VIAMED

~~V4.0.~~ 16/02/05.
Part No.: 061006X.

The Microstim DB, MKIII

Supramaximal Nerve Stimulator.
For Use With Anaesthesia.

Operator Manual.

CE 0086

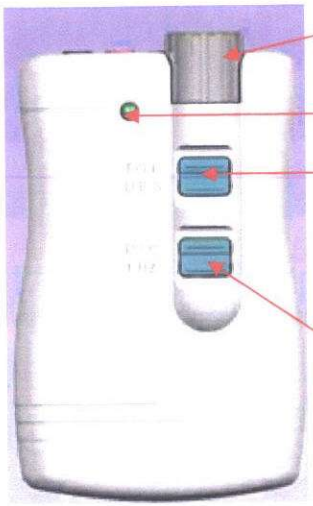
3/5/15.

John,

I have made some amendments (in blue) to improve the text & bring things up to date

Nigel.

Description of the Microstim DB.



Intensity control

Output / Battery Level Indicator.

Selector 1.
Up: Train of Four.
Down: Double Burst Stimulation.

Selector 2.
Up: Post Tetanic Count.
Down: 1 pulse per second (1 Hz).

Output / Battery Level Indicator.
When the Microstim DB is in use, flashes of the output / battery level indicator coincide with stimulus pulses. When patient current flows, audio pulses are also generated. The output / battery level indicator changes from bright green and deep red with use. Replace the battery when the indicator is deep red

For use only by qualified and trained personnel.
Do not use in the presence of MRI equipment.
Do not use with needle electrodes.
Do not use as a nerve locator stimulator.
Do not use in the presence of explosive gases.
Caution in the presence of cardiac pacemakers.
May cause interference on ECG equipment during use

How to use the Microstim DB.

- Position the stimulating electrodes.

Choose the monitoring site,
e.g.: Ulnar nerve, facial nerve, tibial nerve.

1. Clean the skin with an alcohol wipe.
2. Apply two ECG type electrodes, either along the line of the nerve or straddling the nerve.
   Connect the leads; the positive (red) electrode should usually be proximal.

Intensity control

3. Set the intensity control to half scale.

- Decide on the mode of stimulation.

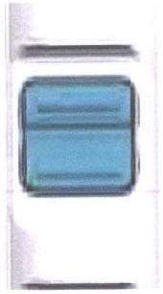
Profound blockade:	Post Tetanic Count (PTC)
Surgical blockade:	Train of Four (TOF) or Double Burst Stimulation (DBS)
Reversal:	Double Burst Stimulation (DBS)

- Adjust the output current.

Increase the intensity until the twitch response is maximal. If the intensity is increased excessively, direct muscle stimulation will become more pronounced (see Problems and Solutions).

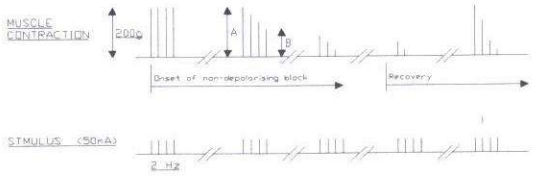
Train of Four (TOF) Stimulation.

To initiate Train of Four stimulation, press and hold the TOF switch. The Microstim DB delivers the correct sequence of stimuli; four stimuli at a frequency of 2 Hz.



An interval of at least 10 seconds should be allowed between successive TOF estimation.

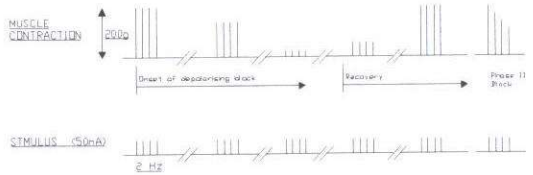
This mode of stimulation, first described in 1970, permits the user to assess the depth of neuromuscular blockade without recourse to a "control twitch" obtained before the muscle relaxant was given. Each train comprises four stimuli of equal intensity at a frequency of 2 Hz. During partial non-depolarising blockade there is a characteristic fade in the magnitude of the resulting four twitches. Depolarising blockade does not produce significant fade unless Phase 11 block has intervened.



The Train of Four ratio is the magnitude of the fourth twitch divided by the magnitude of the first twitch. In the absence of fade, the ratio would be 1.0. Even in experienced hands, it is unusual for fade to be detectable using the palpation method unless the Train of Four ratio has fallen to below 0.5. At this level of blockade, the patient's ability to breathe adequately may still be impaired (see Double Burst Stimulation).

