“KAMEL”
(PIPE TURNING)
ROLLS

MODELS:
KR-200-L
KR-200-M
KR-750

PARTS LIST
&
OPERATING INSTRUCTIONS

Website: www.gullco.com

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SAFETY INSTRUCTIONS

Although the Gullco "Kamel" Turning Rolls and Idler Rolls are manufactured for safe and dependable operation, it is impossible to anticipate those combinations of circumstances, which could result in an accident. An operator of this equipment is cautioned to always practice "**Safety First**" during each phase of operation, setup and maintenance.

Read and understand the whole operation manual (including the supplementary GSP-1000 control manual, “GD-042”) before operating or performing service of this equipment. Become familiar with the machines operation, applications and limitations. Keep the operation manual in a clean and readily available location.

This equipment is normally used to automate / semi-automate welding or cutting processes. These processes usually have any combination of the following; bright and hot arcs, flying sparks, fumes, ultraviolet and infrared radiated energy, hot work-pieces, compressed gases, etc.. The onus is on the operator of this equipment to know, understand and follow all the safety precautions associated with the process being used.

A careless operator invites troubles, and failure to follow safety practices may cause serious injury or even death. Important safety precautions are given in the following:

Electrical Shock Prevention

- Do not use this equipment in damp or wet locations.
- Do not expose this equipment to rain.
- Do not touch electrically live parts or electrode with skin or wet clothing.
- Insulate yourself from the work and ground.
- Never carry this equipment by the cables or pull the cables to disconnect from the receptacle.
- Keep all cables from heat, oil and sharp edges.
- Inspect all cables periodically and replace if damaged.
- Inspect the security of all cables periodically and repair if loose.
- Disconnect the power cord when not in use.
- Disconnect the power cord **positively** to prevent electrical shock before repair and service of the equipment.

Bodily Injury Prevention

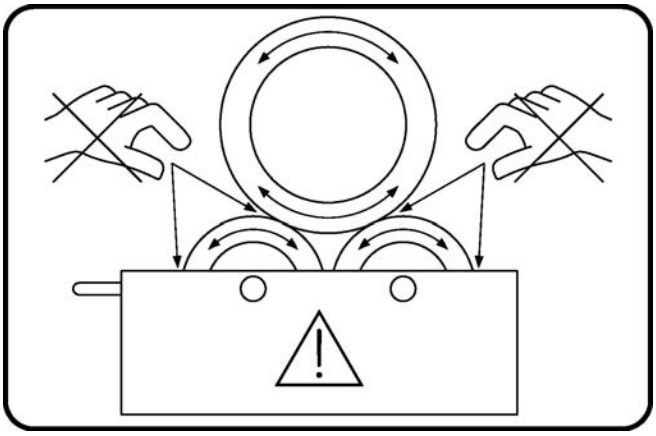
- Do not wear loose clothing, jewellery or loose, long hair, which may get caught into automatic systems or moving parts.
- Keep equipment (especially lifting handles) dry, clean and free from oil & grease.
- Never set the "Kamel" roll to run unattended, as any misalignment between the turning roll and idler roll(s) will result in the pipe being propelled along its axis of rotation and may fall of the rolls.
- Keep hands away from the tired wheels and work-piece when it is in motion, or when there is the slightest possibility of motion.
- Wherever possible, avoid mounting devices, etc., that protrude from the rotating mass, and pose possible pinch-points.
- Make certain that work-piece protrusions will not strike the floor, roll frame, tired wheels or other object during rotation. Be sure that the tired wheels have a smooth, unobstructed clear path to roll on.
- There should only ever be one (1) operator working at the machine at any given time.
- Do not operate this equipment if drowsy from medication or fatigue.
- Only lift the machine using adopted safe lifting standards and practices.

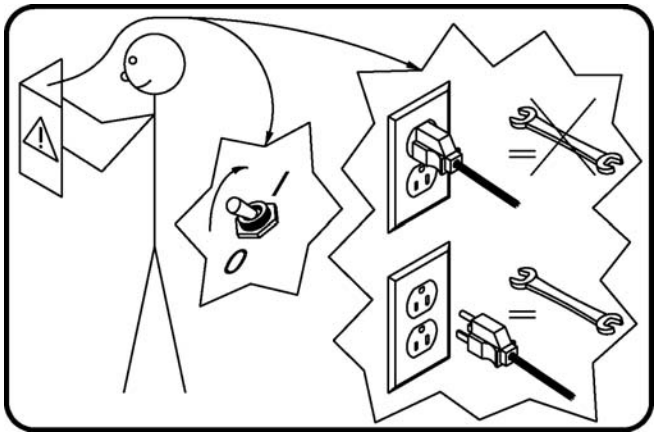
SAFETY PRECAUTIONS

The following cautionary/warning labels are attached to each "Kamel" roll:-

Warning:-

Never place your hands near these pinch points when the rolls are turning, or when there is a possibility of the rolls turning!





Warning:-

Read the manual before turning the unit on and before performing service. Also, positively disconnect the unit from all power supplies before servicing!

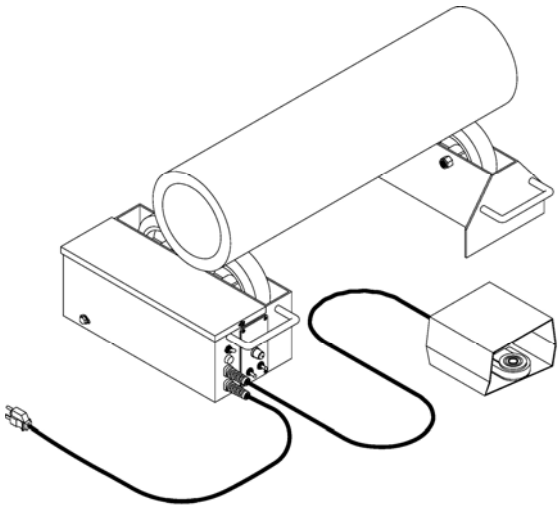
IMPORTANT

READ THIS BEFORE OPERATING THE "KAMEL" ROLL

Important information regarding safety and operation of the "GSP-1000" motor control used in the "Kamel" Roll, is contained in a supplemental manual attached at the end of this manual. It is equally important to read, understand and apply the information contained within that manual. The manual (GD-042) has a title "Technical Information For The Gullco "GSP-1000" Microprocessor Based Motor Control", and it's pages are numbered with a prefix of "T-".

ALL THE SAFE PRACTICES AND PRECAUTIONS MAY NOT BE GIVEN IN WRITING. SOME ARE BASED ON COMMON SENSE, BUT OTHERS MAY REQUIRE TECHNICAL BACKGROUND TO EXPLAIN.

"KAMEL" PIPE TURNING ROLLS



This parts list covers the operation and maintenance requirements of the following Gullco "Kamel" pipe turning rolls;

KR-200-L

KR-200-M

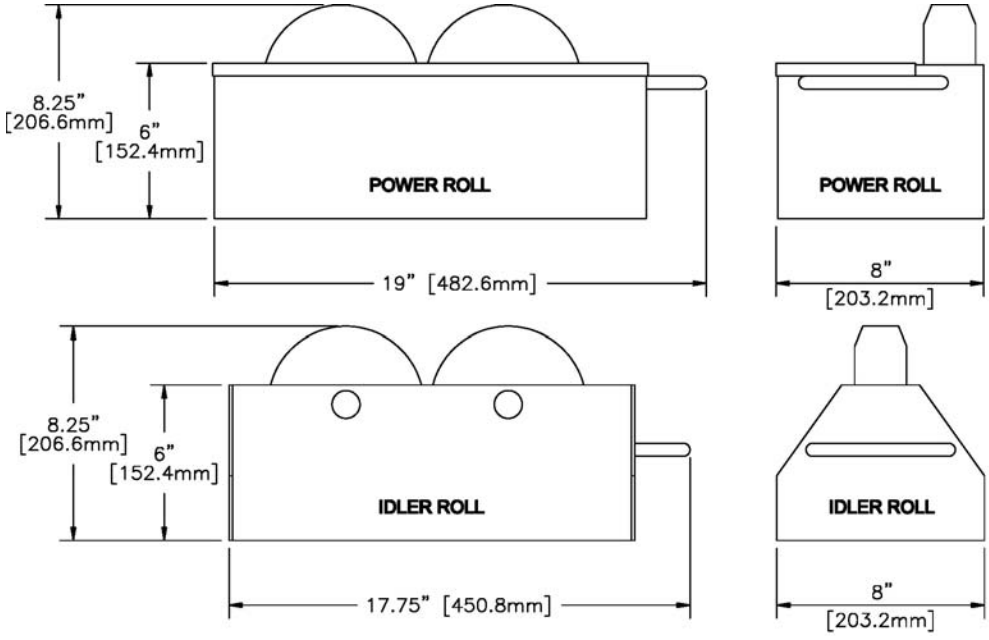
KR-750

SPECIFICATIONS

Model	Standard Power Roll	1 - 35.4 IPM [2.5–89.9 CM/MIN] Rotary Speed	2.2 – 70.8 IPM [5.6–180 CM/MIN] Rotary Speed	Idler Roll
KR-200-L	✓	✓		
KR-200-M	✓		✓	
KR-750				✓

Turning capacity: **KR-200-L** = 1500 Lbs. [680 Kg.] **KR-200-M** = 1000 Lbs. [454 Kg.]
Load capacity / roll: 750 Lbs. [340 Kg.]
Pipe diameter capacity: 2" to 16" [51 - 406 mm]
Power roll weight: 48 Lbs. [21.8 Kg.]
Idler roll weight: 16 Lbs. [7.3 Kg.]
Supply Voltage: Either 42, 115 or 230 VAC, single phase, 50/60 Hz., 200 watts.
Drive motor: 24 VDC permanent magnet gear motor.
Complies with: C.S.A. and NRTL/C and C.E. regulations.

