

ARTISAN®
TECHNOLOGY GROUP

Your **definitive** source for quality pre-owned equipment.

Artisan Technology Group
(217) 352-9330 | sales@artisantg.com | artisantg.com

Full-service, independent repair center
with experienced engineers and technicians on staff.

We buy your excess, underutilized, and idle equipment
along with credit for buybacks and trade-ins.

Custom engineering
so your equipment works exactly as you specify.

- Critical and expedited services
- In stock / Ready-to-ship
- Leasing / Rentals / Demos
- ITAR-certified secure asset solutions

Expert team | Trust guarantee | 100% satisfaction

All trademarks, brand names, and brands appearing herein are the property of their respective owners.

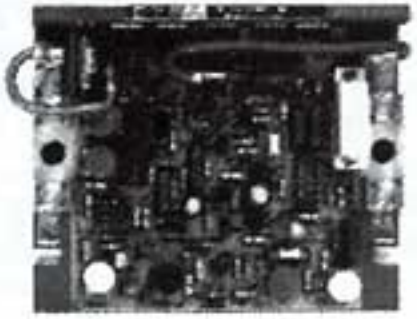
Visit our website - *Click HERE*

KBMM™ * Solid State DC Motor Speed Control

Installation and Operating Instructions**

* Patented

CE c UL us



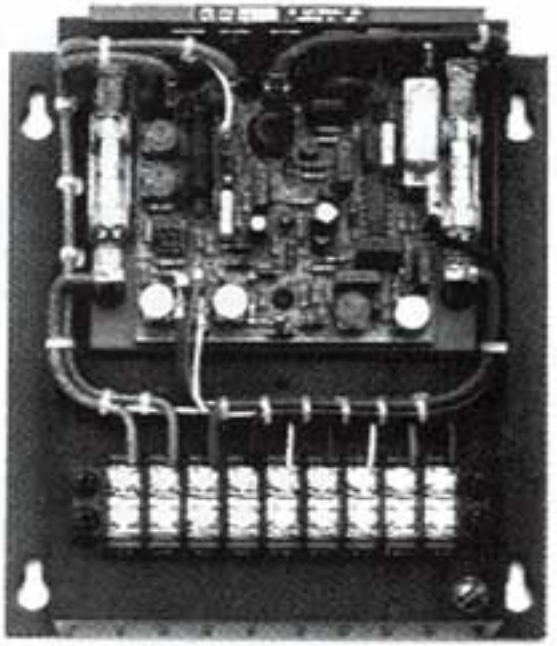
Basic KBMM™



Dial Plate & Knob (Optional)



5K Speed Potentiometer (Included)



KBMM mounted on KB Auxiliary Heatsink and with Barrier Terminal Kit

© 1988 KB ELECTRONICS, INC.

See Safety Instructions On Page 2

PENTA KB POWER

A COMPLETE LINE OF SCR DRIVES

TABLE OF CONTENTS

Section		Page
	Simplified Instructions	3
	Electrical Ratings	3
	Specifications	4
	Introduction	6
I	**Application Information**	6
	A. Motor Type	6
	B. Torque Requirements	6
	C. Acceleration Start	6
	D. Limitations in Use	6
	E. Armature Switching	6
II	**Installation Instructions**	7
	A. Location and Mounting	7
	B. Initial Setup and Wiring	7
	i. General Instructions all Models	7
	ii. Tachometer Connections	9
	iii. Dual Voltage (KBMM-225D only)	9
	C. Voltage Following	10
	D. Fusing	10
III	**Adustments and Control Functions**	10
	A. Acceleration (Accel) Adjustment	12
	B. Deceleration (Decel) Adjustment	13
	C. Maximum Speed Adjustment	13
	D. Minimum Speed Adjustment	13
	E. Current Limit (CL)/Torque Adjustment	13
	F. IR Compensation (IR) Adjustment	14
IV	**Switching Circuits**	14
	A. AC Line Switching	
	B. Armature Switching	
	C. Reversing and Dynamic Brake	
	Warranty	20

LIST OF ILLUSTRATIONS

Figure		Page
1.	Features and Functions	5
2.	Mechanical Specifications	7
3.	Connection Diagrams	8
4.	Accel/Decel Trimpot Adjustments	12
5.	Switching Circuits	15
6.	KBMM™ Schematic	16

LIST OF TABLES

Table		Page
1.	Nominal Trimpot Settings	3
2.	Electrical Ratings	3
3.	General Performance Specifications	4
4.	Plug-in Horsepower Resistor® Chart	5
5.	Minimum Supply Wire Requirements	8
6.	Armature Fuse Chart	11
7.	KBMM™ Parts List	17

SAFETY WARNING—PLEASE READ CAREFULLY

This product should be installed and serviced by a qualified technician, electrician or electrical maintenance personnel familiar with its operation and the hazards involved. Proper installation (see instruction information which accompanies product), which includes wiring, mounting in proper enclosure, fusing or other overcurrent protection and grounding, can reduce the chance of electric shocks, fires or explosion in this product or products used with this product, such as electric motors, switches, coils, solenoids and/or relays. Eye protection must be worn when working with control under power. This product is constructed of materials (plastics, metals, carbon, silicon, etc.) which may be a potential hazard. Individual material safety data sheets (MSDS) are available upon request. Proper shielding, grounding and filtering of this product can reduce the emission of radio frequency interference (RFI) which may adversely affect sensitive electronic equipment. If information is required on this product, contact our factory. It is the responsibility of the equipment manufacturer and individual installer to supply this safety warning to the ultimate user of this product. (SW effective 3/88).

** IMPORTANT **

You must read these simplified instructions before operating control.

1. Be sure AC line voltage corresponds to control voltage. (See electrical rating chart).
2. Install the correct Plug-in Horsepower Resistor® according to armature voltage and motor horsepower (See Table 4. Page 5.) **(supplied separately).**
3. Recheck connections: AC line to L1 and L2; armature to A+ and A– and Field (Shunt motors only to F+ and F–. (Note: If motor runs in improper direction, interchange armature leads).
4. Install proper AC line fuse and armature fuse as required (See page 9) **(supplied separately).**
5. Nominal trimpot settings are as follow (expressed in % of full CW rotation):

TABLE 1: NOMINAL TRIMPOT SETTINGS For detailed instructions see Sec. III

MIN (minimum speed):	15%	CL (current limit/torque):	65%
MAX (maximum speed):	65%	ACCEL (acceleration start):	20%
IR (IR compensation):	25%	DECEL (deceleration):	20%

TABLE 2. ELECTRICAL RATINGS

MODEL NUMBER	AC LINE VOLTAGE (VAC)**	MOTOR VOLTAGE (VDC)	RATING WITHOUT AUXILIARY HEATSINK			RATING WITH AUXILIARY HEATSINK		
			AC LOAD CURRENT (RMS AMPS)	DC LOAD CURRENT (AVG. AMPS)	MAX. HP	AC LOAD CURRENT (RMS AMPS)	DC LOAD CURRENT (AVG. AMPS)	MAX. HP
KBMM-125	120	90-130	12.0	8.0	¾	24.0	16.0	1½
KBMM-225	240	180	12.0	8.0	1½	24.0	16.0	3
KBMM-225D*	120/240	90/180	12.0	8.0	1½	24.0	16.0	3

*Model KBMM-225D is wired at the factory for 120 VAC input and 90VDC output. It can be converted to 240VAC input for use with 180VDC or 90VDC motors (see page 9 for full details).

