



# AUTOWELD “KAT”<sup>®</sup> ALL POSITION, VARIABLE SPEED TRAVEL CARRIAGE

*(USING GULLCO’S GSP-2100 CONTROL)*

**FOR MODELS:**

**GK-200-RL\*-A - GK-200-FL\*-A**

**GK-200-RM\*-A - GK-200-FM\*-A**

**GK-200-RH\*-A - GK-200-FH\*-A**

*(\* indicates voltage reference)*



## OPERATING INSTRUCTIONS

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## **SAFETY INSTRUCTIONS**

Although the Gullco AutoWeld “KAT”<sup>®</sup> carriage is manufactured for safe and dependable operation, it is impossible to anticipate those combinations of circumstances, which could result in an accident. An operator of the “KAT”<sup>®</sup> carriage is cautioned to always practice "**Safety First**" during each phase of operation, setup and maintenance.

Read and understand the whole Operating Instructions manual (as well as the additional Technical Manual complete with the supplementary GSP-2100 Control Manual, “GD-075”) 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**

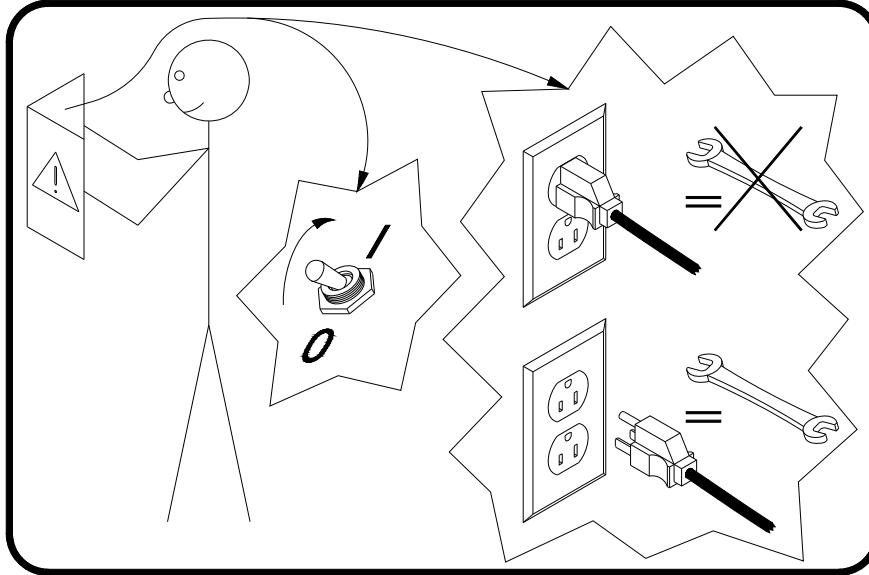
- Do not use this equipment in damp or wet locations.
- Do not expose this equipment to rain.
- Never carry this equipment by the cables or pull the cables to disconnect from the receptacle.
- Keep all cables from heat, oil and sharp edges.
- Inspect all cables periodically and replace if damaged.
- Inspect the secureness 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 and loose, long hair, which may get caught into automatic systems or moving parts.
- Ensure that the track is **well** secured when installed in any other position than flat on a surface.
- The track must have a method of safety backup from falling when elevated, i.e., chained at the ends, welded to work-piece, etc.
- Keep lifting handle dry, clean and free from oil and grease.
- Keep hands away from the underside of the “KAT”<sup>®</sup> carriage when there is the slightest possibility of motion.
- Wherever possible, avoid (or at least protect against) objects protruding from the moving equipment, posing possible pinch-points.
- There should only ever be one (1) operator working at the machine at any given time.
- On Flex “KAT”<sup>®</sup> models, the track is made from spring steel. Therefore extreme caution should be exercised with respect to the hazards of injury due to whipping.
- Protective gloves should be worn when handling Flex Track to prevent injury from sharp edges.

## **SAFETY PRECAUTIONS**

The following cautionary/warning label is attached to each “KAT”<sup>®</sup> carriage:-



The above label pictorially represents the following:

*“Warning:-*

*Read the manuals 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 “KAT”<sup>®</sup> CARRIAGE**

Ensure that an adequate and well-maintained weld return path is provided with good electrical contact. Failure to do so may result in the welding current passing through the carriage and damaging the wiring and electrical components.

Important information regarding safety and operation of the “GSP-2100” motor control used in the “KAT”<sup>®</sup> carriage is contained in a supplemental manual attached at the end of the Technical Manual. It is equally important to read, understand and apply the information contained within that manual. The supplemental manual (GD-075) has a title “Technical Information For The Gullco “GSP-2100” Micro-Processor Based, 24 Volt DC 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.**



## AUTOWELD “KAT”® carriage

This manual covers the operating instructions of the following Gullco AutoWeld, Rigid and Flex “KAT”® all position, variable speed travel carriages (\* indicates voltage reference):

**GK-200-RL\*-A, GK-200-RM\*-A, GK-200-RH\*-A**

**GK-200-FL\*-A, GK-200-FM\*-A and GK-200-FH\*-A**

### GENERAL DESCRIPTION

The Gullco “KAT”® is a heavy duty, all position travel carriage. It is an electrically powered self-propelled carriage that travels in a forward or reverse direction, at precisely controlled speeds, along a special track. The self-aligning wheel system of the carriage grips the top and bottom of the track, enabling it to travel along any plane. The adjustable wheel assembly keeps the carriage snug to the track, while allowing it to be easily mounted and removed from the track at any point. The positive drive of the “KAT”® is obtained from either a pinion that engages with the rack of the rigid track, or a uniquely designed sprocket that engages with slots in the flex track. Both of these systems are driven by a low voltage permanent magnet motor and gear-head power unit assembly. Safety is greatly enhanced by the use of Gullco’s low voltage (24 V), highly advanced control / power supply system that is available in three line voltage inputs, i.e. 42, 115 and 230 VAC, single phase, 50/60 Hz, or any unregulated 24 VDC power supply at 220 watts of power. The motor and the control operate on 24 VDC, supplied by a power supply located within the casing of the “KAT”® carriage. Therefore, all operator interface devices (except the power on/off isolation switch) are subjected to signal level voltages only. The microprocessor pulse width modulation motor control offers operator interface of forward, stop, reverse and infinitely variable control of the speed, within the range of the model, as well as an L.E.D. display indicating travel speed in either in/min. or cm/min. The travel speed is electronically controlled using an optical tachometer located on the back of the gear-motor. Through the use of this, closed loop, feedback circuitry, the motor control can obtain accurate and constant speed control of the “KAT”® carriage when running in any plane, regardless of the load (within the rating of the equipment).