General Dimensions



GENERAL DESCRIPTION

The Gullco "Kamel", power turning rolls are electrically powered units that use wheels to rotate (roll) pipe. They are designed to be used in conjunction with a non-powered idler roll / rolls. Each of the wheels of the turning, and idler, rolls have a moulded rubber tread and rotate on anti-friction roller bearings. The turning roll uses these wheels to provide friction drive and uniformly smooth pipe rotation, while the idler roll / rolls use these wheels to support the pipe.

The powered turning roll imparts tractive effort to the wheels by having a knurled drive wheel press against each of the rubber wheels. This knurled drive wheel is directly attached to the output shaft of a 24 VDC, permanent magnet motor and gear head power unit assembly. The microprocessor motor control offers operator interface of forward, stop, reverse and infinitely variable control of the speed, within the range of the model. Safety is greatly enhanced by the use of Gullco's low voltage (24 V), control and power supply system that is available in one of the following three line voltage inputs: 42, 115 and 230 VAC, single phase, 50/60 Hz, or any unregulated 24 VDC power supply at 220 watts of power. The motor control offers operator interface of run/stop, clockwise, neutral and counter-clockwise rotation as well as speed regulation. A power supply on/off isolation switch is also provided. The rotation speed is electronically controlled using an optical tachometer located on the back of the gear-motor and is infinitely variable in both clockwise and counter-clockwise directions, within the range of the model, by a rotary speed adjustment potentiometer located on the faceplate of the "Kamel" power roll. The powered turning roll is also equipped with a 7-1/2 foot [2.3 mtr.] long power cable and a remote foot switch on 10 feet [3 mtr.] of cable. A lifting handle is also provided for portability.

INTENDED / FORESEEN USAGE

Gullco "Kamel" turning rolls are widely applied to reduce the cost of welding and cutting pipes, flanges and fittings. They are compact, portable and provide fast positioning and smooth rotation.

The power turning roll requires at least one or more idler rolls to support the work piece. Both the power and idler roll are designed to support 750 Lbs. [340 Kg.]. Therefore, by using one powered turning roll and one idler roll a maximum weight of 1500 Lbs. [680 Kg.] is capable of being supported.

Through automation / semi automation, the quality, efficiency and repeatability of the weld or cut produced is greatly improved. Detrimental factors such as poor or awkward accessibility, operator fatigue, or inconsistent workmanship are eliminated. Required quality levels are consistently attained and productivity and profitability increased.

INSTALLATION

ELECTRICAL CONNECTION

WARNING! Ensure proper AC earth grounding of the Gullco "Kamel" power turning roll and all auxiliary equipment (where applicable), before applying power. Failure to do so may invalidate the Gullco Warranty.

WARNING! Before connecting the power turning roll to a power source (receptacle, outlet, etc.,) be sure that the voltage supplied is the same as that specified on the nameplate of the turning roll. If in doubt, DO NOT PLUG IN THE "KAMEL" ROLL. Copies of the possible nameplates are shown below:

As the colours of the wires in the mains lead of this equipment may not correspond with the coloured markings identifying the terminals in your plug, proceed as follows:

- The Green & Yellow or Green wire must be connected to the terminal in the plug which is allocated for “Earth” / “Ground”.
- The Blue or White wire must be connected to the terminal that is allocated for “Neutral”.
- The Brown or Black wire must be connected to the terminal that is allocated for “Live”.

230V Equipment must be installed in accordance with CEC, NEC or other applicable electrical code.

MECHANICAL INSTALLATION

WARNING! Check to ensure that no parts have become loose during transportation.

All "Kamel" powered turning rolls are shipped from the factory completely assembled. The only work necessary to make the unit operational is to connect electrical power, as described previously.

When setting up power and idler rolls it is good practice to align the rolls accurately. The rolls should all be parallel and at the same elevation, with the wheels in line. It is recommended that they be rested on a smooth, flat surface.

OPERATION

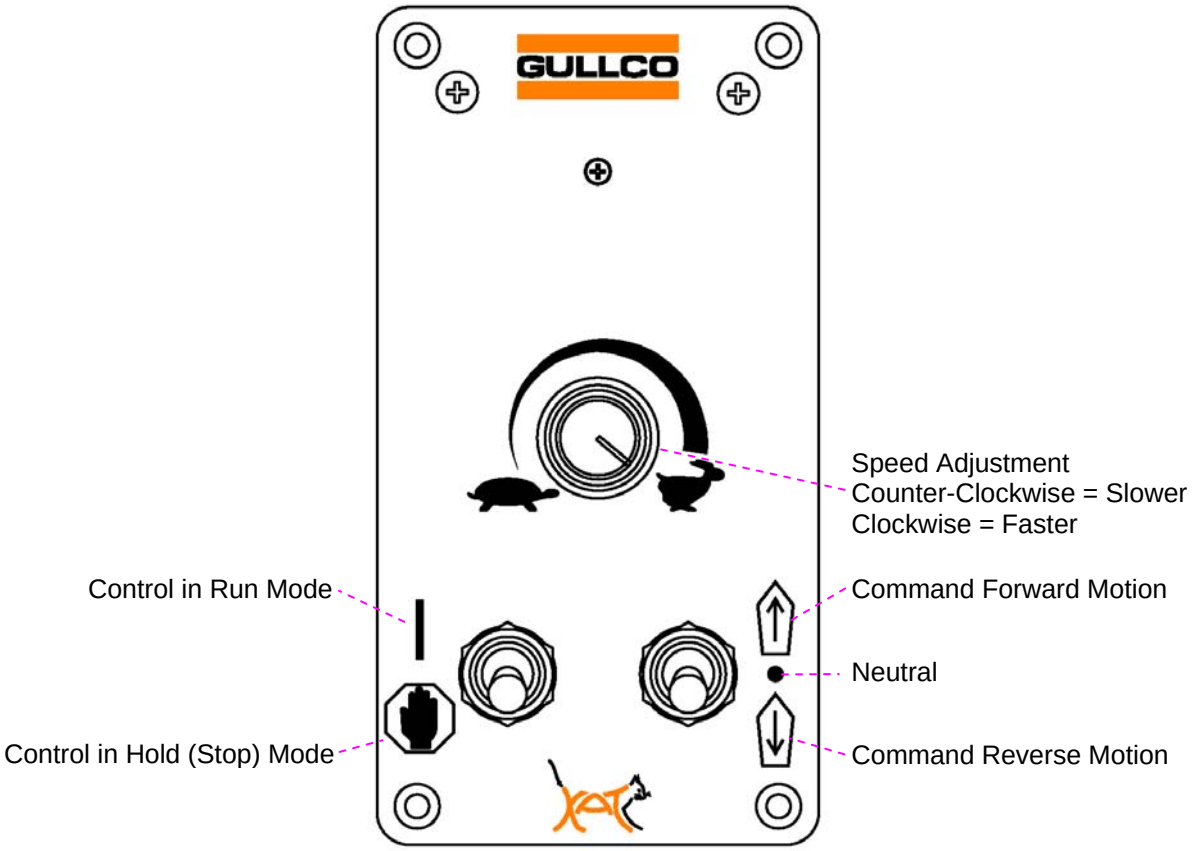
Through the use of the optical tachometer closed loop feedback circuitry, the motor control can obtain constant speed control of the powered turning rolls. The motor and the control operate on 24VDC, supplied by a power supply located behind the control panel assembly. Therefore, all operator interface devices (except the power on/off switch) are subjected to signal level voltages only.

The power On/Off switch is used to disconnect the power to the rest of the control circuitry.

I = On, **O** = Off.

WARNING! The motor control must not be continually started and stopped by the removal and reapplying of power to the control. Turning the power off to the control will not provide instant braking and continued use will damage the control. Allow ten (10) seconds after the removal of power before reapplying the power to the motor control.

The following provides a brief description of the GSP-1000 control (refer to the sketch below):



The Run/Stop Switch

- This switch is used in conjunction with the footswitch to start and stop rotation of the "Kamel" roll.

The Forward/Neutral/Reverse Switch

- This is used to select the direction of rotation.

The Speed Adjustment Knob

- This adjustment is used to increase (clockwise) or decrease (counter-clockwise) the rotational speed of the “Kamel” roll.

WARNING! Avoid changing the direction of rotation without making sure that rotation comes to a complete stop first. Failure to comply may cause an overload.

WARNING! Avoid repeatedly starting and stopping the “Kamel” roll in quick, short succession, as this will reduce the life expectancy of the control and the motor.

The remote foot switch is used to start and stop rotation of the rubber wheels. Depressing the foot switch will activate rotation and releasing the foot switch will deactivate the rotation and apply braking. The Run/Stop switch must be in the Run position and a rotation direction must be selected for the unit to operate when the footswitch is depressed.

Notes:

If the optional GP-200-023, Forward/Stop/Reverse Footswitch assembly is installed (instead of the standard Run/Stop footswitch), the footswitch will start and stop the rotation as previously described, and allow the operator to choose which direction the rolls will rotate. The Run/Stop switch must be in the Run position and the Forward/Neutral/Reverse switch must be in the Neutral position for the unit to operate when the footswitch is depressed.

