

Braketronic™

IMPULSE®-G+ Series 3

Mondel Braketronic Instruction Manual



MAGNETEK
MATERIAL HANDLING

MONDEL

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MATERIAL HANDLING

MONDEL

Installation and Maintenance Instructions

Braketronic

IMPULSE•G+ Series 3

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Chapter 1.0: Braketronic Warnings and Cautions

Read and Understand All Warnings And Notices Printed In This Manual Before Commencing Installation, Adjustment Or Repair.

Anyone involved in the installation or service of this brake must have:

- Received specific training.
- Had experience on similar equipment.
- Knowledge of the equipment on which the brake is installed.
- The ability to understand the terminology.
- The ability to understand the diagrams.

Do not proceed unless technically qualified for the work involved.

Chapter 4.0: ELECTRICAL CONNECTIONS – Warnings and Cautions

Unexpected movement or hazardous voltage can cause injury or death. Disconnect, lock out, and tag out the power source that feeds this device to prevent power from being applied while work is carried out.

Before working on a Braketronic system, ensure that power has been disconnected for at least 3 minutes. Internal capacitors hold a charge and hazardous voltages remain present at terminals and components up to 3 minutes after power is turned off.

Do not connect power directly to terminals T1, T2 and T3 under any circumstances.

Chapter 5.0: OPERATIONAL TEST – Warnings and Cautions

Review and verify the following checklist before switching on the power source feeding this system:

- Components are as supplied by the factory.
- Writing is correct per relevant diagram.
- Enclosures are grounded in accordance with local electrical codes.
- Power supply is within the specified range, and the correct voltage/polarity is available at the power supply input terminals.
- Brake adjustments are complete in accordance with the relevant brake instruction manual.

Before conducting an operational test, remove all tools, chocks and other equipment which may create a hazard when the machine is operating.

Before attempting to operate any motion in any application, advise and account for the location and security of all personnel involved.

Chapter 2.0: General Description

- 2.1: The Braketronic system provides a means of varying the braking torque developed by spring applied, thruster released, shoe and disk brakes.
- 2.2: Single or multiple brakes may be operated in parallel from one Braketronic Controller.
- 2.3: Braking torque modulation is achieved by either of the following methods:
- 2.3.(a):** Continuous variation controlled by external means, (usually a pedal operated potentiometer).
 - 2.3.(b):** Preset rate variation controlled by an internally generated ramp signal.
- 2.4: Control of torque is achieved by modulating the electrical supply voltage and frequency to the thruster pump motor. This varies the speed of the pump impeller and thus the pressure and volume of hydraulic fluid delivered to the thruster piston.
- 2.5: The thruster piston extends, offsetting the torque spring force applied to the brake shoes as follows:
- 2.5.(a):** Maximum frequency & voltage supplied to the thruster produce full motor speed with maximum pump output. Piston output will overcome torque-spring force and move the shoes away from the brake wheel; braking torque falls to zero and shoe clearance reaches its maximum.
 - 2.5.(b):** Thruster piston output force varies with pump motor speed. As pump speed and piston force decrease, the torque-spring force available to the brake shoes increases. This allows the shoes to close on the brake wheel. Braking torque develops and increases as thruster pump output decreases.
 - 2.5.(c):** Maximum brake torque is generated as motor and pump speed fall to the level at which the thruster piston is no longer able to offset torque-spring force.
- NOTE: Interruption of power to the thruster produces the maximum available braking torque.**
- 2.6: When using the pedal, or similar remote control and all conditions for operation are met, the output voltage and frequency produced by the Braketronic controller will vary, depending upon the position of the pedal, as follows:
- 2.6.(a):** With the pedal released (OFF), the Braketronic supplies rated voltage and frequency to the thruster motor. The motor will run at its rated RPM to fully release the brake.
 - 2.6.(b):** When foot pressure is applied to the pedal, an internal switch trips after the pedal leaves the released (OFF) position. This switch signal causes the controller output to decrease, at a preset ramp rate, quickly moving the shoes into light “kiss” contact with the brake wheel.
 - 2.6.(c):** As pressure on the pedal increases, a potentiometer arranged to sense pedal position, adjusts the controller to produce a gradual increase in braking torque.
 - 2.6.(d):** When the pedal is fully depressed, the controller output continues to decrease to the point where the thruster is unable to offset any torque spring force and maximum braking torque is produced.
 - 2.6.(e):** A small decrease in pedal pressure changes the position of the controller potentiometer, producing an increase in controller output which increases the thruster motor RPM. The thruster motor speed increase acts to offset torque spring force and decrease the braking torque.

2.6.(f): When pressure on the foot pedal is completely removed, the internal switch resets to produce maximum controller output and quickly move the shoes clear of the wheel.

Note: When circumstances permit, ramp rate parameters are factory set for operation with a specified brake, or brakes. However, a digital operator is supplied with each Braketronic controller to allow on-site modification of any parameter.

2.7: “Wireless Remote Control”, (supplied by others), can be used to regulate the output of a Braketronic controller. Braking characteristics are similar to those offered by the pedal operator while allowing the operator considerable mobility. Operation is generally as follows:

2.7.(a): When the wireless “Brake Master Switch” is not operated, the Braketronic unit supplies rated voltage and frequency to the thruster motor, and fully releases the brake.

