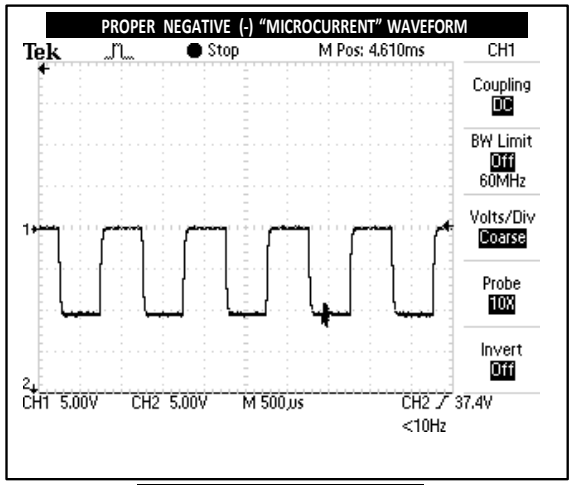


Figure 6.13

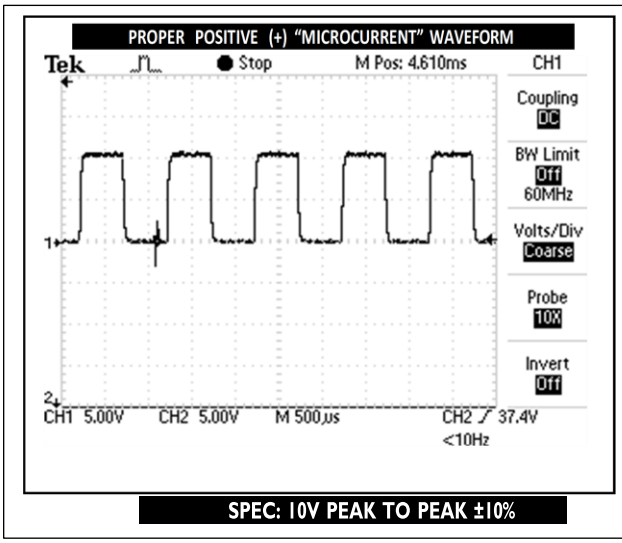


Figure 6.14

6.14 ULTRASOUND TESTS

Equipment Required for 6.14 and 6.15

- Degassed Water. **Refer to Section 6.2** for Degassed Water Recipes.
- Ohmic Instruments DT 100 UPM or DT 10Ultrasound Power Meter.
- Dissolved Oxygen Test Kit. Used to testoxygen level of degassed water.
- Intelect® Transport 2 Applicator.

Figure 6.15

6.15 ULTRASOUND APPLICATOR IDENTIFICATIONTEST

NOTE:
Use any Intelect® Transport 2 Applicator forthis test.

A. Ultrasound Applicator IdentificationTest Procedures

1. Without Ultrasound Applicator installed, turnunit on.
2. View the Ultrasound channel in the lower right corner of screen. It should read “Unplugged”. **See Figure 6.15.**
3. Connect Ultrasound Applicator into Applicator receptacle. **See Figure 6.16.** WatchApplicator LED while connecting to system. The LED should flash Green five times.
4. Look at the Ultrasound channel. It shouldread Available. **See Figure 6.16.**

Figure 6.16

B. Ultrasound Applicator Identification TestResults

1. Unit operates as described in **steps 2, 4,and 7.**
   Unit passed test.
2. "No Cal.", displays in Ultrasound channel.
   a) Applicator not calibrated or needsrecalibration.
   b) Possible bad Applicator. Retest withknown good Applicator.
3. Unplugged displays after ten seconds ofApplicator being connected to System.
   a) Possible bad applicator. Retest withknown good Applicator.
   b) Possible bad internal connection atUltrasound Board.
   c) Possible bad Ultrasound Board.
   d) Possible bad Control Board.

6.16 ULTRASOUND APPLICATOR OUTPUT TEST

Perform this test using all available Intelect® Transport 2 Applicators used with the System being tested.

A. Ultrasound Applicator Output TestProcedures

1. Set up Ohmic Instruments DT 100 or UPM DT 10 Ultrasound Power Meter per Operator's Instructions and fill test reservoirwith Degassed Water.
2. Place an Applicator into the Power Meterretainer. Make certain the Sound Head is completely submerged in the degassed water and centered directly over the Stainless Steel Cone. **See Figure 6.17.**
3. Zero or Tare meter.
4. Highlight Ultrasound. Press the Enterbutton.
5. Highlight Duty Cycle. Press the Enter button. Highlight Continuous and pressthe Enter button.
6. Highlight Display. Press the Enter buttonuntil Watts displays.
7. Press START button.

NOTE:
The position of the Sound Head over the stainless steel cone is critical to the test results.The Sound Head must be level and centered.

8. Increase Intensity until the appropriateWatts is displayed per **Figure 6.18.**
9. Compare Power Meter readings to **Figure 6.18** to all settings for the respective Applicator being tested as shown in **Figure 6.18.**
10. Press Frequency button until 3.3 MHz isdisplayed within the Frequency icon. Repeat test and compare readings to **Figure 6.18.**

NOTE:
The Applicator LED should constantly illuminate green during the Applicator Outputtests.

Figure 6.17

⚠ WARNING

Use only Degassed Water in Power Meter for testingUltrasound Applicators. Use of other types of water will cause false test results. **Refer to Section 6.2** for Degassed Water Recipes.

Do not aerate water when filling Power Meter.

APPLICATOR OUTPUT SPECIFICATIONS

APPLICATOR SIZE	POWER SETTING (WATTS)	OUTPUT RANGE
2 cm^2	1	0.8 - 1.2
	2	1.6 - 2.4
	3	2.4 - 3.6
5 cm^2	1	0.8 - 1.2
	2	1.6 - 2.4
	5	4.0 - 6.0
	6	4.8 - 7.2
10 cm^2	1	0.8 - 1.2
	5	4.0 - 6.0
	6.9	5.5 - 8.3
	12.7**	10.2 - 15.2

Figure 6.18

* 3.3 MHz Only

**1.0 MHz Only

and press the Enter button

6.16 ULTRASOUND APPLICATOR OUTPUT TEST (COUNTINUED)

FIGURE 5.14

B. Ultrasound Applicator Output Test Results

1. Output ranges fall within the specifiedranges as listed in **Figure 6.18.**

   Unit passed test.

2. Readings fall outside specified ranges of **Figure 6.18.**

   a) Possible bad Degassed Water in PowerMeter.

   b) Possible use of Power Meter other than Ohmic Instruments DT 100 or UPM DT 10Ultrasound Power Meter.

   c) Sound Head not leveled and centeredover cone in power meter.

   d) Possible bad or out of calibrationApplicator.

   e) Use known good Applicator.

   f)) Check Ultrasound Board internal connections.

   g) Replace Ultrasound Board.

   h) Replace Control Board.

6.17 ULTRASOUND DUTY CYCLE TEST

This test is performed using only the 5 cm² Intelect® Transport 2 Applicator.

A. Ultrasound Duty Cycle Test Procedures

1. **Set up Ohmic Instruments DT 100 or UPM DT 10 Ultrasound Power Meter per Operator's Instructions and fill test reservoirwith Degassed Water.**

⚠ WARNING

Use only Degassed Water in Power Meter for testing Ultrasound Applicators. Use of other types of water will cause false test results. **Refer to Section 6.2** for Degassed Water Recipes.

Do not aerate water when filling Power Meter.

Figure 6.19

2. Place the 5 cm² Applicator into the Power Meter retainer. Make certain the Sound Head is completely submerged in the degassed water and centered directly overthe Stainless Steel Cone. **See Figure 6.19.**
3. Zero or Tare meter.
4. Highlight Ultrasound on system. Press the Enter button.
5. Highlight Duty Cycle. Highlight Continuous

6.17 ULTRASOUND DUTY CYCLE TEST (CONTINUED)

6. Highlight Display. Press the Enter button until Watts appears beside Display.
7. Press START button.
8. Increase Intensity until the appropriate Watts is displayed. **See Figure 6.20.**
9. Compare Power Meter reading to **Figure 6.20.**
10. Press the STOP button.
11. Highlight Duty Cycle and press the Enter button. Highlight the next level of Duty Cycle and repeat **steps 6 through 10**. Repeat for remaining Duty Cycle levels.
12. Highlight Frequency. Press the Enter button until 3.3 MHz is displayed beside Frequency. Repeat **steps 4 through 11**.

B. Ultrasound Duty Cycle Test Results

1. Duty Cycles fall within the specified rangesas listed in Figure 6.20.

   Unit passed test.

2. Readings fall outside specified ranges of **Figure 6.20.**
   a. Possible bad degassed water in Power Meter
   b. Possible use of Power Meter other than Ohmic Instruments DT 100 or UPM DT 10 Ultrasound Power Meter.
   c. Possible bad or out of calibration Applicator. Retest with known good Intelect® Transport 2 Applicator. Possible bad internal connection atUltrasound Board.
   d. Replace possible bad Ultrasound Board. f) Replace possible bad Control Board.
   e. Replace possible bad Ultrasound Board. f) Replace possible bad Control Board.
   f. Replace possible bad Control Board.

DUTY CYCLE SPECIFICATIONS		
APPLICATOR SIZE	DUTY CYCLE	OUTPUT RANGE
2 cm² at 4.5 Watts Continuous	10%	0.3 - 0.6
	20%	0.7 - 1.1
	50%	1.8 - 2.7
5 cm² at 9 Watts Continuous	10%	0.7 - 1.1
	20%	1.4 - 2.2
	50%	3.6 - 5.4
10 cm² at 17.4 Watts Continuous Operating at 1mHz	10%	1.3 – 2.1
	20%	2.7 – 4.2
	50%	6.9 – 10.5
10 cm² at 13.9 Watts Continuous Operating at 3.3mHz	10%	1.1 – 1.7
	20%	2.3 – 3.4
	50%	5.5 – 8.4

Figure 6.20

6.18 COMBO OPERATION TEST

This test is performed using the 5 cm2Applicator.