When blockade is more profound (at a level more appropriate to surgery) the twitches successively disappear, so that only one or two small responses remain. The number of twitches remaining is the Train of Four count. A count of one or two is usually compatible with adequate surgical relaxation and also indicates that reversal with neostigmine will be satisfactory.

Occasionally, four small responses persist even at profound blockade - see "Problems and Solutions."



Depolarising blockade does not produce significant fade unless Phase 11 block has intervened.

Double Burst Stimulation (DBS)

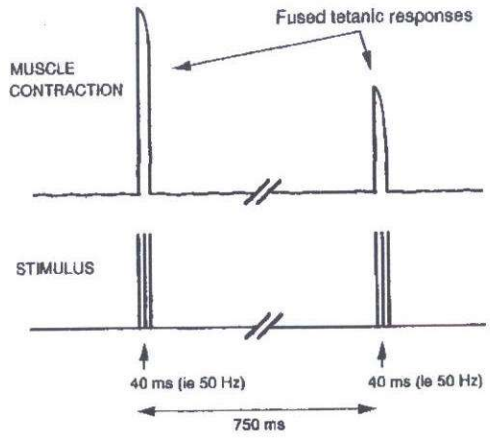
To initiate Double Burst Stimulation, press and hold the DBS switch once. The Microstim DB delivers the correct sequence of stimuli; two bursts of stimuli at 50 pulses per second separated by 750 ms. DBS 3,2 is standard because it is more sensitive to residual neuromuscular blockade at the end of surgery.

An interval of at least 15 seconds should be allowed between DBS estimations.

Although the Train of Four ratio provides a method of monitoring light to moderate neuromuscular blockade, its accuracy is much reduced unless a force transducer or other objective measurement device is used to measure the response of the muscle. This is because the ability of the clinician to estimate the Train of Four ratio reliably is limited. Fade in the four responses may exist without the clinician being aware of the risk of residual blockade.

Double Burst Stimulation (DBS) is designed to produce the same degree of fade as the Train of Four with the advantage that DBS fade is more easily detected and quantified by the clinician who is monitoring the twitch response of the thumb by the palpation method.

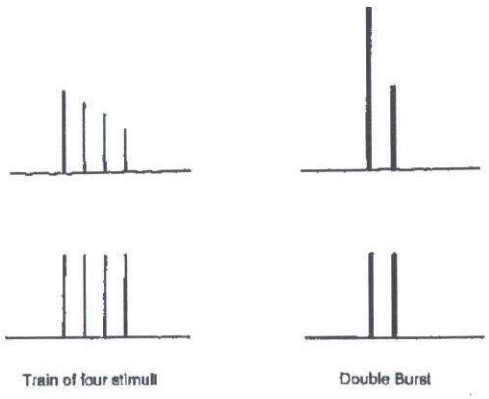
Two short tetanic bursts of stimuli are delivered and the response of the muscle is felt by the anaesthetist as two discrete twitches.



It is relatively easy to quantify the extent of DBS fade because:

(i) Both twitches are larger than the TOF twitches,

(ii) The two middle twitches of the TOF normally confound the comparison of the first & fourth responses.



During spontaneous recovery, the first DBS response re-appears slightly earlier than the first TOF response and the second DBS response re-appears slightly earlier than the fourth TOF response. These differences are unlikely to be of clinical significance; DBS and TOF can be used interchangeably, with the advantage that DBS provides more accurate information to the clinician who does not have access to a force transducer.

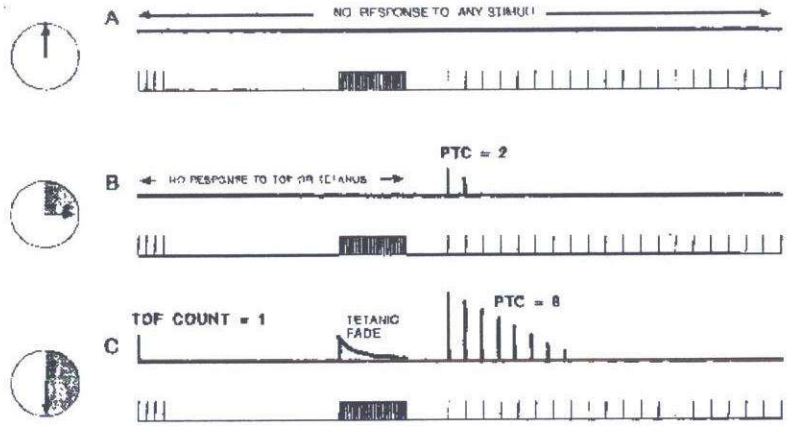
Post Tetanic Count (PTC)

To initiate PTC stimulation, press and hold the PTC switch. The microstim will deliver the correct sequence of stimuli; 50 Hz for 5 seconds, a 3 second pause, followed by l Hz stimuli. An interval of at least 5-6 minutes should be permitted between successive estimations of PTC.