If the optional GP-200-025, Variable Speed Footswitch assembly is installed (instead of the standard Run/Stop footswitch), the footswitch will start and stop the rotation and depending on the varying amount that the footswitch is depressed, will vary the rotational speed from zero (0) rpm up to the speed regulated by the Speed Adjustment Knob of the GSP control. I.e. if the GSP-1000 Speed Adjustment Knob is set to 30% of full speed range, then the Variable Speed Footswitch will be able to vary the “Kamel” roll speed between 0 and 30%. The Run/Stop switch must be in the Run position and a rotation direction must be selected for the unit to operate when the footswitch is depressed.

The fuse holder allows accessibility to the main fuse by pushing the cap in towards the main body and twisting in a counterclockwise direction.

LOADING

WARNING! Lower work-pieces onto the rolls gently. **DO NOT DROP WORK-PIECES ONTO THE ROLLS.** Impact and shock loads are many times greater than the "dead-weight" of the work-piece. Dropping loads onto the rolls can result in damage!

If more than one idler roll is to be used, be sure that the work-piece touches all wheels that are intended for support. Ensure that the work-piece rests on the full face-width of the wheels to avoid damage.

If one end of the work-piece is heavier than the other, be sure that the roll supporting the heavier end is not being overloaded in weight capacity.

Capacities of turning rolls are stipulated to turn cylindrical, concentric work-pieces. If your work-piece has any eccentric loads at all, be sure to check carefully to avoid overloading the drive. Even small eccentric loads can quickly overload the drive. Overloading the rolls, either by weight or eccentricity, could cause the wheels to stall. Under this condition the knurled drive wheel could continue to rotate and act as a milling cutter on the outside diameter of the rubber wheels. Wherever possible, counter weights should be used to balance eccentric loads. Take into consideration the additional weight and distribution of the counterbalance.

Attention should be given to the proximity of the rubber wheels with respect to heat zones through preheating, cutting, etc..

MAINTENANCE

The Gullco "Kamel", power turning rolls and idler rolls are heavy duty, robust pieces of equipment, and under normal conditions, they will give you years of trouble free service, if they are operated within the limits of their expected use and if the following maintenance points are adhered to:

Clean all excess dust, spatter, slag etc. from the rolls regularly. Do not allow any foreign material to impede operation.

Periodically check the power roll for tension of the drive system. **Positively disconnect the power cord from the power source before attempting service.** To test the tension of the drive system, attempt to turn one wheel at a time by hand. If it takes reasonable force in order to make each wheel slip, then the tension is set correctly. If one or both wheels slip with ease, then adjustment is required. To adjust the drive tension, loosen the lock nut (item # 42 - drawing # KR-200) that secures the motor mounting plate. Then by sliding the motor mounting plate (item # 47 - drawing # KR-200) along the length of the “Kamel” roll and tightening the adjusting bolt (item # 38 - drawing # KR-200), the knurled drive wheel can be positioned so that it is applying a snug pressure equally to both rubber wheels. The lock nut (item # 42) can then be retightened. Test, once again, that the tension is set correctly. **Do not tighten the tensioning system any more than necessary.** Excessive pressure could cause damage to the output shaft of the drive motor as well as tearing the rubber treads of the wheels. Do not attempt to compensate for a "Gouged Tire" by increasing the drive pressure; instead replace the wheel with an undamaged one.

Every two hundred and forty (240) hours, the wheels should be lubricated with a general purpose, light duty grease. A grease nipple is provided in the side of each wheel.

INSPECTION

At least once per year, the equipment should be taken out of service, stripped down and all moving parts should be cleaned, greased and inspected for wear and damage. All cables must be inspected for breaks and abrasion and must be well secured. All fastening devices should be inspected for tightness. The rubber treads on the wheels should be checked for flat spots, gouges, tears or signs of pealing from the wheel.

The tachometer feed-back encoder sensor assembly located on the back of the motor, should be inspected for dirt accumulation and cleaned where necessary. It is common for the armature shaft of a fatiguing motor to develop excessive axial float. This float sometimes causes the tachometer feed-back sensor wheel to rub on one of the encoder sensor faces, causing damage and failure. Check that the sensor disk is located centrally within the slot of the encoder sensor when the armature shaft is pressed in and pulled out. Adjust as necessary. The frequency of this inspection should increase with the accumulated use and or workload of the gear-motor.

NOTE: These inspections should be performed with greater frequency if conditions and usage requires.

STORAGE

The Gullco "Kamel" power turning roll and or idler roll, should be kept in a dry environment with no possibility of impact or damage due to stacking of heavy objects on top of the equipment. The drive tension of the power turning rolls should be totally relieved when storing the turning roll. Failure to do this may result in flat spots on the rubber wheels, which will require replacing.

SHIPPING

When shipping the Gullco "Kamel" power turning roll, the tension of the drive system should be totally relieved. There should be sufficient room around the perimeter of the shipping box to allow packing to be placed to help protect susceptible parts from being damaged in shipping.

ACCESSORIES

GP-200-023 Forward/Stop/Reverse Footswitch Assembly. This kit provides a directional footswitch; a footswitch guard cover; a connecting control cable; and strain relief glands. When activated, the footswitch will provide a run signal and a rotary direction signal to the control.

GP-200-025 Variable Speed Footswitch assembly. This kit provides a run/stop/variable speed footswitch; a footswitch guard cover; a connecting control cable; and strain relief glands. When activated, the footswitch will provide a run signal to the control and allow regulation of the rotational speed via the compression of the footswitch pedal.

KR-750 Kamel Idler Roll. Supporting rolls for use with either KR-200-L or KR-200-M power turning rolls.

KR-750-H Kamel Idler Roll with high temperature cast iron wheels (KR-179-104-H).

KR-1000 CSB A free standing support and cutting torch holder assembly. 1-1/8" [28.6mm] square rack arms and rack boxes provide 11-1/2" [292.1mm] of vertical adjustment and 10-1/2" [266.7cm] of horizontal adjustment. Supplied with swivel mounted, standard rack-type cutting torch holder.

KR-2000 CSB Same as above, except uses 1-1/2" [38.1mm] rack arms and rack boxes and provides 7-1/2" [190.5mm] of vertical and 6-1/2" [165.1mm] of horizontal adjustment.

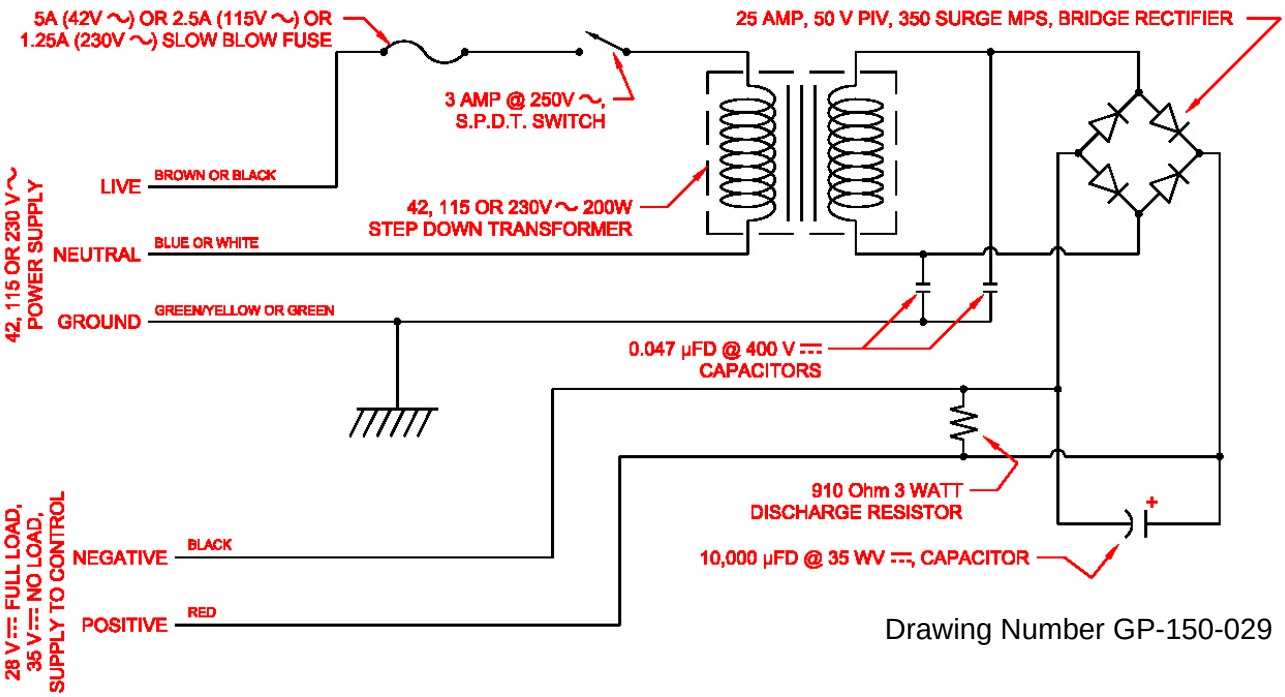
KR-1000 WSB A free standing support and welding gun holder assembly. 1-1/8" [28.6mm] square rack arms and rack boxes provide 11-1/2" [292.1mm] of vertical adjustment and 10-1/2" [266.7mm] of horizontal adjustment. Supplied with swivel mounted, adjustable gun holder assembly.

KR-2000 WSB Same as above, except uses 1-1/2" [38.1mm] rack arms and rack boxes and provides 7-1/2" [190.5mm] of vertical and 6-1/2" [165.1mm] of horizontal adjustment.