2.7.(b): Initial movement of the “Brake Master Switch” activates a primary relay. This sets the controller output to a value that quickly moves the shoes into light “kiss” contact with the brake wheel.

2.7.(c): Advancing the “Brake Master Switch” to nearly full travel, produces a continued, but slower, decrease in controller output with a corresponding increase in brake torque.

2.7.(d): When the “Brake Master Switch” reaches full travel, controller output continues to decrease to the point where the thruster is unable to offset any torque spring force and maximum braking torque is produced.

2.7.(e): Gradually allowing the “Brake Master Switch” to return to its starting position increases controller output and thruster motor RPM. The thruster motor speed increase acts to offset torque spring force and decrease the braking torque.

2.7.(f): When the “Brake Master Switch” returns to its starting position, the primary relay releases to produce maximum controller output and quickly move the shoes clear of the wheel.

2.8: Pre-programmed “**Fixed Rate Ramp Control**” is available as an alternative to variable rate braking. With “Fixed Rate Ramp Control”, the controller produces an output whose voltage and frequency emulate pedal operation.

Ramp function parameters are factory pre-programmed, but can be modified onsite using the digital operator provided with each Braketronic Controller.

2.8.(a): Ramp operation is initiated by closing a voltage free contact. This causes the output frequency and voltage of the controller to decrease relatively quickly moving the shoes into light “kiss” contact with the brake wheel.

2.8.(b): As soon as the “kiss” stage is reached, controller output decreases more slowly to produce a ramp controlled increase in braking torque. At the end of this ramp period, controller output decreases to the point where the thruster is unable to offset torque spring force to produce maximum attainable torque.

2.8.(c): Opening the voltage-free contact signals the Braketronic output to increase at the predetermined ramp rate(s). The frequency and voltage will ramp to maximum and the brake will return to the fully released state. The brake will remain released until “Ramp Control” mode is selected and the voltage free ramp initiation contact closes, or power to the Braketronic system is interrupted.

2.9: Pedal Unit

2.9.(a): Figure 2 and 3 show the standard foot pedal units. It consists of a floor mounted, NEMA 4, cast aluminum enclosure containing 3 switches and a potentiometer. The pedal drives the potentiometer via a gear set and the switches via independently adjustable cams.

Do you require more information? Contact Magnetek at 1-800-288-8178

Figure 2

Standard Duty Foot Pedal

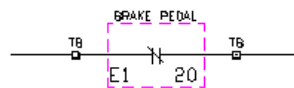
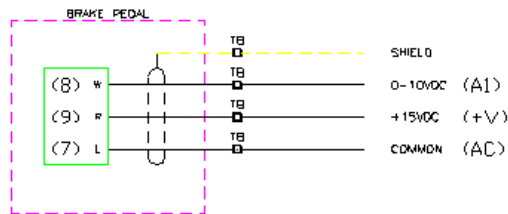
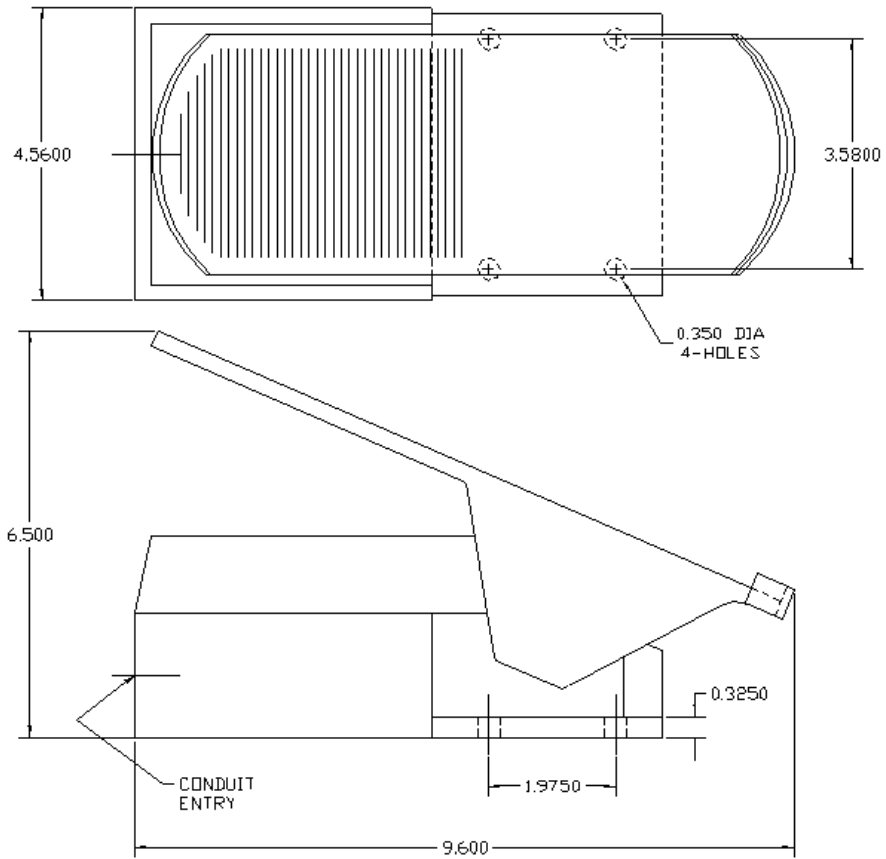
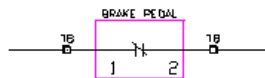
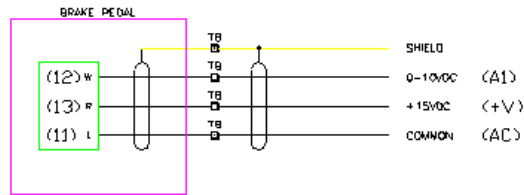
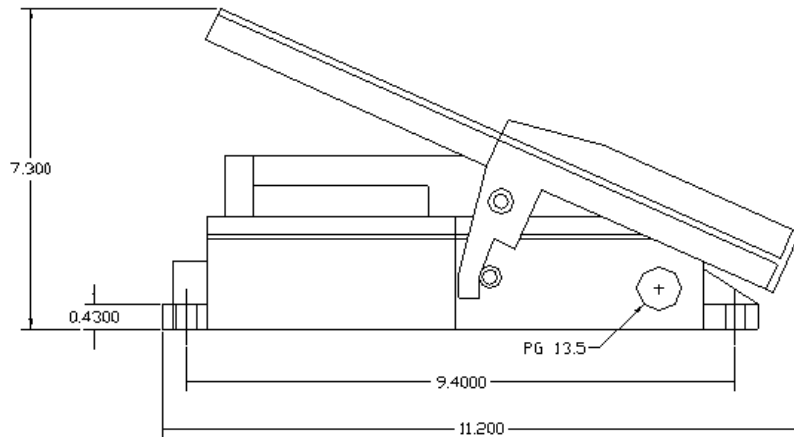
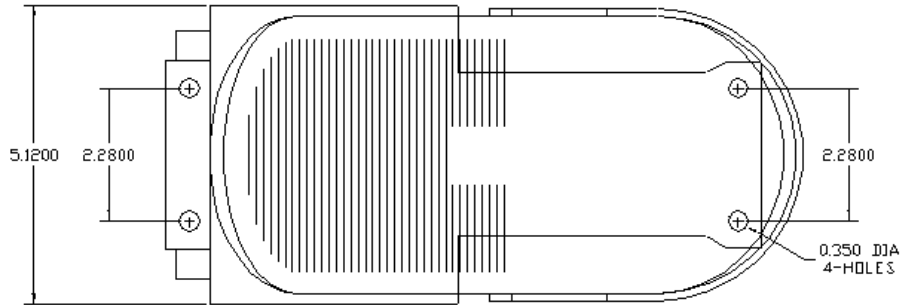