The Gullco AutoWeld “KAT”® system combines the above carriage with travel limit switches, adjustable track actuators, Arc Signal Relay(s) and an AutoWeld GSP micro-processor chip. The Gullco GSP control with the AutoWeld micro-processor chip allows the operator to select a variety of multi-functional settings, which when activated, will sequence the desired starting and stopping of the weld arc signal in conjunction with welding motion. The automated cycles can be configured to provide automated cycles with sequence functions such as stitch welding, automatic return to park position, full speed to weld start location etc. These versatile operator selected settings are designed to allow various semi and fully automatic cycles to be achieved to suit job after job with the same, standard off-the-shelf, piece of equipment.



## INTENDED / FORESEEN USAGE

The Gullco AutoWeld "KAT"® carriage is used throughout the world to automate and improve the quality and efficiency of single or multiple "head" welding (or cutting) operations. Welding guns (or cutting torches) are readily mounted on the "KAT"® carriage. Its track is positioned so that the "KAT"® will move the gun (or torch) along the desired path, then securely held in place using magnetic or vacuum activated mounting devices. With the use of Gullco's AutoWeld "KAT"® carriage, repetitive welding cycles may be performed, with precise motion of the welding gun from start to finish, regardless of the number of passes or the work pieces involved. 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.

## OPERATION

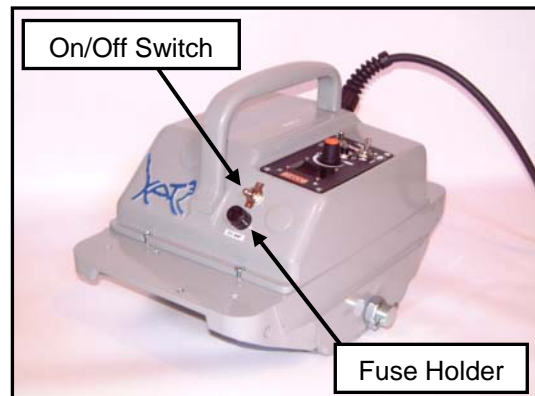
The electrical and mechanical installation of the AutoWeld "KAT"® is explained in the Technical Manual.

### Local Control Devices

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.



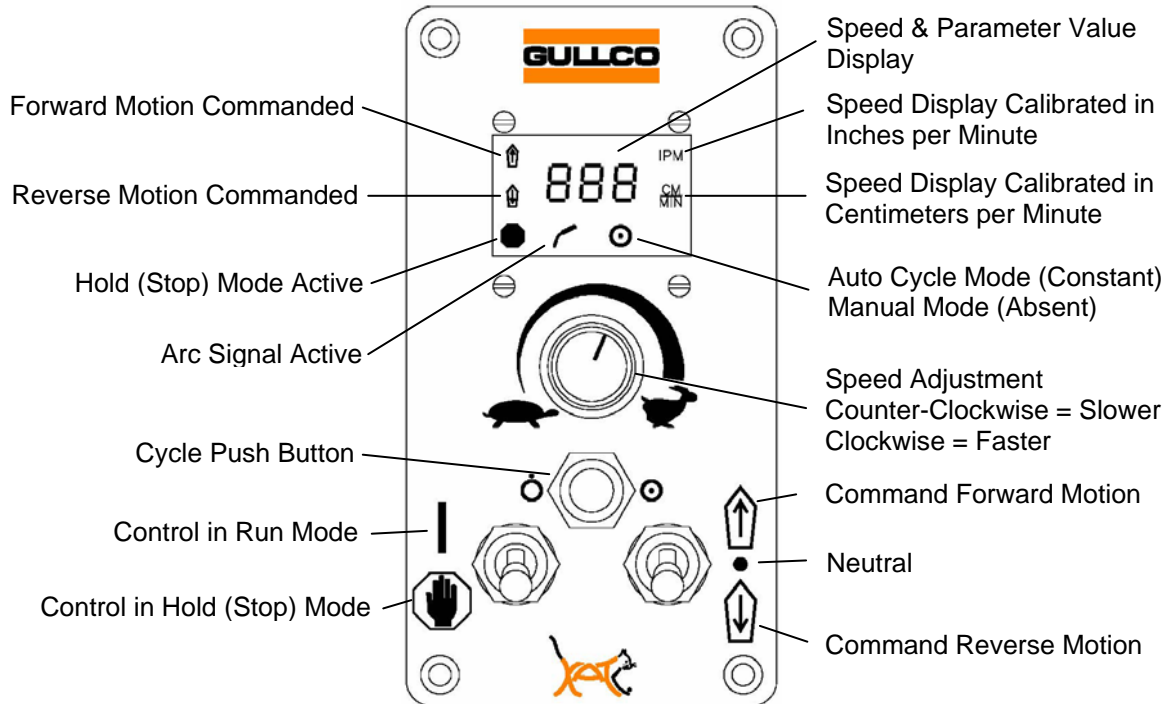
The fuse holder allows accessibility to the main fuse by pushing the cap in towards the main body and twisting in a counter-clockwise direction.

### GSP Control Overview

The AutoWeld series of "KAT"® carriages use Gullco's sophisticated "GSP-2100" microprocessor motor controls.

Externally, this Gullco GSP control has switching for Forward/Neutral/Reverse, Run/Stop, Manual/Auto & program variable increment/decrement, as well as a rotary encoder for speed control.

Please refer to the supplemental manual (GD-075) "Technical Information For The Gullco "GSP-2100" Micro-Processor Based, 24 Volt DC Motor Control" (the pages are numbered with a prefix of "T-"), attached at the end of the Technical Manual, for additional, more comprehensive details than those provided in the following overview.



The following provides a brief description of the GSP-2100 controls (refer to the above sketch):

The Cycle Push Button – is a momentary device, which when pressed for one second while the Run/Stop switch is in the Stop position and the Fwd/Neut/Rev switch in the Rev position, will toggle between Manual Mode (Hnd) and Automatic Mode (Aut). When in Automatic Mode the Auto Cycle Mode LED will be illuminated. *The Cycle Push Button is also used to access the motor control variable parameter settings and the welding variable parameter settings (refer to the section “Programming The Automatic Cycle Parameters/Variables” later in this manual for further details of this function). The cycle push button is also used to reset error codes once they have been rectified (refer to the section “Error Codes” in the GSP-2100 technical manual, GD-075)*

The Run/Stop Switch – is used to start and stop the AutoWeld “KAT”<sup>®</sup> carriage in either Manual Mode or Automatic Mode.

The Forward/Neutral/Reverse Switch – is used to select the travel direction desired in both Manual Mode and Automatic Mode. *When used in conjunction with the speed adjustment knob, the forward or reverse position is used as the method of changing the values/settings of the program variables (refer to the section “Programming The Automatic Cycle Parameters/Variables” later in this manual for further details of this function).*

The Speed Adjustment Knob - is used to increase (clockwise) or decrease (counter-clockwise) the travel speed of the carriage, both in Manual Mode and Automatic Mode. In automatic mode, the carriage will travel at full speed during the no-weld part of a stitch cycle, during an advance to weld start location, during an automatic return to the park position and when traveling in the opposite direction to that set by the Weld Direction parameter (unless the Continual Forward & Reverse feature is active). The speed display will show the set speed when the Run/Stop switch is in the Stop position and the Forward/Neutral/Reverse switch is in the Neutral position.

