DIGITAL KNIGHT

FACTORY

Digital Controller Instructions

NOT FOR CUSTOMER USE

GEO KNIGHT CO INC

Internal Documentation ONLY

Table of Contents

Controller Connections

The Digital Knight controller has several different types of connectors for various purposes. Please note the diagram below for reference on the purpose and use of each connection.

- **Power supply board - Outside**

Auxiliary Relay terminals

Hot Power terminal (Black)

Press - heat platen - terminals

Neut Power terminal (White)

- **Power supply board - Inside**

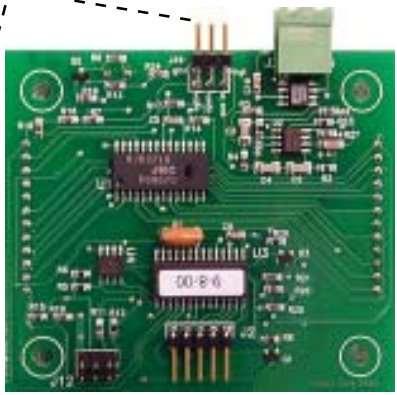
Power board to Processor board interface - female connector. This 6-pin interface supplies communication and power to and from the processor & power boards.

- **Processor board - Outside**

Thermocouple connector. When looking at the LCD display, the red t-couple wire (or white) is on the left, and the yellow (or white with red stripe) t-couple wire is on the right.

Controller Connections (cont.)

- **Processor board - Inside**



Timer / Height Gauge connector. The middle two pins are for the timer signal input. The left two pins are the ground and Height+ signal input from the height gauge, and the right upper pin is the Height- signal from the height gauge. The lower right pin is currently unused in the software.

Power board to Processor board interface - male connector. This 6-pin interface supplies communication and power to and from the processor & power boards.

Membrane keypad 5-pin input

220V Conversion

Conversion to 220/230/240 voltage is done entirely on the power board. The processor board can be used with a 110V or 220V power board without any changes made to it.

- On the INSIDE of the power board, there are 3 jumper positions marked 110VAC, 220VAC, 110VAC.

- For 110/115/120 VAC - attach red jumpers as shown.

- For 220/230/240 VAC - attach one red jumper to the middle connector, and remove the extra jumper.

ERR Msg and T-Couple safety

There are several conditions which will cause a safety shut down of the primary relay supplying power to the Press Terminals.

- If the thermocouple sensor signal is disconnected or interrupted for a short period of time the power to the Press Terminals will be shut off by the controller and **Err** will display. The controller must be shut down and restarted.
- If the thermocouple temperature sensor reading exceeds the maximum 560°F set point, the power to the Press Terminals will be shut off and **Err** will display.
- When the controller is first powered on, if there is no temperature sensor signal from the thermocouple or an open thermocouple circuit, **Err** will display.

Factory Calibration Menus

The Factory Calibration Menus of the controller are only accessible during the power-up countdown. To access the factory menus:

- Turn on the power to the controller.
- During the Countdown boot-up, hold the PRG and TEMP keys together.
- When the first menu appears - OFS, release the PRG & TEMP keys.
- Use the PRG Key to cycle from one menu item to the next.

Offset Temperature Calibration

The displayed current temperature can be offset by + or - 99°. Use the arrow keys to Add or Subtract a desired value to the Current Temperature display.

Due to the programming structure of the controller, the offset value will also offset all programmable presets and other stored temperatures. This means that any presets and set point temperatures will need to be set again.

When calibrating the temperature of the heat press platen to the displayed temperature, always set the offset to display the **highest** temperature read on the heat platen. For example, if the controller says 350°F as the current temperature, and the heat platen readings are 370, 365, 357, 361, etc, set the offset to +20.

Auxiliary Relay

The controller features an auxiliary relay output. This is the small Omron relay located above the transformer and the Song Chuang main heat relay. There are (2) .250" spade lugs for this relay circuit, labeled AUX OUT. The spade lugs simply close and open a circuit. Any low-amperage current may be run through the spade lugs, as these contacts are not powered.

There are three types of signals the auxiliary relay can be programmed to output.

- The heat signal, mimicking the on/off relay switching of the primary heat control relay. Use the UP arrow key to set the Auxiliary Relay to mimic the heat control on/off signal.

- The timer signal, mimicking the "TIMING" indicator on the LCD display. Whenever the controller is actually counting down the set timing cycle, the auxiliary relay will be closed. The auxiliary relay will be open at all other times. If the timing cycle is started, the relay will close. If the timing cycle is interrupted or finishes and the display shows "DONE", the relay will open back up. Use the DOWN arrow to set the Auxiliary Relay to mimic the timer signal.

