



TECHNICAL INFORMATION FOR THE GULLCO “GSP-2100” MICROPROCESSOR BASED, 24 VOLT DC MOTOR CONTROL

**MODEL:
GSP-2100**



PARTS LIST & OPERATING INSTRUCTIONS

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IMPORTANT

READ THIS BEFORE OPERATING THE “GSP-2100” 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 components used in these controls are Electrostatic Discharge Sensitive. Suitable ESD precautions must be adhered to when handling the control. Failure to comply may result in immediate or latent failure.

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.

The “Current Limit” (motor overload protection) on this product is typically factory pre-set to 10 Amps (unless specifically requested at time of order). If a specific application requires that this be changed, please refer to the section which describes the “Motor Control Variable Adjustments”, later in this manual.

The "GSP-2100" control has built in safety logic that reduces the risk of injury, damage and faulty operation. When the “GSP-2100” control recognizes a potential problem, its LED's display an error code and the unit will not allow any motor output until the fault has been cleared and the control has been reset (application of the hold command and pushing the cycle push button, or depending on the circumstances, powering down & waiting 10 seconds before powering back up). The Error Table on the following page lists the generic errors and their displayed error codes. Certain product/application specific programs may have other error codes, specific to that unit, which are not listed in this manual. Refer to the manual for the specific equipment/program for further details.

Error Table

Error Code	Reason for Error
Er.1	The "GSP" control was set to run when; electrical power was initially supplied to the control (powered-up); or upon exiting either the Program Variable or Motor Control Variable settings. To prevent unexpected motion generated from the "GSP" control, the motor output is disabled and the error code displayed until the control is placed in "Hold" (stop) mode & pushing the cycle push button, resetting the error.
Er.2	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" 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" 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 error code displayed. Rectifying the fault and resetting the "GSP" control by placing the control in "Hold" (stop) mode & pushing the cycle push button 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).
Er.3	The current draw of the motor exceeded the amperage set by the "Current Limit" variable of the "GSP" control. Rectify the fault causing the excessive current draw, or increase the value of the "Current Limit" variable – only if it is set too low . Then reset the "GSP" control by either powering-down the control, or by placing the control in "Hold" (stop) mode & pushing the cycle push button, to clear the error.
Er.4	As port "CN13" is usually used to interface normally closed travel limit switches, a closed circuit between pins 1 and 2 indicate a non-activated reverse travel limit switch and a closed circuit between pins 1 and 4 indicate a non-activated forward travel limit switch (a third limit switch is sometimes connected between pins 1 and 3). Each time the "GSP" control is powered-up, it checks the status of pins 2 & 4 of "CN13" with respect to pin 1 and if at least one is closed circuit, the control will continue to monitor their status (as well as the status of pin 3 where relevant) with respect to pin 1 (if both pins 2 & 4 were open circuit to pin 1 on power-up, the control ignores all signals for port "CN13"). Once the "GSP" control has recognized limit switches were connected to "CN13" but are no longer connected (i.e. pin 1 is no longer in a closed circuit with either pin 2 or 4), the motor output is disabled and the error code displayed. Rectifying the fault and resetting the "GSP" control by placing the control in "Hold" (stop) mode & pushing the cycle push button 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 remains open between pin 1 & 2 as well as pin 1 & 4, all signals coming into "CN13" will be ignored (failing to recognize limit switch signals).
Er.5	If, an automatic cycle is requested, but the "GSP" control does not recognize the correct connection of a closed-loop tachometer speed sensor, the motor output (and automatic cycle) will be disabled and the error code displayed. Rectifying the fault and resetting the "GSP" control by placing the control in "Hold" (stop) mode & pushing the cycle push button will clear the error. Note: the motor control will still enable manual operation, but the motor control will only operate in open loop mode (speed will only be calibrated as a percentage and susceptible to speed variations due to loading).
Er.6	If the GSP control does not receive encoder feedback after energizing the motor for two (2) seconds, the control realises that either the motor is stalled or the encoder circuit is not working, in which case the motor output is disabled and the error code displayed.

Er.7	Power supply problem – power supply (transformer) has a malfunction possibly due to low or high input voltage. Note: Whenever the control is powered down by the operator, Er .7 will be displayed.
Er. 55	Software not compatible -If any of the control boards (display, keypad, motor driver) are replaced with incompatible revision this error will be displayed.
Er. 60	Display Error – the control display has encountered a problem.
Er. 70	Keypad Error – the control keypad has encountered a problem.

GENERAL SPECIFICATIONS

The GSP-2100 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 from a full bridge rectified 22-24 vac source. The required wattage of the supply depends upon the size of the motor. This control can operate any motor with a capacity of up to 250 Watts (1/3 horse power).

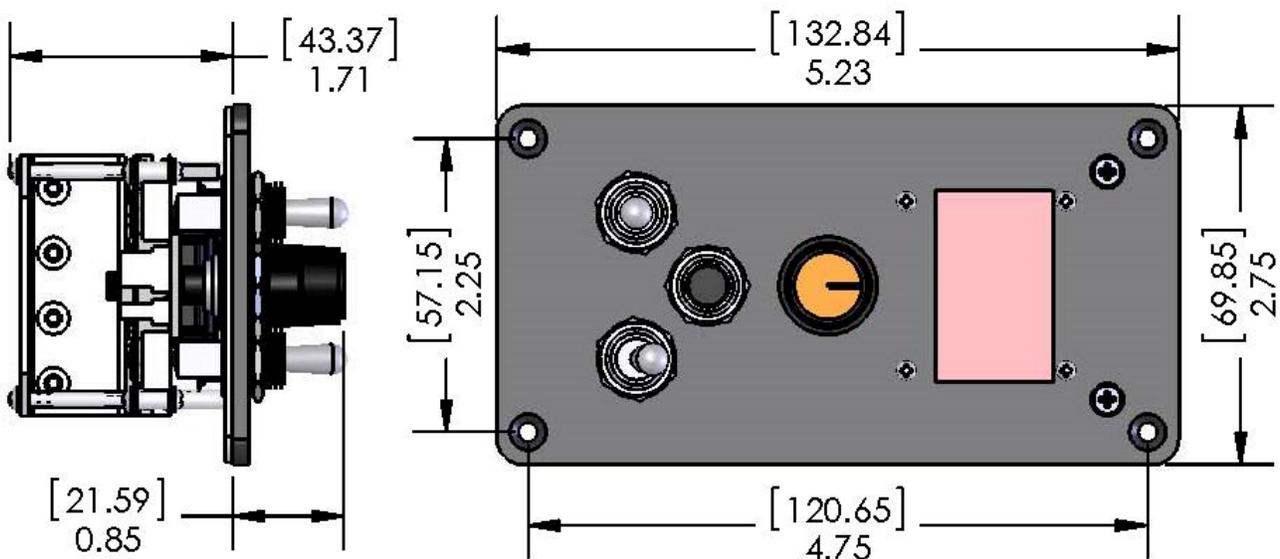
The control can either operate with, or without, a closed loop tach feedback system attached to the armature of the motor. A tach feedback is normally recommended as it allows the motor control to constantly monitor and correct the speed of the motor providing accurate speed control regardless of any variance in loading. A tach feedback system is also necessary for some automatic cycles to function, or when using engineering units (counting of tach feedback pulses, used to measure the distance travelled). Open loop (i.e. no tach feedback) 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.