FOR TECHNICAL ASSISTANCE CALL TOLL FREE (OUTSIDE NY STATE ONLY) 1-800-221-6570

TABLE 3. GENERAL PERFORMANCE SPECIFICATIONS

Speed range (ratio)	50:1
Load regulation—armature feedback (0-full load, 50:1 speed range) (% base speed)	1*
Load regulation—tachometer feedback (0-full load, 50:1 speed range) (% set speed)	1*
Line voltage regulation—armature feedback (at full load, ±10% line variation(% base speed)	½*
Line voltage regulation—tachometer feedback (at full load, ±10% line variation) (% set speed)	½*
Control linearity (% speed vs. dial rotation)	2
CL/torque range (% full load)	0-200
Accel time range (0-full speed) (secs.)	.2-10
Decel time range (full-0 speed) (secs.)	.2-10
Min. speed trimpot range (% full speed)	0-30*
Max. speed trimpot range (% full speed)	50-110*
IR compensation trimpot range (at specified full load) (volts)	0-24
Maximum allowable ambient temperature at full rating (°C/°F)	45/113
Tachometer feedback input volts (per 1000 RPM) (VDC)	7/50

*Performance is for SCR rated PM motors only. Lower performance can be expected with other motor types. Factory setting is for 3% load regulation. To obtain superior regulation, see Sec. III F. Other factory trimpot settings are as follows: CL-150% FL, Accel-2 sec., Decel-2 sec., MIN-(0)-speed, MAX-full speed & IR-6 volts.

PLUG-IN HORSEPOWER RESISTOR®

A Plug-in Horsepower Resistor® must be installed to match the KBMM™ to the motor horsepower and voltage.See Table 4 for the correct value. Plug-in Horsepower Resistors® are stocked by your distributor (supplied separately).

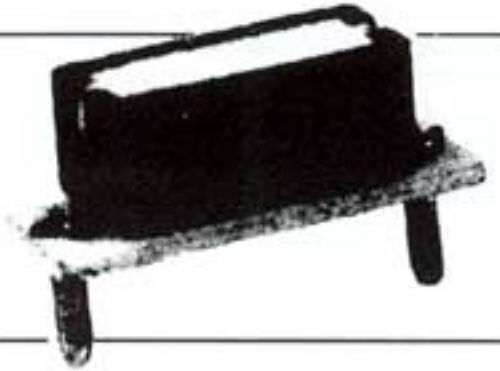


TABLE 4. PLUG-IN HORSEPOWER RESISTOR® CHART *

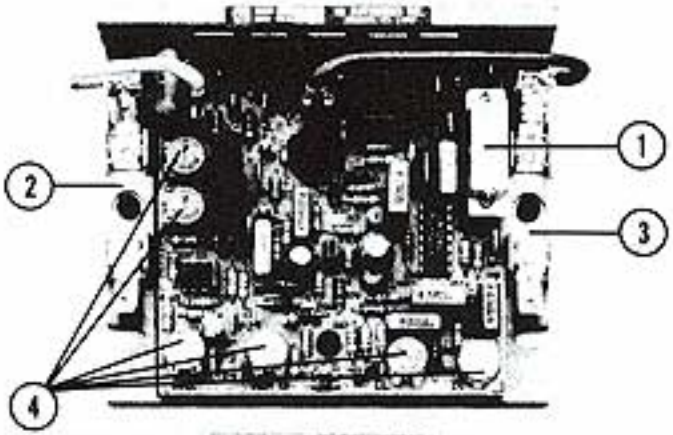
MOTOR HORSEPOWER RANGE**		Plug-In Horsepower Resistor® Resistance Value (Ohms)	KB P/N
Armature Voltage 90-130V DC	Armature Voltage 180V DC		
1/100-1/50	1/50-1/25	1.0	9833
1/50-1/30	1/25-1/15	.51	9834
1/30-1/20	1/15-1/10	.35	9835
1/20-1/12	1/10-1/6	.25	9836
1/12-1/8	1/6-1/4	.18	9837
1/8-1/5	1/4-1/3	.1	9838
1/4	1/2	.05	9839
1/3	3/4	.035	9840
1/2	1	.025	9841
3/4	1-1/2	.015	9842
1***	2***	.01	9843
1-1/2***	3***	.006	9850

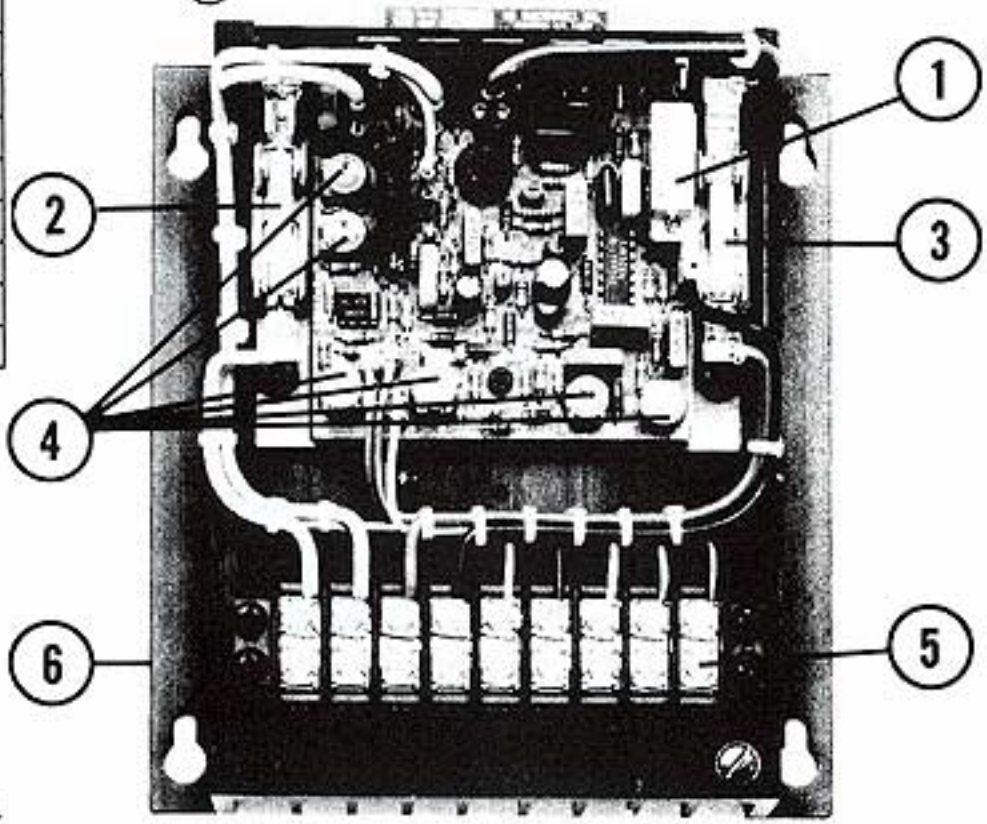
*Motor horsepower and armature voltage must be specified when ordering so that proper resistor will be supplied.
**For overlapping motor horsepower range use lower value Plug-In Horsepower Resistor.
*** Auxiliary heatsink must be used to achieve HP rating.