## **Manual Operation**

To toggle between automatic mode (Aut) and manual mode (Hnd), place the Run/Stop switch in the Stop position and the Fwd/Neut/Rev switch in the Rev position and press and hold the Cycle Push Button until the desired mode is displayed (Aut or Hnd).

In manual mode (Hnd) the Auto Cycle Mode L.E.D. located in the lower right hand side of the display will be extinguished (off).

Manual mode only permits manual motion of the “KAT”<sup>®</sup> carriage. The Forward/Neutral/Reverse switch selects which direction the “KAT”<sup>®</sup> will travel. The Speed Adjustment knob sets the linear travel speed. When the Run/Stop switch is placed in the Run position, the “KAT”<sup>®</sup> carriage will travel in the direction and speed set by the Forward/Neutral/Reverse switch and the Speed Adjustment knob. Travel motion will cease if; the Run/Stop switch is placed in the Stop position; the Forward/Neutral/Reverse switch is placed in the Neutral position; the speed is set to zero; or the appropriate travel limit switch is activated in the relevant direction. Centre limit switch activation is ignored and the Arc Signal Relay remains de-energized in Manual Mode.

## **Automatic Operation**

To toggle between automatic mode (Aut) and manual mode (Hnd), place the Run/Stop switch in the Stop position and the Fwd/Neut/Rev switch in the Rev position and press and hold the Cycle Push Button until the desired mode is displayed (Aut or Hnd).

When the control is in automatic mode (Aut) the Auto Cycle Mode L.E.D. located in the lower right hand side of the display will be constantly illuminated (on).

In automatic mode (Aut), the Run/Stop switch needs to be in the Run position, to allow operation of the unit. Depending on the various parameter settings, the unit will perform as described in the section “Automatic Functions Of The “KAT”<sup>®</sup> Carriage Control”, when the Forward/Neutral/Reverse switch is placed in either Forward or Reverse.

If the Run/Stop switch is placed in the Stop position, or the Forward/Neutral/Reverse switch is placed in the Neutral position at any time during an automatic cycle, the carriage travel will stop immediately, and upon completion of the crater fill delay the Arc Signal will reset (if applicable).



## **Automatic functions of the AutoWeld “KAT”® Carriage Control:**

This section refers to parameter settings and values. Details of accessing and changing these settings and values can be found later in this manual.

1. The automatic cycle is initiated by placing the Run/Stop switch in the Run position and the Forward/Neutral/Reverse switch in either the Forward or Reverse position. The cycle then proceeds to section 2.
2. Momentarily looks at the Forward/Neutral/Reverse direction switch and the limit switch signals.
  - a. If the switch is in the Forward position and the forward limit switch is activated, the cycle aborts, resets and displays “End”.
  - b. If the switch is in the Reverse position and the reverse limit switch is activated, the cycle aborts, resets and displays “End”.
  - c. Otherwise the cycle proceeds to section 3.
3. Momentarily looks at the Forward/Neutral/Reverse direction switch and the Weld Direction parameter. The setting of the Forward/Neutral/Reverse switch is ignored from this point onward, until it is placed in the Neutral position or the Run/Stop switch is placed in the Stop position.
  - a. If the switch is set to the same direction as the Weld Direction parameter, or if the Weld Direction parameter is set to Forward & Reverse, then the cycle proceeds to section 4.
  - b. If the switch is set to the opposite direction as the Weld Direction parameter, then the cycle proceeds to section 20.
4. Momentarily looks at the settings of the Advance To Center Limit Switch parameter and the Stitch Weld Selection parameter.
  - a. If either the Advance To Center Limit Switch parameter is set to On, or the Stitch Weld Selection parameter is set to center limit switch (CLS), then the cycle proceeds to section 5.
  - b. Otherwise the cycle proceeds to section 7.
5. The “KAT”® carriage travels at full speed in the direction initially set by the Forward/Neutral/Reverse switch (detected and recorded at the onset of the cycle), until the activation of the center limit switch (indicating the weld start location), at which point the travel ceases immediately. The cycle then proceeds to section 6.
6. A set timing delay of 0.7 seconds elapses, allowing the carriage to come to a complete stop, before the cycle continues to section 7.
7. The Arc Signal Relay is energized (using output port CN81) and the Travel Motion Delay is initiated. The cycle then proceeds to section 8.
8. Upon completion of the Travel Motion Delay, the “KAT”® carriage starts to travel in the direction set by the Forward/Neutral/Reverse switch (detected and recorded at the onset of the cycle), at the speed set by the potentiometer. The cycle then proceeds to section 9.
9. If the Stitch Weld Selection parameter is set to:
  - a. Off and the Continual Forward & Reverse parameter is set to Off - then the cycle will continue until an event described in section 16 occurs.
  - b. Off and the Continual Forward & Reverse parameter is set to On - then the cycle will continue as described in section 13.
  - c. Center Limit Switch - the weld travel will continue until the deactivation of the center limit switch at which time the weld travel will cease and if the Weld Back Track has been set to a numerical value, it will travel in the opposite direction for this distance while welding. The carriage will then stop and initiate a Crater Fill Delay timing cycle. The cycle will then proceed as per section 10.