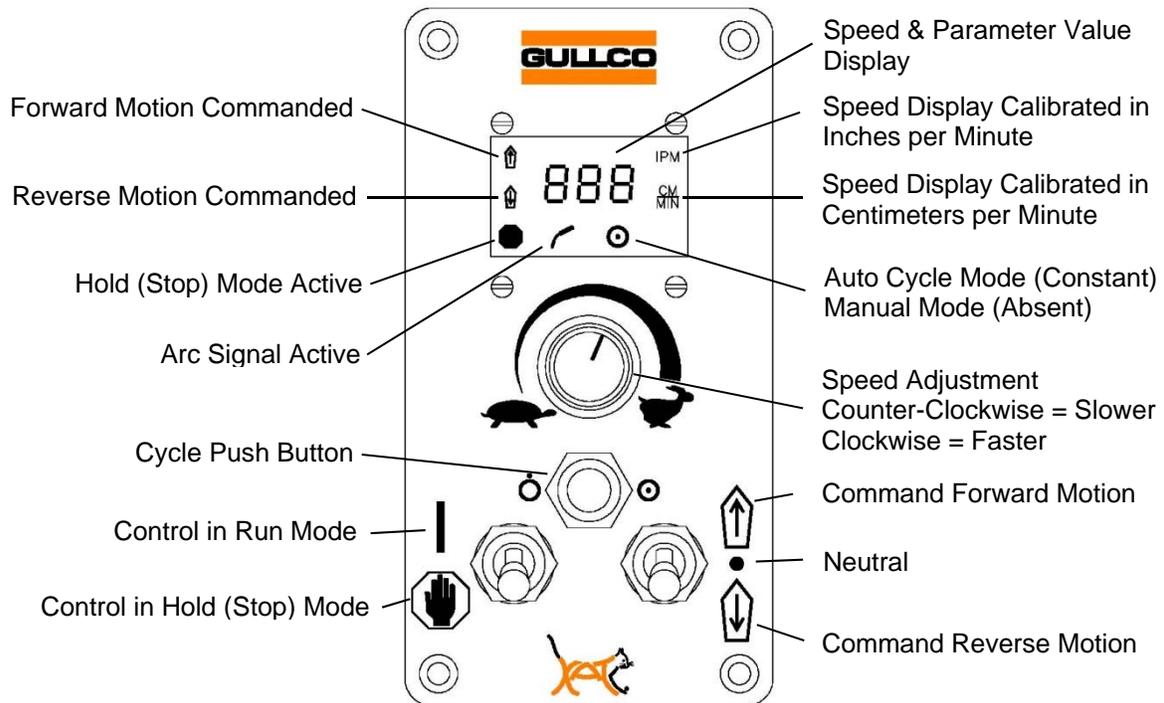
An L.E.D. display is provided to indicate the status of the control. This display is described in detail later in this manual.

A varied selection of programs allows the control to behave in specific ways that are suited with the motorized equipment and process that the controls are being applied to. Typically, each program allows full manual operation of the motor and usually provides; automatic cycle routines; programming ability for the operator to set and fine tune the automatic cycles to that desired; and external interfacing. Refer to the manual for the specific product/micro-processor chip for details.

GENERAL DIMENSIONS



"GSP" CONTROL PANEL LAY-OUT



OPERATION

Local Control Devices

Externally, the Gullco GSP-2100 control has switching for Forward/Neutral/Reverse & Run/Stop, Manual/Auto as well as a rotary encoder for speed control.



= "STOP" - This over-rides all other controls and when activated will apply regenerative braking 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. The Run/Stop switch needs to be in this position to change between automatic and manual modes (where applicable) and also to alter any of the program variable parameters (where applicable).



= "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, while in manual mode and when so permitted. It is also used as the method of adjustment for the program variables when used in conjunction with the speed adjustment knob.



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



= "REVERSE" - When the switch is in this position, the control will drive the motor in the Reverse direction, while in manual mode and when so permitted. It is also used as the method of adjustment for the program variables when used in conjunction with the speed adjustment knob.



= "VARIABLE SPEED CONTROL" - By turning the multi turn rotary encoder knob in a clockwise direction, the motor speed will be increased. When rotated in the counter-clockwise direction, the motor speed will decrease. The Variable Speed Control adjustment is normally used to set the manual speed of the motor and the welding/cutting speed of the motor commanded in an automatic cycle.



= "PRESET CYCLE ENABLED" - Only by depressing the Cycle Push Button continually for one second while the Fwd/Neut/Rev switch is in the Reverse position, and while the control is in "Hold" (Stop) mode, may the preset cycle routine be toggled from disabled to enabled (as indicated by the constant illumination of the Auto Cycle Mode L.E.D.). The Cycle Push Button is also used to enter and exit parameter/variables menu.



= "PRESET CYCLE DISABLED" - Only by depressing the Cycle Push Button continually for one second while the Fwd/Neut/Rev switch is in the Reverse position, and while the control is in "Hold" (Stop) mode, may the preset cycle routine be toggled from enabled to disabled (as indicated by the non-illumination of the Auto Cycle Mode L.E.D.). The Cycle Push Button is also used to enter and exit parameter/variables menu.