FIG. 1. FEATURES AND FUNCTIONS

(1) Plug-In Horsepower Resistor®
(2) AC Line Fuse
(3) Armature Fuse
(4) Trimpots: MIN, MAX, IR, CL, ACCEL & DECEL
(5) Barrier Terminal Accessory Kit (optional)
(6) Auxiliary Heatsink (optional)

BASIC KBMM™





KBMM™ mounted on KB Auxiliary Heatsink (optional) and with Barrier Terminal Kit (opt.)

INTRODUCTION

The KBMM™ Full Wave Solid State DC Motor Speed Control represents the latest state-of-the-art design achievable through modern technology.

Features Include:

- ***Integrated Circuitry***
  Used to control and amplify command and reference levels with both closed and open loop feedback to provide superior motor regulation. (Speed changes due to load, line voltage, or temperature variations are held to minimum levels).
- ***High Quality Components***
  Selected and tested for proven dependability.
- ***Transient Protection***
  Used to prevent failure of the power bridge circuit caused by voltage spikes on the AC Line.
- ***High Reliability***
  When used in accordance with the instructions included in this manual, the KBMM™ will provide years of trouble-free operation. (Five year warranty—see page 18.)

SECTION I. APPLICATION INFORMATION

A. ***Motor Type.*** The KBMM™ is designed for Permanent Magnet (PM) and Shunt Wound D.C. motors. Controls operated on 120 volt AC inputs are designed for 90 volt SCR rated motors. Controls operated on 240 volt AC inputs are designed for 180 volt SCR rated motors. Use of higher voltage motors will result in degradation of full speed performance. Also, if motor is not an SCR rated type, the actual AC line amperage at full load should not exceed the motor's DC nameplate rating.

B. ***Torque Requirements.*** When replacing an AC induction motor with a DC motor and speed control, consideration must be given to the maximum torque requirements. The full load torque rating of the DC motor must be equal to, or greater than, that of the AC motor.

C. ***Acceleration Start.*** The KBMM™ contains an adjustable aceleration start feature which allows the motor to smoothly accelerate from 0-full speed over a time period of .2-10 seconds. The "ACCEL" is factory set at 2 seconds.

D. ***Limitations in Use.*** The KBMM™ controls are designed for use on machine applications.

E. ***Armature Switching:*** Do not switch the armature without taking proper precautions. See Sec. IV.

CAUTION: Consult factory before using on constant horsepower applications such as saws or drill presses. Do not use in explosive atmosphere.

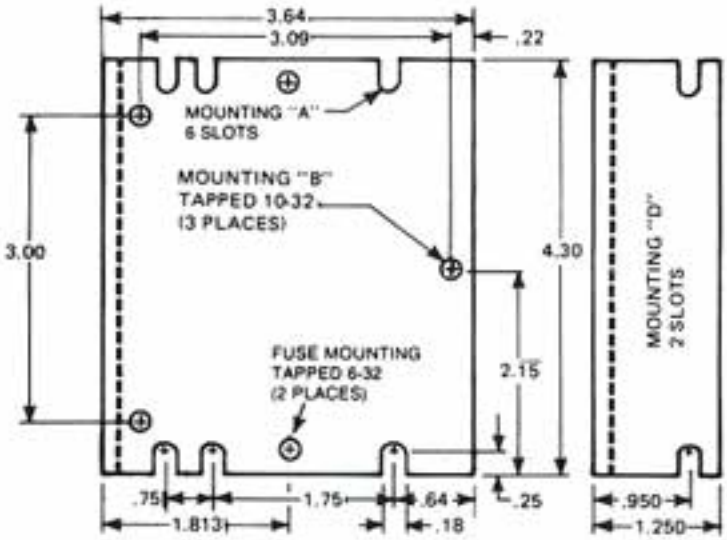
CAUTION: Be sure the KBMM™ is used within its max. ratings. Follow all installation instructions carefully. (Refer to Section II.)

SECTION II. INSTALLATION INSTRUCTIONS

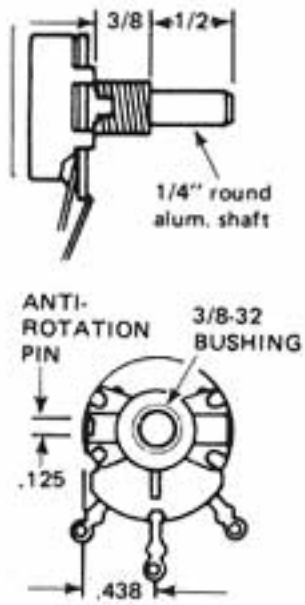
A. *Location and Mounting.* The KBMM™ controls should be mounted on a flat surface and located in an area where it will not be exposed to contaminants such as water, metal chips, solvents or excessive vibration.

When mounting in an enclosure the air space should be large enough to provide adequate heat dissipation. The maximum allowable amibent temperature at full rating is 45°C/113°F. Consult factory if more information is required.