NOTE: The above cutting torch and welding gun support assemblies can be, and often are, equipped with one (1) or two (2) Gullco motorized rack arms controlled by a remote joystick pendant. Ask your local Gullco representative for further details.

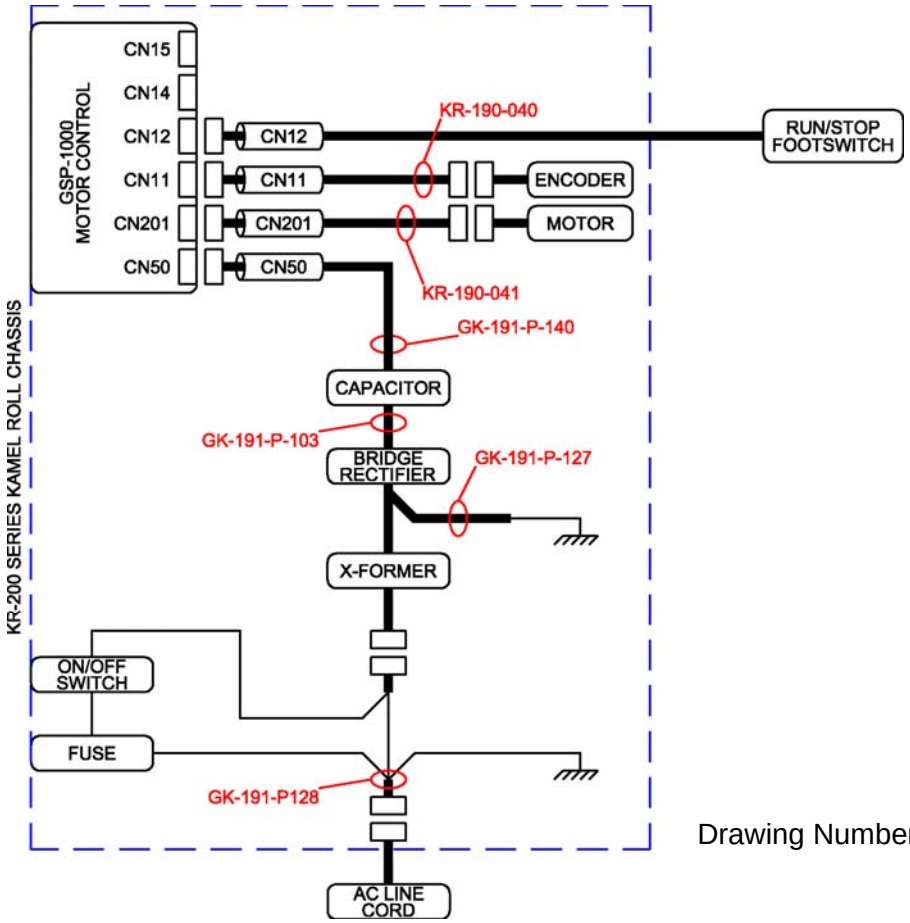
Visit Gullco's web site, "www.gullco.com" to see, or request, more product and application information.

"KAMEL" (POWER TURNING) ROLL, POWER SUPPLY SCHEMATIC



Drawing Number GP-150-029

"KAMEL" (POWER TURNING) ROLL, BLOCK WIRING DIAGRAM

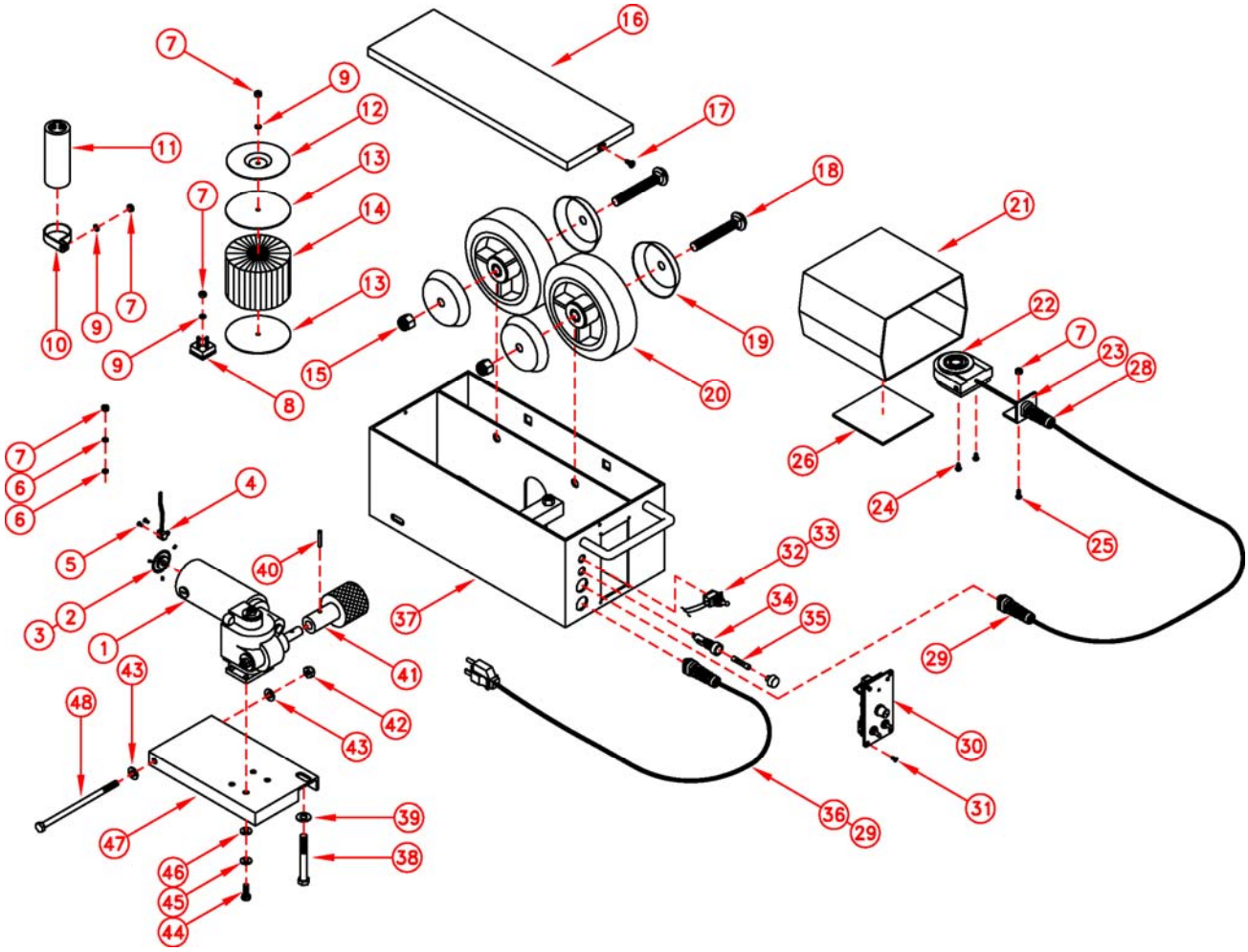


Drawing Number KR-200-001

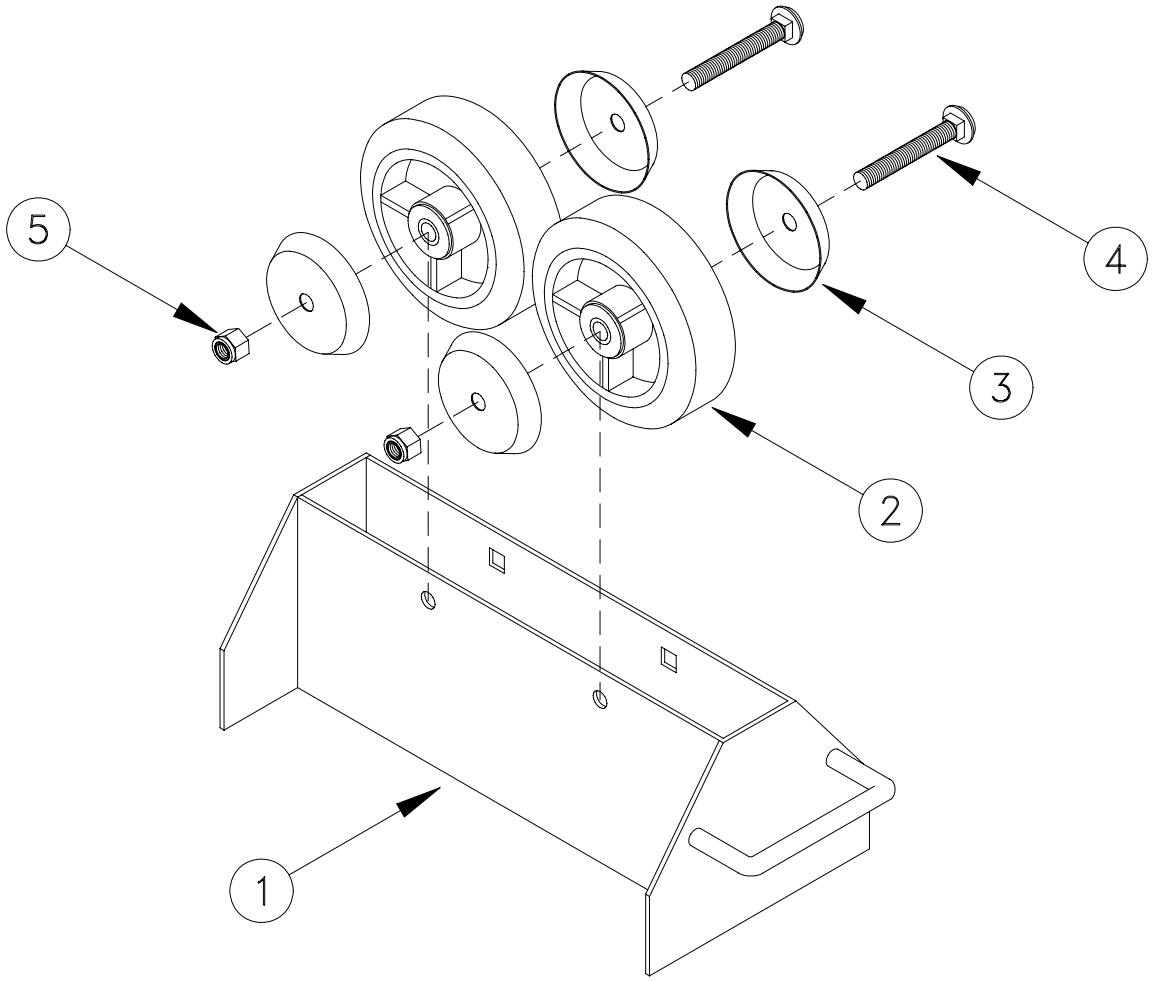
"KAMEL" ROLL PARTS BREAKDOWN - DRAWING KR-200