- d. A numeric value - the weld travel will cease and if the Weld Back Track has been set to a numerical value, it will travel in the opposite direction for this distance while welding and the Crater Fill Delay timing cycle will initiate, when the carriage travel reaches the initial Stitch Weld Selection value plus accumulative sums of each Stitch Weld Selection value and No-Weld Spacing value. (Example, if the Stitch Weld Selection value were set to 4" and the No-Weld Spacing value were set to 8", then the weld travel would stop at 4", 16", 28", 40" etc.). The cycle will then proceed as per section 10.
10. Upon completion of the Crater Fill Delay (maintaining the Arc Signal after the weld motion has ceased, thereby filling the weld crater) the Arc Signal Relay is de-energized and the Post Weld Delay timing cycle is initiated. The cycle then proceeds to section 11.
11. Upon completion of the Post Weld Delay (keeping the carriage stationary to allow time for any burn-back or post flow welding functions), the "KAT"<sup>®</sup> carriage travels at full speed in the same direction, until either:
  - a. The re-activation of the center limit switch (only if the Stitch Weld Selection parameter is set to Center Limit Switch), indicating another weld start location, at which point the travel ceases immediately. The cycle then proceeds to section 12.
  - b. The carriage travel reaches an accumulative value of the sum of the Stitch Weld Selection value and the No-Weld Spacing value (only if the Stitch Weld Selection parameter is set to a numeric value), at which point the travel ceases immediately. (Example, if the Stitch Weld Selection value were set to 4" and the No-Weld Spacing value were set to 8", then the no-weld space travel would stop at 12", 24", 36", 48" etc.). The cycle then proceeds to section 12.
12. The cycle continues as described between section 6 and 12 until an event described in section 16 occurs.
13. If the Continual Forward & Reverse parameter is set to On, whenever, the relevant forward or reverse limit switch is activated, the carriage will immediately start to travel in the opposite direction, at the speed set by the potentiometer, without de-energizing the Arc Signal Relay. The cycle then proceeds to section 14.
14. This continuous forward & reverse cycle continues like this until either the Run/Stop switch is placed in the Stop position, or the Forward/Neutral/Reverse switch is placed in the Neutral position, then the travel motion will cease, and the Crater Fill Delay will commence. The cycle then proceeds to section 15.
15. Upon completion of the Crater Fill Delay (maintaining the Arc Signal after the weld motion has ceased, thereby filling the weld crater), the Arc Signal Relay is de-energized. The cycle is now completed and "End" is displayed.
16. If the Run/Stop switch is placed in the Stop position, or the Forward/Neutral/Reverse switch is placed in the Neutral position, or if the relevant forward or reverse limit switch is activated, then the travel motion will cease, and the Crater Fill Delay will commence. The cycle then proceeds to section 17.
17. Upon completion of the Crater Fill Delay (maintaining the Arc Signal after the weld motion has ceased, thereby filling the weld crater), The Arc Signal Relay is de-energized. The cycle then proceeds to section 18.
18. If the cycle was stopped via:
  - a. The Run/Stop switch or the Forward/Neutral/Reverse switch, the cycle is now completed and "End" is displayed.
  - b. If the cycle was stopped via the relevant forward or reverse limit switch and the Automatic Return To Home parameter is set to Off and the Continual Forward & Reverse parameter is set to Off, the cycle is now completed and "End" is displayed.
  - c. If the cycle was stopped via the relevant forward or reverse limit switch and the Automatic Return To Home parameter is set to On, and the opposite limit switch to

the Weld Direction is detected and not activated, then the Post Weld Delay timing cycle is initiated and the cycle proceeds as per section 19.

19. Upon completion of the Post Weld Delay (keeping the carriage stationary to allow time for any burn-back or post flow welding functions), the cycle will continue as per section 20.
20. The carriage will travel in the opposite direction to that of the Weld Direction parameter, at full speed, until the activation of the home limit switch (limit switch in opposite direction to that of the Weld Direction parameter). The cycle then proceeds to section 21.
21. Upon the activation of the home limit switch the carriage return travel will immediately stop and the cycle is then completed and “End” is displayed.

### **Programming The Automatic Cycle Parameters/Variables**

Cycle Push Button



The Cycle Push Button is used to enter the programmable parameters menu that allows the operator to change their values and settings and so define how the automatic cycle will function. The Cycle Push Button is located between and above the Run/Stop switch and the Forward/Neutral/Reverse switch of the GSP control.

To make changes to the program variables, turn the power turned on and place the Run/Stop switch in the Stop position and the Fwd/Neut/Rev switch in the Neutral position, then press and hold the cycle push button (approximately 5 seconds) until the control acknowledges programming mode has been entered by displaying the first parameter screen “P1”. By rotating the speed adjustment knob clockwise the operator can navigate to the next parameter “P2”. Clockwise rotation will increment the program variable number while counterclockwise rotation will decrement the program variable.

Once the desired parameter has been selected the display screen will automatically alternate between the parameter number (P#) and the programmable parameter/variable that is assigned to it. Changes made by placing the Fwd/Neut/Rev toggle switch in either Fwd or Rev and then rotating the speed adjustment knob to change the value of the parameter. For numeric values, clockwise rotation will increase while counter clockwise rotation will decrease the value.

To exit programming mode, push and hold the Cycle Push Button until the control acknowledges it has exited programming mode by returning the main screen.

## Description of Programmable Parameters/Variables

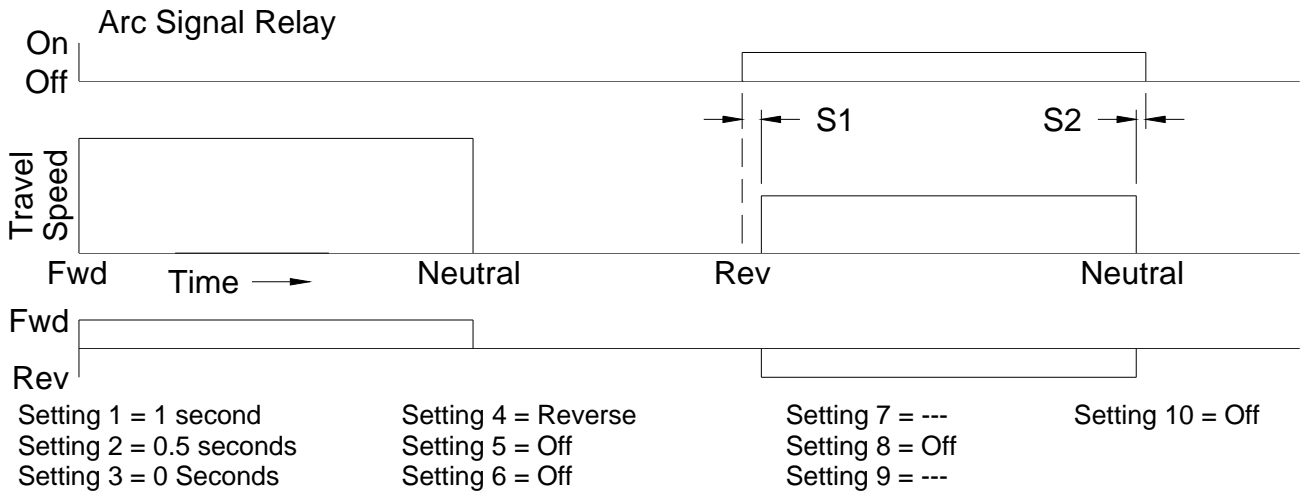
The following describes the Program Variable settings for the GSP-2100 motor control while implementing the stored “-4” program.