Highlight Channel 1 and set up system per **6.6 parts A and B** prior to performing tests.

Connect the Transport® 2 5 cm2 Applicatorto the System. **See Figure 6.21**.
Applicator LED will flash green five times.

A. Combo Operation Test Procedures

1. Highlight Combo. Press the Enter button.
2. Highlight Display. Press the Enter buttonuntil Watts is displayed beside Display.
3. Highlight Waveform. Press the Enter button.
4. Press the Up or Down Arrow button untilIFC is highlighted. Press the Enter button.
5. Highlight Edit Stim. Press the Enter button. Increase Intensity until Channel 1 reads 50 mA.
7. Press START button.
8. Touch the Ultrasound Applicator to theCombo Contact on the ESTI-2 Load TestBox (P/N 27839). The Combo Indicator on the ESTI-2 should illuminate. **See Figure 6.22.**

B. Combo Operation Test Results

1. Combo Indicator light illuminates.Unit passed test.
2. Combo Indicator light does notilluminate.
   Unit failed test.
   Replace Channel 1 Stim Board.

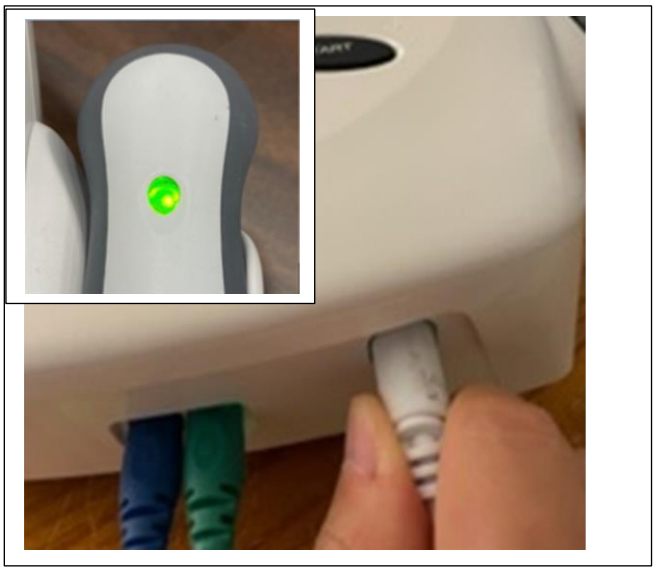


Figure 6.21

FIGURE 5.19

See attached videos for further information

7.1 SEPARATING TOP & BOTTOM

⚠ WARNING

Unplug the unit from the power source before attempting removal or replacement procedures to prevent electrical shock.

A. Part Numbers

Top.....47553
Base.....47983

B. Tools & Equipment Required

- M3 Screwdriver
- Flat Blade Screwdriver
- M3 Torq Screwdriver

C. Removing Top from Bottom

1. Place system face down on a soft worksurface.
2. Remove two screws that join the handle top and bottom. Remove handle lock
3. Remove Fan Grill.Use a Flat Blade Screwdriver to gently pry the Fan Grill free. **See Figure 7.1.**
4. Using a M3 cross head screw drive remove the four mounting screws securing the Top and Bottom together (Two that were hidden by the grill and two in holes near bottom front).**See Figure 7.2.**
5. Turn system over on its base and carefully separate the System Top from the BottomHousing by first disengaging connectors 1 and then 2 and 3.
6. Raise the system Top and disconnect the Fan, Power Supply, and Battery Harnesses from the Control Board. **See Figure 7.3.**
7. Put the unit back together by reversing **steps1 through 5**.

NOTE:

8. When assembling the unit, tuck the Ferrite bead between the power supply and the case. **See Figure 7.3. Pay attention to insulation and standoffs**

Figure 7.1

Figure 7.2

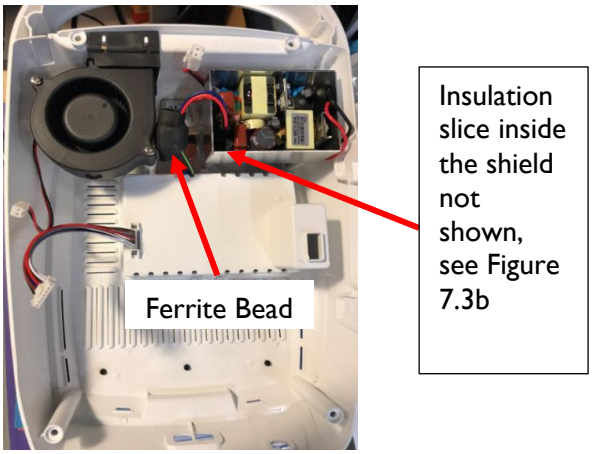


Figure 7.3a

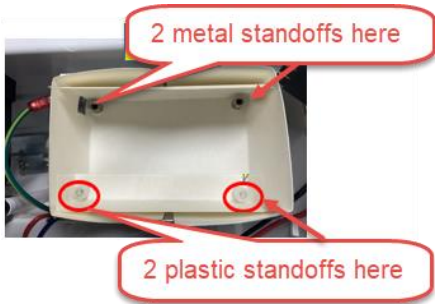


Figure 7.3 c

Figure 7.3 b

7.2 THERAPY SYSTEM FAN

D. Part Number 47159

E. Tools and Equipment Required: M4 Cross head Screwdriver

F. System Fan

1. Separate Top from Bottom. **Refer to 7.1,part C**.
2. Using a M4 Cross head Screwdriver, remove the two Fan Retaining Screws securing the Fan to the system Bottom. **See Figure 7.4.**
3. Remove the Fan Baffle from the Fan Housing. **See Figure 7.5.**
4. Replace the Fan by reversing **steps 1through 3.**

NOTE:

Do not over tighten the screws. Over tightening will damage the threads of thebrass standoffs.

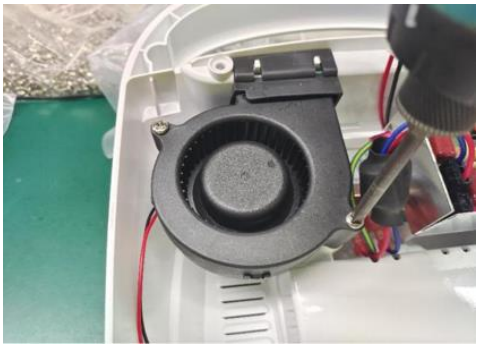


Figure 7.4

Figure 7.5

7.3 POWER SUPPLY

⚠ WARNING

Unplug the unit from the power source before attempting removal or replacement procedures to prevent electrical shock.

Part Number.....27265

A. Tools and Equipment Required

- M3 Corss head Screwdriver
- M3 Torx screwdriver
- Flat screw driver or plastic pick
- Insulated Needle Nose Pliers
- Digital Multi Meter
- 10k Resistor

B. Power Supply

1. Separate Top from Bottom. **Refer to 7.1,part C.**
2. Disengage 2 connectors as shown in the **Figure 7.6**: using flat head screwdriver or plastic pick to push the connector latch and lifting the connector at the same time.
3. Using the M3 Cross head Screwdriver, remove the 4 screws securing the Power Supply to the system Bottom and 2 connectors **See Figure 7.7.**
4. Lift the shield box (Power Supply Assembly sits inside) up to removefrom mounting tabs.

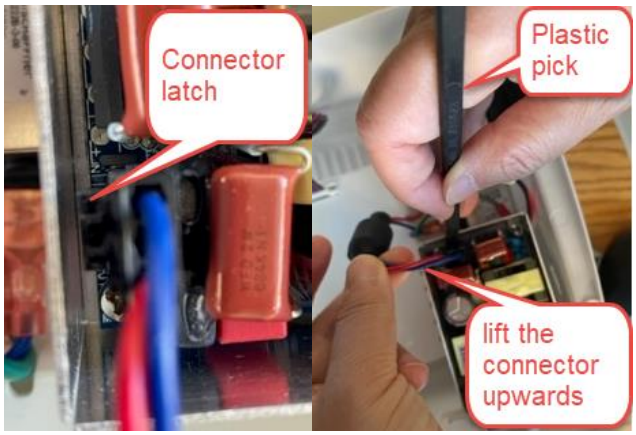


Figure 7.6

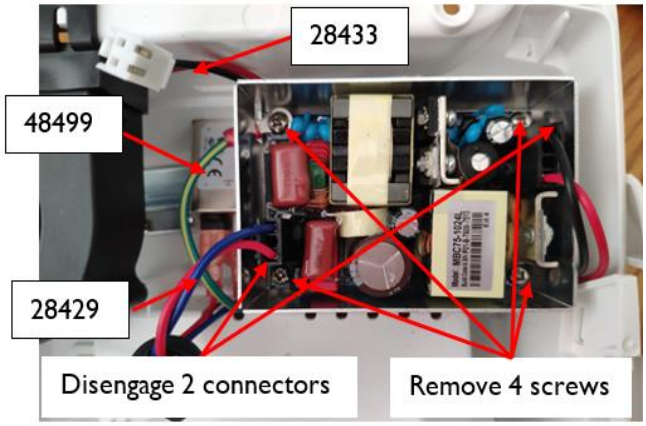


Figure 7.7

⚠ DANGER

POWER SUPPLIES RETAIN HIGH VOLTAGE! WHEN REMOVING FROM SYSTEM, HANDLE POWER SUPPLIES BY MOUNTING BRACKETS ONLY.

5. Discharge the 400V Capacitor by wrappinga 10k resistor around the probes of a Multi meter. Touch the leads of the Multi meter to the prongs on the capacitorto discard. **See Figure 7.8.**
6. Watch the Multi meter to verify that thevoltage across the capacitor dischargesclose to zero volts DC.
7. To remove the 3 harness 28433, 48499, 28429 in **Figure 7.7**, first remove the main inlet. See **Figure 7.9** using M3 Torx screwdriver
8. Using Insulated Needle Nose Pliers, disconnect the Power Supply Harnesses fromthe Mains Connector. **See Figure 7.10.**
9. Replace the Power Supply by reversing **steps1 through 5**.

