



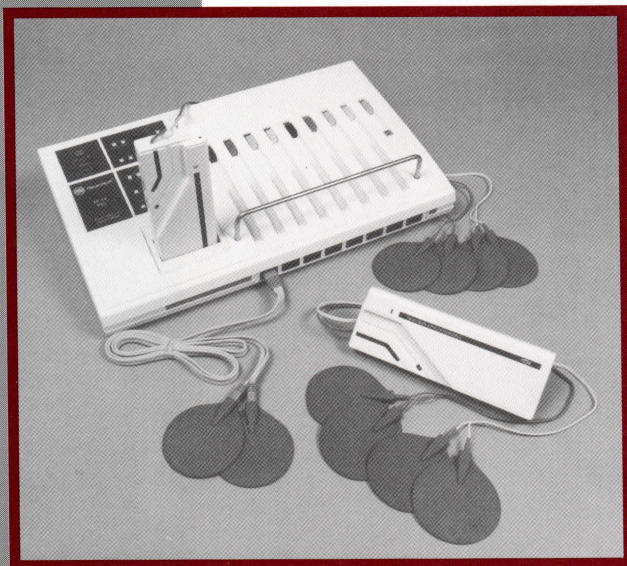
NT-16

BMR

NeuroTech

# NT16 PROGRAMMABLE SYSTEM

**The NT16 Neuromuscular Stimulation System is the most advanced in the world today. It is the realization of BMR NeuroTech's fundamental objective of providing the clinician with optimum versatility and the patient with the most comfortable neuromuscular electrical stimulation yet devised.**



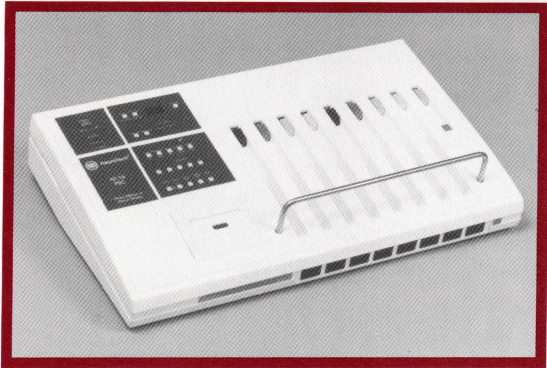
The BMR NeuroTech clinical neuromuscular electrical stimulation system consists of the **NeuroTech 16 Programmable System Controller** and the **NeuroTech 4 Programmable Stimulator**. This system allows for the progressive development of treatments specifically tailored to the precise needs of the individual patient in the clinic and for subsequent treatment off-site. Developed by leading clinical researchers, BMR NeuroTech's unique waveform is widely regarded as being the most comfortable stimulation available.

## NT16 Programmable System Controller

The centerpiece of the NT16 System is the Programmable System Controller. This is a micro-computer driven neuromuscular stimulator featuring eight independent stimulation outlets with full programming of all stimulation parameters. When used in a hospital or clinic, the unit can function as a stand-alone neuromuscular electrical stimulator.