ITEM	PART No.	DESCRIPTION	QTY.
1	KR-191-P-271	MOTOR & GEARHEAD (1 - 35 IPM)	1
	KR-191-P-133	MOTOR & GEARHEAD (2 - 70 IPM)	
2	GK-191-P-038	SENSOR WHEEL	1
3	GK-106-063	4-40 x 3/16" SET SCREW	3
4	GK-191-P-035	SENSOR ASSEMBLY	1
5	GK-112-060	4-40 x 1/4" ROUND HEAD SCREW	2
6	GK-129-012	# 10 INTERNAL STAR LOCK WASHER	3
7	GK-135-057	10-32 LOCK NUT	5
8	GK-191-P-020	BRIDGE RECTIFIER	1
9	GK-111-068	# 10 FLAT WASHER	3
10	GK-191-P-063	CAPACITOR CLAMP	1
11	GK-191-P-062	CAPACITOR	1
12	GK-191-P-105	TRANSFORMER MOUNTING PLATE	1
13	GK-191-P-218	TRANSFORMER MOUNTING RUBBERS	2
14	GK-191-P-019-A	TRANSFORMER - 42 VOLT INPUT	1
	GK-191-P-019-B	TRANSFORMER - 115 VOLT INPUT	
	GK-191-P-019-C	TRANSFORMER - 230 VOLT INPUT	
15	GK-135-055	1/2"-13 LOCK NUT	2
16	KR-190-114	LID	1
17	GK-112-089	8-32 x 1/4" ROUND HEAD SCREW	2
18	GK-160-002	1/2"-13 x 3-1/2" CARRIAGE BOLT	2
19	KR-179-106	WHEEL HUB COVERS	4
20	KR-179-104	6" [15.2 cm] DIAMETER RUBBER TIRED WHEEL	2
	GP-200-024	RUN/STOP FOOTSWITCH ASSEMBLY (Items 21 to 28 + 1 x items 7 & 29)	1
21	KR-179-113	FOOT SWITCH COVER	1
22	KR-179-122	FOOT SWITCH	1
23	KR-190-112	CABLE STRAIN BRACKET	1
24	GK-125-055	# 8 x 3/8" SELF TAPPING SCREW	2
25	GK-112-065	10-32 x 3/8" ROUND HEAD SCREW	2
26	KR-179-115	FOOT SWITCH COVER ANTI-SLIP PAD	1
28	GK-148-014	STRAIN RELIEF BUSHING	1
29	GK-148-015	7/8" STRAIN RELIEF BUSHING	2
30	GSP-1000	GSP-1000 CONTROL ASSEMBLY	1
31	GK-141-014	6-32 x 5/16" FLAT HEAD SCREW	4
32	GK-191-P-022	POWER ON/OFF SWITCH	1
33	GK-191-P-050	POWER ON/OFF NAMEPLATE	1
34	GK-165-134	FUSE HOLDER	1
35	GK-165-098	5 AMP SLOW BLOW FUSE (42 VOLT INPUT)	1
	GK-165-099	2.5 AMP SLOW BLOW FUSE (115 VOLT INPUT)	
	GK-165-097	1.25 AMP SLOW BLOW FUSE (230 VOLT INPUT)	
36	GK-171-032	POWER CORD (Specify voltage) (Not always supplied with plug)	1
37	KR-190-108	FRAME	1
38	GK-108-089	3/8"-24 x 3" HEX BOLT	1
39	GK-111-058	3/8" FLAT WASHER	1
40	GK-117-026	3/16"Ø x 1" SPRING PIN	1
41	KR-179-102	KNURLED DRIVE WHEEL	1
42	GK-135-050	5/16"-18 LOCK NUT	1
43	GK-111-054	5/16" FLAT WASHER	2
44	GK-108-050	1/4"-20 x 5/8" HEX BOLT	4
45	GK-136-053	1/4" SPLIT LOCK WASHER	4
46	GK-111-051	1/4" FLAT WASHER	4
47	KR-190-109	MOTOR MOUNTING PLATE	1
48	GK-108-090	5/16"-18 x 6" HEX BOLT	1
49	GK-191-P-128	POWER CORD INTERFACE WIRING HARNESS (Not shown on drawing)	1
50	GK-190-P-140	DC SUPPLY WIRING HARNESS (Not shown on drawing)	1
51	GK-191-P-103	DISCHARGE RESISTOR WIRING HARNESS (Not shown on drawing)	1
52	GK-191-P-127	HIGH FREQUENCY CAPACITOR HARNESS (Not shown on drawing)	1
53	KR-190-040	SENSOR EXTENSION WIRING HARNESS (Not shown on drawing)	1
54	KR-190-041	MOTOR EXTENSION WIRING HARNESS (Not shown on drawing)	1

"KAMEL" ROLL PARTS BREAKDOWN - DRAWING KR-200



"KAMEL" IDLER ROLL PARTS BREAKDOWN
PART NUMBER KR-750



ITEM	PART No.	DESCRIPTION	QTY.
1	KR-179-112	IDLER FRAME	1
2	KR-179-104	6" [15.2 cm] DIAMETER RUBBER TIRED WHEEL	2
3	KR-179-106	WHEEL HUB COVERS	4
4	GK-160-002	1/2"-13 x 3-1/2" CARRIAGE BOLT	2
5	GK-135-055	1/2"-13 LOCK NUT	2

REVISIONS LIST

July, 2005

Overall	First release.

January, 2007

Title Page	Updated Gullco contact details.
Page 5	Updated product labels.

ADDITIONAL NOTES

Specifications and products are subject to change without notice.
KAT, Moggy, Sam, KATBAK & KBM are registered trademarks of Gullco International Enterprises Ltd.
Only use genuine/authorized replacement parts.

TECHNICAL INFORMATION FOR THE GULLCO "GSP-1000" MICROPROCESSOR BASED MOTOR CONTROL

MODEL: GSP-1000

PARTS LIST & OPERATING INSTRUCTIONS

Website: www.gullco.com

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IMPORTANT

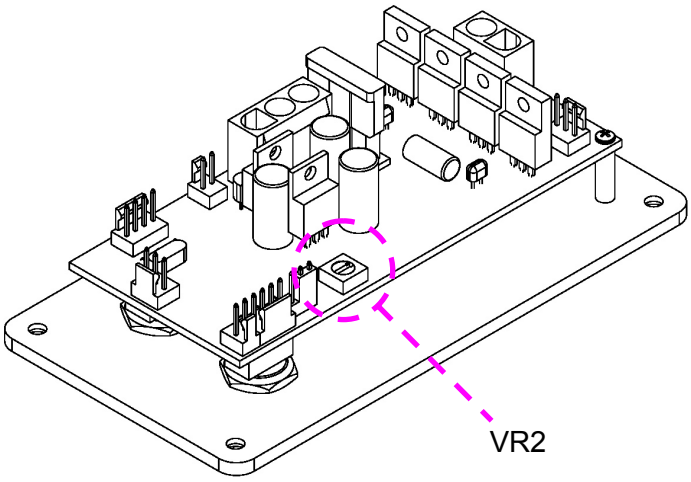
READ THIS BEFORE OPERATING THE "GSP-1000" CONTROL

Read and understand the operation manual before operating or performing service of this equipment. Become familiar with the machines operation, applications and limitations. Keep the operation manual in a clean and readily available location.

The motor control must not be continually started and stopped by the removal and reapplying of power to the control. Turning the power off to the control will not provide regenerative braking and continued use will damage the control.

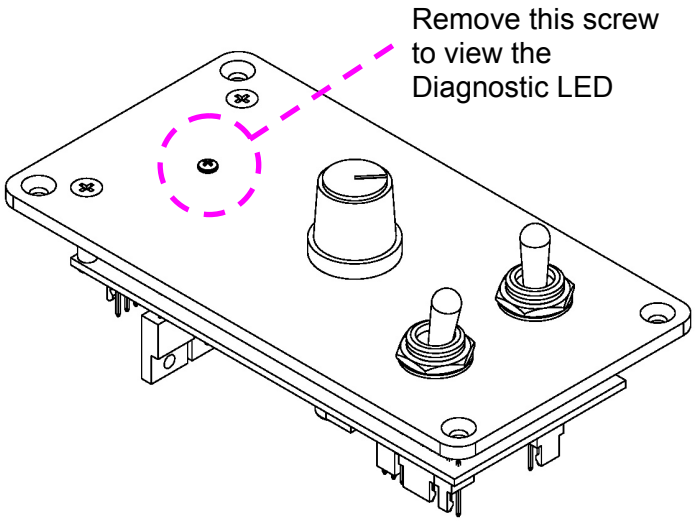
Allow ten (10) seconds after the removal of power before reapplying the power to the "GSP" control.