P#	Details:
P. 1	Travel Motion Delay - Sets a delay after the activation of the Arc Signal Relay, prior to starting the weld travel, to allow for such things as shielding gas preflow and to allow the arc to establish before starting the welding motion. The variable value range is from 00.0 to 09.9 seconds, in increments of 00.1 seconds.
P. 2	Crater Fill Delay - Sets a delay after the cessation of weld travel (including the end of each stitch weld, if applicable) prior to de-energizing the Arc Signal Relay, allowing the weld trigger signal to remain active after the motion has stopped. The variable value range is from 00.0 to 09.9 seconds, in increments of 00.1 seconds.
P. 3	Post Weld Delay - Sets a delay after each Crater Fill Delay (above) prior to allowing the carriage to travel. This is to allow the welding gun to remain stationary over the end of the weld for such things as burnback or postflow to occur. The variable value range is from 00.0 to 09.9 seconds, in increments of 00.1 seconds. If the Continual Forward and Reverse parameter is set to On, then this parameter is ignored and the display variable will show “- - -”.
P. 4	Weld Direction - Allows the operator to select the direction(s) in which the automatic weld routines are to occur in. The variable options are Forward; Reverse; or Forward & Reverse.
P. 5	Advance To Center Limit Switch - Instructs the carriage to travel at full speed until the center limit switch is activated (indicating weld start location) at the beginning of an automatic weld cycle. When this feature is set to On, the automatic weld cycle may only start when the end of travel limit switch at the opposite end of the selected Weld Direction is activated. The variable options are either On or Off. If the Continual Forward and Reverse parameter is set to On, then this parameter is disabled (forced to Off) and the display variable will show “- - -”.
P. 6	Stitch Weld Selection - Enables/disables stitch welding and specifies the length of each weld stitch. The variable options are; Off; CLS (Center Limit Switch); or a numerical value (travel distance). When Off is selected the weld will be continuous. When CLS is selected, a weld routine is performed each time the center limit switch is activated and for the duration of the limit switch activation. A numerical value specifies the distance in inches or cm (dependent upon the unit calibration of the control) that the carriage will travel during a stitch weld. If the Continual Forward and Reverse parameter is set to On, then this parameter is disabled (forced to Off) and the display variable will show “- - -”.
P. 7	No-Weld Spacing (Stitch Weld) - Specifies the distance in inches or cm (dependent upon the unit calibration of the control) that the carriage will travel between stitch welds. If the Continual Forward and Reverse parameter is set to On, or the Stitch Weld Selection parameter is set to either Off or CLS (Center Limit Switch), then this parameter is disabled (forced to Off) and the display variable will show “- - -”.

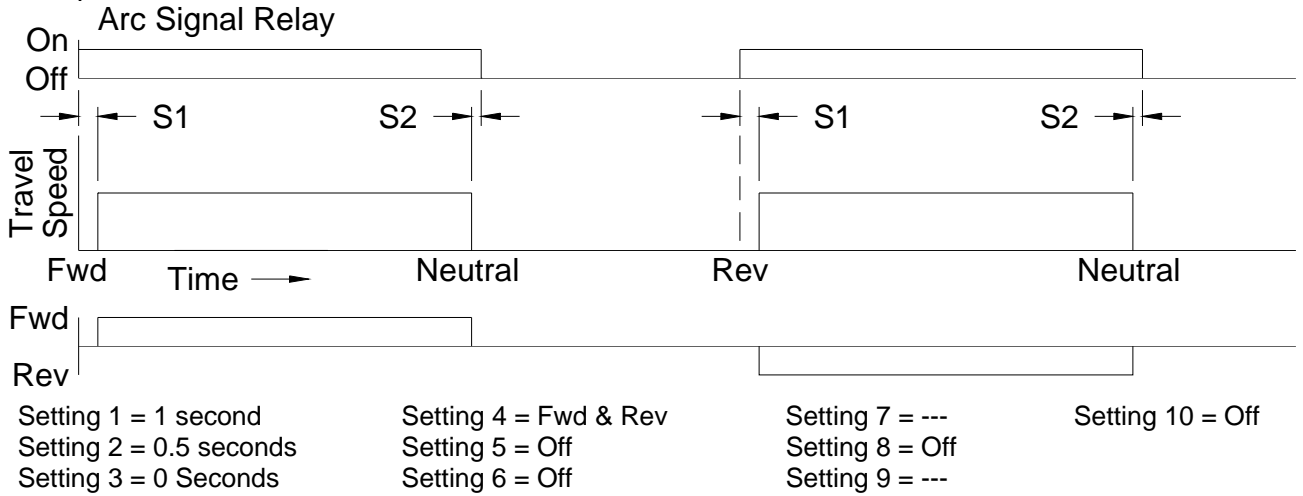
P. 8	<p>Weld Back Track- When this parameter has been set to a numerical value, at the end of every weld, the carriage will travel in the direction opposite to that of the weld direction by the amount entered in this parameter, then stop &amp; perform a controlled shut down of the weld.</p> <p>Note: if stitch welding, this back track feature will occur after each stitch weld. If the travel limit switch or the “Run/Stop” switch is put into Stop or the “Fwd/Neut/Rev” switch is put into neutral, this back track feature will execute, if high Automatic Return to Home (P9) is enabled, the back track feature will execute first.</p>
P. 9	<p>Automatic Return To Home - When this parameter is set to On, upon completion of a weld cycle (indicated by the activation of the weld direction limit switch) and the completion of the Crater Fill Delay and the Post Weld Delay, the carriage will automatically travel at full speed back to the home limit switch (opposite direction to the Weld Direction parameter). Once the cycle is initiated, the Forward and Reverse positions of the Forward/Neutral/Reverse switch are ignored until reset. Only the Neutral setting will be recognized, resetting the cycle. The variable options are either On or Off. If the Continual Forward and Reverse parameter is set to On, or the Weld Direction parameter is set to Forward &amp; Reverse, then this parameter is disabled (forced to Off) and the display variable will show “- -”.</p>
P. 10	<p>Continual Forward &amp; Reverse - Instructs the carriage to automatically change the direction of travel upon the activation of the forward and reverse limit switches. The variable options are either On or Off. The center limit switch is ignored when this parameter is set to On. Either the forward or reverse travel limit switches must be activated to allow the initiation of this cycle. Once initiated, the Arc Signal will remain energized and the carriage travel will repeatedly reverse direction upon activation of the travel limit switches, at the speed set by the potentiometer, until stopped by the operator. Once the cycle is initiated, the Forward and Reverse positions of the Forward/Neutral/Reverse switch are ignored until reset. Only the Neutral setting will be recognized, resetting the cycle.</p>

The timeline charts on the following pages provide some examples of different functionality available through the program variables.

