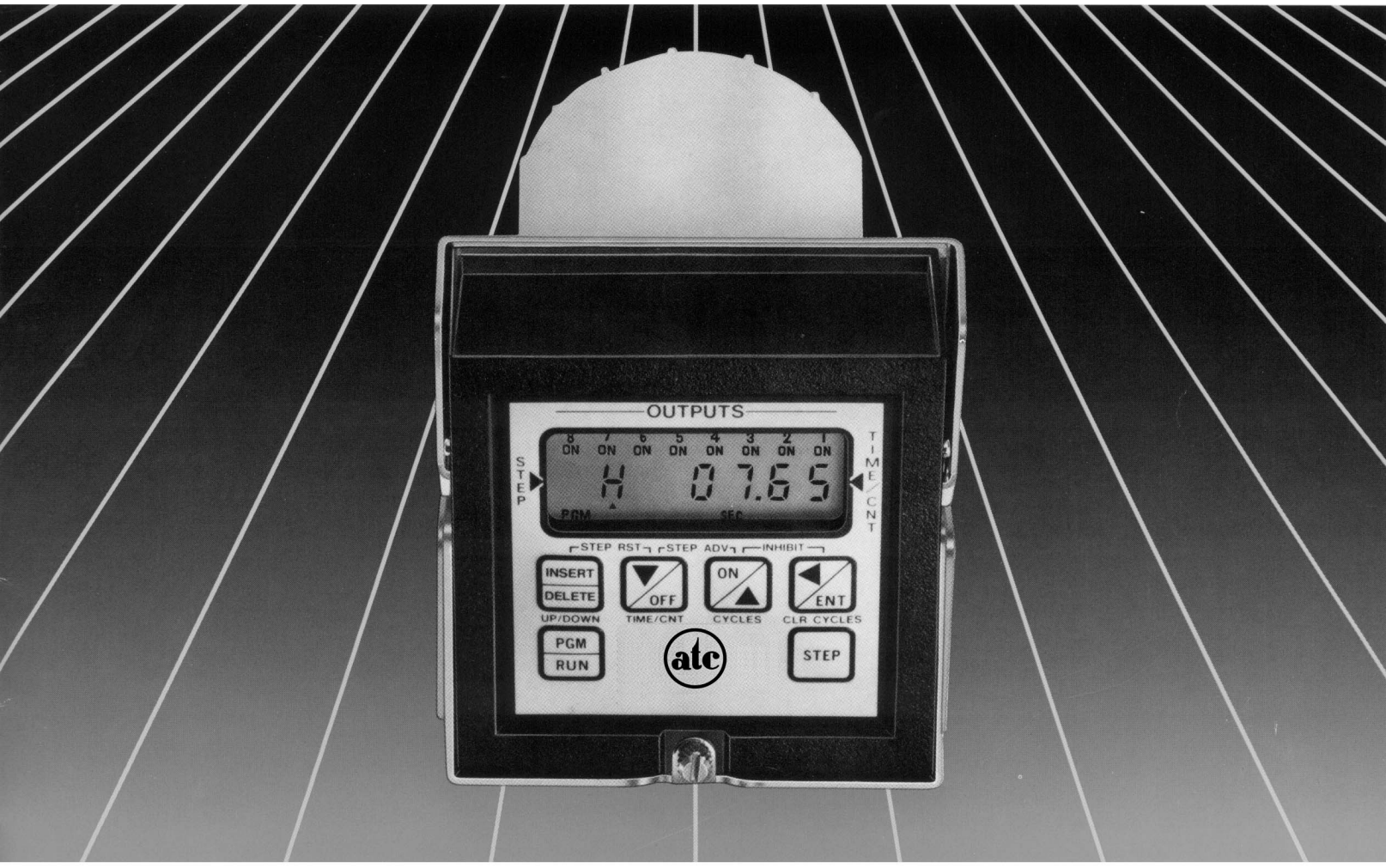
ATC
Model 765
Mini-Sequencer



AUTOMATIC
TIMING & CONTROLS

ATC Model 765 Mini-Sequencer

DESCRIPTION

The Model 765 is a microprocessor-based sequence controller with a digital LCD display. It contains 100 steps and has 8 programmable relay outputs. Step advance takes place on the basis of either time or count. Timing and counting steps can be intermixed as desired. For simple sequence applications, this product offers an alternative to Cam Timers or Micro PLC's for the user who requires a device that is EASY to program, FLEXIBLE to change and LOW in cost.

There are four timing ranges covering values from 0.01 sec. to 99 hr. 59 min., and selectable on a step basis. Counting can be performed at a maximum rate of either 500 or 5000 counts per minute. Programming is accomplished with an internal four-switch DIP assembly and the keypad on the front face. Programmed information is retained indefinitely in an EEProm chip without the use of a battery. Program security is maintained by a DIP switch setting and/or a keypad lockout command which allows the programmed sequence to be viewed but not changed.