⚠ WARNING

Do not touch the components of the Power Supply.

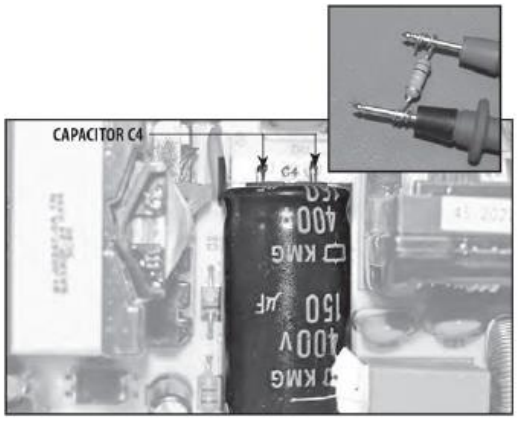


Figure 7.8

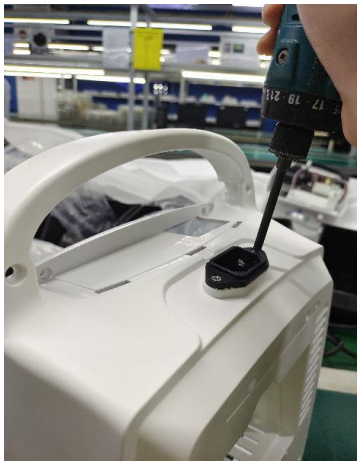


Figure 7.9

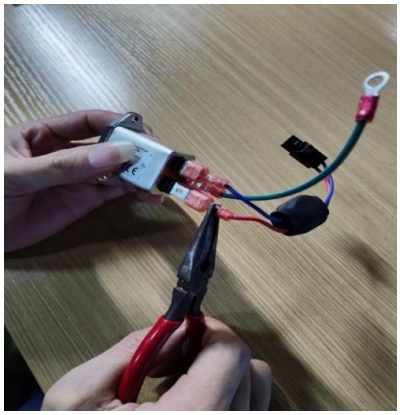


Figure 7.10

7.3 CHANNEL 1 STIM BOARD

⚠ WARNING

Unplug the unit from the power source before attempting removal or replacement procedures to prevent electrical shock.

A. Part Number..... PG17PCBA020

B. Tools and Equipment Required

- M3 Cross head Screwdriver

C. Channel 1 Stim Board

1. Separate Top from Bottom. **Refer to 7.1,part C.**
2. Using the M3 Cross head Screwdriver, remove the four screws securing Channel 1 Stim Board to the Stand Offs. **See Figure 7.11.**
3. Carefully lift the Channel 1 Stim Board from the unit. Make certain not to bend any of theHeader Connector Pins on the board below during removal. **See Figure 7.12.**
4. Replace Channel 1 Stim Board in reverse order of preceding steps. Make certain all Header Connector Pins are properly engaged.**See Figure 7.11.**

NOTE:

Do not over tighten the screws. Over tightening will damage the threads of thebrass inserts and Stand Offs.

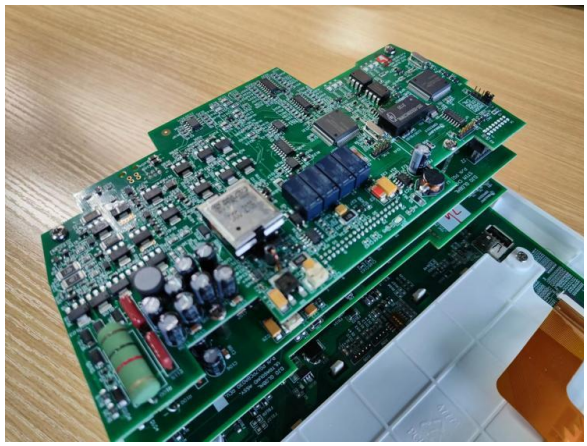


Figure 7.11

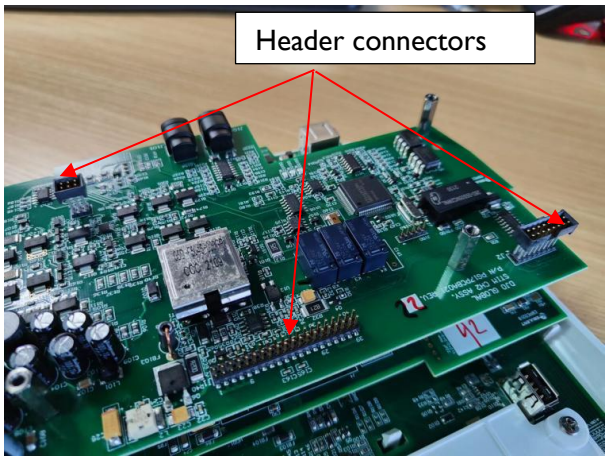


Figure 7.12

⚠ WARNING

Care must be taken during removal and replacement with the Header Pins. Bending the Header Pins may cause the unit to fail.

7.4 CHANNEL 2 STIM BOARD

⚠ WARNING

Unplug the unit from the power source before attempting removal or replacement procedures to prevent electrical shock.

A. Part Number PG17PCBA021

B. Tools and Equipment Required

- M3 Crosshead Screwdriver
- M3 Nut Driver or Wrench

C. Channel 2 Stim Board Removal

1. Separate Top from Bottom. **Refer to 7.1, part C.**
2. Remove Channel 1 Stim Board. **Refer to 7.4,part C**.
3. Using the M3 Nut Driver, remove the four Stand Offs securing Channel 2 Stim Board in place. **See Figure 7.12.**
4. Remove the 40 Pin Header from the back of the Channel 2 Stim Board. **See Figure 7.13.**

5 Install 40 Pin Header to back of new Channel 2 Stim Board. Make certain it iscompletely seated against board. **See Figure 7.13.**

6. Position the Channel 2 Stim Board over the Ultrasound Board aligning the 40 Pin Headerwith the 40 Pin Connector. **See Figure 7.14.**
7. Press the Channel 2 Stim Board into position until the board rests against the Ultrasound Board Stand Offs.
8. Secure the Channel 2 Stim Board using theStand Offs removed in **part C, step 3** above.
9. Install the Channel 1 Stim Board. **Refer to 7.4,part C.**
10. Re-assemble Top to Bottom. **Refer to 7.1, part C.**

NOTE:
Do not over tighten the Stand Offs or Screws.Over tightening will damage the threads of the Brass Inserts and Stand Offs.

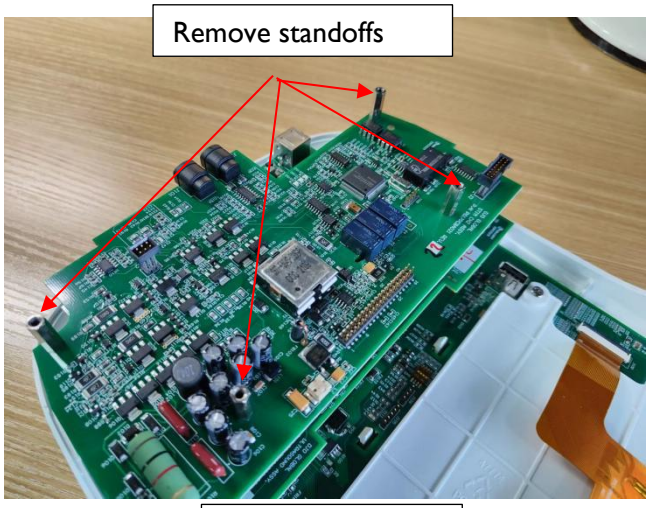


Figure 7.12

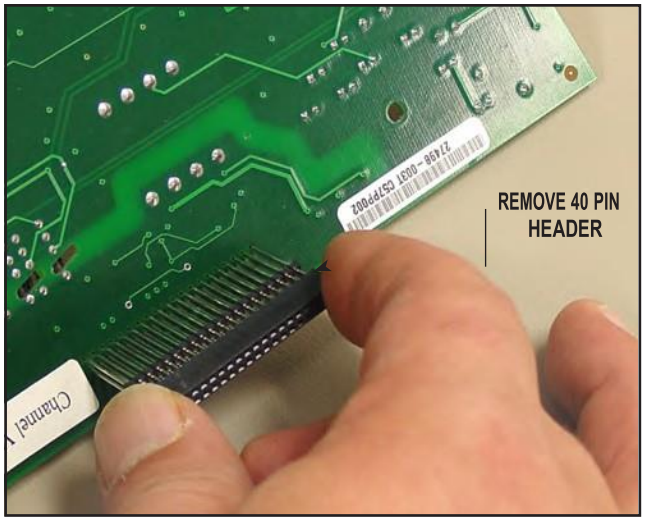


Figure 7.13

⚠ WARNING

Care must be taken during removal and replacement with the Header Pins. Bending the Header Pins may cause the unit to fail.

7.5 ULTRASOUND BOARD

⚠ WARNING

Unplug the unit from the power source before attempting removal or replacement procedures to prevent electrical shock.

A. Part Number PG17PCBA030

B. Tools and Equipment Required

- M3 Cross head Screwdriver
- M3 Nut Driver or Wrench

C. Ultrasound Board

1. Separate Top from Bottom. **Refer to 7.1,part C.**
2. Remove Channel 1 Stim Board. **Refer to 7.4, part C.**
3. Remove Channel 2 Stim Board. **Refer to 7.5, part C.**
4. Using the M3 Nut Driver, remove the 4 Stand Offs securing Ultrasound Board in place. **See Figure 7.14.**
5. Carefully remove the Ultrasound Board. **See Figure 7.15.**

NOTE:

Headers may stay on the board being removed or on the connector. If the header stays with the connector, remove and installon the replacement board.