This method of measuring the depth of profound non-depolarising neuromuscular blockade was introduced in 1981. It operates as follows: suppose that blockade is very profound and there is no response whatever to other modes of nerve stimulation. A difficulty exists in quantifying such extreme blockade. However, for a short while following a burst of tetanic stimulation (for example, 50 Hz for 5 seconds), the process of mobilization of acetyl-choline at the motor nerve terminal persists in a state of enhanced activity.

If, at this stage, the nerve is stimulated at a much slower rate (for example at 1 Hz), the twitch response is initially boosted by the greater quantity of acetyl-choline that is released by each stimulus. This is the phenomenon of post-tetanic facilitation. The enhancement of transmitter release soon wanes, and the twitch response also declines to the level that existed before the tetanic burst was given. The number of palpable facilitated twitches can easily be counted; this number is the Post Tetanic Count (PTC).

PTC is useful in monitoring the progress of profound blockade soon after a dose of relaxant has been given or when any sudden spontaneous diaphragmatic movement is undesirable, for example during neurosurgery.



The more profound the blockade, the lower is the Post Tetanic Count (PTC). As neuromuscular transmission recovers, the number of palpable post-tetanic twitches increases until, at a P.T.C of approximately 6-10 (depending on the muscle relaxant) spontaneous recovery has progressed sufficiently for the first response of the TOF to become just detectable. From this point onwards, PTC loses its usefulness and TOF or DBS take over.

Problems and Solutions

During TOF or DBS stimulation all the twitch responses persist even at profound blockade.

This is due to direct electrical stimulation of the muscles underlying the electrodes. Try reducing the intensity of stimulation and/or repositioning the electrodes. If monitoring the hand muscles, try moving the positive electrode to the ulnar groove at the elbow.

Avoid the temptation to assess the muscle response visually; always use tactile assessment and apply a gentle pre-load to the patient's thumb.

At the end of the surgical procedure movement of the reservoir bag appears to indicate adequate tidal breathing and there is no fade in the TOF responses: should neostigmine still be given?

Tactile assessment of the TOF ratio is inaccurate. The TOF ratio can be less than 0.5 with no apparent clinical fade. At the end of the surgical procedure it is preferable to use DBS which often reveals covert fade. If there is any fade whatever, neostigmine should be given.

The response of the facial muscles to stimulation of the facial nerve indicates that the patient is fully reversed but the patient is clearly partially paralysed.

The facial muscles are relatively resistant to muscle relaxants compared with the muscles of the hand. This must be borne in mind if this monitoring site is used; otherwise it is easy to over-paralyse the patient.

There is very little response to nerve stimulation but the patient is clearly insufficiently relaxed for surgery.

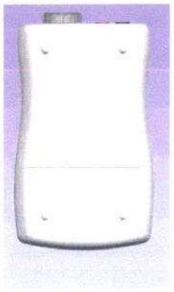
This is commonly due to dry stimulating electrodes. It is preferable to use ordinary ECG electrodes rather than to keep a supply of special electrodes for neuromuscular monitoring which might become dry if they are left in a drawer for a period of time.

I would like to measure neuromuscular transmission in the recovery room but supramaximal is too painful when the patient is awake.

The stimulus current may be reduced to approximately 1/3 maximum (30 mA). At this level of current the TOF or DBS ratio is not significantly reduced compared with supramaximal stimulation and the stimuli are much less unpleasant for the patient.

Servicing Information

The Microstim DB1000 is designed to be robust yet compact in size. Without access to specialised equipment, troubleshooting and repair of circuit board components are not feasible.



With the exception of replacing batteries and switches, there are no user serviceable components within the unit.

If a problem arises with the Microstim, the unit must be returned to Viamed Ltd, for repair or replacement.

Cleaning Instructions

The instrument case and leads can be cleaned using isopropyl alcohol. The instrument and leads are not intended to be sterilised. Do not autoclave.

Warranty.

Viamed warranty ensures that goods are free from defects of manufacture for a period of one year from the date of shipment from Viamed. Liability shall be limited solely to the replacement and repair of the goods and shall not include shipping costs or other incidental damages.
This warranty is null and void if any items are subjected to misuse, negligence, accident, or repairs other than those performed by Viamed or an authorised service centre.
Cables and transducers are not included.

Description	Part Number
Microstim DBS MKIII	
MKIII Stimulator Lead	
V4.0 User Manual	
9v Battery	

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