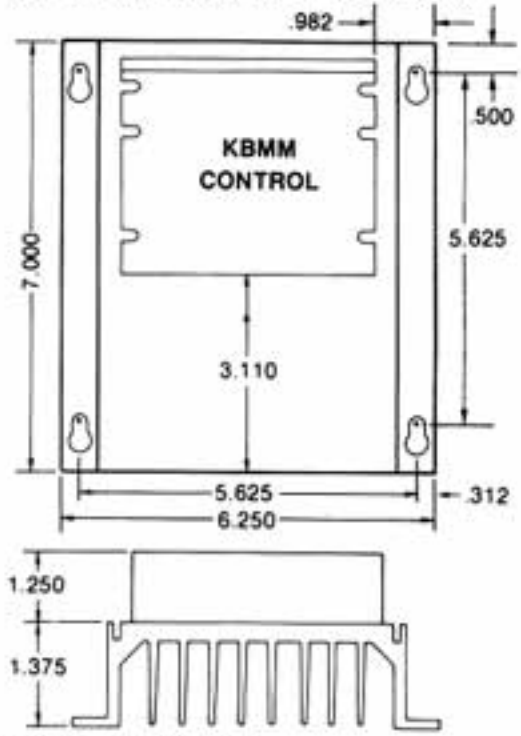
MECHANICAL SPECIFICATIONS



POTENTIOMETER



OPTIONAL AUXILIARY HEATSINK



B. *Initial Setup and Wiring*

i. General Instructions

1. Install proper size Plug-in Horsepower Resistor® (See Table 4, page 5.).
2. The KBMM can be connected to a standard 120V or 240V 50/60 Hz AC line [Be sure the AC input voltage corresponds to the control voltage rating and the motor rating (e.g. 90-130VDC motor on 120VAC and 180VDC motor on 240VAC)].
3. Follow the recommended supply wire sizes as per Table 5.
4. Follow the NEC and other electrical codes that apply. CAUTION: Separate branch protection must be provided on 240V circuits.
5. Connect control in accordance to connection diagram—See Fig. 3, page 8.

TABLE 5. MINIMUM SUPPLY WIRE SIZE REQUIREMENTS

MAX. MOTOR AMPS (DC AMPS)	MAX. MOTOR HP 90V	MAX. MOTOR HP 180V	MINIMUM WIRE SIZE (AWG) Cu Only	
			MAX. 50 FOOT RUN	MAX. 100 FOOT RUN
6.0	½	1	16	14
12.0	1	2	14	12*
16.0	1½	3	12	12

*Maximum recommended wire size.

CONNECTION DIAGRAMS

Fig. 3a. Basic KBMM Connection Diagram

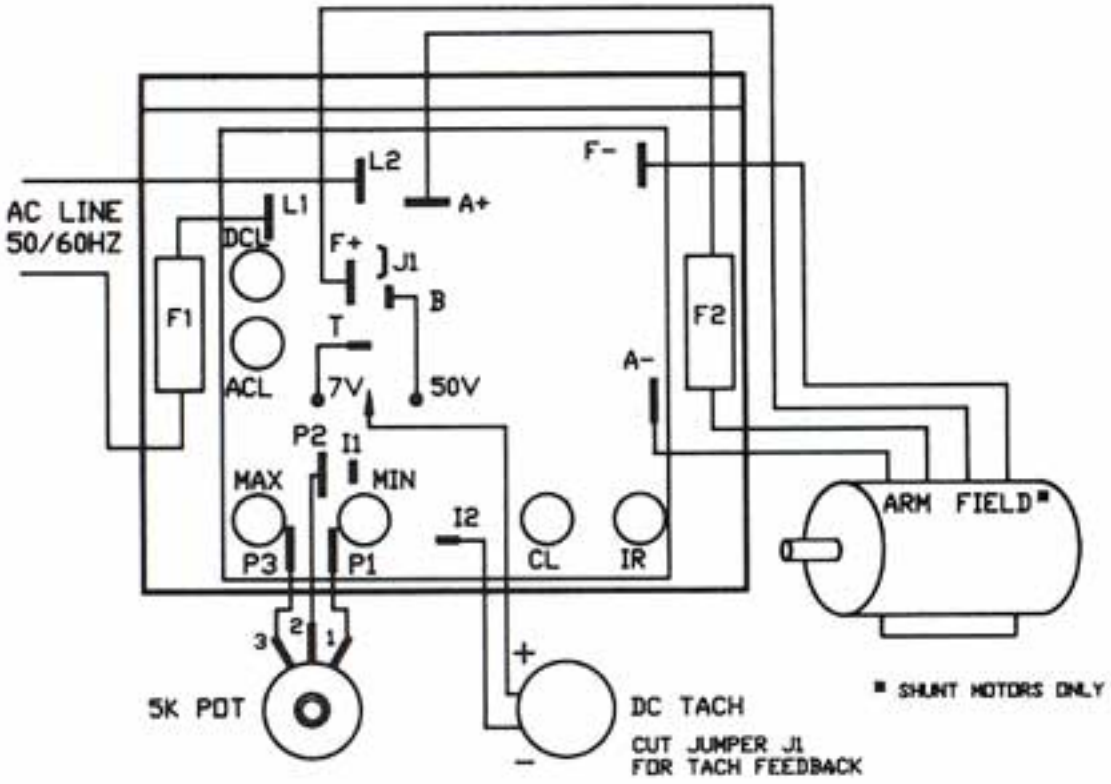
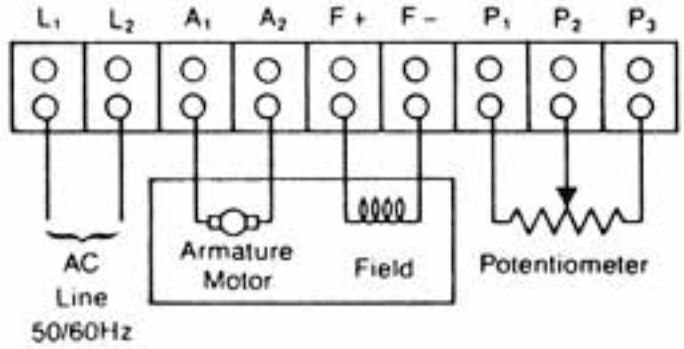


Fig. 3b. KBMM w/Barrier Terminal Kit



ii. Tachometer Connection—All Models (Note: DC Tachs Only)

(1) For tach feedback, cut jumper J1 on Printed Circuit Board. (Note: On Model KBMM-225, J1 is an 82K resistor)

(2) Connect tach as follows:

(a) 7 volts/1000 RPM Connect (+) lead to Terminal "T"
Connect (–) lead to Terminal I_2 or F–

(b) 50 volts/1000 RPM Connect (+) lead to Terminal "B"
Connect (–) lead to Terminal I_2 or F–

Note: Set IR Comp to minimum for tach feedback.

iii. DUAL VOLTAGE—Model KBMM-225D Only

The **KBMM-225D** is a dual voltage input and output control. The unit is factory wired for 120VAC input and 90VDC output. To change to other voltages, resistors R17 and R19A must be selectively cut from the control as indicated below:

Input Voltage (VAC)	Output Voltage (VDC)	Modification Required
120	90	None—Factory wired
240	90	Remove one R17 resistor (8.2K)
240	180	Remove one R17 resistor (8.2K) and one R19A resistor (120K)*

*If tachometer feedback is used, do not remove resistor R19A (120K) and follow tachometer connection instructions.

$$RT=(1.3 \times Vt \times S)-16,000$$

ii. Tachometer Connection—All Models (Note: DC Tachs Only)

(1) For tach feedback, cut jumper J1 on Printed Circuit Board. (Note: On Model KBMM-225, J1 is an 82K resistor)

(2) Connect tach as follows:

(a) 7 volts/1000 RPM Connect (+) lead to Terminal "T"
Connect (–) lead to Terminal I_2 or F–

(b) 50 volts/1000 RPM Connect (+) lead to Terminal "B"
Connect (–) lead to Terminal I_2 or F–

Note: Set IR Comp to minimum for tach feedback.

iii. DUAL VOLTAGE—Model KBMM-225D Only

The **KBMM-225D** is a dual voltage input and output control. The unit is factory wired for 120VAC input and 90VDC output. To change to other voltages, resistors R17 and R19A must be selectively cut from the control as indicated below:

Input Voltage (VAC)	Output Voltage (VDC)	Modification Required
120	90	None—Factory wired
240	90	Remove one R17 resistor (8.2K)
240	180	Remove one R17 resistor (8.2K) and one R19A resistor (120K)*

*If tachometer feedback is used, do not remove resistor R19A (120K) and follow tachometer connection instructions.

$$RT=(1.3 \times Vt \times S)-16,000$$

CAUTION: If control is wired to a transformer, it is advisable to switch the secondary to disconnect power. If the primary is switched, additional snubber capacitors may have to be added across the transformer output to prevent damage to the power bridge.

Note: (Shunt motors only) For 90 Volt dc motors with 50VDC fields and 180 Volt dc motors with 100VDC fields use half voltage field connections F+ and L_1.

CAUTION: Do not bundle potentiometer connections (P_1, P_2, P_3) and Inhibit™ connections (I_1, I_2) with AC line or motor wires.

WARNING: Armature Switching. Do not switch the armature in and out of circuit or catastrophic failure will result. If armature switching is required for dynamic brake or reversing, use Models KBPB or KBCC-R.

C. *Voltage Following.* All models can be controlled with an **isolated** analog reference voltage (0-9VDC) in lieu of the main speed potentiometer. The voltage is connected to P_2(+) and F−. The control output voltage will linearily follow the input voltage. The source impedance of the input should be 10K ohms or less. The Min trimpot can be used to provide an offset speed. If an offset is not required adjust the Min to 0+ or 0− speed as desired. The Max trimpot is rendered inoperative in the voltage following mode. Use auxiliary trimpot to limit the control range. If the input signal is not isolated, or is a current signal (4-20ma), the KBSI-240D Signal Isolator must be used. It will allow direct connection to process controllers and microprocessors.

CAUTION: 1. The voltage feeding P_2 and F− must be isolated from the AC line. Do not ground P_2 or F− to set up a zero or ground reference.
2. Do not bundle signal wires to P_2 and F− with AC line or motor connections. If signal wires are over 18", use shielded cables.

D. *Fusing.* The KBMM has provision for a built-in AC line fuse and armature fuse. The AC line fuse protects the control against catastrophic failure. If the fuse blows, the control is miswired, the motor is shorted or grounded, or the KBMM control is defective. The armature fuse provides overload protection for the motor and control. Choose the proper size armature fuse by multiplying the maximum **dc motor amps by 1.7. NOTE: Be sure to fuse each ungrounded AC line supply conductor. Do not fuse neutral or grounded conductors. All fuses should be normal blow ceramic 3AG, ABC or equivalent.**

1. *AC Line Fuse* is chosen according to the maximum rating of the control:
   12 Amp fuse for all motors up to ¾ HP-90V and 1½ HP-180VDC.
   25 Amp fuse for all motors 1 and 1½ HP-90V and 2 and 3 HP-180VDC.
   (Use Buss ABC, Litt. 326 ceramic fuse or equivalent.)
2. *Armature Fuse* can be chosen in accordance with the fuse chart. Note: The armature fuse is calculated based on the approximate full load DC current rating of the motor times a form factor of 1.5. If motor has characteristics not consistent with these approximations, a different fuse value may have to be used. Fuses are available from your distributor. Also available is a Fuse Kit (KB Part #9870) containing 700 assorted fuses.

TABLE 6. ARMATURE FUSE CHART

90VDC MOTOR	180VDC MOTOR	APPROX. DC MOTOR CURRENT (AMPS)	FUSE RATING (AC AMPS)
HORSEPOWER			
1/30	1/15	.33	1/2
1/20	1/10	.5	3/4
1/15	1/8	.65	1
1/12	1/6	.85	1-1/4
1/8	1/4	1.3	2
1/6	1/3	1.7	2-1/2
1/4	1/2	2.5	4
1/3	3/4	3.3	5
1/2	1	5.0	8
3/4	1-1/2	7.5	12*
1	2	10.0	15
1-1/2	3	15.0	25*

*Also used as AC Line Fuse.

SECTION III—ADJUSTMENTS AND CONTROL FUNCTIONS

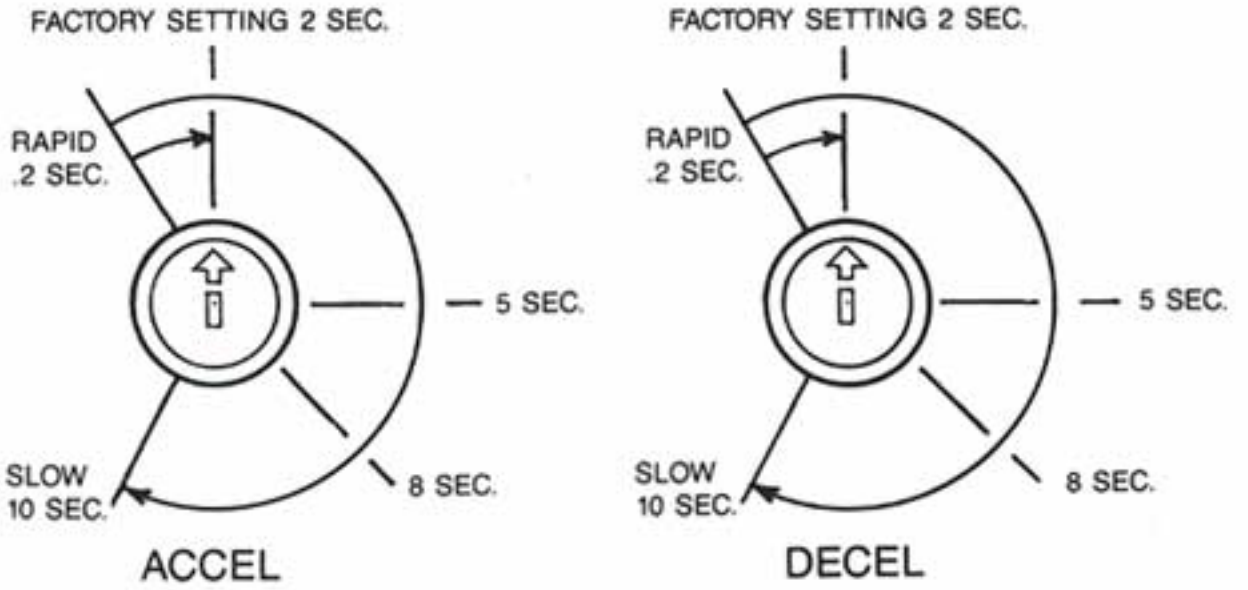
WARNING: If adjustments are made under power insulated adjustment tools must be used and eye protection must be worn.