Figure 3

Mill Duty Foot Pedal



Chapter 3.0: Installation

3.0.(a): These notes form part of the scope of supply for Braketronic systems when used with Mondel spring applied, thruster released brakes. These notes are valid only when the equipment is installed in accordance with drawings and supporting documentation specific to the equipment.

3.0.(b): Magnetek will not be responsible for modifications made by others, after this equipment leaves the factory, unless prior written authorization has been obtained from Magnetek.

3.0.(c): Based on data furnished to us by the purchaser or his agents, Magnetek will adjust and calibrate Braketronic controllers to suit specific brake applications.

3.0.(d): The installer is responsible for compliance with all relevant safety codes and regulations.

3.1: Locating the Braketronic controller

3.1.(a): Mount the control enclosure with the hinge vertical to ensure the effectiveness of internal cooling fins.

3.1.(b): Allow 4" minimum clearance all around the enclosure for ventilation. Protect from unreasonable amounts of dust, grease, liquids or gases.

3.1.(c): Mount in a shaded location out of direct sunlight, and provide radiant heat shielding, where necessary, to protect the temperature-sensitive components.

Chapter 4.0: Electrical Connections

4.0.(a): Wiring diagrams specific to the Braketronic Controller are shipped with each unit. External (user) connections are shown on sheet 1 of 2.

4.1: Power Supply Connections

4.1.(a): Select appropriate conductor size, insulation, jacket and branch circuit protection in accordance with local electrical codes. Connect power only to the power supply terminals as shown on the wiring diagram. Verify polarity when a direct current supply is specified.

4.1.(b): Internal fuses or circuit breakers, suitable for the application, are provided. The fuse/breaker rating is shown on the wiring diagram.

4.1.(c): A ground stud is provided on the sub-panel to receive all connections from power line protective ground wire conductors.

4.1.(d): External electrical wiring must be connected only at the terminal block; wiring diagrams will show connection details.

4.1.(e): Conduit/cable entries must be located in the bottom face of the enclosure to minimize moisture entry. Use separate conduits for power line input and control wiring.

4.1.(f): Ground all enclosures and components as required by local electrical codes.