The L.E.D. Display

The control has an L.E.D. display that indicates the travel speed in one of four possible calibration scales. The calibration scale selection is made using the Motor Control Variables, Rotary Switch, described later in this manual. The four possible calibration scales are as follows:

1. Calibration in inches per minute (IPM L.E.D. will be illuminated and the closed loop tach feedback system is required);
2. Calibration in centimetres per minute (CM/MIN L.E.D. will be illuminated and the closed loop tach feedback system is required);
3. Calibration in other units such as degrees per minute (no L.E.D. will be illuminated and the closed loop tach feedback system is required, or;
4. Calibration in percentages of full speed obtainable (0 to 100% pulse width duty cycle) (no L.E.D. will be illuminated and automatically selected when no closed loop tach feedback is recognized).

Whenever the control is in Stop (hold) mode and there is no Forward or Reverse direction commanded (Neutral), the speed display will indicate the preset speed.

The display also shows the travel direction accessed as well as the status of the “Hold” (Stop) command. Weld activation signal and Program/Cycle mode L.E.D.’s are also provided.



The Forward and Reverse L.E.D.’s indicate the motor direction commanded.



The “Hold” (stop) L.E.D. will illuminate whenever there is a “Hold” (stop) command present. This could be any combination of either the Run/Stop switch being in the Stop position, or a “Hold” (stop) command being activated through one of the interface ports, or a part of the automatic cycle. When the “Hold” (stop) L.E.D. flashes on and off, it is indicating that the control is looking for a reset before allowing any functionality. To reset this condition, initiate a “Hold” (stop) command through the Run/Stop switch or one of the interface ports. See the section regarding error codes, earlier in the manual for more details.



The Arc Signal L.E.D. is typically used as an indication that the product/application specific program has activated the output ports “CN81” & “CN83” (The “-2” program activates “CN82” & “CN84”). When a Gulco auxiliary relay module (optional on most equipment) is connected to the “CN81” (or “CN82”) port the relay energizes, providing an isolated signal activating the welding/cutting equipment. When the “CN81” port is de-activated, the relay is de-energized, instructing the welding/cutting equipment to stop and the Arc Signal L.E.D. is extinguished.



The Pre-set Cycle L.E.D. is used to indicate whether the Preset Cycle routine is enabled (automatic cycle mode) or disabled (manual mode). When the L.E.D. is constantly illuminated the Preset Cycle is enabled (automatic cycle mode). When the L.E.D. is not illuminated the Preset Cycle is disabled (manual mode).

Local Control Operation

The following provides some basic operational procedures that are typical on the GSP-2100 control. It is important to note that depending upon the product/application specific program, some of the following information may vary or not be applicable.

SPEED PRESET - The travel speed may be preset, prior to any motion, by placing the Run/Stop switch to the Stop position and the Forward/Neutral/Reverse switch in the Neutral position. Then, by rotating the Variable Speed Control knob, the travel speed can be pre-set to the required value, as indicated in the L.E.D. display.

MANUAL MODE – To place the control in manual mode (disable the preset cycle), with the power on, place the Run/Stop switch in the Stop position and Fwd/Neut/Rev switch in the Reverse position. Then continually press the Cycle Push Button until the display shows “Hnd” (the Pre-set Cycle L.E.D. will be extinguished). While the control is in manual mode, the motor may usually be 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 or activated limit switch signals etc., 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 manual 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.

AUTOMATIC MODE - To place the control in automatic mode (enable the preset cycle), with the power on, place the Run/Stop switch in the Stop position and Fwd/Neut/Rev switch in the Reverse

position. Then continually press the Cycle Push Button until the display shows "Aut" (the Pre-set Cycle L.E.D. will be illuminated). While the control is in automatic mode, the automatic cycle is usually initiated by placing the Forward/Neutral/Reverse switch in the desired travel direction (if applicable), and placing the Run/Stop switch in the Run position. When the automatic cycle has completed, the display will show "End" and the "Hold" (stop) L.E.D. will flash, indicating the need to reset the Autocycle by placing the Run/Stop switch in the Stop position before another automatic cycle may be initiated. The automatic cycle may be aborted at any time by placing the Run/Stop switch in the Stop position. The welding/cutting speed may usually be adjusted at any time during an automatic cycle.

PROGRAM VARIABLE ADJUSTMENTS

Program Variables are adjustable parameters available to the operator that determine the functionality, and allow fine-tuning, of the automatic cycle operation. **Note:- Not all GSP-2100 product/application specific programs provide program variables - refer to the manual for the specific machine or specific program for further details.**

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 counter clockwise 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 are 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.

The values/settings of the variables are stored on the product/application specific program. If the program is changed, the values/settings of the variables will need to be re-entered.

MOTOR CONTROL VARIABLE ADJUSTMENTS

Motor Control Variables are adjustable parameters that affect the core operation of the motor control and its relationship with the motor. These variables are generic, regardless which product/application specific program is selected.

The Cycle Push Button is used to enter the motor control variable adjustments menu that allows the operator to change their values and settings. 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, with the power turned off 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, then power up the control. Continue to press and hold the cycle push button while the control boots up (approximately 5 seconds). The control will acknowledge programming mode has been entered by displaying the first parameter screen "A1". By rotating the speed adjustment knob clockwise the operator can navigate to the next parameter "A2". Clockwise rotation will increment the program variable number while counter clockwise rotation will decrement the program variable.

Once the desired parameter has been selected the display screen will automatically alternate between the parameter number (A#) and the programmable parameter/variable that is assigned to it. Changes are 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.

The values/settings of the variables are stored on the product/application specific program. If the program is changed, the values/settings of the variables will need to be re-entered.

Descriptions of the Motor Control Variable parameter settings:

The following describes the settings.

- A. 1 Current Limit – This sets the maximum current draw that the motor control will allow before activating an error code and ceasing operation. The variable value range is from 00.0 to 15.0 Amps, in increments of 1.0 amperes.
- A. 2 Speed Calibration, 2 Most Significant Digits – This sets the first two digits of the maximum speed (regardless of decimal place). The variable value range is from 00 to 99, in increments of 1.
- A. 3 Speed Calibration, 2 Middle Digits – This sets the second two digits of the maximum speed (regardless of decimal place). The variable value range is from 00 to 99, in increments of 1.
- A. 4 Speed Calibration, 2 Least Significant Digits – This sets the last two digits of the maximum speed (regardless of decimal place). The variable value range is from 00 to 99, in increments of 01.