6. Remove the 40 Pin Header from the Ultrasound Board or the connector. **SeeFigure 7.15.**
7. Install 40 Pin Header to back of new Ultrasound Board. Make certain it is completely seated against board. **SeeFigure 7.16**.
8. Position the Ultrasound Board over the Control Board aligning the 40 Pin Header with the 40 Pin Connector on Control Board.**See Figure 7.15.**
9. Press the Ultrasound Board into position until the board rests against the Control Board Stand Offs. Verify that it is well seatedby pushing on the sides of the connector.
10. Secure the Ultrasound Board using the Stand Offs removed in **part B, step 4** above.
11. Reassemble by reversing **steps 1through 3**

⚠ WARNING

Unplug the unit from the power source before attempting removal or replacement procedures to prevent electrical shock.

Figure 7.14

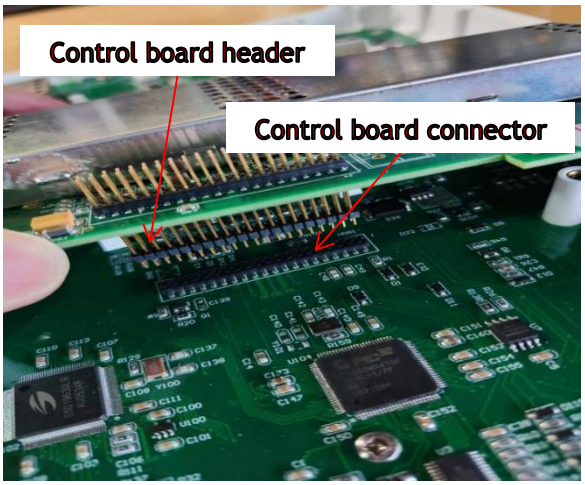


Figure 7.15

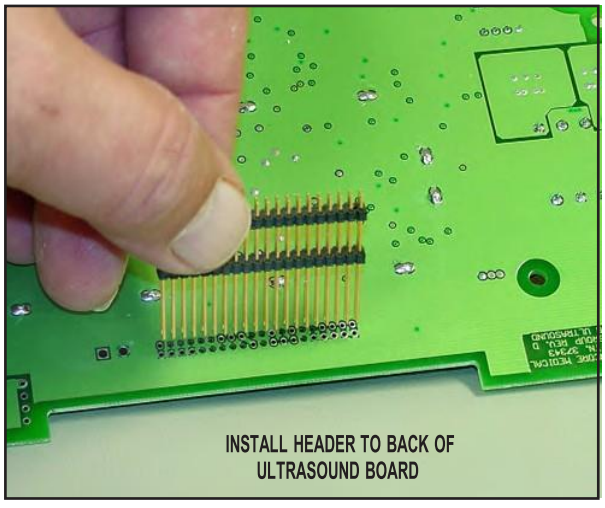


Figure 7.16

7.7 CONTROL BOARD ASSEMBLY

Part Number..... PG17PCBA010

A. Tools and Equipment Required

- M3 Cross head Screwdriver
- M3 Nut Driver or Wrench

B. Control Board Replacement

1. Separate Top from Bottom. **Refer to 7.1,part C.**
2. Remove Channel 1 Stim Board. **Refer to 7.4, part C.**
3. Remove Channel 2 Stim Board. **Refer to 7.5, part C.**
4. Remove Ultrasound Board, **Refer to 7.6,part C.**
5. Remove 7 screws securing theControl Board Assembly in position. **SeeFigure 7.17.**
6. Remove the four LCD Bracket MountingScrews. **See Figure 7.17.**
7. While lifting on the lower end of the Control Board Assembly with one hand, release the four Tabs securing the Control Board with the other, to remove the Control Board from the system Top. Two of the Tabs are located above the LCD and two below. **See Figures 7.17** and **7.18**.
8. On the back side of the Control Board, press down and back on the four release tabs and push back through the Control Board. **See Figure 7.18.**
9. Position the new Control Board Assembly over the Alignment Tabs of the system Top.Press the Control Board Assembly until theAlignment Tabs lock the Control Board intoposition.
10. Reverse **steps 1 through 9** to install the replacement Control Board.

NOTE:

Do not over tighten the Stand Offs or screws. Over tightening will damage the threads of the brass inserts and Stand Offs.

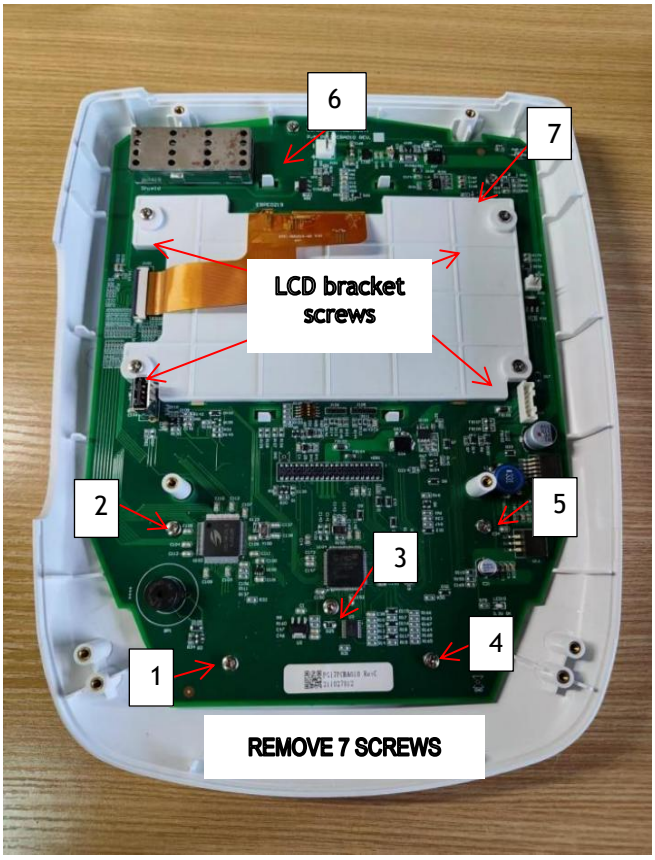


Figure 7.17

Figure 7.18

7.8 DISPLAY

A. Part Number 48606

B. Tools and Equipment Required

- M3 Cross head Screwdriver
- M3 Nut Driver or Wrench

C. LCD Replacement

1. Separate Top from Bottom. **Refer to 7.1,part C.**
2. Remove Channel 1 Stim Board. **Refer to 7.4,part C.**
3. Remove Channel 2 Stim Board. **Refer to 7.5,part C.**
4. Remove Ultrasound Board, **Refer to 7.6,part C.**
5. Remove Control Board, **Refer to 7.7,part C steps 1 through 9.**
6. Release the LCD tabs, **See Figure 7.19**
7. Disconnector the LCD flex cable from the ZIF connector, **See Figure 7.20.**
8. Disassembled LCD bracket from the Control PCBA, **See Figure 7.21.**
9. Replace the LCD by reversing the steps above.

⚠ WARNING

Unplug the unit from the power source before attempting removal or replacement procedures to prevent electrical shock.

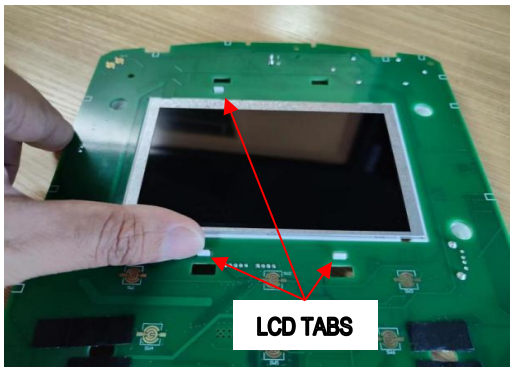


Figure 7.19

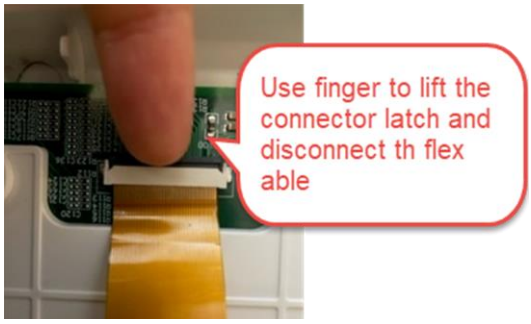


Figure 7.20

7.9 KEYMAT, ON/OFF BUTTON, OR UNIT TOP

Part Number

Keymat (48603) **and On/Off Button** (48602),

Tools and Equipment Required

- M3 Cross head Screwdriver
- M3 Nut driver or Wrench

B. Keymat Assembly Removal

1. Separate Top from Bottom. **Refer to 7.1,part C.**
2. Remove Channel 1 Stim Board. **Refer to 7.4,part C.**
3. Remove Channel 2 Stim Board. **Refer to 7.5,part C.**
4. Remove Ultrasound Board. **Refer to 7.6,part C.**
5. Remove Control Board Assembly. **Refer to7.7, part C.**
6. Lift out Keymat Assembly or On/Off Button. **See Figure 7.22**
7. Replace the Keymat or On/Off button by reversing **steps 1 through 6.**

NOTE:

Do not over tighten the Stand Offs or screws.Over tightening will damage the threads of the brass

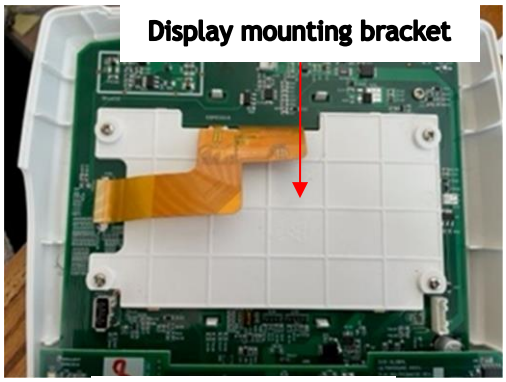


Figure 7.21

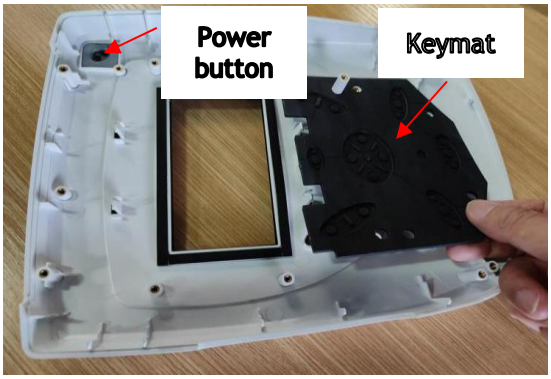


Figure 7.22

8.1 CLEANING THE SYSTEM

A. Cleaning the Therapy System

With the system disconnected from the powersource, clean the system with a clean, lint freecloth moistened with water and mild antibacterial soap. If a more sterile cleaning is needed, use a cloth moistened with an antimicrobial cleaner.