4.2: Power Connection To The Brake Thruster

4.2.(a): Select appropriate conductor size, insulation and jacket in accordance with local electrical codes. Specific electrical characteristics will be found on the Thruster nameplate. Use a separate conduit to connect from the brake thruster terminals to terminals on the controller. Shielded conductors are unnecessary under most conditions, however output cable runs exceeding 150 feet, require motor line reactors to be installed. For information concerning unusual operating conditions **Contact Magnetek at 1-800-288-8178.**

4.3: Control Connection

4.3.(a): The control lines (16 to 20 AWG., low voltage 0 – 15VDC) between the controller and the pedal unit or any other remote control devices, must be shielded. Ground the control conductor shields only at the Braketronic terminal block. Run the control wiring in a separate conduit containing no other circuits.

Chapter 5.0: Operational Test

5.1: Comply with the owners' safety procedures and heed all warnings and cautions, both in the BRAKETRONIC and BRAKE instruction manuals.

5.2: Follow all standards and local statues.

5.3: As a preliminary test, operate the brake system without load and proceed as follows:

5.4: Pedal Controlled Variable Torque

5.4.(a): Switch on the power supply to the Braketronic unit. The brake must quickly release the load.

5.4.(b): Without delay, apply light pressure to the brake pedal; the shoes should quickly move into light "kiss" contact with brake wheel.

5.4.(c): Apply more force to the pedal; braking torque will increase as shoe pressure on the brake wheel increases.

5.4.(d): Just before the pedal reaches its fully depressed position maximum brake shoe to wheel pressure is achieved; full torque is developed to hold the load stationary.

5.4.(e): If the brake fails to respond as above, repair or re-adjust the brake as necessary. Visually inspect the brake during operation to ensure all adjustments are correct. If successful, continue with longer duration tests until confident that the brake and Braketronic system is operating satisfactorily.

5.5: Ramp Controlled Torque, Optional Feature

5.5.(a): Switch on the power supply to the Braketronic unit. The brake must quickly release the load.

5.5.(b): Initiate the ramp signal contact; the shoes should move quickly into light "kiss" contact with the brake wheel.

5.5.(c): After the "kiss" contact stage is reached, shoe movement slows and increases pressure to the wheel; braking torque rises as shoe pressure on the brake wheel increases.

5.5.(d): The time taken from ramp contact initiation to the development of full torque is determined by the duration of the ramp signal.

5.5.(e): When the ramp signal duration times out, the controller output decreases to produce maximum brake shoe to wheel pressure; full torque is developed to hold the load stationary.

5.5.(f): If the brake fails to respond as above, repair or re-adjust the brake as necessary. Visually inspect the brake during operation to ensure all adjustments are correct. If successful, continue with longer duration tests until confident that the brake and Braketronic system is operating satisfactorily.

Chapter 6.0: Parameter Settings / Timing Charts

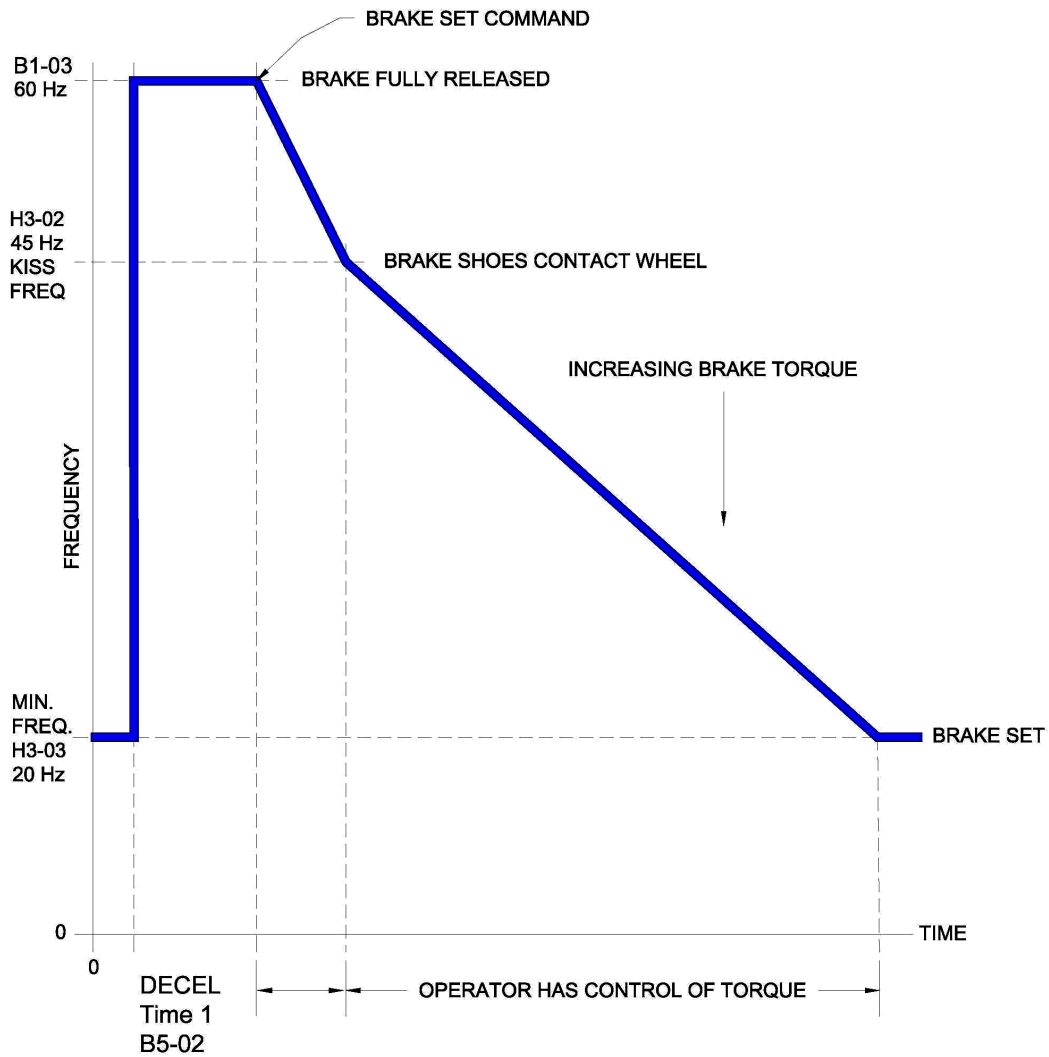
**PARAMETER SETTINGS FOR
IMPULSE G+ SERIES 3 DRIVE
230/460VAC BRAKETRONIC APPLICATIONS**