The KBMM has been factory adjusted to provide 0-full speed using the speed control knob. Minimum and Maximum speed trimpots are provided to change the speed from other than 0-full speed. The Acceleration (ACCEL) trimpot is provided to allow for a smooth start over an adjustable time period each time the AC power is applied or the speed pot is rotated. The DECEL trimpot controls the amount of ramp-down time when the speed pot is adjusted to a lower speed. The Current Limit (CL, or torque output) adjustment is factory set to approximately 1½ times the motor rating. The IR Compensation (IR) is factory adjusted to provide excellent motor regulation under normal operation.

NOTE: In order for the IR comp and CL trimpot settings to be correct, the proper Plug-in Horsepower Resistor® must be installed for the particular motor and input voltage being used. Do not attempt to change the settings of the trimpots unless absolutely necessary since they are factory adjusted to near optimum settings.

The following procedure, presented in order of adjustment sequence, should be used when readjusting all trimpot functions:

Fig. 4 ACCEL/DECEL TRIMPOT ADJUSTMENT



CAUTION!

[PM motors only]. Adjusting the accel time below .5 seconds increases inrush current. It may be necessary to measure the peak inrush current and consult with motor manufacturer since field magnet demagnetization may occur.

A. *Acceleration Start.* The ACCEL is factory set at approx. 2 seconds. To readjust to different times, set the knob to the desired position as indicated in Fig. 4.

B. *Deceleration.* The DECEL is factory set to provide a ramp-down time of 2 seconds. To change the ramp-down time adjust the DECEL trimpot as indicated in Fig. 4.

C. *Minimum Speed Adjustment.* If a higher than zero minimum speed is desired, readjust the minimum speed by turning the speed control knob to zero setting (full CCW position). Then adjust the Min. Speed Trimpot to the desired setting.

NOTE: The min. speed adjustment will affect the max. speed setting. Therefore, it is necessary to readjust the max. speed after the min. speed.

D. *Maximum Speed Adjustment.* Turn Speed Control Knob to full speed (maximum CW position). Adjust max. speed trimpot to new desired setting.

NOTE: Do not attempt to adjust the max. speed above the rated motor RPM since unstable motor operation may occur. For moderate changes in the max. speed, there will be a slight effect on the min. speed setting.

E. *Current Limit (CL/Torque Adjustment).* CL circuitry is provided to protect the motor and control against overloads. The CL also limits the inrush current to a safe level during startup. The CL is factory set to approximately 1.5 times the full load rating of the motor. (CL trimpot is nominally set to approx. 65% of full CW rotation.)

To set the CL to factory specifications adjust as follows:

1. Set speed control knob at approximately 30-50% CW rotation. Set CL trimpot to full CCW position.
2. Connect a DC ammeter in series with the armature lead.
3. Lock shaft of motor (be sure CL pot is in full CCW position). Apply power and rotate CL pot CW slowly until DC ammeter reads 1.5 times motor rating (do not exceed 2 times motor rating, Max. CW position).

NOTE: If only an AC ammeter is available, it can be installed in series with AC input line. Follow above instructions; however, set AC amperage at .75 times motor rating.

F. *IR Compensation Adjustment.* IR compensation is provided to substantially improve load regulation. If the load presented to the motor does not vary substantially, the IR adjustment may be set at a minimum level (approximately 1/4 of full setting). The control is factory adjusted to approximately 3% regulation. If superior performance is desired (less than 1% speed change of base speed from 0 to full load), then the IR comp. should be adjusted as follows:

NOTES: 1. Excessive IR comp. will cause control to become unstable, which causes motor cogging.
2. For tach feedback applications the IR Comp can be set to minimum rotation (full CCW).

1. Set IR comp. trimpot at approximately 25% of CW rotation. Run motor unloaded at approximately 1/3 speed and record RPM.
2. Run motor with maximum load and adjust IR comp. trimpot so that the motor speed under load equals the unloaded speed per step 1.
3. Remove load and recheck unloaded RPM. If unloaded RPM has shifted, repeat procedure for more exact regulation.

The KBMM is now compensated to provide minimal speed change under large variations of applied load.

SECTION IV. SWITCHING CIRCUITS

A. *AC Line Switching.* The KBMM™ can be turned "on" and "off" using the AC Line. Auto Inhibit® circuitry contained in the KBMM™ automatically resets critical components each time the AC line is interrupted. This, along with Acceleration Start and CL, provides a smooth start each time the AC line is connected.