Current Overload Setting (VR2)



The "Current Limit" (motor overload protection) on this product is typically factory preset to 70% (1 to 2 o'clock position) unless specifically requested at time of order. If a specific application requires that this be changed (to prevent damage to drive mechanism), use the circuit board mounted variable potentiometer, VR2 (located on the underside of the control circuit board. When adjusted, this potentiometer will set the amount of current allowed to pass through the motor control before it will shut-down. It is recommended that the setting be made excessively low, and gradually increased until the desired protection is achieved. Always perform this procedure under worse case allowable conditions, I.e. vertically up instead of vertically down.

Diagnostic LED



The microprocessor based "GSP-1000" control has built in safety logic that reduces the risk of injury, damage and faulty operation. The "GSP-1000" control flashes its Diagnostic LED in preset sequences to indicate a potential problem.

The diagnostic LED is visible by removing the round head Philips screw from the faceplate.

The table on the following page provides information regarding the Diagnostic LED.

Upon rectifying the fault, normal operational status may be resumed by first placing the Run/Stop switch into the Stop position (Hold mode).

Diagnostic LED Table

LED Flash Rate	Reason
4 Flashes every 2 seconds	Normal Closed Loop Operation - No problems detected.
24 Flashes every 2 seconds	Open Loop Operation - No problems detected which would prevent the motor from running safely, however a travel speed encoder has not been detected and as such the control will run in open loop mode. The speed regulation is not as accurate in open loop mode.
1 Flash every 2 seconds	The "GSP-1000" control was set to run when electrical power was initially supplied to the control (powered-up). To prevent unexpected motion generated from the "GSP-1000" control, the motor output is disabled and the LED blinks once every two seconds until the control is reset by being placed in "Hold" (stop) mode.
2 Flashes every 2 seconds	The current draw of the motor exceeded that permissible (set by the "Current Limit" potentiometer VR2), resulting in the termination of motor output from the control. Rectify the fault causing the excessive current draw, or increase the value of the "Current Limit" potentiometer ***- only if it is set too low***. Then reset the "GSP-1000" control by either powering-down the control, or by placing the control in "Hold" (stop) mode.
3 Flashes every 2 seconds	A motor travel speed encoder was detected on power-up, but is no longer recognized, resulting in the termination and/or prevention of motor output from the control. Rectify the encoder problem then, reset the "GSP-1000" control by placing the control in "Hold" (stop) mode. Note: If the power is turned off then back on again without rectifying the encoder fault, the control will not detect the encoder on power-up and will only operate in open-loop mode (NO CLOSED-LOOP SPEED REGULATION).
4 Flashes every 2 seconds	A motor travel speed encoder is detected on, but no encoder pulses are received from it during a two second period of the motor output being energized, resulting in the termination of motor output from the control. Rectify the encoder problem then, reset the "GSP-1000" control by placing the control in "Hold" (stop) mode.
5 Flashes every 2 seconds	As port "CN12" is usually used to provide an external "Hold" (stop) command, wiring should run from pin 1 of this port, up to the external device and then back to pin 3, thereby closing the circuit between pins 1 and 3 whenever connected. Each time the "GSP-1000" control is powered-up, it checks the status of pins 1 & 3 of "CN12" and if closed circuit, the control will continue to monitor their status as well as the status of pin 2 with respect to pin 1 (if pin 1 & 3 were open circuit on power-up, the control ignores all signals for port "CN12"). Once the "GSP-1000" control has recognized a device was connected to "CN12" but is no longer connected (i.e. pins 1 & 3 change from closed circuit to open circuit), the motor output is disabled and the LED blinks five times every two seconds. Rectifying the fault and resetting the "GSP-1000" control by placing the control in "Hold" (stop) mode, will clear the error. ***Note: turning the power to the "GSP" control off, waiting ten (10) seconds then re-applying the power will clear the error, but if the circuit between pin 1 & 3 remains open, all signals coming into "CN12" will be ignored (failing to recognize external "Hold" commands).***

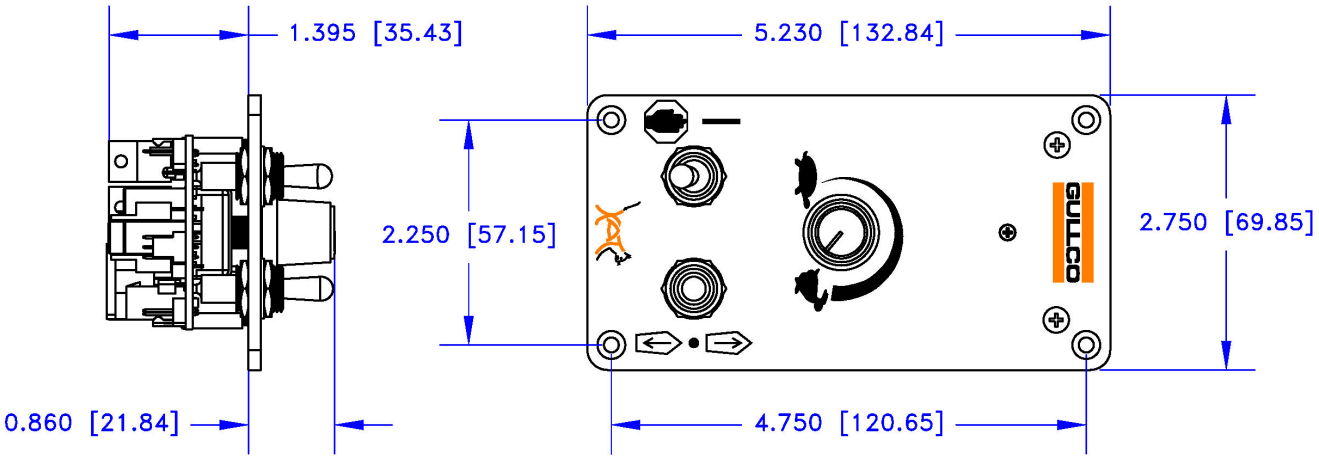
GENERAL SPECIFICATIONS

The “GSP-1000” microprocessor based motor control is a 24 vdc, full “H”-Bridge, pulse width modulation control with regenerative braking. It is designed to run 24 vdc motors and requires a 24 to 38 vdc, no-load, supply (30 to 38 vdc is usually required for Gullco products to meet specifications), usually derived form a full bridge rectified 22-24 vac source. The required wattage of the supply depends upon the size of the motor. These controls can operate any motor with a capacity of up to 250 Watts (1/3 horse power).

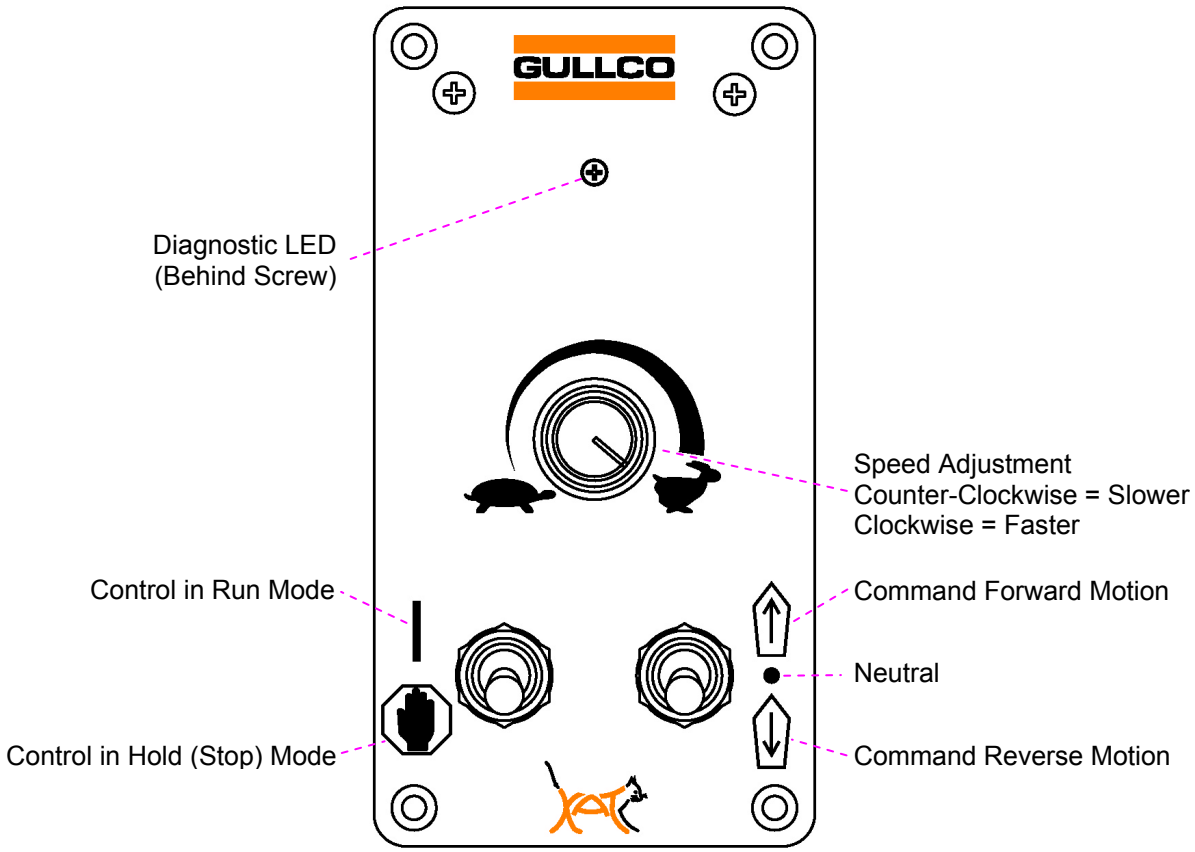
These controls can either operate with or without a closed loop tach feed back system attached to the armature shaft of the motor. A tach feed back is normally recommended as it allows the motor control to constantly monitor and correct the speed of the motor providing accurate speed control regardless of any variance in loading. Open loop (i.e. no tach feed back) may be acceptable for manual motor operation in situations where; the motor sensor is temporarily damaged; the motor sensor is susceptible to failure due to an exceptionally harsh environment; or where accurate calibrated speed is not required and the loading of the motor is constant.