CAB	RADIO	PARAMETER SETTING	PARAMETER DESCRIPTION SETTING DESCRIPTION
X	X	A1-01	Setting determines which parameters are accessible
		4	Allow access to advanced programming parameters
X	X	A1-02	Determines method of control
		0	V/f Control Method
X	X	A1-03	Parameter set to match motion of the application
		0	Decelerate motor to stop upon removal of run command
X	X	A1-04	Parameter set to define input terminals
		0	Two Speed multi-step. Defines Terminal S3 = 2nd Speed (Kiss Frequency)
X	X	B1-03	Frequency reference (3) - Full release frequency
		60	Brake is fully released at 60 Hz
X	X	B1-18	Parameter set to select reference terminal
		2	Higher reference automatically selects the fastest input frequency
X	X	B3-10	Allow Run at power up
		1	Enabled - this allows the brake to release when power is turned on
X	X	B5-01	Acceleration time (1) - Brake release time
		1	Time for brake to release to full open is 1 second
X	X	B5-02	Deceleration time (1) - Approx time from Fully Released to Kiss Frequency
		1	Decel time from 60 Hz to Kiss Frequency is 1 second
	X	B5-03	Acceleration time (2) - Brake release time when frequency is below L4-01
		0.3	Time for brake to release to full open from frequency below 50 Hz is 0.3 sec.
	X	B5-04	Deceleration Time (2) - Approx elapsed time to full brake torque
		20	Time for brake achieve full braking torque from full release is 20 seconds
	X	D8-03	Dwell frequency at stop
		40*	Determines braking torque level, factory set to 40 Hz
	X	D8-04	Dwell time at stop
		3**	Time brake is held at torque level set by D8-03
X	X	D9-01	S-Curve characteristic
		0	Acceleration at start is set to 0 seconds
X	X	D9-02	S-Curve characteristic
		0	Acceleration at end is set to 0 seconds
X	X	D9-03	S-Curve characteristic
		0	Deceleration at end is set to 0 seconds
X	X	E2-01	Full load amps
		***	Set to total full load amps of all connected actuators. Default is drive capacity.
	X	H1-05	Multi-Function inputs - Terminal 7
		65	Activates the B5-04 Decel (2) Parameter for the dwell function
X		H3-02	Auto speed reference signal gain - Cab Kiss Frequency Setting
		75	Cab Kiss Frequency is 75% of B1-03 (45 Hz)
X		H3-03	Bias multiplier for terminal 13 analog input signal - Min frequency of thruster
		33.3	Minimum thruster frequency is 33.3% of B1-03 (20 Hz)

- Do not change parameter
- * - Adjust lower for greater braking torque
- ** - Set equal to the time it takes to bring the motion from full speed to stop
- *** - Set to total full load amps of all connected actuators. Default is drive capacity.