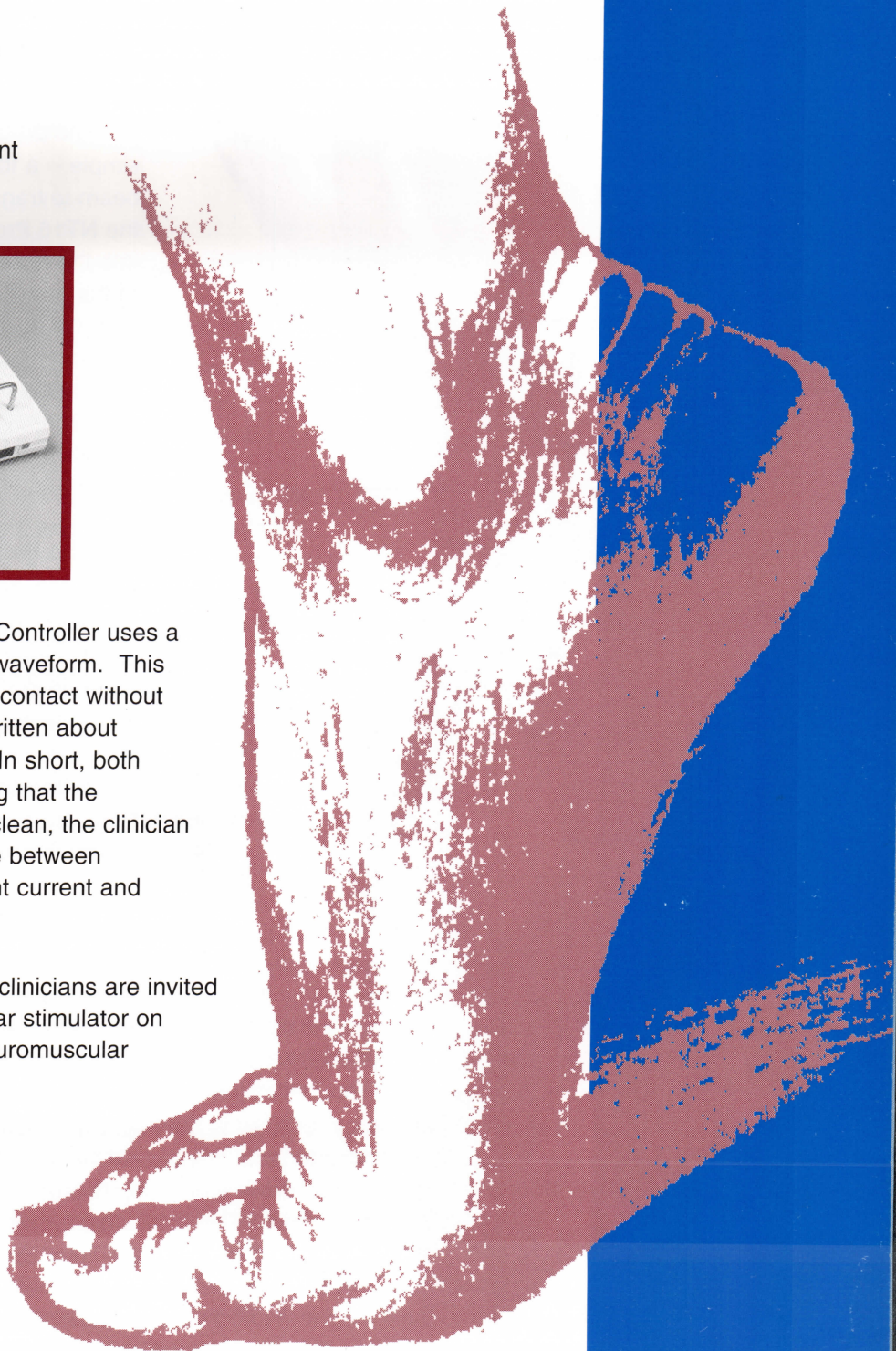
The ease and simplicity with which all stimulation parameters can be programmed means that clinicians can target treatments to maximize their therapeutic benefits, and, progressively, modify the treatment throughout the recovery phase -- thereby optimizing the therapeutic effect. Sub-Pulsing the waveform is another BMR discovery where normal muscle contractions can be achieved by using a discontinuous stimulation pulse; that is, instead of the conventional pulse, each individual pulse can be programmed to be broken up into a sequence of millionths-of-a-second

micropulses, greatly reducing the amount of current needed for effective treatment. This increases patient tolerance, thereby allowing for longer treatment times and improved treatment outcomes.

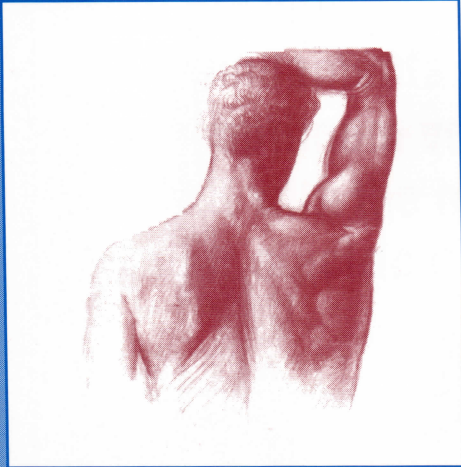


The NT16 Programmable System Controller uses a constant voltage asymmetric biphasic waveform. This allows for changes in electrode to skin contact without inadvertent shocks. Much has been written about constant current vs. constant voltage. In short, both stimuli will contract a muscle. Providing that the electrodes and skin are prepared and clean, the clinician can be assured that variable resistance between electrodes is minimized in both constant current and constant voltage systems.

To really appreciate the difference, clinicians are invited to use a BMR NeuroTech neuromuscular stimulator on one of their arms and an alternative neuromuscular stimulator on the other arm. Having ascertained the different degrees of comfort, carefully move one of the BMR NeuroTech electrodes as if performing a motor point search. It is not recommended that this be done with the alternative neuromuscular stimulator.



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## NeuroTech 4 Programmable Stimulator

The programming technique could not be more simple -- a touch of a button causes an infra-red beam to transmit all stimulation parameters from the NT16 Programmable System Controller directly into the NeuroTech 4 Stimulator. With the exception of the amplitude controls, all other parameter controls reside exclusively in the NT16 Programmable System Controller, thereby eliminating the risk of the patient altering the pre-set parameters. Even the home treatment time period is set automatically by the NT16 Programmable System Controller.