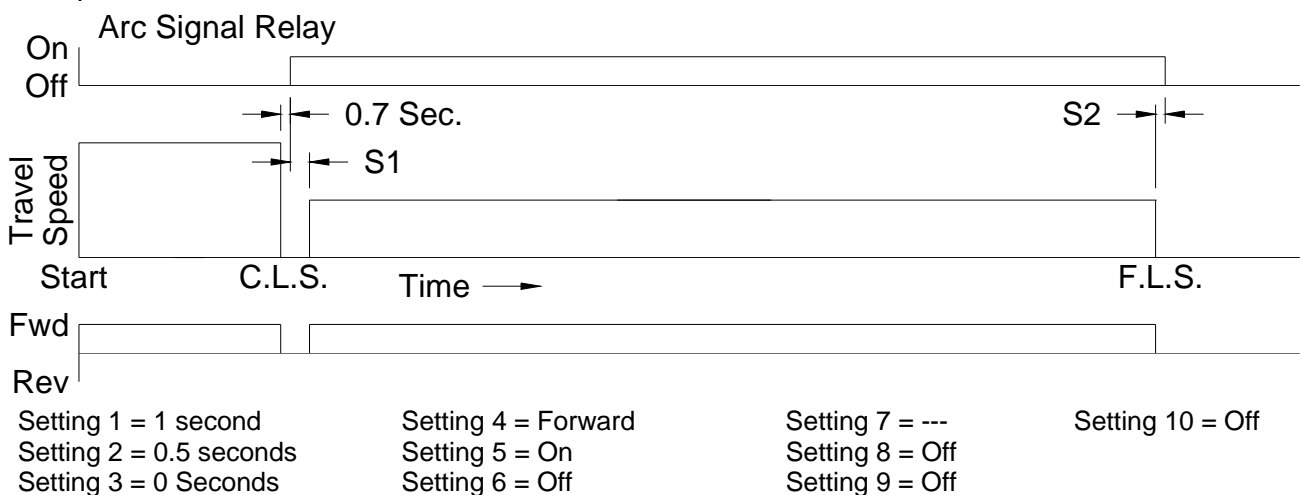
Example 1:



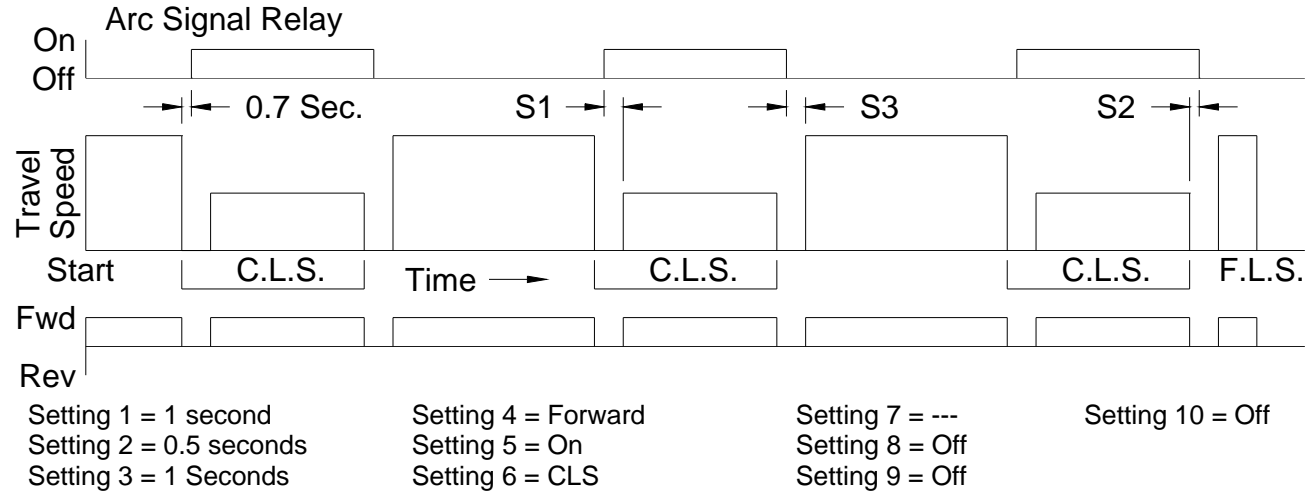
Example 2:



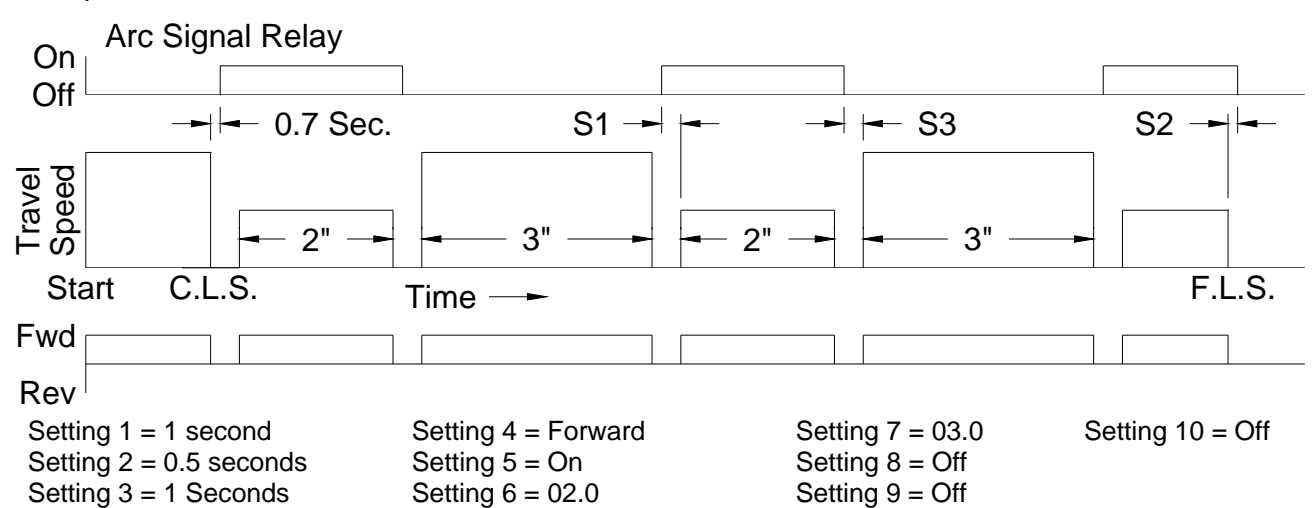
Example 3:



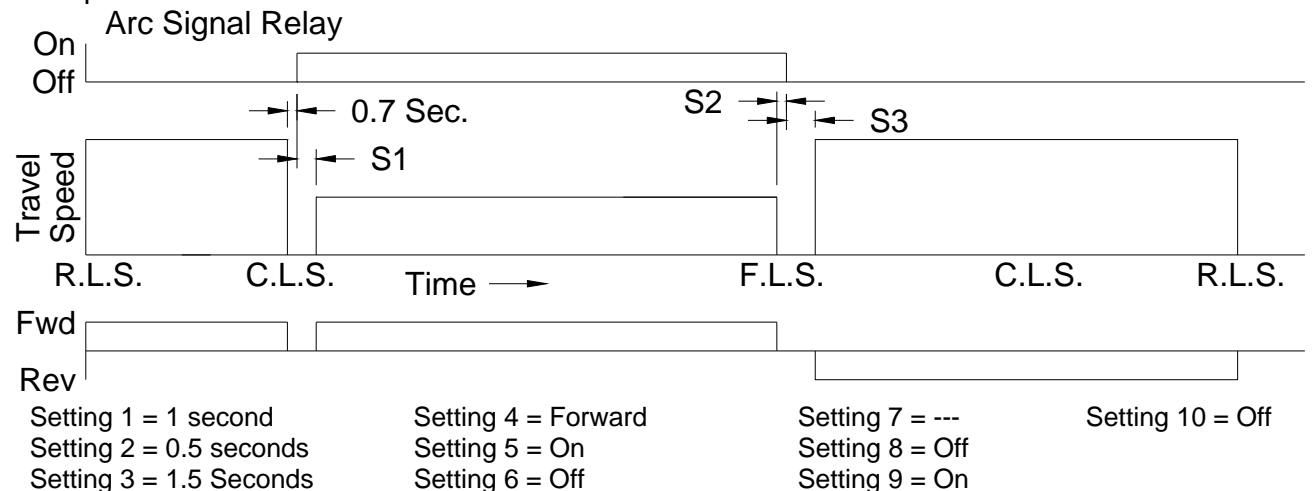
Example 4:



