

(iv) Massage
 Getting a professional massage can help loosen tight muscles, which can cause the weak muscles.

Muscle Stimulator

Stimulators are the devices that are used to stimulate innervated muscles & nerves.

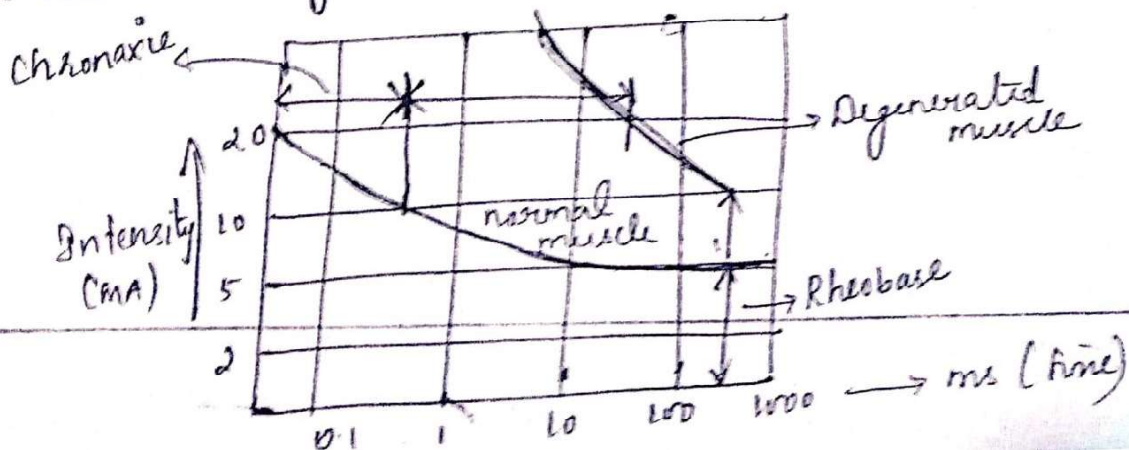
These are used for the treatment of paralysis with totally or partially denervated muscle, for the treatment of pain & muscle spasm.

This technique is called "electrotherapy" which uses the low volt, low frequency impulses of currents.

If a muscle or motor nerve stimulated with a current of adequate intensity, it results in its contraction of muscles or nerves.

Intensity vs Time - Curve [I-T curve]

In order to examine the conditions of contraction & to obtain a good picture of regeneration & degeneration process of neuromuscular unit, motor stimulation current diagnostic plots so called i-t curve based on intensity & its duration.



The chronaxie and rheobase can be easily read from i-t curves.

The rheobase is minimum intensity of current that will produce a response if the stimulus is of infinite duration.

The chronaxie is minimum duration of impulse that will produce a response with a current of double rheobase.

Type of current & waveforms required for electrotherapy
Unit

- (i) Galvanic current
- (ii) faradic current
- (iii) Surged current
- (iv) Exponential current

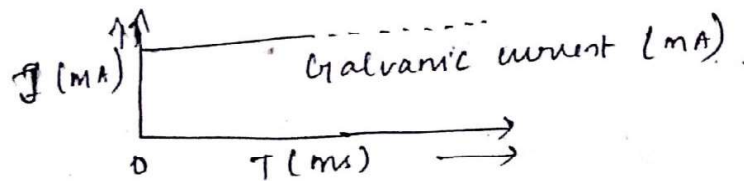
Galvanic current

Constant flow of electric current is passed through a tissue, its effect is chemical shift (ie) movements of ions.

It manifest as bright red coloration (ie) hyperaemia (\uparrow blood flow).

Current $\dots 0.3$ to 0.5 mA/cm²

Time 10 to 20 mins

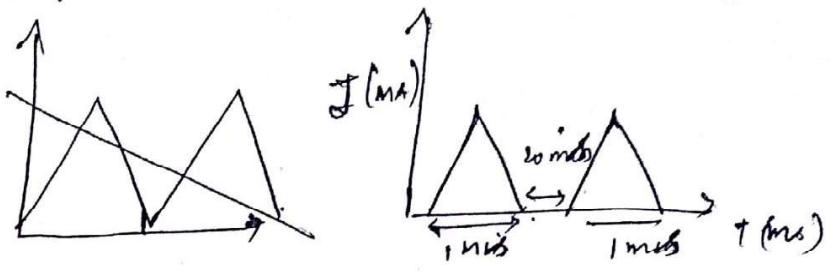


Faradic current

Sequence of pulses with defined shape & current intensity

pulse duration is about 1ms (or) 1ms
duration of about 20ms (or) 20ms

There is no ion movement so no chemical shift
 It is used for the treatment of weak muscles



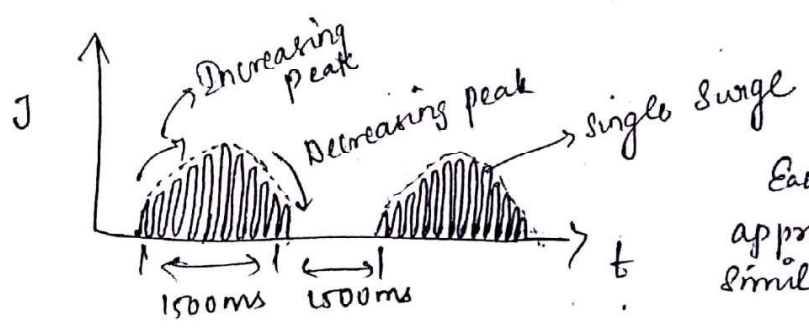
Surged current

If peak current intensity is applied to the patient for increasing & decreasing rhythmically