- The alarm signal, mimicking the same patterns played by the on-board piezo buzzer. This is useful if a louder buzzer is needed, or an additional light or sound indicator is desired beyond the small piezo buzzer on-board. The auxiliary relay will close for the same duration that the piezo sounds, and will open when every the piezo does not sound. Keep in mind, because the auxiliary relay signal is not powered, separate low amperage 110V or 220V must be sent through the auxiliary relay to power the separate buzzer. Use the TEMP key to set the Auxiliary Relay to mimic the alarm/buzzer signal.

Timer Configuration

The timer menu allows for the configuration of the timing signal. To start the timer of the controller, a signal must be sent to the controller via mercury switch, lever switch, momentary switch, etc. The controller is able to process a normally open, normally closed, or partial momentary signal to start, stop, interrupt and reset the timing cycle.

- The **FULL** setting configures the controller to receive a normally open timer signal. This means that whenever the signal is open, the timing cycle is not counting, and the press is "OPEN". The moment the signal is closed, the timer begins counting down. The timer will continue counting down, and when finished, will display "DONE". When the switch is opened, the display will show "OPEN". Use the UP arrow to set FULL.

- The **FUL2** setting is the opposite of the FULL setting. FUL2 configures the controller to receive a normally closed timer signal. If the press starts counting down when the machine is open, and it stops counting down when the machine is closed (working backwards from what it should be), simply change the timer configuration to the opposite of its current setting. Use the UP arrow to set FUL2.

- The **PART** setting configures the controller to receive a momentary closure signal. This means that only a "Blip" of signal closure will start the timer, or interrupt and reset the timer. This is useful for automatic and push-button activated machines. The first closure begins the timing cycle. If the timing cycle is completed, it immediately resets back to the original timer setting, and awaits another closure. If a second signal closure is detected during the countdown then the timer will be interrupted and reset. There is a 2 second 'bounce' feature that disallows additional signal closures to confuse the controller and stop/start/stop the timer. Use the DOWN arrow to set PART.

Date / Serial Number

The Date and Serial Number information of the machine is stored in the controller. This provides a verification of the machines age and identity if the serial tag information is not available or the processor is separate from the machine. The date and serial number are locked and not changeable by the user. Do not provide the unlocking procedure to any user or reseller. This information is only available for Geo Knight staff.

- The **DTE** menu displays the month and year for the controller. The first two digits represent the month, and the second two digits represent the year in which the machine was shipped. In order to set the Serial Number or the Date codes, the unlocking procedure must be done at the DTE menu.

- To unlock the DTE menu:
  Press UP arrow, then PRG, then DOWN arrow, then PRG
  separately.

- The lower numbers will flash. Use the UP and DOWN arrows to change the month digits. Press PRG to switch to the year digits. Use UP and DOWN arrows to change the year digits.

- Press the PRG key again, and the **Sn** menu will appear. Use the UP and DOWN arrows to change the first two digits of the Serial Number. Press PRG again to switch to the last two digits of the Serial Number, and use the UP and DOWN arrow keys to change the values. Press PRG to lock in the settings.

Recorded Pressings

The controller will record the number of pressings throughout the life of the machine. The number of pressings is Not necessarily the number of times the press has been opened or closed. The 'odometer' value recorded in the controller is based on the number of *completed timing cycles* the press has performed. This provides a fair and conservative picture of the number of pressings the machine has performed throughout its lifetime (or throughout the lifetime of the machine with that particular controller in it).

This is useful for determining whether gas springs, silicone rubber, or other mechanical components are covered under warranty due to extreme use inside the typical warranty period. It is also helpful to get a good picture of the general volume of use on the machine.

- The **RCP** menu displays the number of complete pressing cycles performed. Because the number can display up to 9,999,999, the figure is scrolled across the screen, and separated by a "-" sign. The RCP menu is not editable, or resettable to zero.

Recorded Cycles

The controller will record the number of heating cycles throughout the life of the machine. A heating cycle is defined as a full closing and opening succession of the relay. To avoid a high volume of write operations to the EEPROM, the controller writes to the heating cycle 'odometer' every 20 cycles. For this reason, the odometer reading will be conservative, displaying lower than the "real life" wear and tear on the relay. This is due to the fact that it will not record the last set of cycles stored in memory if less than 20, when the machine is turned off. This results in a very fair and user-favorable age determination of the press.