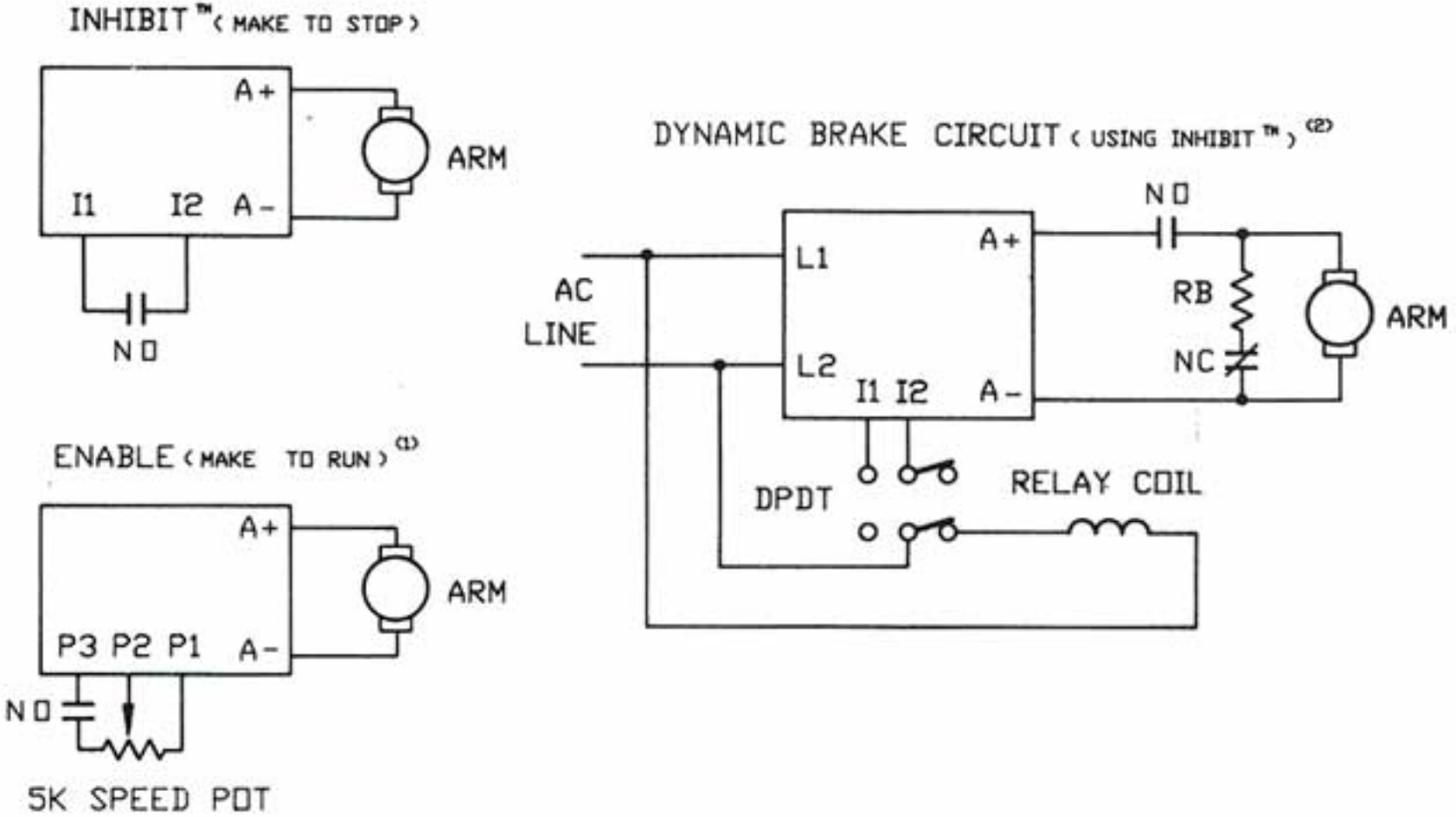
Warning: Do not disconnect and reconnect the Armature with the AC line applied or catastrophic failure will result. See armature switching.

B. *Inhibit™ and Armature Switching.* If the armature is to be disconnected and reconnected with AC power applied the Inhibit Circuit™ must be simultaneously activated and deactivated. Connect I_1 and I_2 together to activate the Inhibit Circuit™. When the Inhibit is activated the control output will be electronically extinguished which eliminates arcing. See Fig. (5) for Dynamic brake circuit.

NOTE: Inhibit is not to be used as a failsafe or safety switch.

C. *Reversing and Dynamic Brake.* KB has developed the APRM® * which provides anti-plug "instant" reversing and solid state dynamic braking. The APRM® is built in as standard in all KBCC-R suffix models and in all KBPB™ models. *Patented

FIG. (5) SWITCHING CIRCUITS—CONNECTION DIAGRAMS



APPLICATION NOTES:

1. ***ENABLE:*** Stop time is adjustable with DECEL trimpot. To obtain zero speed when enable is open Min. speed trimpot must be set to zero speed. Two speed operation can be obtained by setting the Min. speed to the desired level.
2. ***DYNAMIC BRAKE:*** choose RB resistance and wattage according to braking requirements. Inhibit Circuit extinguishes output of control during brake. When armature is reenergized the Inhibit releases and provides a smooth start. Choose relay or contactor with appropriate rating.