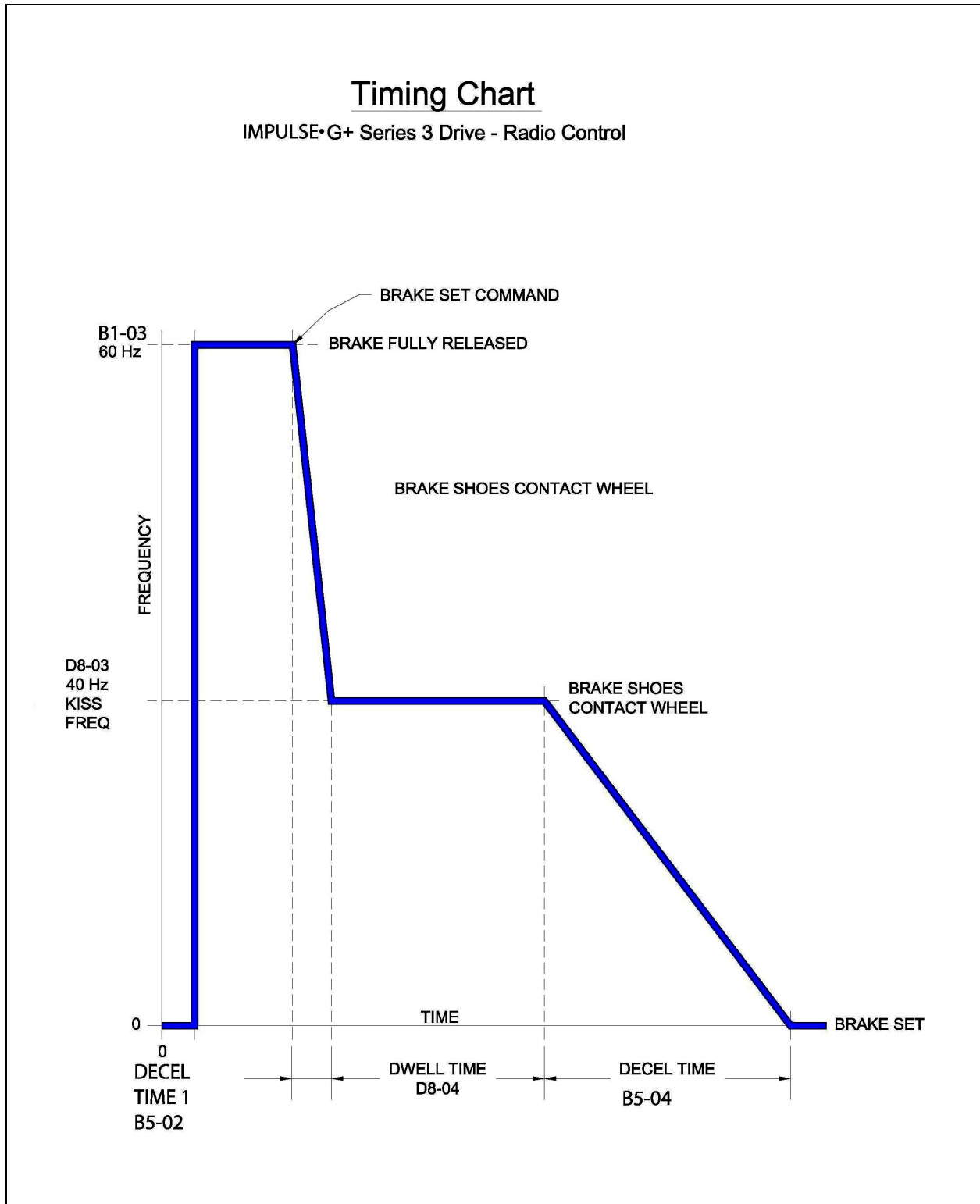
Timing Chart

IMPULSE•G+ Series 3 Drive - Cab Control
230/460 VAC BRAKETRONIC APPLICATIONS



Timing Chart

IMPULSE•G+ Series 3 Drive - Radio Control



**PARAMETER SETTINGS FOR
IMPULSE G+ SERIES 3 DRIVE
230VDC BRAKETRONIC APPLICATIONS**

CAB	RADIO	PARAMETER SETTING	PARAMETER DESCRIPTION SETTING DESCRIPTION
X	X	A1-01	Setting determines which parameters are accessible
		4	Allow access to advanced programming parameters
X	X	A1-02	Determines method of control
		0	V/f Control Method
X	X	A1-03	Parameter set to match motion of the application
		0	Decelerate motor to stop upon removal of run command
X	X	A1-04	Parameter set to define input terminals
		0	Two Speed multi-step. Defines Terminal S3 = 2nd Speed (Kiss Frequency)
X	X	B1-03	Frequency reference (3) - Full release frequency
		60	Brake is fully released at 60 Hz
X	X	B1-18	Parameter set to select reference terminal
		2	Higher reference automatically selects the fastest input frequency
X	X	B3-10	Allow Run at power up
		1	Enabled - this allows the brake to release when power is turned on
X	X	B5-01	Acceleration time (1) - Brake release time
		1	Time for brake to release to full open is 1 second
X	X	B5-02	Deceleration time (1) - Approx time from Fully Released to Kiss Frequency
		1	Decel time from 60 Hz to Kiss Frequency is 1 second
	X	B5-03	Acceleration time (2) - Brake release time when frequency is below L4-01
		0.3	Time for brake to release to full open from frequency below 50 Hz is 0.3 sec.
	X	B5-04	Deceleration Time (2) - Approx elapsed time to full brake torque
		20	Time for brake achieve full braking torque from full release is 20 seconds
	X	D8-03	Dwell frequency at stop
		40*	Determines braking torque level, factory set to 40 Hz
	X	D8-04	Dwell time at stop
		3**	Time brake is held at torque level set by D8-03
X	X	D9-01	S-Curve characteristic
		0	Acceleration at start is set to 0 seconds
X	X	D9-02	S-Curve characteristic
		0	Acceleration at end is set to 0 seconds
X	X	D9-03	S-Curve characteristic
		0	Deceleration at end is set to 0 seconds
X	X	E1-03	Input voltage setting
		F	Custom V/f pattern selected
X	X	E1-05	Maximum voltage that the inverter should put out
		208***	Set to actuator nameplate voltage.
X	X	E1-06	Maximum voltage frequency
		60	The frequency at which maximum voltage should occur - base frequency
X	X	E1-13	Base voltage
		208***	Set to actuator nameplate voltage
X	X	E2-01	Full load amps
		****	Set to total full load amps of all connected actuators. Default is drive capacity.
	X	H1-05	Multi-Function input - (Terminal 7)
		65	Activates the B5-04 Decel (2) Parameter for the dwell function
X		H3-02	Auto speed reference signal gain - Cab Kiss Frequency Setting
		75	Cab Kiss Frequency is 75% of B1-03 (45 Hz)
X		H3-03	Bias multiplier for terminal 13 analog input signal - Min frequency of thruster
		33.3	Minimum thruster frequency is 33.3% of B1-03 (20 Hz)