Do not submerse the system in liquids. Should the unit accidentally become submersed, contact the dealer or DJO, LLC Service Department immediately. Do not attempt to usea system that has been wet inside until inspected and tested by a Service Technician Certified by DJO, LLC.

Do not allow liquids to enter the ventilationholes in the optional modules. This could permanently damage the modules.

B. Cleaning Therapy System Lens

Clean the Therapy System Lens with the NOVUS® Plastic Polishing System. NOVUS can be purchased by going to www.novuspolish.com. Follow the instructions asgiven by NOVUS on their product.

Do Not Use alcohol or chlorine-based solventsas this may damage the lens.

8.2 CALIBRATION REQUIREMENT

Ultrasound Applicators:

Annual calibration is required for all Ultrasound Applicators. Only the Applicators should be sent to the factory or a Field Technician certified by DJO, LLC for this procedure.

8.3 FIELD SERVICE

A. All field service procedures as described in this Service Manual must be performed by aService Technician certified by DJO, LLC.

B. Any attempted outside the scope of this Service Manual is the sole responsibility andliability of the Field Technician performing such procedures.

C. After the performance of any Field Service, perform the tests as described in **6.3 through 6.16** to verify the system operates properly and within specifications prior to placing theunit back into operation.

8.4 FACTORY SERVICE

When the Intelect® Transport 2 TherapySystem requires factory service, contact the dealer or Chattanooga ServiceDepartment.

8.5 FIRMWAREUPDATES

The Firmware can be updated through the USB interface, Refer to the following steps.

1. Prepare a USB flash disk formatted as FAT32
2. Copy three files (**Figure 8.1**) to the root directory of the USB flash disk. These three files have similar names to the following.
   G17_CTRL_CMB_M*.bin is the app software of control board, R_FontLib*.bin is a font library and R_StrLib*.bin is a string library
3. Turn the device upside down, open the battery cover. Insert the USB flash disk **(Figure 8.2)** containing files into the USB interface of the device when the device is powered off.
4. Reverse the device to face up. Press and hold three keys (Time Down + Intensity Down + Library) at the same time and power up the device (**Figure 8.3**)
5. After the device is powered on, the Transport 2 Firmware Upgrade Program screen will appear. When programming, the power LED will flash fast (**Figure 8.4**)
6. After about 2 minutes, the upgrade process will be completed (**Figure 8.5**)
   After the integrity check is completed, the device will operate normally, You will see that the power LED flashes every 0.5 seconds and the screen is off.
   Upgrade Complete.

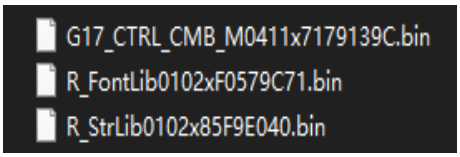


Figure 8.1


Figure 8.2

Figure 8.3

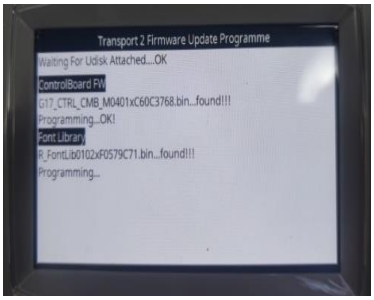


Figure 8.4

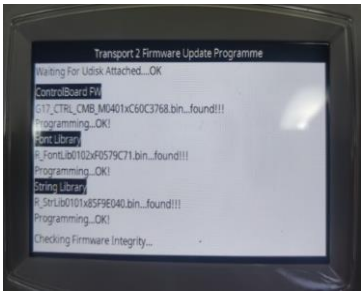


Figure 8.5

9.1 GENERAL PROCEDURES

A. Tools and Equipment Required

- All Ultrasound Applicators for the unit being serviced.
- Ohmic Instruments UPM DT 10 or UPM DT 100 Ultrasound Power Meter, set to "Watts".
- Degassed Water. **Refer to Section 6.2** for Degassed Water Recipes.

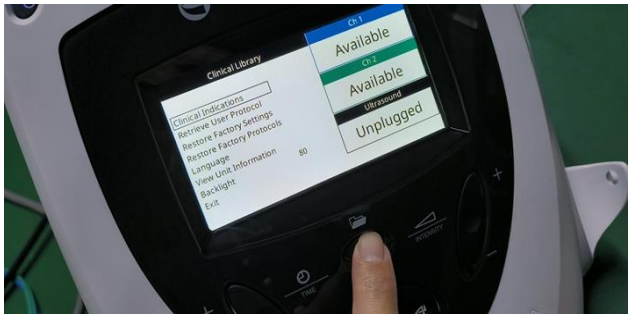


Figure 9.1

⚠ WARNING

Use only Degassed Water in Power Meter for calibrating Ultrasound Applicators.

Use of other types of water will cause false readings and bad test results.

See Section 6.2 for Degassed Water Recipes.

Use of other brands or types of tools, equipment, fixtures, materials, and supplies other than those specifically listed on **Section 6.2** will give bad test and calibration results.

If proper equipment is not available or cannot be obtained, send the Ultrasound Applicators to the factory for calibration.

Figure 9.2

B. Ultrasound Applicator Calibration Procedures

1. Perform the following on all Ultrasound Applicators for the unit being serviced atleast annually.
2. With the system on, press the Clinical Resources button once. **See Figure 9.1.**
3. Simultaneously press and hold the TreatmentTime and Intensity Decrease buttons for approximately 2 seconds. **See Figure 9.2**. Thecalibration procedures screen should display.
4. Press the Down Arrow button until US Applicator Calibration is highlighted.
5. Press the Enter button.
6. Place the Ultrasound Applicator being calibrated into the Ohmic Instruments UPM DT 100 or DT 10 Ultrasound PowerMeter and set meter to "Watts". **See Figure 9.3**.
7. Follow the instructions on the LCD Display.
8. When calibration is complete, follow the test procedures in **6.13 and 6.14** to verifythat the Applicator is calibrated.

Figure 9.3

10.1 SERVICE KITS LIST

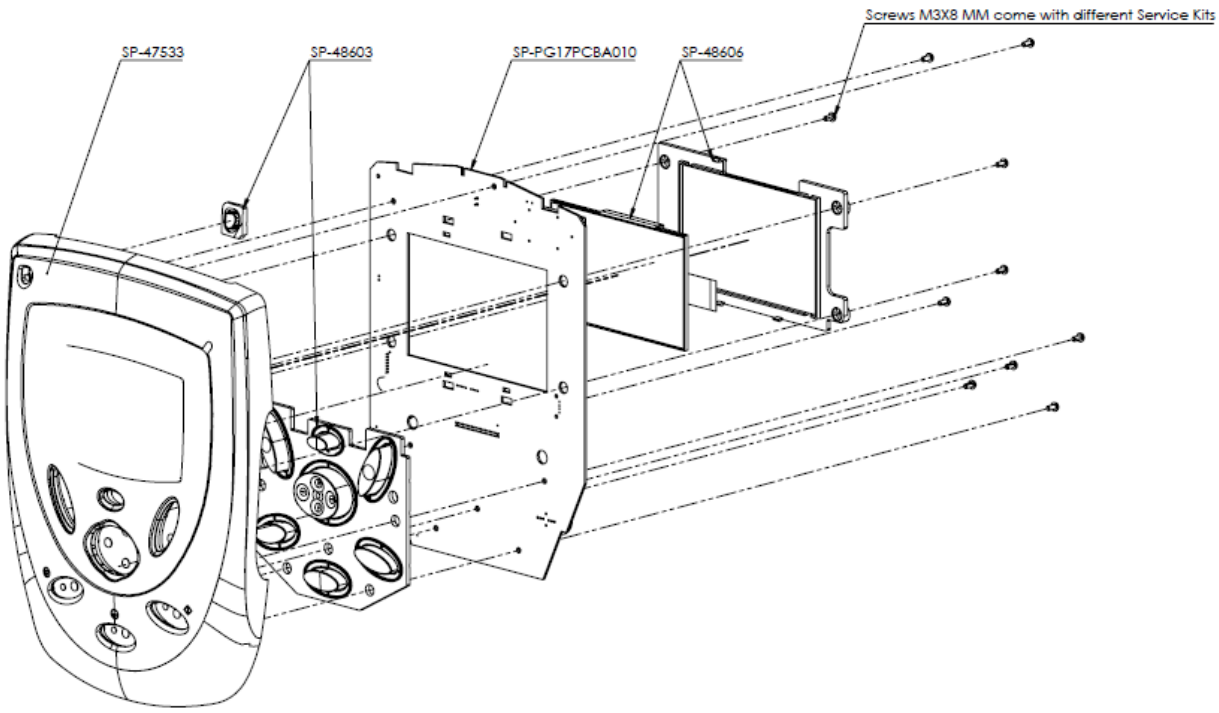
The service kits are design to contain major components and needed screws for easy repair or replacements
Please note individual component cannot be ordered separately.