FIG. (6) KBMM™ SCHEMATIC

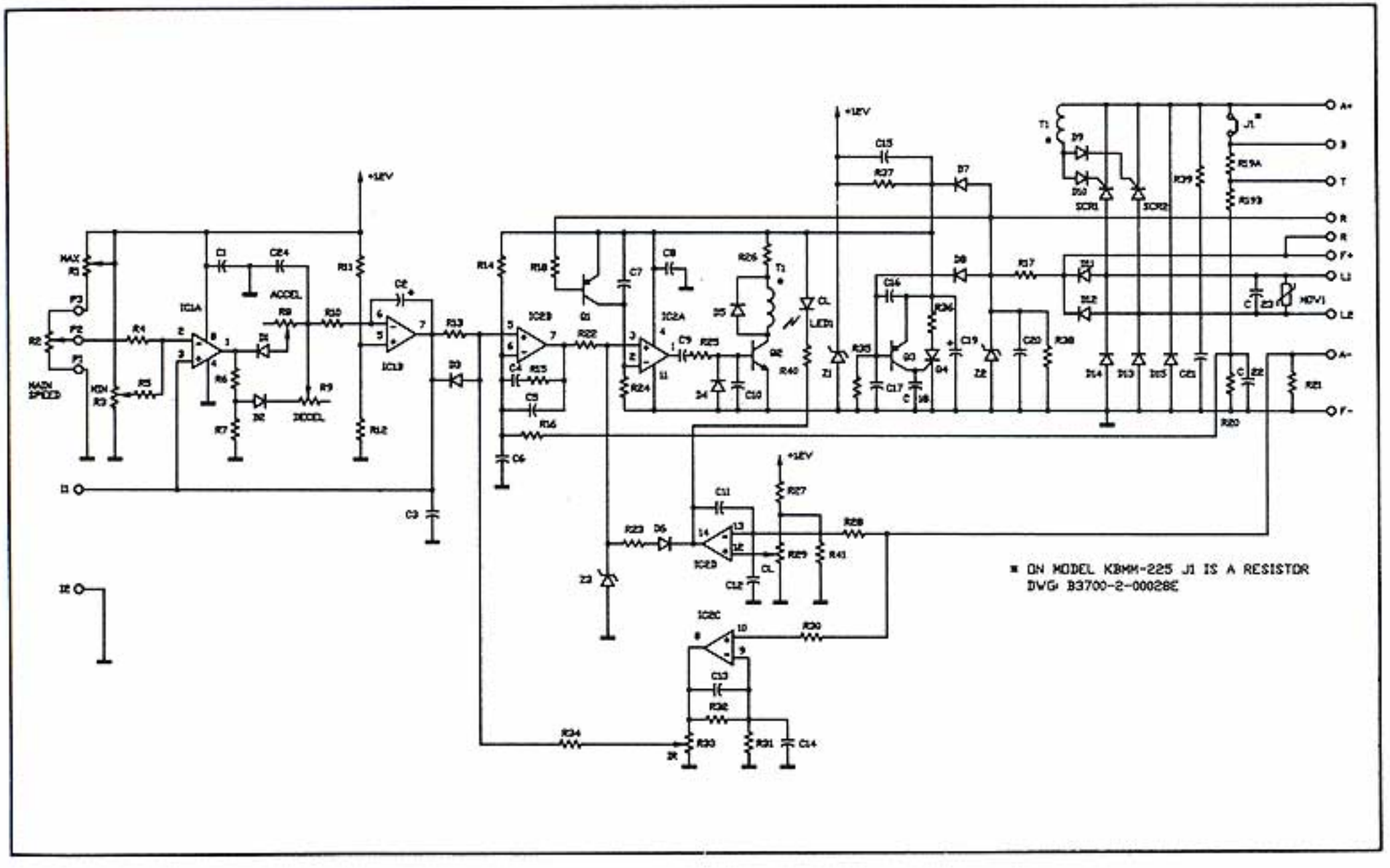


TABLE 7. KBMM™ PARTS LIST

MODELS	CKT. REF.	VALUE/RATING	MFG. TYPE	FUNCTION
All Models	C1	0.01ufd-25V	Ceramic Tubular	Capacitor
	C14-16,18	0.01ufd-25V	Ceramic Tubular	Capacitor
	C2	1.5ufd-50V	Electrolytic	Capacitor
	C3	0.47ufd-50V	Film/lytic	Capacitor
	C4	0.33ufd-50V	Metal Film	Capacitor
	C5	0.033ufd-50V	Metal Film	Capacitor
	C6,8,10,12,24	0.022ufd-25V	Ceramic Tubular	Capacitor
	C7	0.1ufd-50V	Metal Film	Capacitor
	C9,11,13	0.01ufd-50V	Metal Film	Capacitor
	C17	4.7ufd-35V	Electrolytic	Capacitor
	C19	100-0ufd-35V	Electrolytic	Capacitor
	C20	0.047ufd-50V	Metal Film	Capacitor
	C22	0.022ufd-50V	Metal Film	Capacitor
	D1-D10	1A-600V	1N4005GP	Diode
	D11,12	1.5A-600V	1N5397GP	Diode
	D13, D14	25A-600V	D6025L	Power Diode
	D15	15A-600V	D6015L	Power Diode
	IC1		LM358P	Dual Op-Amp
	IC2		LM324	Quad Op-Amp
	LED1	35MA-30mcd	MV5753	CL Indicator
	Q1,3	0.6A-40V	2N4403	Small Signal Transistor
	Q2	0.61-40V	2N4401	Small Signal Transistor
	Q4	0.8A-50V	S347S101E	Small Signal SCR
	R1	10K-0.33W-10%	PTC-10YV	Max Trimpot
	R2	5K-5W-20%		Main Speed Pot
	R3	25K-0.33W-10%	PTC-10YV	Min Trimpot
	R4	33K-0.25W-5%	Carbon Film	Resistor
	R5,16,18,27	47K-0.25W-5%	Carbon Film	Resistor
	R28,30,31	47K-0.25W-5%	Carbon Film	Resistor
	R6	24K-0.25W-5%	Carbon Film	Resistor
	R7,12	3.3K-0.25W-5%	Carbon Film	Resistor
	R8	500K-0.33W-10%	PTC-10YV	Accel Trimpot
	R9	500K-0.33W-10%	PTC-10YV	Decel Trimpot
	R10,41	1K-0.25W-5%	Carbon Film	Resistor
	R11	56K-0.25W-5%	Carbon Film	Resistor
	R13,23,35	22K-0.25W-5%	Carbon Film	Resistor
	R14,32	2.2M-0.25W-5%	Carbon Film	Resistor
	R15	1M-0.25W-5%	Carbon Film	Resistor
	R19B	12K-0.25W-5%	Carbon Film	Resistor
	R20	3.9K-0.25W-5%	Carbon Film	Resistor
	R21*	0.006 ohm-1.0 ohm-5W-5%	Wire Wound	Plug-in-Horsepower Res.
	R22,24,34	100K-0.25W-5%	Carbon Film	Resistor

ACCESSORY ITEMS FOR KBMM™ CONTROLS available from your distributor



Auxiliary
Heatsink
Part No. 9861



Barrier Terminal
Accessory Kit (MM)
Part No. 9883



Knob/Dial Kit
Part No. 9832



Potentiometer Kit
Part No. 9831



Barrier Terminal Board
Part No. 9897

LIMITED WARRANTY—KBMM-125, 225, 225D

For a period of 5 years from date of original purchase KB will repair or replace without charge devices which our examination proves to be defective in material or workmanship. This warranty is valid if the unit has not been tampered with by unauthorized persons, misused, abused, or improperly installed and has been used in accordance with the instructions and/or ratings supplied. The foregoing is in lieu of any other warranty or guarantee expressed or implied, and we are not responsible for any expense (including installation and removal), inconvenience, or consequential damage, including injury to any person, caused by items of our manufacture or sale. Some states do not allow certain exclusion or limitations found in this warranty so that they may not apply to you. In any event, KB's total liability, under all circumstances, shall not exceed the full pruchase price of this unit. (Rev. 4/88)

The information contained in this brochure is intended to be accurate. However, the manufacturer retains the right to make changes in design which may not be included herein.

KB ELECTRONICS, INC.
12095 NW 39th Street, Coral Springs, FL 33065 • (954) 346-4900 • Fax (954) 346-3377
Outside Florida Call TOLL FREE (800) 221-6570 • Email – info@kbelectronics.com •
www.kbelectronics.com

A40245 Rev. 10/97
PC 10M 11/02

Artisan Technology Group is an independent supplier of quality pre-owned equipment

Gold-standard solutions

Extend the life of your critical industrial, commercial, and military systems with our superior service and support.

We buy equipment

Planning to upgrade your current equipment? Have surplus equipment taking up shelf space? We'll give it a new home.

Learn more!

Visit us at **artisantg.com** for more info on price quotes, drivers, technical specifications, manuals, and documentation.

Artisan Scientific Corporation dba Artisan Technology Group is not an affiliate, representative, or authorized distributor for any manufacturer listed herein.

We're here to make your life easier. How can we help you today?

(217) 352-9330 | sales@artisantg.com | artisantg.com

ARTISAN® TECHNOLOGY GROUP