Various input and output ports are provided which are either optically coupled or transistor outputs. These ports are described in detail later in this manual.

GENERAL DIMENSIONS



"GSP-1000" CONTROL PANEL LAY-OUT



OPERATION

Local Control Devices

Externally, the Gullco "GSP-1000" controls have switching for Forward/Neutral/Reverse and Run/Stop, as well as a speed control potentiometer.

= "STOP" - This over-rides all other controls and when activated will apply regenerative breaking to the motor to bring it to a dead stop, and will disallow any further operation of the motor while ever it is in this state. This position will also reset an error code once the fault has been rectified.

= "RUN" - This removes the "STOP" command and allows the control to assume an operational status.

= "FORWARD" - When the switch is in this position, the control will drive the motor in the Forward direction when so permitted.

= "NEUTRAL" - When the switch is in this position, the control will not drive the motor in either direction.

= “REVERSE” - When the switch is in this position, the control will drive the motor in the Reverse direction when so permitted.

= “VARIABLE SPEED CONTROL” - By turning the ten potentiometer knob in a clockwise direction, the motor speed will be increased. When rotated in the counter-clockwise direction, the motor speed will decrease.

Local Control Operation

The control is operated by placing the Forward/Neutral/Reverse switch in the desired travel direction, and placing the Run/Stop switch in the Run position. Normally, if there are no other external “Hold” (stop) signals, direction signals or speed signals, the motor will run in the direction selected at the speed set by the Variable Speed Control Knob. The speed may be adjusted at any time and the motor motion may be stopped by placing either the Run/Stop switch in the Stop position or by placing the Forward/Neutral/Reverse switch in the Neutral position.

If an external “Hold” (stop) signal is being used (e.g. Run/Stop footswitch), the motor will only be allowed to run when: the speed adjustment knob is set to a value greater than zero: the Run/Stop switch is in the Run position: the Forward/Neutral/Reverse switch is either set to Forward or Reverse; and the external “Hold” (stop) signal is released (i.e. Run/Stop footswitch is activated).

If external direction signals are being used (e.g. Forward/Neutral/Reverse footswitch), the motor will run in the direction set by either the direction switch located on the “GSP-1000” control or by the external direction signal. In the event of directional conflict (i.e the local direction toggle switch is requesting a directional command opposite to that of an external direction command) the control will terminate and/or prohibit motor output until the conflict is cleared.

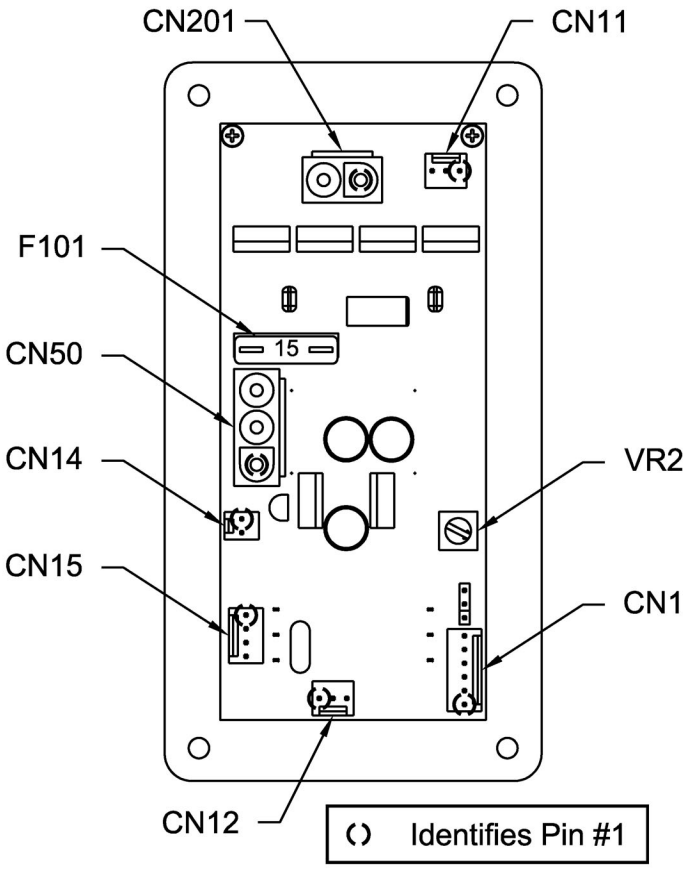
If an external speed signal is being used (e.g. Variable Speed footswitch), the motor will rotate at the speed set by the external speed signal up to the maximum speed set by the Speed Adjustment potentiometer. For example, if the Speed Adjustment potentiometer of the “GSP-1000” control was set to 47% of full speed, then the external speed signal could control the motor speed from zero (0) up to 47% of full speed.

"GSP-1000" CIRCUIT BOARD DETAILS

Major Circuit Board Component Details

F101 - Replaceable, 15 Amp automotive fuse.

VR2 – Current Limit setting potentiometer.



Control Connection Details

Note: CN50 & CN201 are Molex 0.093" [2.36mm] series connectors

CN50 - Power Supply Input

Pin 1 - Optional earth ground
Pin 2 - Common
Pin 3 - 24 to 38 Vdc supply

Note:
Pin 1 is not required when control faceplate is secured to a conductive, earthed plane.

CN201 - Motor Output

Pin 1 - Motor output
Pin 2 - Motor output

Note:
Pins 1 and 2 may be swapped to reverse polarity (only necessary to match the forward and reverse of the motor with those of the control).

Note: CN1, CN11, CN12, CN14 & CN15 are Molex KK, or equivalent, 0.1" [2.54mm] spaced series connectors/headers

CN1 – Flash Programming Port

Note:
Factory use only.

CN11 – Tach Feed Back Connection

Pin 1 - Common
Pin 2 – Signal
Pin 3 – Sensor detection & current source

CN12 - Auxiliary "Hold" (Stop) Port

Pin 1 - Common
Pin 2 – "Hold" (Stop) (digital input active LOW)
Pin 3 – Port active recognition

Note:
When the "GSP-1000" control is initially powered-up, it looks to see if pin 1 & 3 are in a closed circuit, thereby indicating a device/signal using this port. If the control does not see pin 3 connected to common, it assumes that nothing is connected to this port and will not look for the auxiliary "Hold" (stop) signal. **Therefore, any auxiliary "Hold" (stop) device that is connected to the control after it has been powered-up will be ignored.** After the microprocessor has recognised that a device is connected to this port, it will activate the "Hold" (stop) command when pin 1 & 2 are in a closed circuit.

CN14 – Remote Speed Port

Pin 1 - Common
Pin 2 – 0 to 2.5 Kohm signal

Note:
The external resistance applied across pins 1 & 2 will regulate the motor speed up to the setting of the Speed adjustment potentiometer on the "GSP-1000" faceplate (not necessarily 0 to 100%).

CN15 – Remote Direction Port

Pin 1 - Common
Pin 2 - Reverse travel direction (digital input active LOW)
Pin 3 - Forward travel direction (digital input active LOW)
Pin 4 - Spare (not used)

Note:
By connecting Pin 1 with either pins 2 or 3 (closing the circuit) the Reverse or Forward commands will be activated. Avoid calling up Forward and Reverse simultaneously. The Hold (stop) command has precedence over the Forward or Reverse commands. If either of these remote directions are opposite to that of the Forward/Neutral/Reverse switch located on the "GSP-1000" control, the motor output will be disallowed until the conflict is resolved.