Part Number Description	Contains	Part description	Qty
SP-47553 SP-TOP ASSY TRANSPORT 2	47553	TOP ASSY TRANSPORT 2	1
	47141	SCREW M3X8MM	4
	47493	BAG POLY 350X600MM 0.04MM	1
	47520	BAG SEAL 70X50MM 0.04MM	1
	LBL-SP47553-PK	LABEL OF SP-47553	1
SP-48606 SP-DISPLAY 5" 800 RGB X 480	48606	DISPLAY 5" 800 RGB X 480	1
	47984	COPPER TAPE LCD EMC	4
	47982	BRACKET ASSY DISPLAY TRANSPORT 2	1
	47142	SCREW M3X6MM	4
	48605	BAG SEAL 70X50MM 0.04MM	1
	47520	BAG SEAL 70X50MM 0.04MM	1
	LBL-SP48606-PK	LABEL OF SP-48606	1
SP-48603 SP-KEY PADS	48603	KEYMAT TRANSPORT 2	1
	48602	POWER BUTTON TRANSPORT 2	1
	47580	BAG SEAL 250X150MM 0.04MM	1
	LBL-SP48603-PK	LABEL OF SP-48603	1
SP-PG17PCBA010 SP-PCBA CONTROL TRANSPORT 2	PG17PCBA010	PCBA CONTROL TRANSPORT 2	1
	47142	SCREW M3X6MM	7
	47158	BAG SEAL ANTI-STATIC 300X230MM 0.075MM	1
	47520	BAG SEAL 70X50MM 0.04MM	1
	LBL-SPPG17PCBA010-PK	LABEL OF SP-PG17PCBA010	1
SP-PG17PCBA030 SP-PCBA U/S TRANSPORT 2	PG17PCBA030	PCBA U/S TRANSPORT 2	1
	47142	SCREW M3X6MM	4
	28029	HEADER 40 PIN DBL ROW SAMTEC INC TW-20-12-G-D-540-125	1
	47158	BAG SEAL ANTI-STATIC 300X230MM 0.075MM	1
	47520	BAG SEAL 70X50MM 0.04MM	2
	LBL-SPPG17PCBA030-PK	LABEL OF SP-PG17PCBA030	1

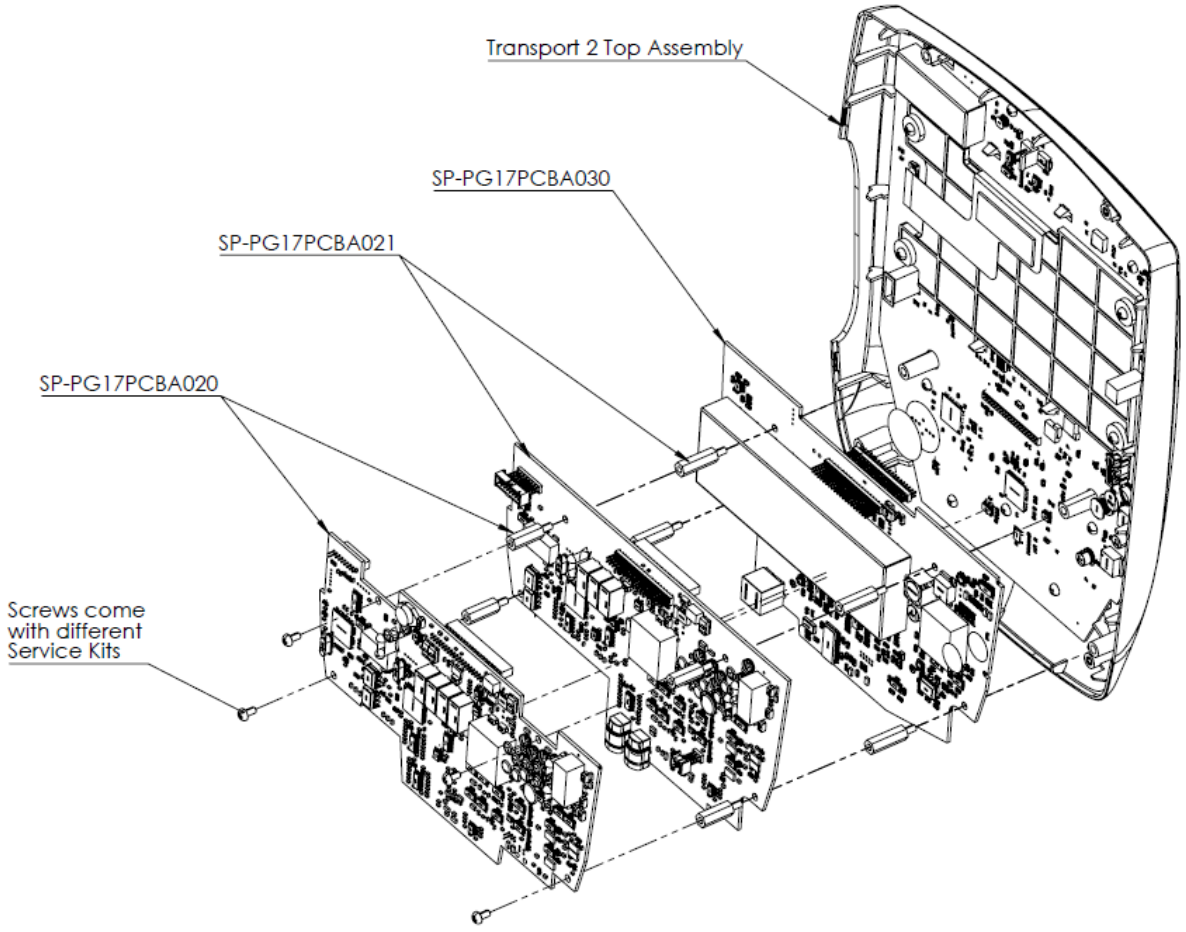
SP-47252 SP-BASE ASSY U/S TRANSPORT 2 (U/S only)	47252	BASE U/S TRANSPORT 2	1
	47989	HARNESS BATTERY TRANSPORT 2	1
	47141	SCREW M3X8MM	4
	21190	DECAL ELECTRONICS DISPOSAL	1
	47985	COUNTER PLATE FOR MAGNET TRANSPORT 2	2
	47142	SCREW M3X6MM	4
	47152	INLET IEC FILTER FN9222B-3-06	1
	47413	SCREW KW M3X8MM	2
	47986	HANDLE LOCK TRANSPORT 2	1
	47981	SCREW M4X8MM	2
	47987	RUBBER FEET FRONT BLACK	1
	47988	RUBBER FEET REAR BLACK	1
	47772	ADHESIVE RUBBER FEET FRONT	1
	47773	ADHESIVE RUBBER FEET REAR	1
	47493	BAG POLY 350X600MM 0.04MM	1
	47520	BAG SEAL 70X50MM 0.04MM	1
	LBL-SP47252-PK	LABEL OF SP-47252	1
SP-27265-1 SP-POWER SUPPLY & PARTS	27265	POWER SUPPLY TRANSPORTABLE	1
	28429	HARNESS EPR MOBILE MAIN INPUT	1
	28433	HARNESS 75WALL MAIN OUTPUT	1
	48449	PE CABLE ASSY TRANSPORT 2	1
	47990	SHIELD POWER SUPPLY TRANSPORT 2	1
	48300	INSULATION SLICES TRANSPORT 2	1
	27411	STANDOFF M3X7MM	2
	20028	STANDOFF M3X7MM	2
	47142	SCREW M3X6MM	2
	48605	BAG SEAL ANTI-STATIC 190X120MM 0.075MM	1
	47520	BAG SEAL 70X50MM 0.04MM	1
	LBL-SP27265-PK	LABEL OF SP-27265	1
SP-47159 SP- FAN AND PARTS	27367	SEAL FAN TRANSPORTABLE	1
	47159	FAN ASSY TRANSPORT 2	1
	47136	SCREW M4X35MM	2
	48605	BAG SEAL ANTI-STATIC 190X120MM 0.075MM	1
	47520	BAG SEAL 70X50MM 0.04MM	1
	LBL-SP47159-PK	LABEL OF SP-47159	1
SP-27256-1 HANG UP APPLICATOR TRANSPORT 2	27256-1	HANG UP APPLICATOR TRANSPORT 2	1
	47580	BAG SEAL 250X150MM 0.04MM	1
	LBL-SP27256-1-PK	LABEL OF SP-27256-1	1
SP-47410 SP-BATTERY COVER ASSY TRANSPORT 2	47410	BATTERY COVER ASSY TRANSPORT 2	1
	47580	BAG SEAL 250X150MM 0.04MM	1
	LBL-SP47410-PK	LABEL OF SP-47410	1