- The **RCC** menu displays the number of complete heating cycles performed. Because the number can display up to 9,999,999, the figure is scrolled across the screen, and separated by a "-" sign. The RCC menu is not editable, or resettable to zero.

Top Temperature

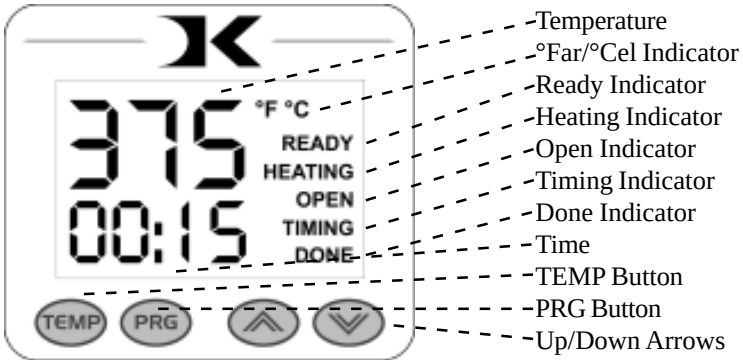
The Top Temperature limit sets a maximum temperature limit for the controller. This is useful if certain presses should not be allowed to exceed a certain temperature setting.

The default value for this setting will be 548 or similar. This will limit the set point temperature, as well as any prgrammable presets that are edited afterwards.

- The **tOPt** menu displays the temperature limit at the top, and the menu title at the bottom, opposite of all other menu items. Use the arrow keys to change the temperature to the desired Max Temp Limit ***minus one***. For example, for a maximum temperature limit of 400°F, set the **tOPt** value to 399.

Default Operating Mode

The ***Default Operating Mode*** of the controller is the mode in which Current temperature and Set time are displayed. From the default operating mode, the programmable presets and user options menus are accessible. The factory calibration menus are only accessible during the power-up countdown.



Setting Time

The time setting is always editable in the default operating mode of the controller. The left two digits of the time display are minutes. The right two digits are seconds. This can be changed to Hours/Minutes in the User Options Menu.

- Use the Up & Down arrow keys to change the time.
- Hold the Up or Down arrow key down to increment the values quickly. After a brief pause, the values will accelerate.
- Press the Up & Down arrow keys together to clear the setting to 00:00
- When the press is closed, the timing cycle starts. The “TIMING” indicator will appear.
- When the timing cycle is finished, the “DONE” indicator will appear.
- Depending on the timer alarm chosen, the alarm may continue to sound at the end of the timing cycle until the press is opened.
- When the press is opened up, the “OPEN” indicator will appear.

Setting Temperature

In the default operating mode of the controller, the displayed temperature is the **Current** temperature. This is the actual temperature of the heat platen surface. Please note that the operating range of the controller is from 150°F to 550°F (65°C to 288°C). During the first heat up cycle of the press, the controller will display 150°F (65°C) until the heat platen temperature rises above that temperature.

The **Set Point** temperature is the temperature the operator sets the press for. This is the value the press will regulate the **Current** temperature based on. The set point temperature may be changed whenever necessary:

- When in the default operating mode, press the TEMP button.
- The Current temperature will be replaced by the ***blinking*** Set Point temperature.
- Use the Up & Down arrow keys to change the Set Point temperature.
- Hold the Up or Down arrow key down to increment the values quickly. After a brief pause, the values will accelerate.
- Press the Up & Down arrow keys together to set the temperature to 350.
- When finished setting the temperature, press the TEMP button to return to the default operating mode.

- The control will regulate the heat platen temperature based on the set point temperature. When the temperature falls below the Set Point, the “HEATING” indicator will appear.
- When the temperature reaches the Set Point, the “HEATING” indicator will disappear and the “READY” indicator will appear.
- If the Set Point temperature is set to a temperature below the Current temperature, the press will wait to cool down to that Set Point. At that time, neither the “READY” or “HEATING” indicators will appear.

Programmable Presets

This feature is ideal for recalling previously saved settings from various different applications. The presets are extremely easy to use, and bring a powerful level of accuracy to heat transfer pressing.

For example, the user may have Setting 00 for Hot-Split T-Shirts. When the user needs to perform that particular application, they simply select Setting 00, and the Current temperature & time parameters are updated. A pressure reference is also displayed, telling the user what pressure to set the press to. The user can then rotate the pressure knob until the gauge displays the same value that was stored and displayed by the preset.