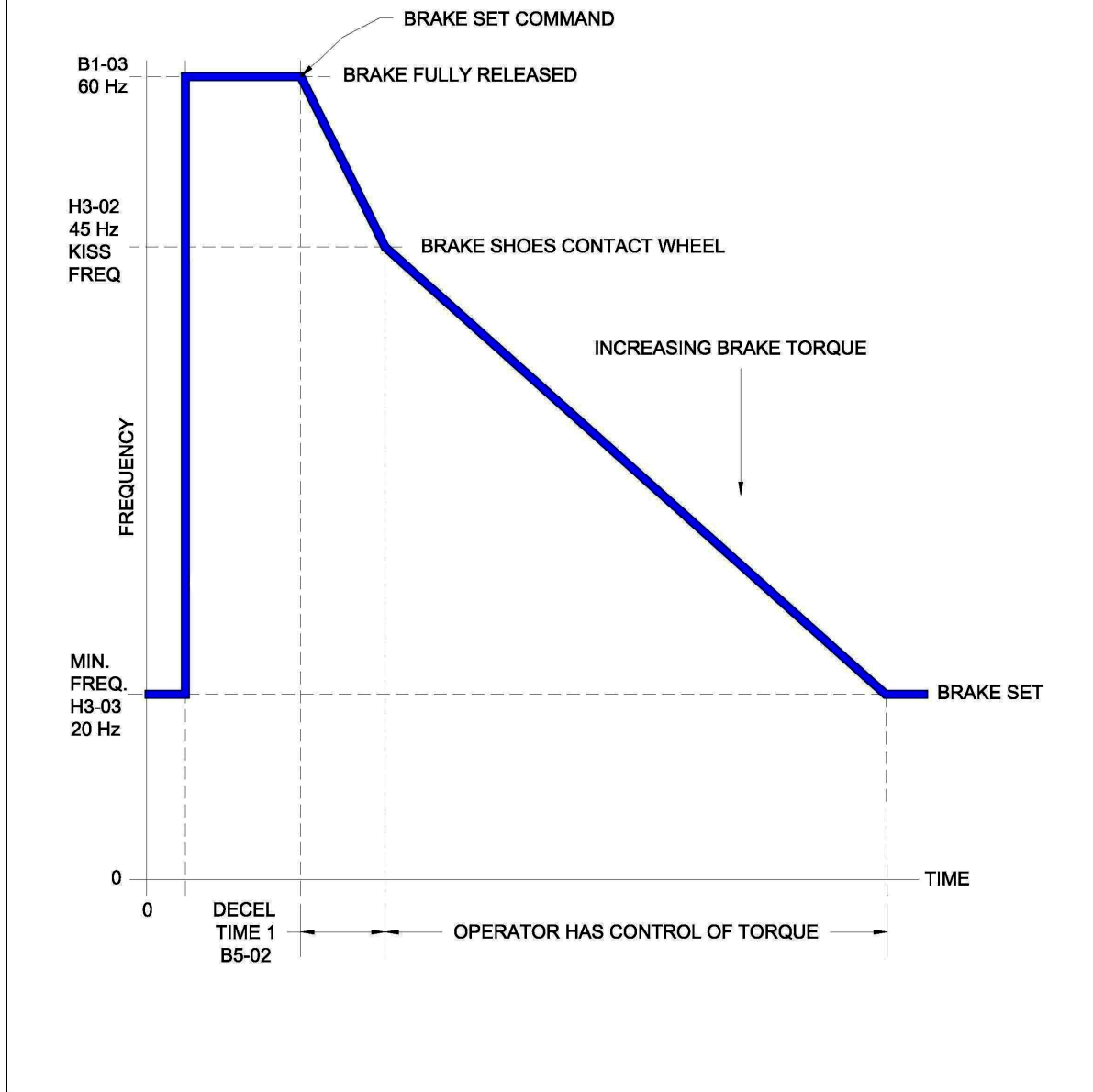
X	X	L2-01	Momentary power loss detection setting - provides voltage sag protection
		2	Setting allows drive to re-start after undervoltage without faulting out
X	X	L2-05	Under-Voltage threshold - Drive shuts down below this supply voltage
		151	Under voltage detection setting is 151 Volts



- Do not change parameter
- * - Adjust lower for greater braking torque
- ** - Set equal to the time it takes to bring the motion from full speed to stop
- The standard actuator used on 230 VDC applications is rated at 208 VAC;
- *** however, DC Braketronic panels can be applied to 180 VAC actuators. If so, this parameter should be set to 180.
- **** - Set to total full load amps of all connected actuators. Default is drive capacity.

