

ECTOBRAIN™ II INSTRUCTION MANUAL

(For Use with the Thymatron™ System IV)

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LOAD
200 Ohms

OUTPUT ○ FAIL
TEST ○ PASS

<p>POWER</p> <p>On</p> <p>Off</p>	<p>MODE</p> <p>Auto</p> <p>Cal</p> <p>Manual</p>	<p>SEIZURE</p> <p>Good</p> <p>Baseline</p> <p>Seizure</p> <p>Endpoint</p> <p>Poor</p>
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EctoBrain™ II

EEG/EMG SIMULATOR



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EctoBrain™ II provides the 6 different functions described below: ECT stimulus output test; impedance test circuit check; ECT stimulus cable integrity check; recording channel and special features check; seizure quality recognition and identification training; calibration of EEG amplifiers; and calibration of ECT stimulus output.

EctoBrain™ II functions as a simulated patient and requires neither application of electrodes to a patient, nor administration of an impedance test or stimulus current to a patient: *it completely replaces the patient for testing and demonstration purposes.*

I. ECT stimulus output test

This function measures the peak current of each stimulus pulse through a 200 ohm dummy load (resistor) to determine whether the Thymatron™ is delivering the selected dosage.

- 1. Turn EctoBrain™ II “POWER” switch to “ON”; the green “POWER” switch indicator will light (if it does not light, replace the 9V battery located in the rear compartment of the EctoBrain™ II).**
- 2. Insert the 2 ECT stimulus cable banana plugs into the 200 ohm load jacks located towards the top of the EctoBrain™ II front panel.**
- 3. Connect the other end of the ECT stimulus cable to the Thymatron™ front panel jack marked “ECT”.**
- 4. Make sure the Thymatron™ contains recording paper.**
- 5. Set the Thymatron™ “PERCENT ENERGY” dial to 100% and press and hold down the “TREAT” switch while observing the “OUTPUT TEST” LEDs on the EctoBrain™ II front panel. If the green “OUTPUT TEST” LED lights during stimulus activation, stimulus output is accurate to within +/- 5%, which is acceptable; the Thymatron™ may be used to treat patients.**
- 6. (The chart recorder will automatically start to run when the “TREAT” button is released—just press the “START/STOP” button on the Thymatron™ front panel to generate a printed report of the actual stimulus dose delivered.)**
- 7. If the red “OUTPUT TEST” LED lights during stimulus activation, stimulus output is too high or too low; further checks by a licensed biomedical technician are required before the Thymatron™ is used to treat patients.**
- 8. If neither the red nor the green “OUTPUT TEST” LED lights during stimulus activation, the Thymatron™ is not delivering any stimulus at all. Among other possibilities, this could result from a damaged ECT stimulus cable, which can be tested as described in section III below. If such testing reveals the integrity of the ECT stimulus cable to be compromised, the cable must be repaired or replaced. If the ECT stimulus cable is intact, further checks of the Thymatron™ by a licensed biomedical technician are required to determine the nature of the malfunction.**

II. Impedance test circuit check

This function checks the accuracy of the impedance test circuitry by measuring the impedance test current through the 200 ohm dummy load of the EctoBrain™ II.

1. Turn EctoBrain™ II “POWER” switch to “ON”; the green “POWER” switch indicator will light (if it fails to light, replace the 9V battery located in the rear compartment of the EctoBrain™ II).
2. Insert the 2 ECT stimulus cable banana plugs into the 200 ohm load jacks located towards the top of the EctoBrain™ II front panel.
3. Connect the other end of the ECT stimulus cable to the Thymatron™ front panel jack marked “ECT”.
4. Press the yellow “IMPEDANCE TEST” button on the Thymatron™ front panel.
5. If the impedance test circuitry is functioning correctly (and if the ECT stimulus cable is intact), an impedance value in the range of 180 to 220 ohm will appear in the light-emitting display.
6. If an impedance test value outside the 180 to 220 ohm range is displayed, the impedance test circuitry and/or the ECT stimulus cable require further checks by a licensed biomedical technician before the Thymatron™ is used to treat patients.

III. ECT stimulus cable integrity check

1. Turn EctoBrain™ II “POWER” switch to “ON”; the green “POWER” switch indicator will light (if it fails to light, replace the 9V battery located in the rear compartment of the EctoBrain™ II).
2. Insert the 2 ECT stimulus cable banana plugs into the 200 ohm load jacks located towards the top of the EctoBrain™ II front panel.
3. Connect the other end of the ECT stimulus cable to the Thymatron™ front panel jack marked “ECT”.
4. Press the yellow “IMPEDANCE TEST” button on the Thymatron™ front panel.
5. If an impedance test value between 40 and 220 ohm is displayed, then the stimulus cable is intact but the impedance test circuitry requires further checks by a licensed biomedical technician before the Thymatron™ is used to treat patients.
6. If an impedance test value from 0 to 40 ohm is displayed, there may be a short circuit in the cable or its connections, both of which must be checked by a licensed biomedical technician before the Thymatron™ is used to treat patients.
7. If the impedance test value appears as a flashing “>3000”, then the stimulus cable may be broken and in need of repair or replacement.