- A. 5 Speed Calibration, Decimal Place – This sets the decimal place location for the speed display. The variable settings range between no decimal places and two decimal places.
- A. 6 Calibration Units – This sets the units of calibration for the speed display. The variable settings offer either; inches per minute (Inc); or centimetres per minute (CEn); or non-specific (rAd). When the closed loop tach feedback is connected and; if the inches per minute option is selected the IPM L.E.D. will illuminate; or if the centimetres per minute option is selected the CM/MIN L.E.D. will illuminate; or if the non-specific option is selected neither the IPM nor the CM/MIN L.E.D.'s will illuminate.
- A. 7 Braking – This sets the level of motor braking from instant braking to a variable degree of pulsed graduated braking. The variable value range is from a reference value of 000 to 010 in increments of 1. A reference value of 0 provides instant braking whereas a reference value of 10 provides the slowest, softest pulse braking.
- A. 8 Response Gain – This sets the speed correction response rate. By having the motor speed correction rate at a slow response, the motor takes longer to accelerate to speed and reacts to motor speed variances slower. By having a fast response, the motor will accelerate to speed quickly, sometimes resulting in over shooting of the preset speed, and reacting to motor speed variances instantly, sometimes resulting in slight speed oscillation. The variable value range is from a reference value of 001 to 010 in increments of 1. A reference value of 1 provides the fastest speed correction rate, whereas a reference value of 10 provides the slowest, speed correction response rate.
- A. 9 Maximum Speed Scale – This sets the maximum speed at which the motor control will allow (the speed is capped at this set percentage). The variable value range is from 001 to 100 percent of full speed, in increments of 1%.
- A. 10 Program Select – This allows the operator to set the product/application specific program. Programs will be shown as “-1” for example. Each GSP-2100 control will have a number of preloaded programs to choose from depending on the application. Other programs can be loaded by your local authorized Gullco service representative.

Note: Following the A.10 motor control variable parameter, U.1, U.2 & U.3 will follow as the next three parameters. These are for factory diagnostic purposes only and are non-adjustable. They indicate the revision level of software and hardware of the control.

If the specific product/application for which a control is to be used and unless otherwise specified, the Motor Control Variables will be factory pre-set as follows:

Variable/Parameter	A. 1	A. 2	A. 3	A. 4	A. 5	A. 6	A. 7	A. 8	A. 9	A.10
Value/Setting	10.0	10	00	00	---	Inc	001	002	100	-1
Overall Result	The control will allow a current draw of up to 10 amperes. The speed will be calibrated so that full speed will display 100 IPM. The braking will be close to instantaneous. The speed correction response will be medium. 100% of full speed will be available.									

The Gullco “GSP-2100” motor controller needs to have the speed display calibrated to match that of the equipment driven by the motor. This is required so that the speed displayed is equal to that of the motion and also so that the control may calculate engineering units (counting and scaling of tach feedback pulses, used to measure distance travelled). If the product/application specific program utilises engineering units, the calibration of the speed is very important. For this reason, the speed calibration is performed with an accuracy of six digits, even though the speed displayed is only three digits. After the calibration process has been completed, the three least significant digits are not displayed.

As mentioned earlier, the accuracy of the calculated engineering unit output is only as good as the calibration of the control relevant to the actual speed. The following example shows how to calculate the actual full speed of a Gullco “KAT®” carriage.

Known Factors:

- Control is running at full speed when receiving 2KHz from tach feedback sensor.
- Sensor wheel on motor armature creates 20 pulses per revolution.
- Gear box ratio = 540:1
- External gear drive = 15 tooth to a 30 tooth, gear ratio.
- Pitch diameter of the 30 tooth final drive gear = 1.875”

Calculation:

- 2KHz. = 120,000 pulses per minute.
- 120,000 pulses per minute / 20 pulses per rev = 6000 revs per minute (armature)
- 6000 rpm (armature) / 540 (gearbox ratio) = 11.111111 rpm (output shaft of gear box)
- 11.111111 rpm x 15/30 (external gear ratio) = 5.555556 rpm (final drive gear)
- 1.875” (pitch diameter) x Pi = 5.890486” (circumference)
- 5.555556 rpm x 5.890486” per rev = 32.7249” per minute
- Therefore maximum travel speed = 32.7249 inches per minute

In the above example, the speed calibration values of the Motor Control Variables would be set as follows:

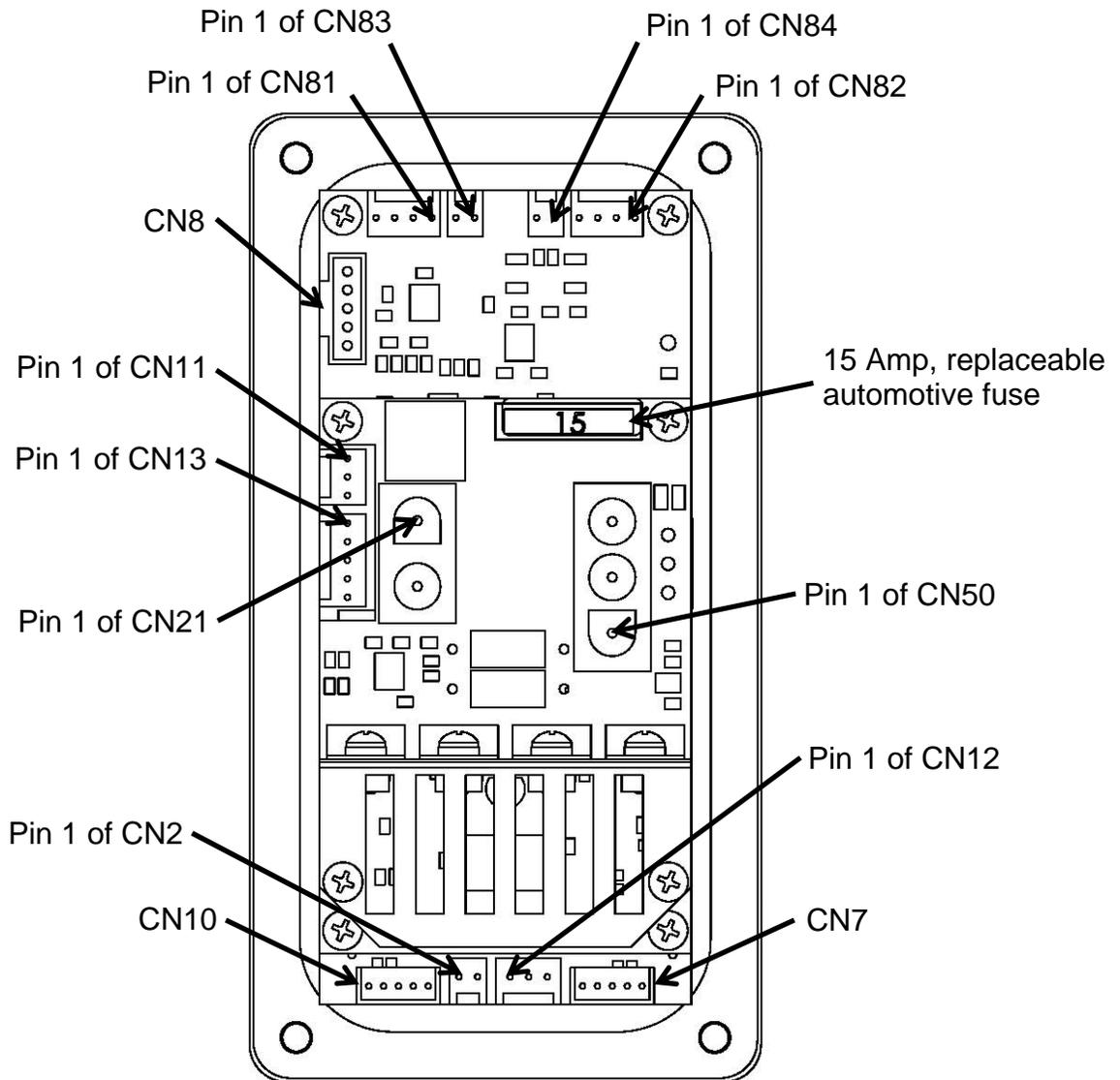
Variable/Parameter	A. 2	A. 3	A. 4	A. 5	A. 6
Value/Setting	32	72	49	-. .	Inc

Accurate calculations are preferred, however, a practical test whereby the distance of travel may be timed at full speed and then the distance divided by the time to give a value of full speed. Any inaccuracies in the calibration, all be it small, will magnify through accumulation over distance. For example, if the true full speed of a unit is 18.3125" per minute, and is calibrated to 18.0000" per minute, every time the control thinks that it has travelled 18", it would have, in fact travelled an extra 0.3125". Therefore, there would be a 3.125" [7.94mm] error on 180" [457.2mm] of theoretical travel.

STANDARD GULLCO PRODUCT SPEED CALIBRATION TABLE

PRODUCT	MAXIMUM SPEED	
	IMPERIAL	METRIC
KAT® CARRIAGES		
GK-200-RL	16.3625 "/MIN	41.5607 CM/MIN
GK-200-RM	32.7249 "/MIN	83.1213 CM/MIN
GK-200-RH	88.3573 "/MIN	224.428 CM/MIN
GK-200-RL C/W HI-SPEED GEAR TRAIN	43.6332 "/MIN	110.828 CM/MIN
GK-200-RM C/W HI-SPEED GEAR TRAIN	87.2665 "/MIN	221.657 CM/MIN
GK-200-RH C/W HI-SPEED GEAR TRAIN	235.619 "/MIN	598.473 CM/MIN
GK-200-RL C/W LOW-SPEED GEAR TRAIN	6.98132 "/MIN	17.7325 CM/MIN
GK-200-RM C/W LOW-SPEED GEAR TRAIN	13.9626 "/MIN	35.4654 CM/MIN
GK-200-RH C/W LOW-SPEED GEAR TRAIN	37.6991 "/MIN	95.7557 CM/MIN
GK-200-FL	25.7652 "/MIN	65.4436 CM/MIN
GK-200-FM	51.5304 "/MIN	130.887 CM/MIN
GK-200-FH	139.132 "/MIN	353.395 CM/MIN
MOGGY'S	IMPERIAL	METRIC
GM-03 Standard Moggy's	115.178 "/MIN	292.552 CM/MIN
GM-03 Magnetic Moggy's	54.0000 "/MIN	137.000 CM/MIN
SAM'S	IMPERIAL	METRIC
GM-02	66.1000 "/MIN	168.000 CM/MIN
KAMEL ROLLS	IMPERIAL	METRIC
KR-200-L	35.4302 "/MIN	89.9927 CM/MIN
KR-200-M	70.8604 "/MIN	179.985 CM/MIN
POSITIONERS	REVOLUTIONS PER MINUTE	
GP-250-M & GPP-250-M	4.62962 REV/MIN	
GP-250-H & GPP-250-H	12.5000 REV/MIN	

"GSP-2100" CIRCUIT BOARD DETAILS



Control Connection Details

Note: CN50 & CN21 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

CN21 - 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: CN11 to CN13 & CN81 to CN84 are Molex KK, 0.1" [2.54mm] series connectors, or equivalent spaced headers

CN11 - Tach Feed Back Connection

Pin 1 - Common

Pin 2 - Signal

Pin 3 - Sensor detection and current source

Note: Because the following connectors are effectively inputs/outputs, the particular program of the product/application specific program installed may use these ports for specific signals, other than their common use (described below).

CN12 - Auxiliary "Hold" (Stop) Port (Typical)

Pin 1 - Common

Pin 2 - "Hold" (Stop) (digital input active LOW)

Pin 3 - Port active recognition

Note:

When the "GSP" control is initially powered-up, it looks to see if pins 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.

CN13 - Limit Switch Monitoring Input (Typical)

Pin 1 - Common

Pin 2 - Reverse limit switch

Pin 3 - Center limit switch

Pin 4 - Forward limit switch

Pin 5 - Spare (not used)

Note:

Limit switches are to be wired in the "normally closed" configuration to allow normal use. When the "GSP" control is initially powered-up, it looks to see if either the forward or reverse limit switches are in closed circuit to common. If the control does not see either of pins 2 or 4 connected to common, it assumes that no limit switches are in use and will not look for further signals. **Therefore limit switches that are connected to the control after it has been powered-up will be ignored.** After the microprocessor has recognised that limit switches are being used, it will disable any travel in the relevant direction to that of an open circuit.