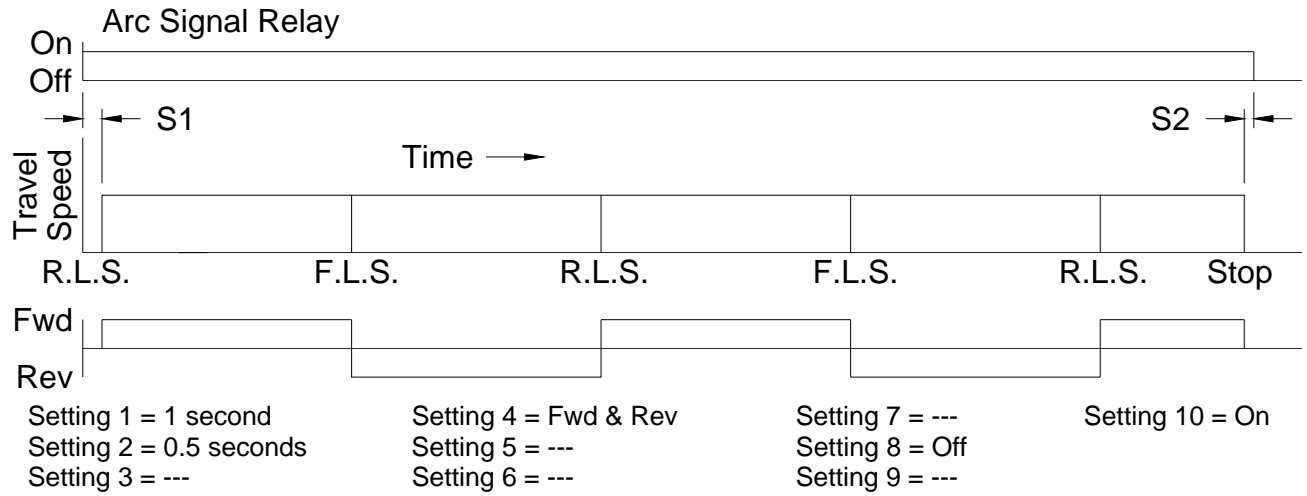
Example 5:



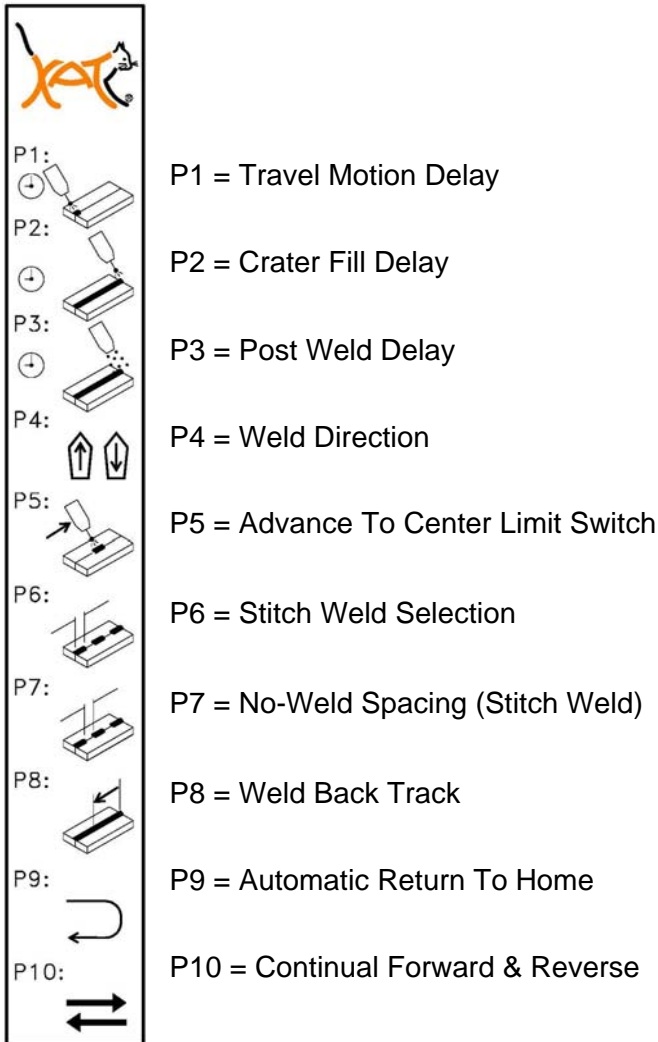
Example 6:



Example 7:



The following label is applied to each AutoWeld “KAT”<sup>®</sup> carriage to graphically identify the individual programmable parameters/variables:

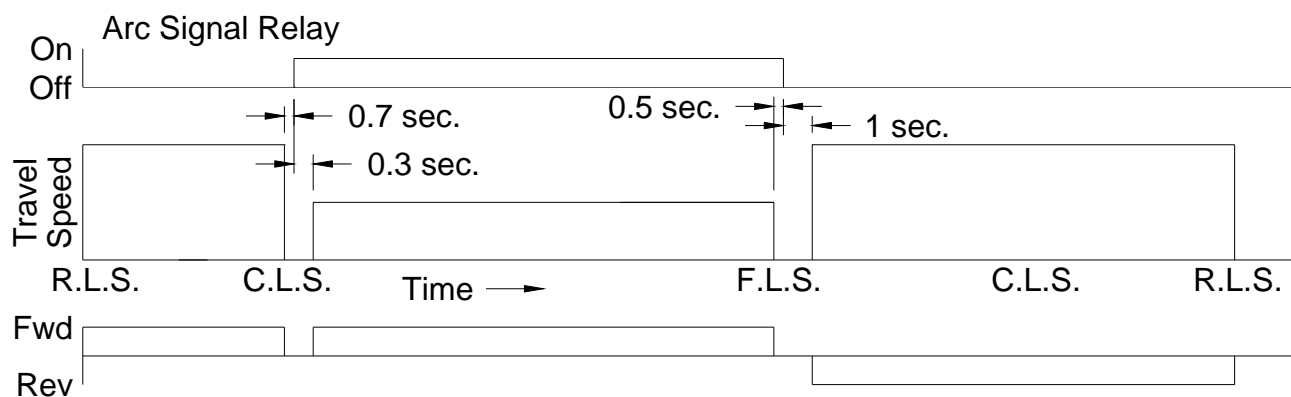




### Factory Settings:

The following table shows the settings/values of the Programmable Parameter/Variables as supplied from the factory:

Switch Position	Parameter	Value
P. 1	Travel Motion Delay	00.3 (seconds)
P. 2	Crater Fill Delay	00.5 (seconds)
P. 3	Post Weld Delay	01.0 (seconds)
P. 4	Weld Direction	Forward
P. 5	Advance To Center Limit Switch	On
P. 6	Stitch Weld Selection	Off
P. 7	No-Weld Spacing (Stitch Weld)	- - -
P. 8	Weld back track	0.0
P. 9	Automatic Return To Home	On
P. 10	Continual Forward & Reverse	Off



The cycle, if uninterrupted, will function as follows:

The reverse limit switch (home limit switch) must be activated, the Runs/Stop switch in the Run position and the Forward/Neutral/Reverse switch in the Forward position to initiate the cycle. The carriage will then travel at full speed until the activation of the center limit switch (weld start location) at which time the carriage will stop. A fixed timing delay of 0.7 seconds will elapse to allow the carriage to come to a complete rest before the Arc Signal Relay is energized. An adjustable delay of 0.3 seconds will then elapse to allow for any preflow feature and to allow the arc to establish prior to the carriage starting to travel forward at the welding speed set by the speed potentiometer. When the forward limit switch (end of weld travel) is activated the carriage travel will stop. An adjustable delay of 0.5 seconds will then elapse to allow the filling of the weld crater, prior to de-energizing the Arc Signal Relay. Another adjustable delay of 1 second then elapses, keeping the carriage stationary to allow for any burn-back and or postflow features, before the carriage starts to travel in reverse at full speed. The center limit switch is ignored and the Arc Signal remains de-energized on the Return To Home Routine (as the Weld Direction parameter is set to Forward only). When the reverse limit switch (home limit switch) is activated the carriage travel will stop and the cycle is then complete. The display will show "End" until reset by either the Forward/Neutral/Reverse switch being placed in the Neutral position or the Run/Stop switch being placed in the Stop position.

## ACCESSORIES

GK-191-P-071 Arc Signal Relay Kit	Additional Arc Signal Relay kits can be installed on the “KAT” <sup>®</sup> carriage to provide multiple isolated relay signals (generated by the GSP control during automated welding cycles), to the trigger input of multiple welding power units.
GK-190-067 Lower Housing Dust Cover (Rigid “KAT” <sup>®</sup> )	A cover which is installed to a rigid “KAT” <sup>®</sup> carriage lower housing, reducing the drive opening to minimize dust & smoke pollutions to the interior of the “KAT” <sup>®</sup> carriage.
GK-190-068 Lower Housing Dust Cover (Flex “KAT” <sup>®</sup> )	A cover which is installed to a Flex “KAT” <sup>®</sup> carriage lower housing, reducing the drive opening to minimize dust & smoke pollutions to the interior of the “KAT” <sup>®</sup> carriage.
GK-166-169 Low Speed Gear Assembly (Rigid “KAT” <sup>®</sup> )	An external gear assembly is available which can easily be fitted to any of the rigid track “KAT” <sup>®</sup> carriages to decrease the available speed range.
GK-166-153 High Speed Gear Assembly (Rigid “KAT” <sup>®</sup> )	An external gear assembly is available which can easily be fitted to any of the rigid track “KAT” <sup>®</sup> carriages to increase the available speed range.

### Other Accessories:

The Gullco AutoWeld “KAT”<sup>®</sup> carriage is drilled to facilitate the mounting of rack boxes and rack box riser brackets, cable support brackets, as well as links for towing idler carriages. Many other accessories such as remote controls, oscillation, seam tracking, auto indexing, auto stitch welding, and automatic overlaying are also available for fitting to the “KAT”<sup>®</sup> all position, variable speed travel carriage.

**Visit Gullco’s web site, “[www.gullco.com](http://www.gullco.com)”  
to see, or request, more product and  
application information.**

## REVISIONS LIST

### July, 2004

Overall First Release.

### June, 2005

Page 2 Corrected references to the location of the supplemental GSP control manual.  
Page 5 Corrected Run/Stop switch reference from "Moggy" to AutoWeld "KAT"®.

### April, 2006

Overall Reprinted.

### October, 2007

Title Page Updated Gullco contact details.  
Page 7 Revised reference of port CN303A to CN81.

### June, 2011

Title Page Updated Gullco contact details.  
Back Page Updated back page.

### March 2014

Overall Updated for the GSP-2100 control, replaces GSP-2000/2001/2010 controls

## 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.



**GULLCO**



LINEAR or RADIAL  
HIGH DEPOSIT RATE  
QUICK SETUP TIME

## KAT<sup>®</sup> OSCILLATOR

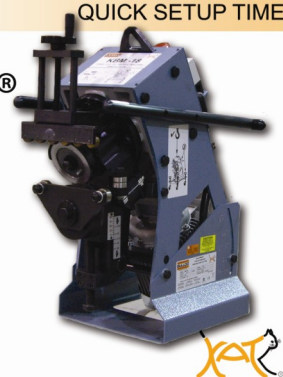
- Motorized weld center line adjustment
- Motorized stroke width
- Oscillation speed control
- Store up to 10 welding programs



PORTABLE PLATE EDGE  
BEVELLING MACHINE  
QUICK SETUP TIME

## KBM<sup>®</sup>

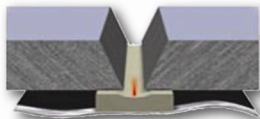
- Produce clean bevels with no thermal distortion
- Bevels angles 22° to 55° (other angles available)
- Hydraulic and Adjustable undercarriages available
- Bevels Mild Steel, Stainless Steel, and Aluminium
- Reduce cost and save time by minimising defects and poor fit up



ONE SIDED WELDING  
X-RAY QUALITY BEADS  
HIGH DEPOSIT RATE

## KATBAK<sup>®</sup> CERAMIC WELD BACKING

- Eliminate Defects And Rework
- Eliminate Costly Unnecessary Gouging And Grinding
- Sizes 1/4" (6.3 mm) to 2" (51 mm)
- Special Sizes And Configurations Available



PORTABLE AND COMPACT  
INCREASE EFFICIENCY  
MORE ARC ON TIME

## MOGGY<sup>®</sup> FILLET WELD CARRIAGE

- Single or Dual Torch Models
- Magnet or Non Magnetic Base
- Continuous or Stitch Welding Models
- Fillet, Lap, Butt and Dual Torch Welding