This allows the user to quickly change from one application to another with extreme accuracy. Over time, the user will save many different settings in the presets based on the best results for every application. When those presets are selected, the user is immediately returned to the proper settings, without time consuming experimentation and risk of unsuccessful applications.

- From the default operating mode, to select a preset, press PRG.
- Use the Up & Down arrow keys to select a preset (00 - 70).
- Press PRG to update the current settings and return to the default operating mode.

- To edit or add a new preset, select the preset to be added/updated.
- Press TEMP to cycle through Temperature, Time & Pressure values.
- The editable value will flash indicating it may be changed.
- Use the Up & Down arrow keys to change values. Pressing Up & Down together when editing the temperature value resets it to 350, and 00 for time.
- After setting the pressure value, pressing PRG again will bring the user back to the preset selection screen.
- The user may press PRG to update the current settings and return to the default operating mode, or select another preset for editing/adding.

User Options Menu

The user options menu is a set of features and calibration options that are programmable and adjustable by the user. It consists of a set of menu items that can be scrolled through. Each menu item is a feature whose values can be viewed and /or changed. To enter the user options menu:

- From the default operating mode, press the TEMP & PRG keys simultaneously.
- If the keys are not pressed exactly at the same time, you may enter the temperature edit mode, or the presets mode. Exit either of those modes and try again.
- To cycle from one menu item to the next, press PRG.

Fahrenheit / Celsius

The Current, Set Point, and Preset temperature values can be displayed in Fahrenheit or Celsius. To change the value to F or C, use the arrow keys. Press PRG to move to the next menu item.

Timer Counter

The timer displays as factory default Minutes:Seconds. This can be changed to Hours:Minutes. To change to value to HR (hours:mins) or MIN (mins:secs), use the arrow keys. Press PRG to move to the next menu item.

Recorded Pressings

The digital control records the number of pressing cycles completed. This can be very helpful when counting the number of full pressings that have been performed. The value will scroll from left to right. A "-" sign will separate the beginning and end of the number. To reset the count to Zero, press an arrow key. Press PRG to move to the next menu item.

Pressure / Height Gauge Calibration

The digital pressure/height gauge is calibrated from the factory to recognize the lowest and highest pressure points settable on the press. By defining the highest and lowest points of adjustment, the controller is then able to accurately calculate and display the current heat platen height & pressure as the operator turns the pressure knob.

It may become necessary to recalibrate the digital pressure/height gauge if the displayed values of 00 through 10:00 do not properly correspond to the lowest and highest pressure adjustment levels. This could happen if the stop collar is loosened to adjust the stopping position of the heat platen over the lower table. Other factors may also require the user to redefine the highest and lowest points of pressure adjustment to the controller.

This is done very easily through the following User Options Menu items:

Height Gauge - High Point

Turn the pressure knob to the left to raise the top head. Do this until the highest level is reached, without unscrewing the internal bolt from the main post. Press an arrow key to lock in that pressure value to PRH. The high point of the pressure/height gauge is now defined. Press PRG to move to the next menu item.

Height Gauge - Low Point

Turn the pressure knob to the right to lower the top head. Do this until the lowest level is reached. Press an arrow key to lock in that pressure value to PRL. The low point of the pressure/height gauge is now defined. Press PRG to move to the next menu item.

Drop Sense

A temperature alarm is available for warning the user of out-of-range temperature conditions. The user can set this menu item to sound an alarm if the heat platen drops below the Set Point temperature by the amount indicated. This can be helpful when pressing substrates that absorb an unusually large amount of heat, causing the platen to fall in temperature quickly. If the results of the transfer begin to deteriorate, the Drop Sense feature can help the user avoid this.

Use the arrow keys to set the degrees or to turn this feature off. If the Current temperature drops below the Set Point by this amount or more, an alarm will sound. The default value is OFF.

Beep

Normally, all buttons on the keypad beep when pressed. This can be turned off, so all button key-presses are silent. Use the arrow keys to turn this feature On or Off.

Alarms

There are 10 different alarms available to choose from. These alarms are sounded at the end of the timing cycle, as well as if the Drop Sense feature is enabled.

Use the arrow keys to change the values or to turn the alarm off. Please note the different alarms below.

• denotes a short beep.
_ denotes a longer beep.
~ denotes infinite loop.

Alarm #	**Alarm Pattern**
Off	No alarm
01	• • • _
02	• • • _ ~
03	• • _
04	• • _ ~
05	• • •
06	• • • ~
07	_ ~
08	_
09	•
10	• (shorter)

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