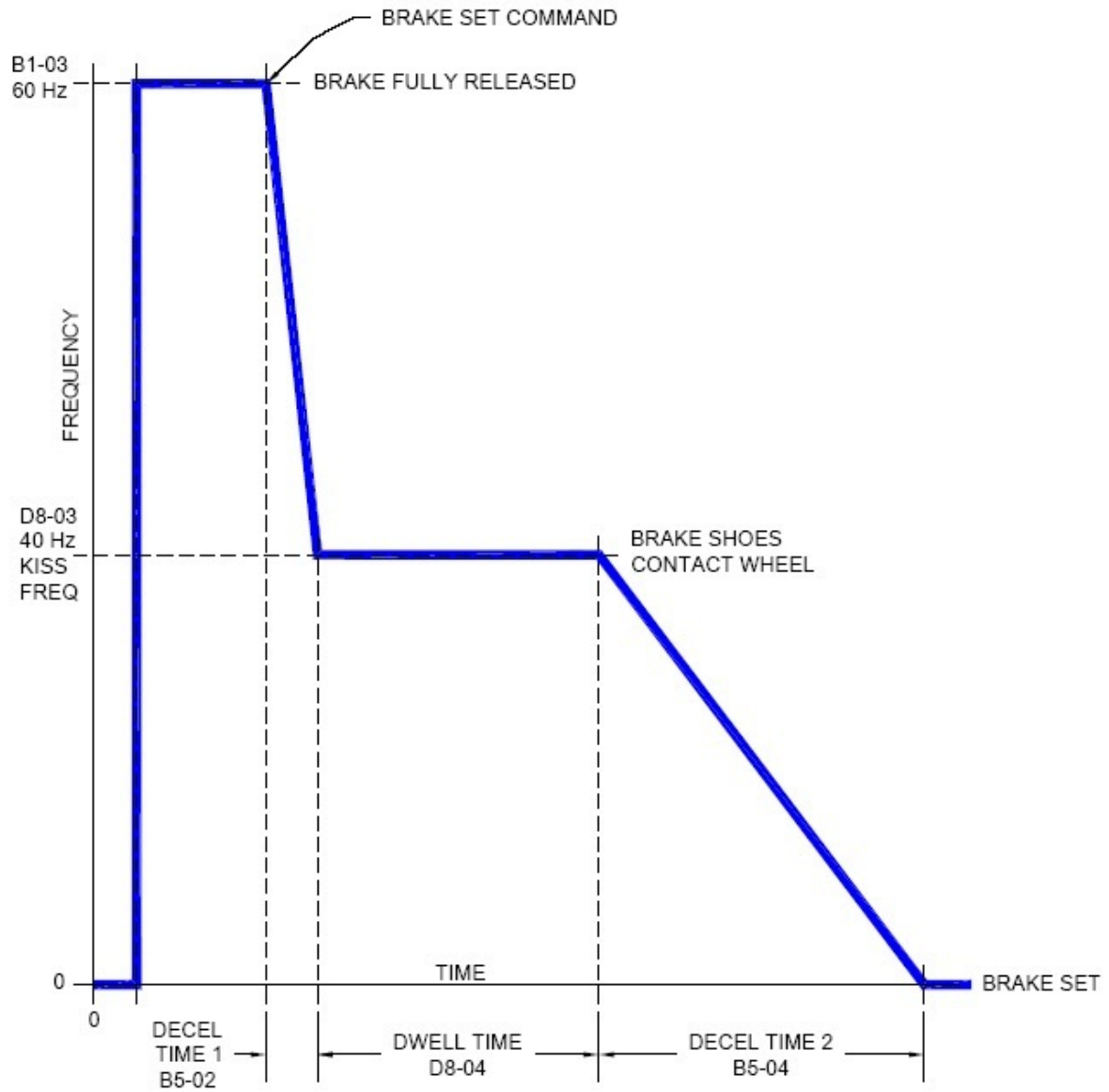
Timing Chart

IMPULSE•G+ Series 3 Drive - Cab Control
230 Vdc BRAKETRONIC APPLICATIONS



Timing Chart

Impulse G+ Series 3 Drive - Radio Control
230 VDC BRAKETRONIC APPLICATIONS



Chapter 7.0: Servicing

7.0.(a): Maintain cleanliness and ensure that all covers and doors are sealed to exclude dirt.

7.0.(b): Parameter adjustments and trouble shooting guidelines for the integral solid state drive are beyond the scope of this publication. Refer to the Technical Manual supplied with the Braketronic system for related information.

Chapter 8.0: Long Term Storage

- 8.1: If the equipment will not be installed immediately, it can be stored indoors in a dry location indefinitely or outdoors for a reasonable time if adequately protected from moisture and corrosive atmosphere. The equipment must always be protected from direct exposure to the elements unless specifically treated at the factory for use in that environment. Covering with plastic sheeting is not acceptable unless provision is made to prevent condensation under the plastic.
- 8.2: Braketronics in long term storage should be powered every six months to keep the drive's internal capacitors in good condition.
- 8.3: If the Braketronic is being stored for over one year, please refer to "Long Time Storage" in the IMPULSE•G+ Series 3 Instruction Manual, available at www.magnetekmh.com.