CN2 - Buzzer Output

Pin 1 - Common

Pin 2 - +12VDC

Note:

This output will be energized whenever the arc signal is on. An external buzzer can be connected (not supplied) and used as a warning indicator to others that the equipment is running. This connector may not be populated on some controls

CN8 – I²C Communication

For future use, may not be populated on some controls.

CN7 & CN10 – Factory Programming ports

These ports are used by the factory for programming and diagnostic purposes.

Logic Output Ports

CN81 - Relay Drive Output (Transistor Output)

Pin 1 - Common

Pin 2 - Spare (not used)

Pin 3 - Transistor collector out

Pin 4 - +12 V

Note:

This port is typically configured to activate whenever the arc signal is called for in the automatic cycle routine.

Pin 3 and Pin 4 are typically used to energize the coil of the optional auxiliary relay module, which is usually connected to the welding/cutting trigger signal.

CN83 - Optically Coupled Output Signal

Pin 1 - Emitter

Pin 2 - Collector

Note:

This port is typically configured to activate whenever the arc signal is called for in the automatic cycle routine (activated at the same time as CN81, providing an optically coupled output signal as an alternative to a transistorized output).

CN82 - Relay Drive Output (Transistor Output)

Pin 1 - Common
Pin 2 - Spare (not used)
Pin 3 - Transistor collector out
Pin 4 - +12 V

Note:

Depending upon the product/application specific micro-processor chip installed, this port, in conjunction with one of Gullco's optional auxiliary relay modules, may be used to activate such things as pneumatic solenoid valves, safety circuits, etc. that may be part of the automatic cycle routine.

Pin 3 and Pin 4 are typically used to energize the coil of an optional auxiliary relay module.

CN84 - Optically Coupled Output Signal

Pin 1 - Emitter
Pin 2 - Collector

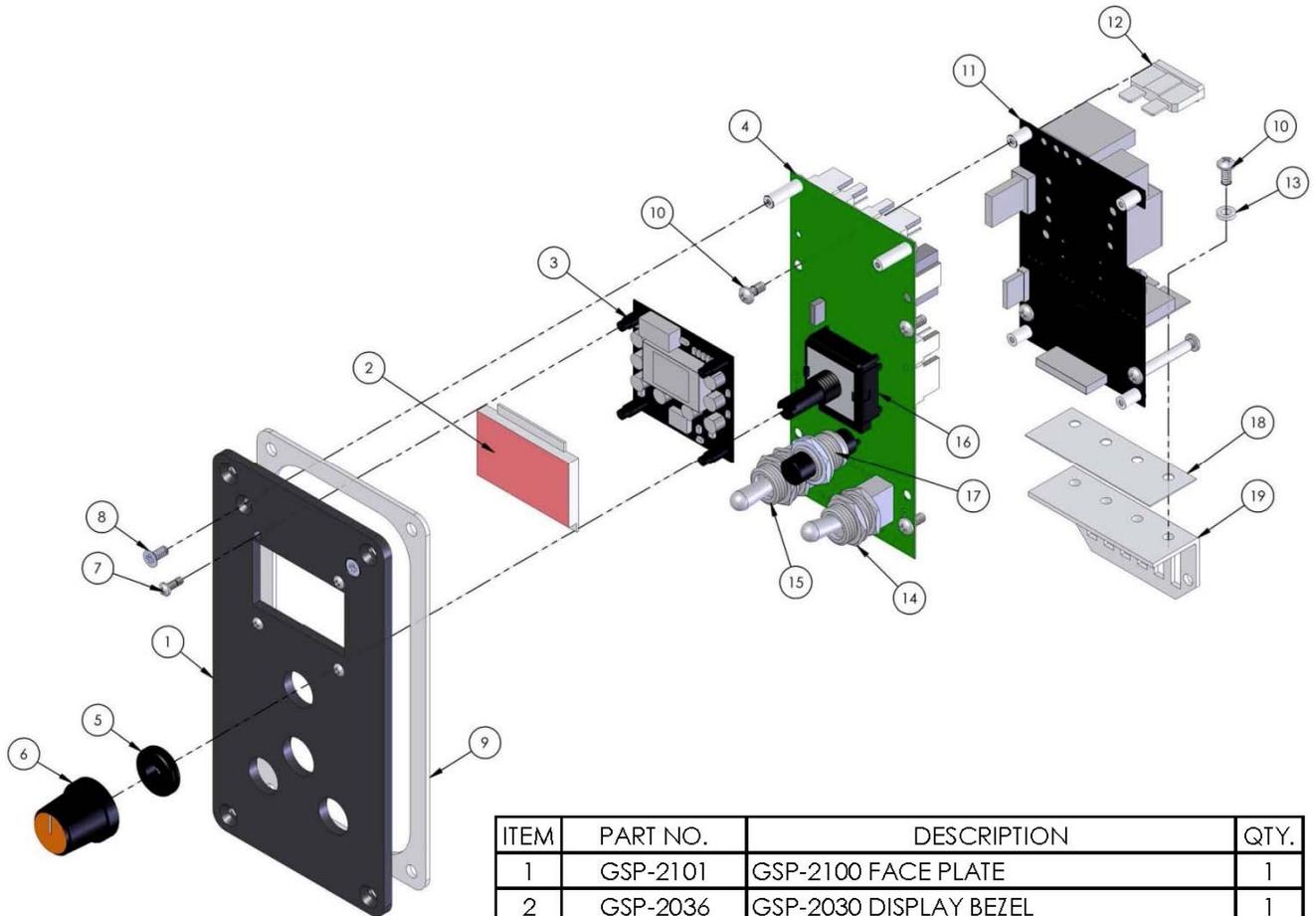
Note:

This port is typically configured to activate at the same time as CN82, providing an optically coupled output signal as an alternative to a transistorized output.