Rate of increasing & decreasing of the peak amplitude is slow, the resulting shape of the current waveform is surged current

6-60 surges per minute

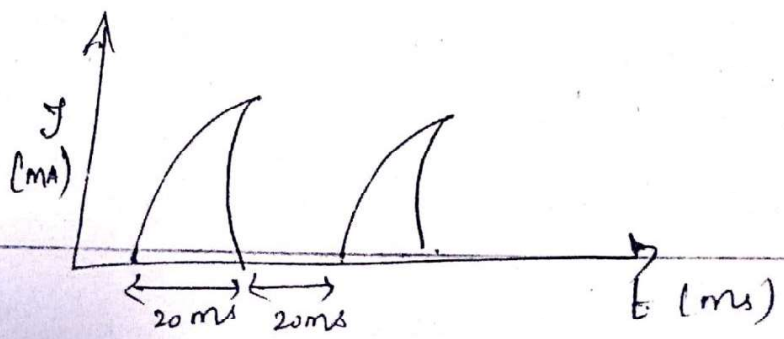
It is used for treatment of muscle spasms & pain.



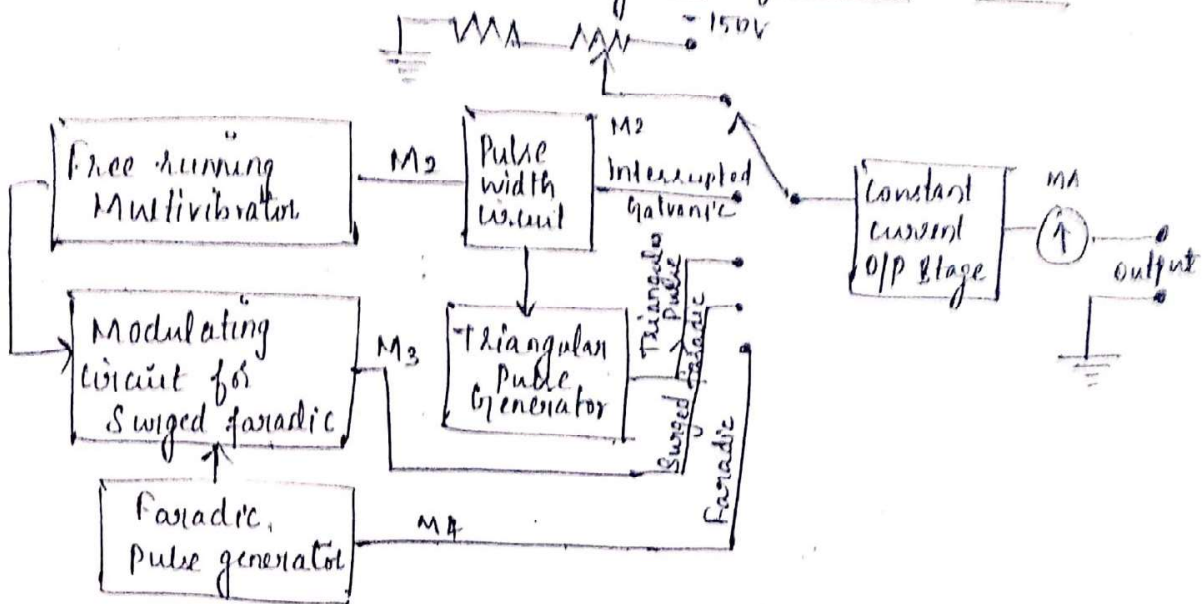
Each surge = approx. 70 impulses similar to faradic

Exponential current

The slope of exponential varied to provide selective stimulation - It is used for the treatment of paralysis



Functional Block diagram of Muscle stimulator



- M₁ - variable rate multivibrator
- M₂ - Monostable multivibrator
- M₃ - Variable multivibrator
- M₄ - Astable multivibrator

- ↳ M₁ is a variable rate multivibrator to set a basic stimulus frequency
- ↳ The o/p from free running multivibrator triggers M₂ circuit which set the pulse width
- ↳ The o/p from M₂ provides interrupted o/p whose rate & pulse duration can be controlled
- ↳ M₄ produces short duration pulses called faradic current
- ↳ Faradic current usually modulated at the frequency set by M₁ & M₄
- ↳ Modulation of faradic pulses take place with a slow rate of increase & decrease. ^{output of} M₃ is Surged current.
- ↳ By integrating the o/p of M₂ produce exponential rise & fall shape of pulse is similar to triangular

pulses. Galvanic current is produced by tapping DC supply.

↳ Finally, any one of the waveforms can be selected through selector switch & fed either to an emitter follower stage.

↳ In order to provide a low o/p impedance constant voltage or to high o/p impedance constant current voltage.

Advantages of constant current therapy

↳ The current flow is largely constant, irrespective of patient's resistance.

↳ Discomfort-free.

↳ It avoids symptoms like irritating stimulatory sensation b/w electrodes.

In case of constant voltage therapy

↳ Current flow is dependent on the resistance.

↳ Irritating stimulatory sensation b/w electrodes do not occur.

NERVE STIMULATOR

Transcutaneous Electrical Nerve Stimulator (TENS)

→ It is method of non destructive, non-invasive, well tolerated and effective way of relieving pain that is both efficient and practical.

→ It uses electrical impulses to block the pathways of the transmission of pain.

→ The impulses are produced in a battery

powered pulse-generator to which a pair of electrode-tipped wires can be attached.