SP-PG17PCBA020 (Combo only) SP-PCBA STIM CH1 TRANSPORT 2 & PARTS	47770	STANDOFF M3X16MM	4
	PG17PCBA020	PCBA TRANSPORT 2 STIM CH1	1
	47142	SCREW M3X6MM	4
	47158	BAG SEAL ANTI-STATIC 300X230MM 0.075MM	1
	47520	BAG SEAL 70X50MM 0.04MM	1
	LBL-SPPG17PCBA020-PK	LABEL OF SP-PG17PCBA020	1
SP-PG17PCBA021 (Combo only) SP-PCBA STIM CH2 TRANSPORT 2 & PARTS	PG17PCBA021	PCBA TRANSPORT 2 STIM CH2	1
	47142	SCREW M3X6MM	4
	48018	STANDOFF M3X19MM	4
	28030	HEADER 40 PIN DBL ROW SAMTEC INC ESQT-120-02-GF-D-496	1
	47158	BAG SEAL ANTI-STATIC 300X230MM 0.075MM	1
	47520	BAG SEAL 70X50MM 0.04MM	1
	LBL-SPPG17PCBA021-PK	LABEL OF SP-PG17PCBA021	1
SP-47983 (Combo only) SP-BASE COMBO ASSY TRANSPORT 2	47983	BASE COMBO TRANSPORT 2	1
	47989	HARNESS BATTERY TRANSPORT 2	1
	47141	SCREW M3X8MM	4
	21190	DECAL ELECTRONICS DISPOSAL	1
	47985	COUNTER PLATE FOR MAGNET TRANSPORT 2	2
	47142	SCREW M3X6MM	4
	47152	INLET IEC FILTER FN9222B-3-06	1
	47413	SCREW KW M3X8MM	2
	47986	HANDLE LOCK TRANSPORT 2	1
	47981	SCREW M4X8MM	2
	47987	RUBBER FEET FRONT BLACK	1
	47988	RUBBER FEET REAR BLACK	1
	47772	ADHESIVE RUBBER FEET FRONT	1
	47773	ADHESIVE RUBBER FEET REAR	1
	47493	BAG POLY 350X600MM 0.04MM	1
	47520	BAG SEAL 70X50MM 0.04MM	1
	LBL-SP47983-PK	LABEL OF SP-47983	1
SP-28029 SP-HEADERS TRANSPORT 2	28029	HEADER 40 PIN DBL ROW SAMTEC INC TW-20-12-G-D-540-125	2
	28030	HEADER 40 PIN DBL ROW SAMTEC INC ESQT-120-02-GF-D-496	2
	48605	BAG SEAL ANTI-STATIC 190X120MM 0.075MM	1
	LBL-SP28029-PK	LABEL OF SP-28029	1

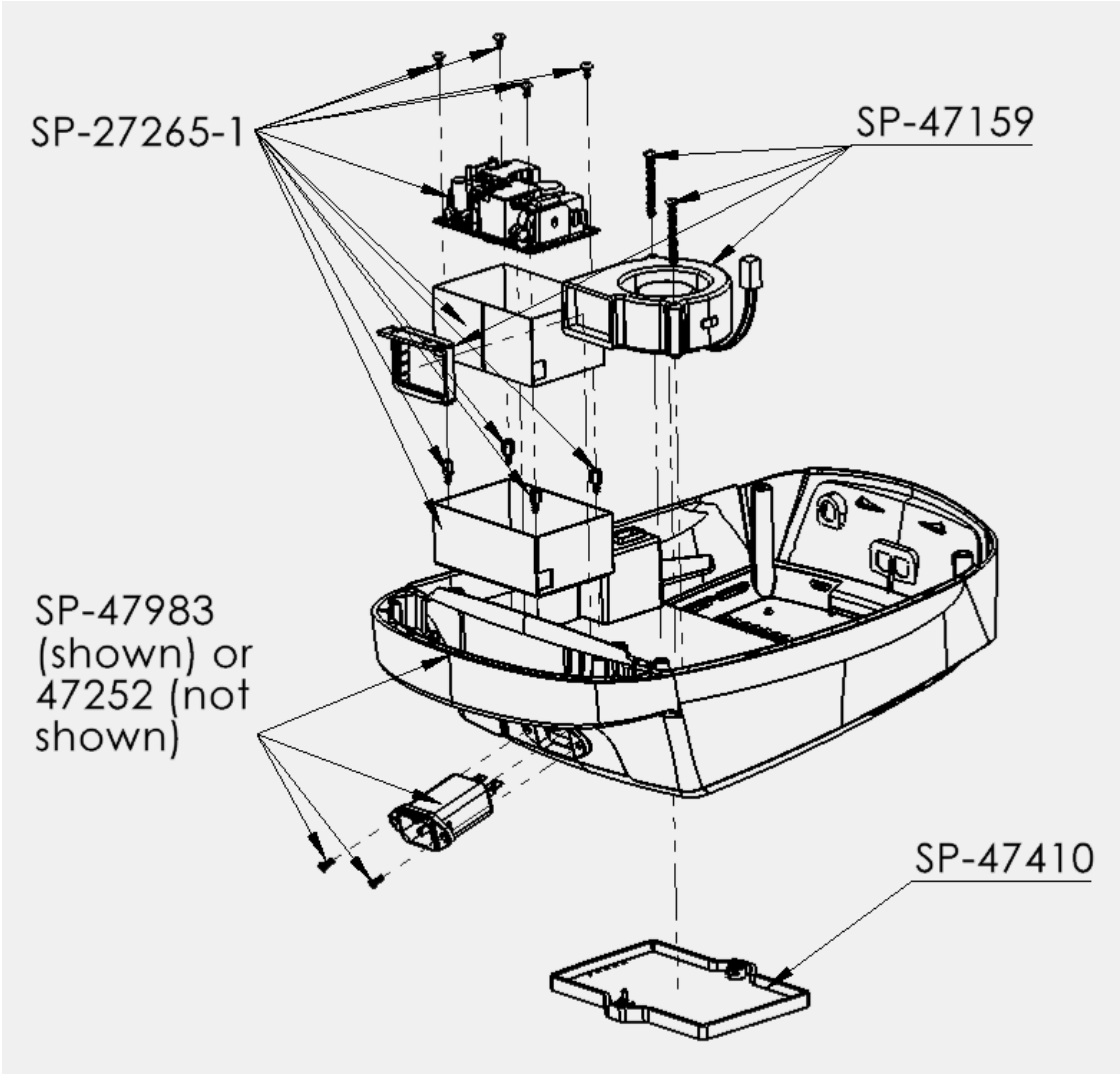
10.2 INTELECT® TRANSPORT 2 TOP ASSEMBLY



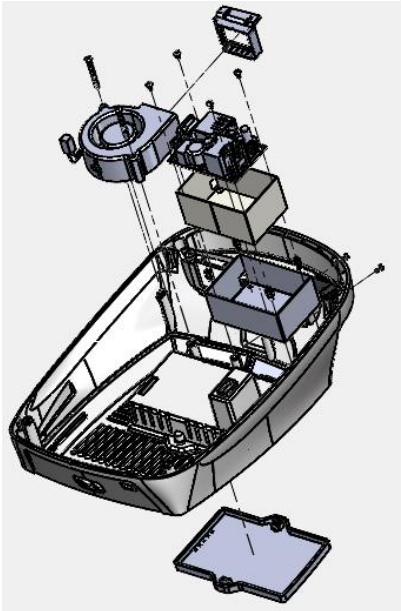
10.3 INTELECT® TRANSPORT 2 ULTRASOUD AND STIM BOARDS



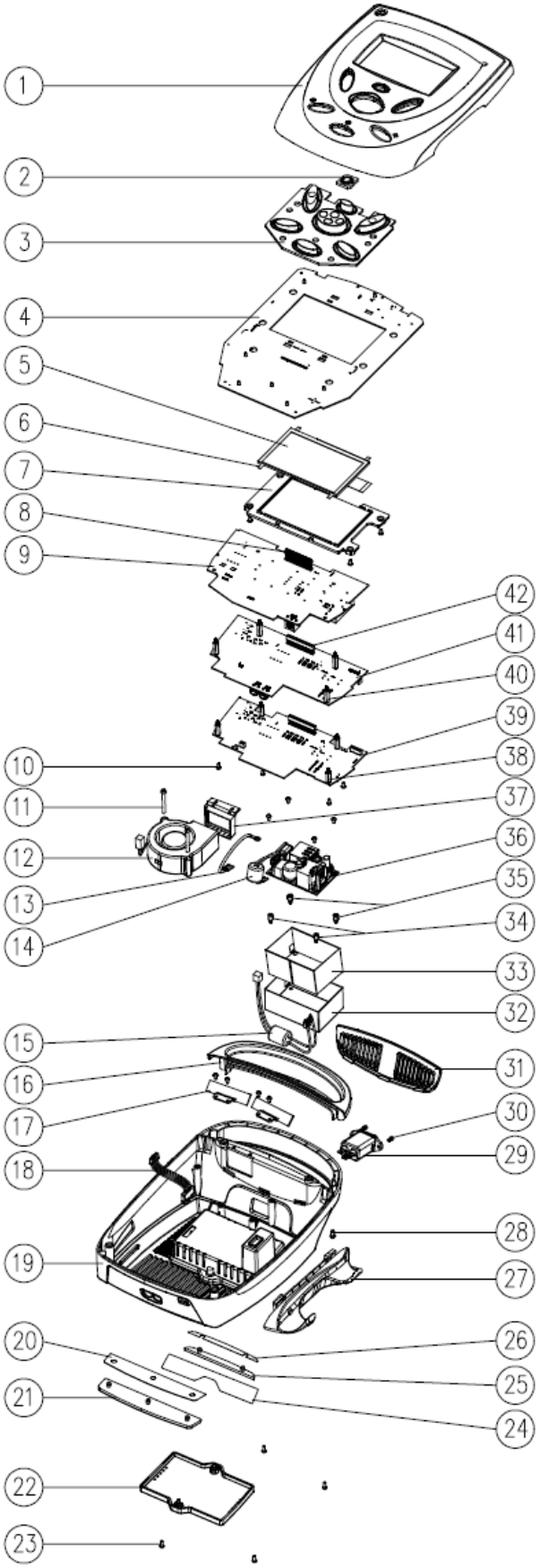
10.4 INTELECT® TRANSPORT 2 BASE ASSEMBLY