Caution:

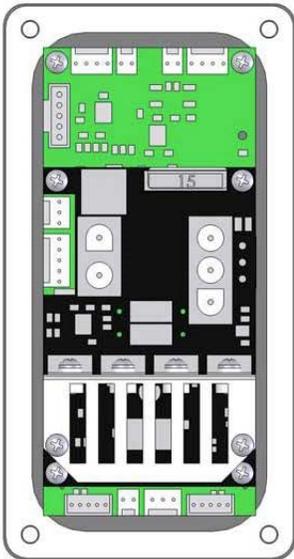
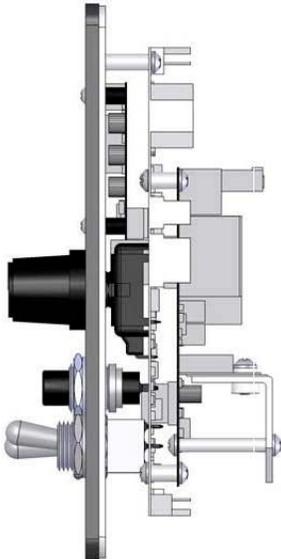
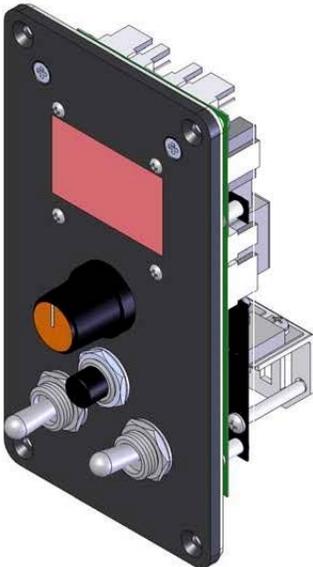
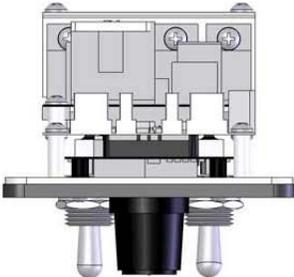
*Even though this control and its input and output ports have been designed to be as non destructible and as isolated and durable as possible, extreme radiated high frequency bombardment **may** cause a malfunction of the control. Gullco recommends that they be consulted in such instances.*

GSP-2100 CONTROL ASSEMBLY BREAKDOWN



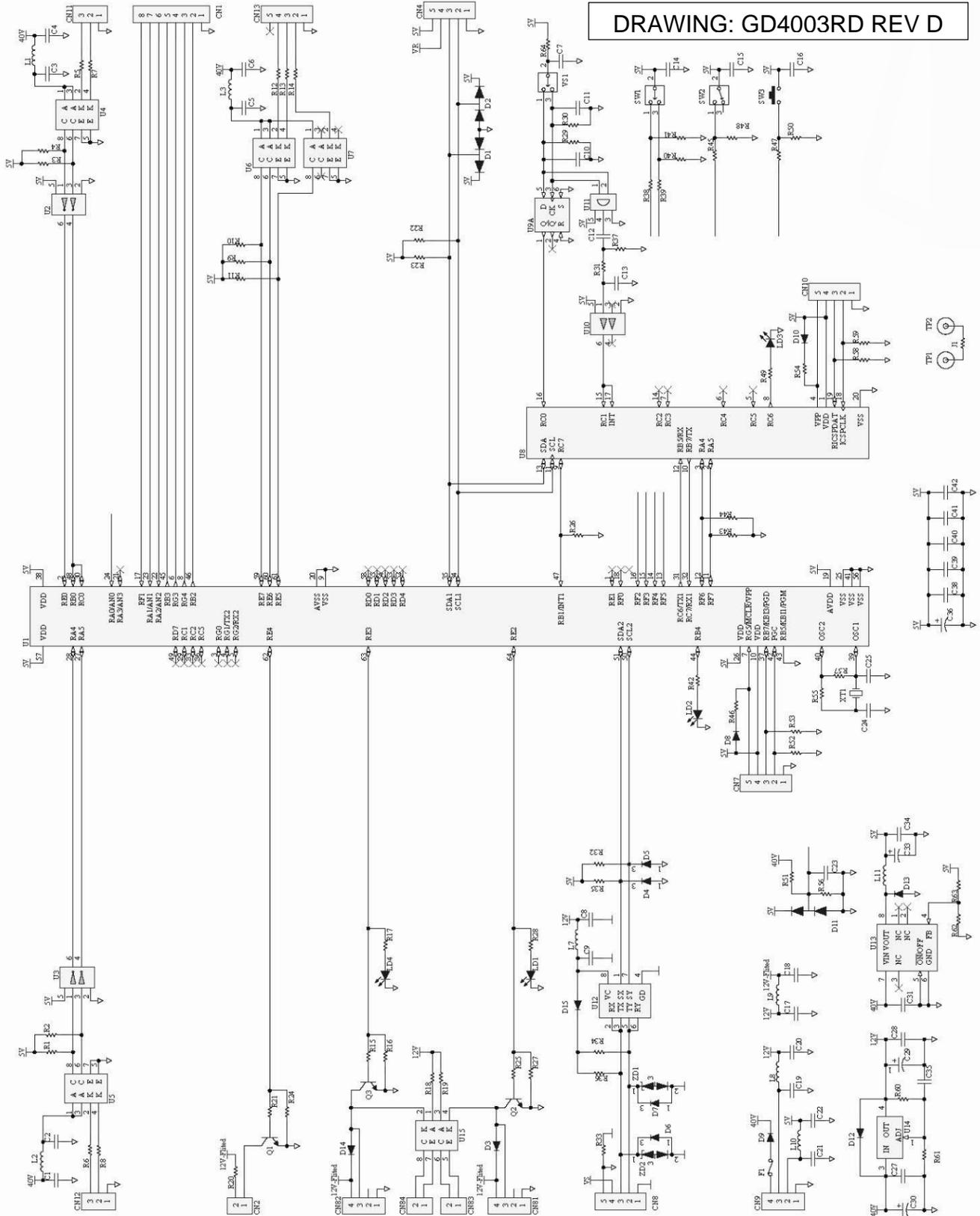
ITEM	PART NO.	DESCRIPTION	QTY.
1	GSP-2101	GSP-2100 FACE PLATE	1
2	GSP-2036	GSP-2030 DISPLAY BEZEL	1
3	GSP-4001	DISPLAY BOARD	1
4	GSP-4003	MOTHER BOARD (KEYPAD BOARD)	1
5	GK-151-004	GROMMET	1
6	GK-191-P-097	SPEED SELECTOR KNOB	1
7	GK-112-091	#2-56UNC x 1/4 RND HEAD SCREW	4
8	GK-141-013	#4-40UNC x 1/4 FHMS	2
9	GSP-2027	GSP FACEPLATE GASKET	1
10	GK-112-060	#4-40UNC x 1/4 RND HEAD SCREW	14
11	GSP-4002	DRIVER BOARD ASSEMBLY	1
12	GSP-2006	15 AMP FUSE	1
13	GK-156-120	GSP FET/HEATSINK BUSHING	4
14	GSP-2007	FORWARD/NEUTRAL/REVERSE SWITCH	1
15	GSP-2008	RUN/STOP SWITCH	1
16	GK-191-P-235	ROTARY SPEED ENCODER	1
17	GK-191-P-236	CYCLE PUSH BUTTON	1
18	GSP-2028	HEATSINK ISOLATION PAD	1
19	GSP-2024	GSP HEAT SINK	1