A large, easy-to-read LCD readout displays the Step Number, Time or Count Value, Cycle Counter Value and Output Status. The keypad can be used to perform secondary functions such as step reset, step advance, time or count inhibit, viewing the cycle counter and clearing the cycle counter. There is an internal cycle counter which keeps a running total of the number of sequential cycles actually run. It can even be programmed to control the number of sequential cycles desired.

The Model 765 is housed in a standard 15-terminal plug-in round case. Two models are available for operation on either 120 VAC or 240 VAC. Counting can be done at either line voltage or at 12-48 VDC/24 VAC by proper placement of an internal jumper. With its sealed faceplate and membrane keypad, the Model 765 is designed to operate in harsh industrial environments. But with its low cost and flexibility, it is also well suited for quality control test applications and laboratory applications.

SPECIFICATIONS

NUMBER OF STEPS
100

TIMING RANGES
0.01 Sec. to 99.99 Sec.
0.1 Sec. to 999.9 Sec.
1 Sec to 99 Min. 59 Sec.
1 Min. to 99 Hr. 59 Min.

COUNT RANGE
9999

COUNT SPEEDS
500/Min. AC or DC
5000/Min. AC or DC

REPEAT ACCURACY
Count: 100%
Time: ± .01 Sec. Max.

DISPLAY
Type: LCD
Digit Size: 9/32"

MEMORY
EEProm

POWER AND CONTROL INPUT
Voltage: 120 or 240 VAC
Range: –20% to +10% of Nominal
Frequency: 50/60 Hz
Power Consumption: 3.2 VA

TIME-INHIBIT/COUNT INPUT
Line Voltage or 12-48 VDC/24 VAC

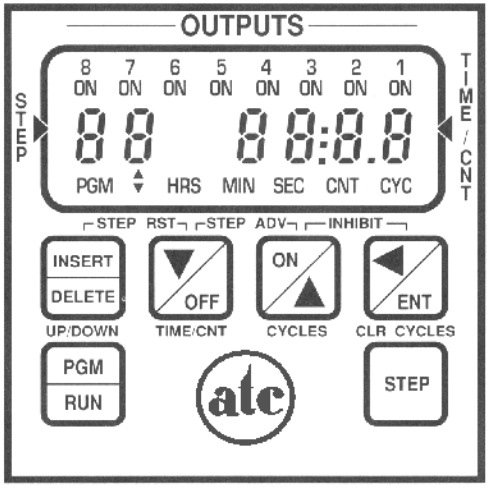
OUTPUT
Number: 8
Type: Relay Contacts, N.O.
Resistive Rating: 5 Amps Max., 250 Volts Max., 1250 VA Max.
Inductive Rating: 2 Amps Max., 250 Volts Max., 500 VA Max.
Mechanical Life: 50,000,000 Operations

TRANSIENT VOLTAGE PROTECTION
Metal Oxide Varistor

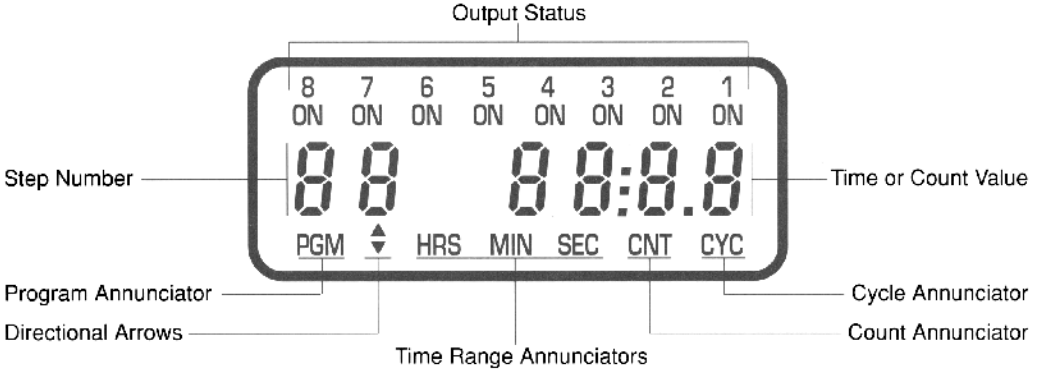
OPERATING TEMPERATURE
+32°F to +140°F (0°C to 60°C)

FRONT PANEL DESCRIPTION

The front panel consists of an LCD display and six membrane keys. The display provides an indication of step number, time or count value and output status when the unit is in the run mode, and provides programming information when the unit is in the program mode. The membrane keys provide input commands to generate the desired sequence in the program mode and provide input commands to intervene in the sequence in the run mode.



LCD DISPLAY



OUTPUT STATUS — Provides an indication of the "on" or "off" state of each output in both the program and run modes.

STEP NUMBER — Step number indication from "H" (Home) through "99".

TIME OR COUNT VALUE — Provides a four-digit indication of the programmed value in the program mode or the actual value in the run mode.

PROGRAM ANNUNCIATOR — Illuminated when unit is in the program mode.

DIRECTIONAL ARROWS — In the run mode, they provide an indication of the direction of timing or counting, i.e., from the setpoint to zero or from zero to the setpoint. In the program mode, they provide an indication of the direction of manual stepping with the STEP key.