View from the other direction

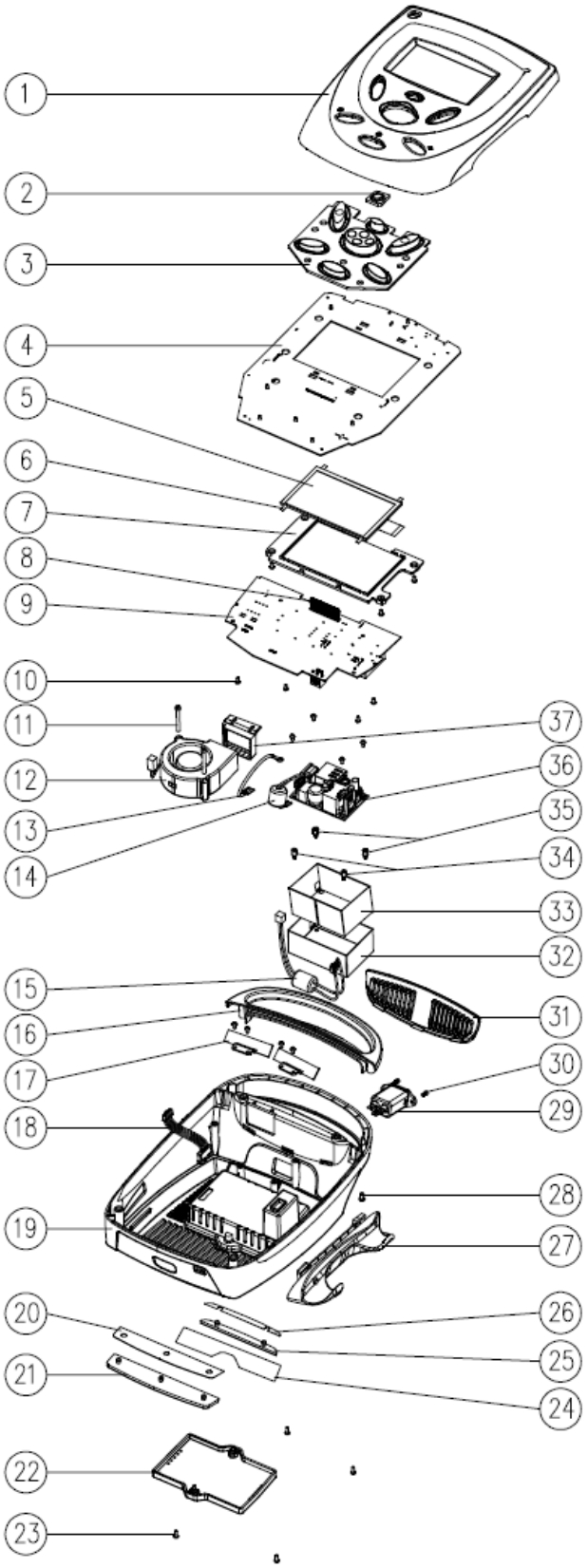


10.5 INTELECT® TRANSPORT 2 COMBO FINAL ASSEMBLY



NO.	PART NO.	DESCRIPTION	QTY.
42	28030	HEADER 40 PIN DBL ROW SAMTEC INC ESQT-120-02-GP-D-496	1
41	PG17PCBA021	PCBA TRANSPORT 2 STIM CH2	1
40	48018	STANDOFF M3X19MM	4
39	PG17PCBA020	PCBA TRANSPORT 2 STIM CH1	1
38	47770	STANDOFF M3X16MM	4
37	27367	SEAL FAN TRANSPORTABLE	1
36	27265	POWER SUPPLY TRANSPORTABLE	1
35	27411	STANDOFF M3X7MM	2
34	20028	STANDOFF M3X7MM	2
33	48300	INSULATION SLICES TRANSPORT 2	1
32	47990	SHIELD POWER SUPPLY TRANSPORT 2	1
31	47263	VENT REAR TRANSPORT 2	1
30	47413	SCREW KW M3X8MM	2
29	47152	INLET IEC FILTER FN9222B-3-06	1
28	47981	SCREW M4X8MM	2
27	27256-1	HANG UP APPLICATOR TRANSPORT 2	1
26	47773	ADHESIVE RUBBER FEET REAR	1
25	47988	RUBBER FEET REAR BLACK	1
24	48025	DECAL SER COMBO INTL TARNSPORT 2	1
23	47141	SCREW M3X8MM	4
22	47410	BATTERY COVER ASSY TRANSPORT 2	1
21	47987	RUBBER FEET FRONT BLACK	1
20	47772	ADHESIVE RUBBER FEET FRONT	1
19	47983	BASE COMBO TRANSPORT 2	1
18	47989	HARNESS BATTERY TRANSPORT 2	1
17	47985	COUNTER PLATE FOR MAGNET TRANSPORT 2	2
16	47986	HANDLE LOCK TRANSPORT 2	1
15	28433	HARNESS 75WALL MAIN OUTPUT	1
14	28429	HARNESS EPR MOBILE MAIN INPUT	1
13	48449	PE CABLE ASSY TRANSPORT 2	1
12	47159	FAN ASSY TRANSPORT 2	1
11	47136	SCREW M4X35MM	2
10	47142	SCREW M3X6MM	23
9	PG17PCBA030	PCBA U/S TRANSPORT 2	1
8	28029	HEADER 40 PIN DBL ROW SAMTEC INC TW-20-12-G-D-540-125	1
7	47982	BRACKET DISPLAY ASSY TRANSPORT 2	1
6	47984	COPPER TAPE LCD EMC	4
5	48606	SP-DISPLAY 5″ 800 RGB X 480	1
4	PG17PCBA010	PCBA CONTROL TRANSPORT 2	1
3	48603	KEYMAT TRANSPORT 2	1
2	48602	POWER BUTTON TRANSPORT 2	1
1	47553	TOP ASSY TRANSPORT 2	1

10.6 INTELECT® TRANSPORT 2 ULTRASOUND FINAL ASSEMBLY



NO.	PART NO.	DESCRIPTION	QTY.
37	27367	SEAL FAN TRANSPORTABLE	1
36	27265	POWER SUPPLY TRANSPORTABLE	1
35	27411	STANDOFF M3X7MM	2
34	20028	STANDOFF M3X7MM	2
33	48300	INSULATION SLICES TRANSPORT 2	1
32	47990	SHIELD POWER SUPPLY TRANSPORT 2	1
31	47263	VENT REAR TRANSPORT 2	1
30	47413	SCREW KW M3X8MM	2
29	47152	INLET IEC FILTER FN9222B-3-06	1
28	47981	SCREW M4X8MM	2
27	27256-1	HANG UP APPLICATOR TRANSPORT 2	1
26	47773	ADHESIVE RUBBER FEET REAR	1
25	47988	RUBBER FEET REAR BLACK	1
24	47522	DECAL SER U/S DOM TRANSPORT 2	1
23	47141	SCREW M3X8MM	4
22	47410	BATTERY COVER ASSY TRANSPORT 2	1
21	47987	RUBBER FEET FRONT BLACK	1
20	47772	ADHESIVE RUBBER FEET FRONT	1
19	47252	BASE U/S TRANSPORT 2	1
18	47989	HARNESS BATTERY TRANSPORT 2	1
17	47985	COUNTER PLATE FOR MAGNET TRANSPORT 2	2
16	47986	HANDLE LOCK TRANSPORT 2	1
15	28433	HARNESS 75WALL MAIN OUTPUT	1
14	28429	HARNESS EPR MOBILE MAIN INPUT	1
13	48449	PE CABLE ASSY TRANSPORT 2	1
12	47159	FAN ASSY TRANSPORT 2	1
11	47136	SCREW M4X35MM	2
10	47142	SCREW M3X6MM	23
9	PG17PCBA030	PCBA U/S TRANSPORT 2	1
8	28029	HEADER 40 PIN DBL ROW SAMTEC INC TW-20-12-G-D-540-125	1
7	47982	BRACKET DISPLAY ASSY TRANSPORT 2	1
6	47984	COPPER TAPE LCD EMC	4
5	48606	SP-DISPLAY 5″ 800 RGB X 480	1
4	PG17PCBA010	PCBA CONTROL TRANSPORT 2	1
3	48603	KEYMAT TRANSPORT 2	1
2	48602	POWER BUTTON TRANSPORT 2	1
1	47553	TOP ASSY TRANSPORT 2	1

DJO, LLC ("Company"), warrants that the Intelect® Transport 2 Therapy System ("Products") are free of defects in material and workmanship. This warranty shall remain in effect for two years (24 months) from the date of original consumer purchase. If these Products fail to function during the two years warranty period due to a defect in material or workmanship, at the Company's option, the Company or the selling dealer will repair or replace the respective Product without charge within a period of thirty days from the date on which the Product is returned to the Company or the dealer.

All repairs to the Product must be performed by a service center certified by the Company. Any modifications or repairs performed by unauthorized centers or groups will void this warranty.

The warranty period for certain accessories is 90 days. Accessories consist of Lead Wires, Electrodes, and Nylatex®. The warranty period for the Battery and Ultrasound Applicators is one year (12 Months).

This Warranty Does Not Cover:

- Replacement parts or labor furnished by anyone other than the Company, the selling dealer, or a certified Company service technician.
- Defects or damage caused by labor furnished by someone other than Company, the selling dealer, or a certified Company service technician.
- Any malfunction or failure in the Product caused by product misuse, including, but not limited to, the failure to provide reasonable and required maintenance or any use that is inconsistent with the Product User's Manual.

COMPANY SHALL NOT BE LIABLE IN ANY EVENT FOR INCIDENTAL OR CONSEQUENTIAL DAMAGES.

Some locations do not allow the exclusion or limitation of incidental or consequential damages, so the above limitation or exclusion may not apply to you.

To obtain service from Company or the selling dealer under this warranty:

1. A written claim must be made within the warranty period to the Company or the selling dealer. Written claims made to the Company should be sent to:

   ChattProduct.Support@djoglobal.com (USA)
   Or
   internationalproductsupport@djoglobal.com (Other countries)

2. The Product must be returned to the Company or the selling dealer by the owner. A Return Authorization (RA) Number must be obtained before returning any product to the Company.

   This warranty gives you specific legal rights and you may also have other rights which vary from location to location.

The Company does not authorize any person or representative to create for it any other obligation or liability in connection with the sale of the Product.

Any representative or agreement not contained in the warranty shall be void and of no effect.

THE FOREGOING WARRANTY IS IN LIEU OF ALL OTHER WARRANTIES, EXPRESSED OR IMPLIED, INCLUDING ANY WARRANTY OR MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE.

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