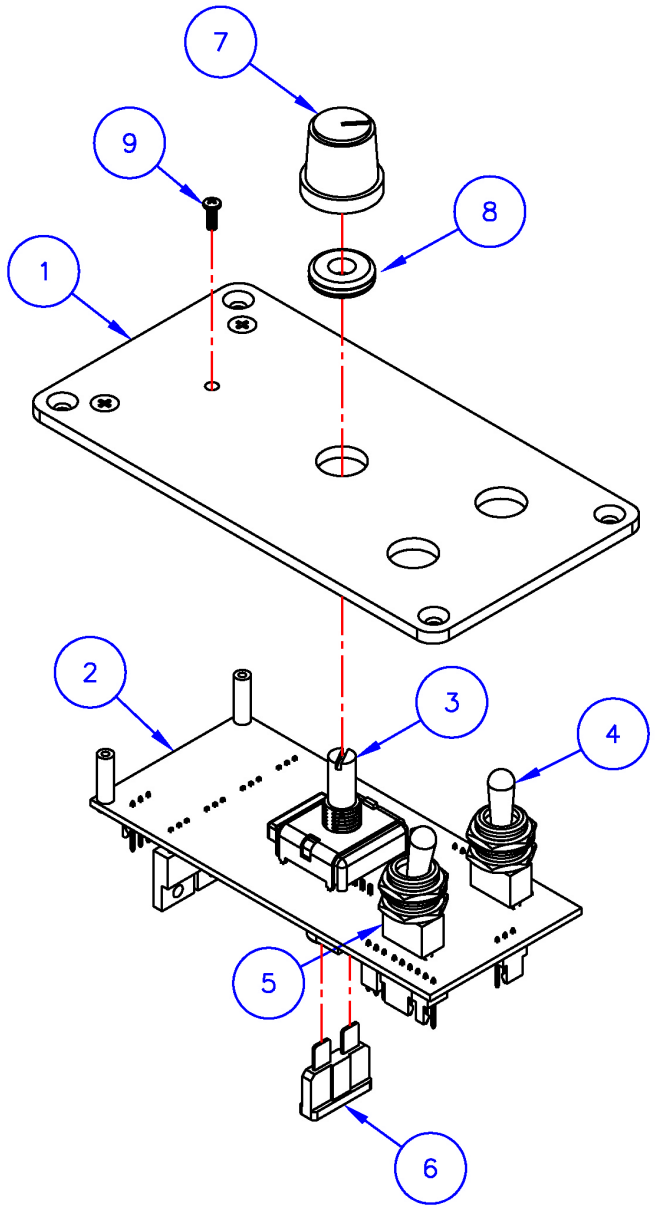
Caution:

Even though this control and its input and output ports have been designed to be as non-destructible, durable and as isolated as possible, extreme radiated high frequency bombardment ***may*** *cause a malfunction of the control. Always use best practices with regards to shielding, bonding and isolating when making any revisions to the equipment.*

Wiring Connector Details

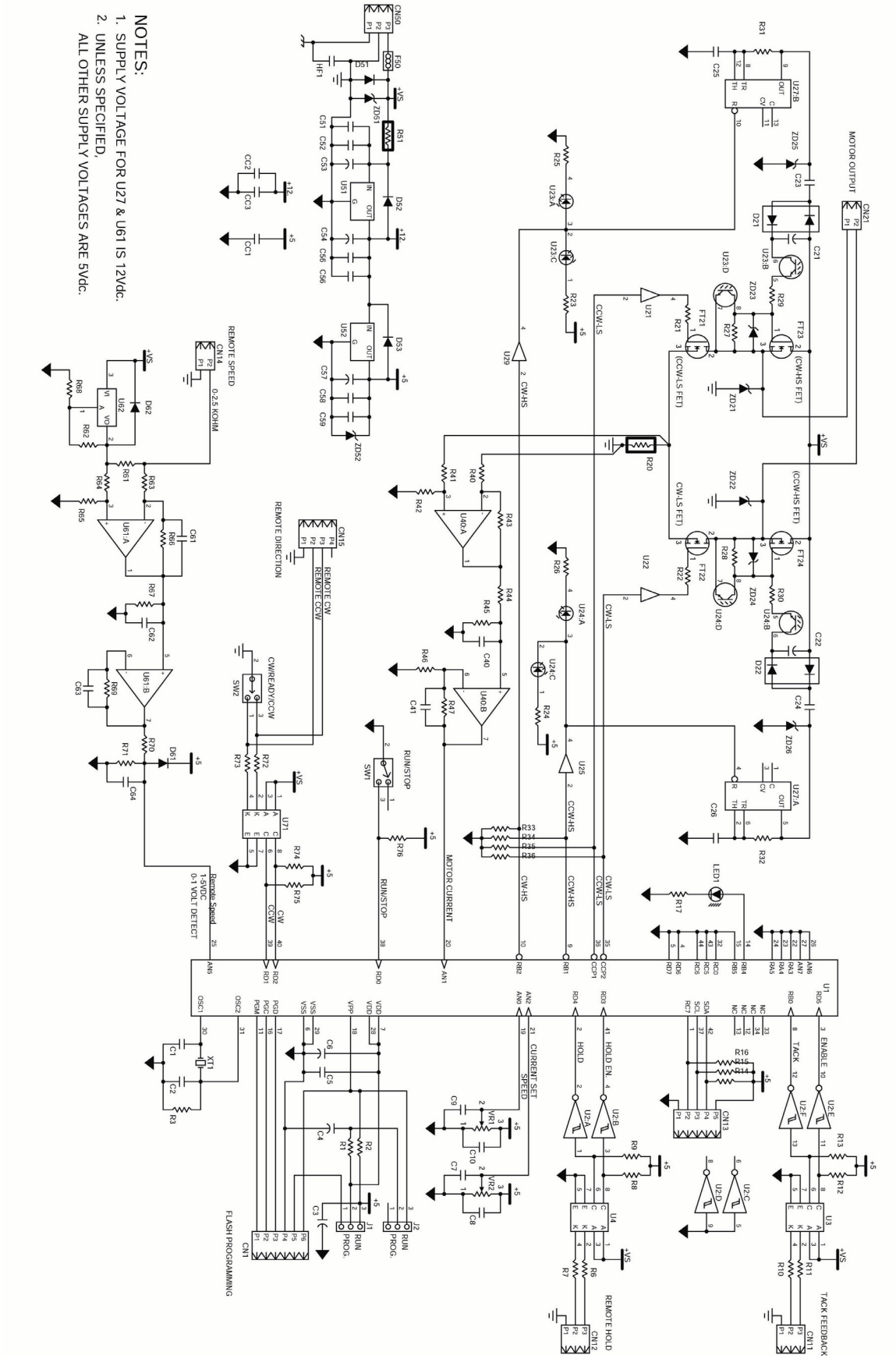
CONNECTOR DESIGNATOR	BOARD MOUNTED HEADER MOLEX PART NUMBER	WIRING CONNECTOR	
		MOLEX PART NUMBER	GULLCO PART NUMBER
CN11 & CN12	1 x "22-23-2031"	1 x "22-01-2035" 3 x "08-50-0114"	1 x GK-156-032 3 x GK-156-017
CN14	1 x "22-23-2021"	1 x "22-01-2025" 2 x "08-50-0114"	1 x GK-156-031 2 x GK-156-017
CN15	1 x "22-23-2041"	1 x "22-01-2045" 3 x "08-50-0114"	1 x GK-156-033 3 x GK-156-017
CN50	1 x "15-31-1036"	1 x "19-09-1039" 3 x "02-09-1104"	1 x GK-156-004 3 x GK-156-016
CN201	1 x "15-31-1026"	1 x "19-09-1029" 2 x "02-09-1104"	1 x GK-156-003 2 x GK-156-016

GSP-1000 CONTROL ASSEMBLY BREAKDOWN



ITEM	PART NUMBER	DESCRIPTION	QTY
1	GSP-1005	GSP CONTROL FACEPLATE	1
2	GSP-1000-A	GSP-1000 CIRCUIT BOARD ASSEMBLY (Includes item #s 3 to 6)	1
3	GK-189-053	ADJUSTABLE SPEED POTENTIOMETER	1
4	GSP-2007	FORWARD/NEUTRAL/REVERSE SWITCH	1
5	GSP-2008	RUN/STOP SWITCH	1
6	GSP-2006	15 AMP FUSE	1
7	GK-191-P-097	SPEED SELECTOR KNOB	1
8	GK-151-004	GROMMET	1
9	GK-112-091	#2-56 x 1/4" PAN HEAD SCREW	1

GSP-1000 CONTROL CIRCUIT BOARD SCHEMATIC



REVISIONS LIST

November, 2004
Overall First release.

July, 2005
Page T-2 Updated LED Table with Normal closed loop & Normal open loop modes.
Page T-9 Corrected spelling of “Circuit” on item 2.

ADDITIONAL NOTES

Specifications and products are subject to change without notice.
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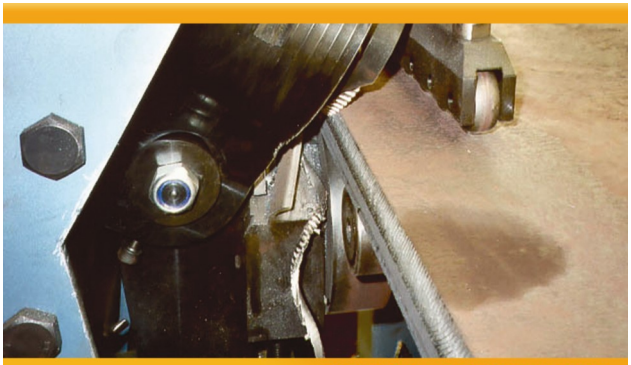

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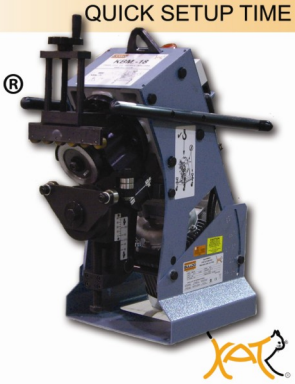

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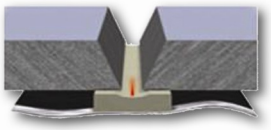

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