IV. Recording channel and special features check

This function checks the integrity and accuracy of the recording channels and as many of the special features as you wish to test (e.g., Automatic Seizure Endpoint Detection, Seizure Quality Measures, Peak Heart Rate Printout, etc.)

1. Turn EctoBrain™ II “POWER” switch to “ON”; the green “POWER” switch indicator will light (if it fails to light, replace the 9V battery located in the rear compartment of the EctoBrain™ II).
2. Make sure the Thymatron™ contains recording paper.
3. Connect the black plastic end of the EctoBrain™ II cable to the front panel EEG/ECG/EMG input jack of the Thymatron™.
4. Insert the 2 ECT stimulus cable banana plugs into the 200 ohm load jacks located towards the top of the EctoBrain™ II front panel.
5. Connect the other end of the ECT stimulus cable to the Thymatron™ front panel jack marked “ECT”.
6. Flip the EctoBrain™ II “MODE” switch up to “AUTO”; flip the EctoBrain™ II “SEIZURE” switch up towards “GOOD”.
7. Use the Thymatron™ front panel FlexDial™ to enable as many of the 4 recording channels as desired, and to select and set the ECT stimulus parameters and as many of the special features as you wish to test.
8. Set the Thymatron™ “PERCENT ENERGY” dial to deliver the desired dose.
9. Press the yellow “IMPEDANCE TEST” button on the Thymatron™ front panel to see the impedance displayed in the light-emitting display, and then release; then wait several seconds after the impedance test value disappears from the light-emitting display for the “READY” message to appear in its place.
10. Press and hold down the Thymatron™ “TREAT” switch until stimulus delivery is complete.
11. Observe the entire seizure sequence of about 40 sec duration on the paper strip printout, and press the “START/STOP” button of the printer at least 6 seconds after the EEG seizure ends (e.g., at about 46 sec) to terminate recording and generate the end-of-treatment printed report.
12. The appearance in the end-of-treatment printed report of each of the channels and special features selected demonstrates that each is functioning correctly.

V. Training in seizure quality recognition and identification

AUTOMATIC MODE

Displays the full seizure sequence with a single button press. Select automatic mode by flipping the “MODE” switch up to “AUTO”.

In automatic mode you also have the choice to display either a *good*- or a *poor*-quality seizure pattern.

The *good quality* seizure is represented by a high amplitude EEG of substantial duration, followed by electrical silence at termination. There is a pronounced tachycardia during the seizure, and a well-developed EMG response that terminates before the EEG does. Select a *good* quality seizure by flipping the “SEIZURE” switch (far right-hand side of EctoBrain™ II front panel) up in the direction of the word “GOOD”.

The *poor-quality* seizure is represented by a low-amplitude EEG pattern lasting less than 20 sec, and followed by mixed EEG fluctuations after termination in the alpha/beta range. There is no tachycardia response, and an initial poorly-formed EMG response lasts only a few seconds. Select a *poor* quality seizure by flipping the “SEIZURE” switch down in the direction of the word “POOR”

1. Turn EctoBrain™ II “POWER” switch to “ON”; the green “POWER” switch indicator will light (if it fails to light, replace the 9V battery located in the rear compartment of the EctoBrain™ II).
2. Connect the black plastic end of the EctoBrain™ II cable to the front panel EEG/ECG/EMG input jack of the Thymatron™.
3. Insert the 2 ECT stimulus cable banana plugs into the 200 ohm load jacks located towards the top of the EctoBrain™ II front panel.
4. Connect the other end of the ECT stimulus cable to the Thymatron™ front panel jack marked “ECT”.
5. Make sure the Thymatron™ contains recording paper.
6. Select AUTOMATIC mode by flipping the EctoBrain™ II “MODE” switch up to “AUTO”.
7. Select good- or poor-quality seizure pattern by flipping EctoBrain™ II “SEIZURE” switch up towards “GOOD” or down towards “POOR”.
8. Set ECT stimulus parameters and dosage on the Thymatron™ as desired.
9. Press the yellow “IMPEDANCE TEST” button on the Thymatron™ front panel to see the impedance displayed in the light-emitting display, and then release; then wait several seconds after the impedance test value disappears from the light-emitting display for the “READY” message to appear in its place.
10. Press the “TREAT” button; the paper chart drive will automatically begin to run when “TREAT” button is released.
11. Observe seizure on paper stripchart; after seizure termination (about 40 sec for a *good* seizure, and 19 sec for a *poor* one) wait at least 7 seconds and then press the “START/STOP” button on the Thymatron™ front panel to terminate recording and generate the end-of-treatment printed report.