The NeuroTech 4 is portable, has two output channels, four electrodes, and the same output capability as the NT16 Programmable System Controller. It is primarily designed for off-site use -- whether it be hospital room, satellite clinic or home.

### Why is the NeuroTech system so comfortable?

In the SUB-PULSE mode, good muscle contractions can be achieved easily with only pleasant sensation being experienced by the patient. BMR NeuroTech starts with an asymmetric biphasic waveform which is then pulsed in individual waves of twenty microsecond increments. This technique reduces the amount of electrical energy required to contract the muscle. The exceptionally comfortable stimulation makes possible the very long treatment times which recent studies on muscle "plasticity" have shown to be invaluable for rehabilitating and changing the structure of muscle fiber. Even in the normal EXTENDED mode, stimulation is made far more comfortable than that of conventional units by BMR's low impedance circuitry, and patented, multiplexed signal. Patient comfort is further protected by the fact that the precision of the current delivered to the patient by the circuitry approximates an ideal voltage controlled source. This allows for changes in electrode to skin contact during motor point searches and functional movement training without inadvertent shocks to the patient.





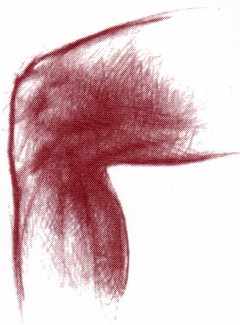
## What is special about the NeuroTech electrodes?

BMR NeuroTech electrodes are superior in design and versatility. Material design was selected for maximum conductivity so that current is quickly and efficiently passed from electrode to body. Physical design includes a ridged surface that increases surface area to maximize electrode to skin contact. Standard electrodes are insulated to prevent the therapist from being stimulated, and to prevent overlap of electrodes in a limited surface area. Electrodes are varied in size to accommodate extremely small muscles (i.e., facial) to large muscle groups (i.e., quadriceps). Specifically, sizes range from the "button" (less than one inch) to the large, general purpose 3-1/2" diameter electrodes. The electrodes may be used with water or gel, a feature that enhances time efficiency in the clinic. BMR NeuroTech further supports the clinical organization by providing convenient storage on the unit itself, which allows the color-coded leads to hang neatly when not in use.

## How does the NeuroTech system quantify patient compliance?

Successful off-site treatment outcomes are dependent upon patient compliance. As the BMR NeuroTech stimulation is generally reckoned to be the most comfortable yet devised, clinicians can be assured that patients will adhere to their treatment regimens. This can be quantified by the interrogation feature built into the NeuroTech 4 Programmable Stimulator and NT16 Programmable Controller. In short, the clinician can insert the NeuroTech 4 Programmable Stimulator into the NT16 Programmable Controller and read from the display the number of times that the NeuroTech 4 Programmable Stimulator has been used and the total treatment time accumulated off-site.

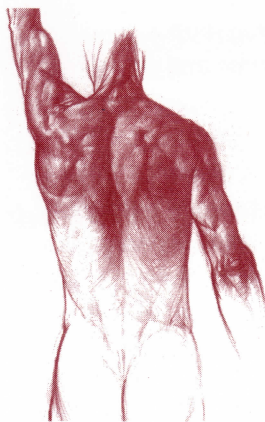
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#### TREATMENT PRECISION AND FLEXIBILITY

At the present time, when researchers are discovering that each type of muscular disorder may call for treatments that require a different frequency, arbitrary levels of stimulation are no longer considered acceptable, and the necessity for digital precision in all output parameters is widely understood. The NT16 Programmable Controller, with its "intelligent" micro-processor and simple keyboard operation is perfectly equipped to treat the following indications:

1. Relaxation of muscle spasm
2. Prevention or retardation of muscle atrophy
3. Muscle re-education
4. Increase local blood circulation
5. Immediate post surgical stimulation of calf muscles to prevent deep vein thrombosis
6. Maintaining or increasing range of motion



#### PRE-SET PROGRAMS

PROG	FREQ	CONTRACT	RELAX	P-WIDTH
	Hz	Sec.	Sec.	X10uS
P1	50	2	2	20
P2	50	10	50	20
P3	40	4	4	20
P4	2	1	0	20
P5	5	2	2	8

Programs 4 and 5 can be reprogrammed to a clinician's own specifications.

What parameters and features exist for the output channels?