GSP-2100 CONTROL ASSEMBLY



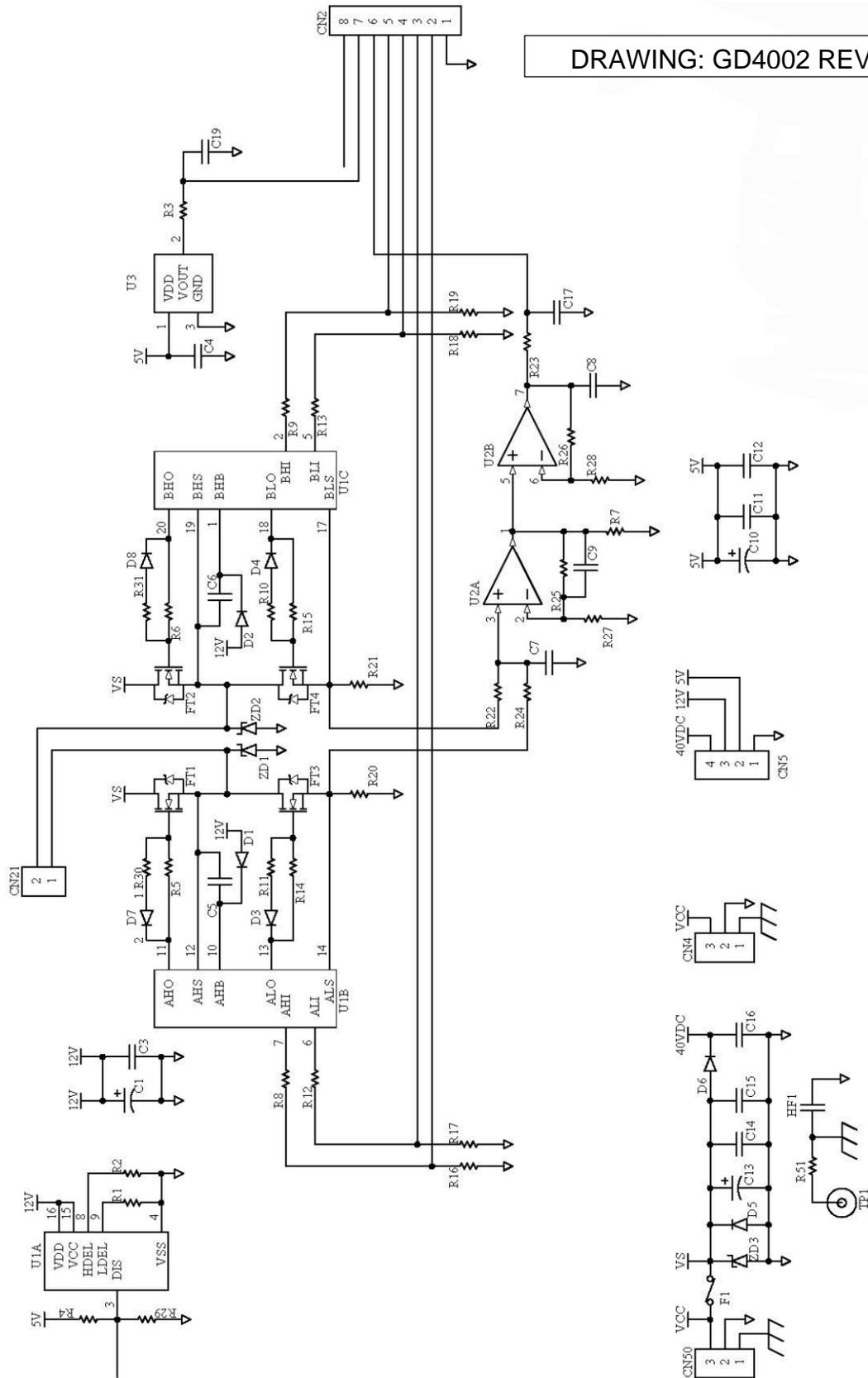
GSP-2100 MOTHER BOARD (KEYPAD BOARD) SCHEMATIC (GSP-4003)

DRAWING: GD4003RD REV D



GSP-2100 DRIVER BOARD SCHEMATIC (GSP-4002)

DRAWING: GD4002 REV D



REVISIONS LIST

March, 2014

Overall Manual release

June 4, 2015

T-19 to T21 Added circuit board schematics.

T-17 Corrected bill of materials, GSP-4001 (item 3) was GSP-2003.

February 14, 2016

T-12 Updated Kamel Roll part numbers on the Speed Calibration Table.

May 20, 2016

T-12 Included the Magnetic Moggy in the Speed Calibration Table.

ADDITIONAL NOTES

Specifications and products are subject to change without notice.

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Only use genuine/authorized replacement parts.



GULLCO



LINEAR or RADIAL
HIGH DEPOSIT RATE
QUICK SETUP TIME

KAT. 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®

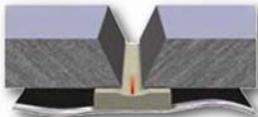
- Produce clean bevels with no thermal distortion
- Bevels angles 22° to 55° (other angles available)
- Hydraulic and Adjustable undercarriages available
- Bevels Mild Steel, Stainless Steel, and Aluminium
- Reduce cost and save time by minimising defects and poor fit up



ONE SIDED WELDING
X-RAY QUALITY BEADS
HIGH DEPOSIT RATE

KATBAK® 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® 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