MANUAL MODE

Allows the operator to demonstrate each of 3 seizure phases (*baseline*, *seizure*, and *endpoint*) for a good-quality seizure only. Select manual mode by flipping the “MODE” switch down to “MANUAL”. Select seizure phases to demonstrate by setting the EctoBrain™ II “SEIZURE” switch up for *baseline*, in the middle position for *seizure*, and down for *endpoint*:

- *Baseline* simulates pre-treatment conditions and allows the system to obtain an EEG baseline.
 - *Seizure* simulates a good-quality seizure
 - *Endpoint* simulates the seizure ending and postictal condition
1. Turn EctoBrain™ II “POWER” switch to “ON”; the green “POWER” switch indicator will light (if it fails to light, replace the 9V battery located in the rear compartment of the EctoBrain™ II).
 2. Connect the black plastic end of the EctoBrain™ II cable to the front panel EEG/ECG/EMG input jack of the Thymatron™.
 3. Insert the 2 ECT stimulus cable banana plugs into the 200 ohm load jacks located towards the top of the EctoBrain™ II front panel.
 4. Connect the other end of the ECT stimulus cable to the Thymatron™ front panel jack marked “ECT”.
 5. Make sure the Thymatron™ contains recording paper.
 6. Select MANUAL mode by flipping the “MODE” switch down to “MANUAL”.
 7. Set ECT stimulus parameters and dosage as desired.
 8. Set EctoBrain™ II “SEIZURE” switch up for *baseline* recording pattern, to the middle position for *seizure* recording pattern, or down for the *endpoint* and *postictal* pattern.
 9. Press “START/STOP” button on the Thymatron™ front panel to see selected recording pattern on paper stripchart.

In EctoBrain™ II *baseline* mode, it’s simplest to press the “IMPEDANCE TEST” button before starting the printer in order to demonstrate baseline EEG data collection. Baseline collection has been accomplished when the “READY” message appears in the light-emitting display, after which you can press the “START/STOP” button of the Thymatron™ to display a printout of the baseline EEG.

(If you press the “START/STOP” button to run the stripchart and then press the “IMPEDANCE TEST” button you will still initiate baseline EEG sample collection, but the printer will stop—just press “START/STOP” again for it to resume printing.)

VI. Calibration of EEG amplifiers and ECT stimulus output (CAUTION: To be accomplished by a licensed biomedical technician *only*)

This dual function allows a licensed biomedical technician to calibrate the EEG amplifiers and the ECT stimulus output without the need for an oscilloscope. In “CAL” mode, the EctoBrain™ II continuously generates a 10 Hz, 200 microvolt peak-to-peak test signal.

To calibrate EEG amplifiers:

1. Turn EctoBrain™ II “POWER” switch to “ON”; the green “POWER” switch indicator will light (if it fails to light, replace the 9V battery located in the rear compartment of the EctoBrain™ II).
2. Connect the black plastic end of the EctoBrain™ II cable to the front panel EEG/ECG/EMG input jack of the Thymatron™.
3. Insert the 2 ECT stimulus cable banana plugs into the 200 ohm load jacks located towards the top of the EctoBrain™ II front panel.
4. Connect the other end of the ECT stimulus cable to the Thymatron™ front panel jack marked “ECT”.
5. Select “CAL” mode mode by placing the EctoBrain™ II “MODE” switch in the middle (“CAL”) position.
6. Follow the instructions in the Thymatron™ System IV Service Manual for calibrating the EEG amplifiers. The calibration signal from the EctoBrain™ II will appear on the Thymatron™ stripchart printed during the calibration procedure.

To calibrate ECT stimulus output:

1. Turn EctoBrain™ II “POWER” switch to “ON”; the green “POWER” switch indicator will light (if it fails to light, replace the 9V battery located in the rear compartment of the EctoBrain™ II).
2. Connect the black plastic end of the EctoBrain™ II cable to the front panel EEG/ECG/EMG input jack of the Thymatron™.
3. Insert the 2 ECT stimulus cable banana plugs into the 200 ohm load jacks located towards the top of the EctoBrain™ II front panel.
4. Connect the other end of the ECT stimulus cable to the Thymatron™ front panel jack marked “ECT”.
5. Select “CAL” mode mode by placing the EctoBrain™ II “MODE” switch in the middle (“CAL”) position.
6. Follow the instructions in the Thymatron™ System IV Service Manual for calibrating the ECT stimulus output. Identify which trimmer to adjust on the power board and adjust until *both* the red and green (“FAIL” and “PASS”) “OUTPUT TEST” LEDs of the EctoBrain™ II are lit simultaneously.

Problem-solving using EctoBrain™ II
(assumes Thymatron™ is plugged in and powered on, and contains recording paper)

<i>Problem</i>	<i>How to test using EctoBrain™ II</i>
No stimulus output	Section I
Impedance test error	Section II
ECT stimulus cable failure	Section III
No EEG (EMG, ECG) endpoint	Section IV (with EEG endpoint detection enabled)
ECG channel doesn't print	Section IV (with ECG enabled in channel 4)
No Ictal Line	Section IV
Special feature doesn't print	Section IV (with special feature enabled)
EEG amplifiers require calibration	Section VI (licensed biomedical technician only)
ECT stimulus requires calibration	Section VI (licensed biomedical technician only)