In complete contrast to the sophistication of the electronic components, the NT16 Programmable Controller is remarkably simple to operate. The multi-channel design allows power through the eight outlets to be individually adjusted so that each pair of electrodes can be set at a different stimulation strength. As researchers learn to treat muscular diseases with stimulation signals, the need increases for multi-channel devices in order to treat a large number of muscle groups simultaneously.

The "ALT" or alternating feature can be selected to allow for reciprocal and asynchronous movement. This allows the clinician to treat muscle problems that require flexion and extension or other similar movement combinations of agonist and antagonist. Through the use of this feature, BMR NeuroTech has developed protocols in the areas of spasticity control and functional movement training.

BMR NeuroTech's standard mode of operation is the "SYN" or synchronous control where all eight channels are in synchronous timing. This mode allows for simultaneous movement of agonists and/or antagonists. This feature may be used in functional movement training and patterns that require symmetric and synchronous movements, (i.e., lifting with the arms).

# NT16 PROGRAMMABLE SYSTEM

## PROGRAMMABLE PARAMETERS

Five standard programs are stored in the permanent memory. When the PROGRAM button is pushed, "P1" appears on the LED DISPLAY, and the unit is then ready to function in the first program mode. To select any of the other four pre-set programs, press Button 2, Button 3, Button 4 or Button 5 on the numbered key panel, then press the ENTER button. The RUN/STOP button starts the unit operating in the selected program mode. Programs 4 and 5 are user redefinable, if required. Selecting stimulation parameters other than those available in the pre-set programs is just as user-friendly. For example: Press FREQ (Frequency in pulses per second) and the frequency of pre-set Program 1 will appear on the LED Display (50 Hz). Press buttons in the key panel below to change this number to the frequency preferred, then press ENTER. This procedure can be repeated for all the other parameters, thereby creating a unique patient specific protocol.

## POWER

Power ON/OFF button with warning lights indicates low batteries or that batteries are recharging. All other functions are usable when recharging.

## OUTPUT

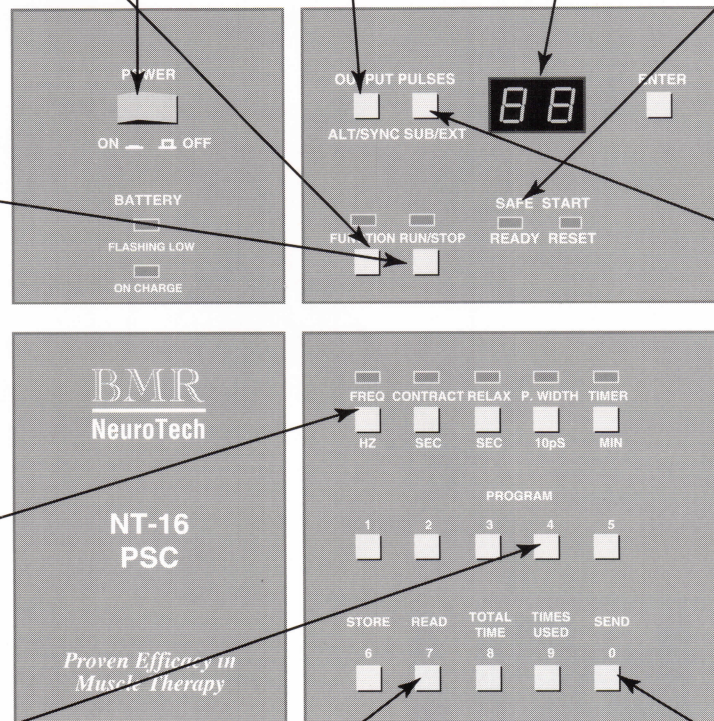
Choose SYNCHRONOUS output when all eight outlets transmit stimulation simultaneously, or choose ALTERNATING output when the first four channels alternate in a reciprocal manner with the second four

## LED DISPLAY

A continuous visual reference to the state and settings of all

## THE SAFE START

feature prevents use of the unit if any of the output controls have been inadvertently left.



## PULSES

With BMR's low impedance circuitry and patented multiplexed signal, exceptionally comfortable contractions are achieved. The EXT button selects the normal EXTENDED mode and the SUB button selects the unique SUB-PULSE mode which supplies good muscle contractions with only pleasant sensation experienced by the patient -- ideal for long-term treatments.

## READ

This control can be used to remind the clinician of the parameter settings in the NeuroTech 4 being interrogated, prior to reading the TIMES USED and TOTAL TIME.

## The RISE/FALL TIME

control (not shown), mainly for use with long and powerful contractions, allows the therapist to set a time interval of zero (0) to five (5) seconds, during which the selected stimulation may surge to its maximum strength, hold, and then decline over an identical interval.

## INFRA-RED PROGRAMMING BUTTON

Used to download to the NeuroTech 4 Programmable unit.



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