TIME RANGE ANNUNCIATORS — In the run mode, they provide an indication of the time range being executed on each step. In the program mode, they provide an indication of the time range that has been or will be programmed. Note that the SEC annunciator when used by itself is associated with two different time ranges depending on the position of the decimal point.

COUNT ANNUNCIATOR — Illuminated in both the program and run modes when step advance is to take place on the basis of a count value.

CYCLE ANNUNCIATOR — Illuminated in both the program and run modes when the value of the cycle counter is being displayed.

PRIMARY KEYPAD FUNCTIONS

PROGRAM/RUN KEY — Pressing this key alternates between the program and run modes.

STEP KEY — Operates in the PROGRAM MODE only. Pressing this key moves bi-directionally to the next adjacent step. When the STEP key is pressed simultaneously with an UP ARROW/ON or DOWN ARROW/OFF key, the direction of stepping can be changed.

INSERT/DELETE KEY — This key is used in the PROGRAM MODE to insert a new step at the step number shown on the display, or to delete the step shown on the display. When inserting or deleting a step from an existing sequence, all other steps will be automatically renumbered accordingly.

DOWN ARROW/OFF KEY — This key is used in the PROGRAM MODE to: 1) scroll through the time ranges or count function if one of these annunciators is flashing, 2) decrement a time or count value digit that is flashing, or 3) turn off an output whose number is flashing and is presently programmed to be on.

UP ARROW/ON KEY — This key is used in the PROGRAM MODE to: 1) scroll through the time ranges or count function if one of these annunciators is flashing, 2) increment a time or count value digit that is flashing or 3) turn on an output whose number is flashing and is presently programmed to be off.

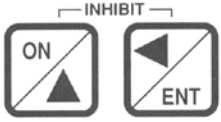
LEFT ARROW/ENTER KEY — This key is used in the PROGRAM MODE to move from right to left through the four time or count value digits and the eight outputs. It is also used in both the program and run modes to provide an affirmative answer to those commands which require a confirmation.

SECONDARY KEYPAD FUNCTIONS

STEP RESET — Simultaneous pressing these two keys in the RUN MODE will cause the time or count value of the step being executed to be reset back to the programmed set-point. Before reset actually takes place, the prompt "rSt?" will appear on the display requiring a confirmation. The LEFT ARROW/ENTER key must now be pressed. The command may be cancelled by pressing any key other than LEFT ARROW/ENTER, or by not pressing any key for 10 seconds, after which the command is automatically cancelled.

SECONDARY KEYPAD FUNCTIONS (Cont.)

STEP ADVANCE — Simultaneous pressing these two keys in the RUN MODE will cause immediate time out or countdown of the step being executed and advance to the next step. Before advance actually takes place, the prompt "Ad?" will appear on the display requiring a confirmation. The LEFT ARROW/ENTER key must now be pressed. The command may be cancelled by pressing any key other than LEFT ARROW/ENTER, or by not pressing any key for 10 seconds, after which the command is automatically cancelled.



INHIBIT — Simultaneous pressing these two keys in the RUN MODE will "freeze" the current time or count value and not allow additional timing or counting to take place. Before the inhibit actually takes effect, the prompt "inh?" will appear on the display requiring a confirmation. The LEFT ARROW/ENTER key must now be pressed. The command may be cancelled by pressing any key other than LEFT ARROW/ENTER, or by not pressing any key for 10 seconds, after which the command is automatically cancelled. To cancel the inhibit function after it is in effect, simply press the same two keys again. The display will show the prompt "run?" requiring that the LEFT ARROW/ENTER key now be pressed.

UP/DOWN

UP/DOWN — Pressing this key in the RUN MODE will change the display direction from showing time/count remaining (decrementing from the setpoint to 0) to showing the accumulated time/count value (incrementing from 0 to the setpoint). The up or down arrow will be illuminated to indicate the display direction. No confirmation is required for this command since only the display is affected. The display direction may be individually set for timed steps, count steps, and the cycle counter when the number of cycles is being controlled. When changing the display direction on a timed step, all other timed steps will be affected. When changing the display direction on a count step, all other count steps will be affected.

CYCLES

CYCLES — Momentarily pressing this key in the RUN MODE will cause the cycle count value to be shown on the display for 10 seconds. The actual cycle count number and the CYC annunciator will alternate with the letters CYCL and CNT annunciator on the display for 10 seconds. If the CYCLES key is pressed and held down for 5 seconds or longer, the cycle count will be displayed indefinitely until the TIME/CNT key is pressed.

TIME/CNT

TIME/COUNT — Momentarily pressing this key in the RUN MODE will change the display from showing the cycle count value to showing the time or count value.

CLR CYCLES

CLEAR CYCLES — Pressing this key in the RUN MODE will clear the accumulated value in the cycle counter. Before the cycle counter is actually cleared, the prompt "Clr?" will appear on the display requiring a confirmation. The LEFT ARROW/ENTER key must now be pressed. The command may be cancelled by pressing any other key other than LEFT ARROW/ENTER, or by not pressing any key for 10 seconds, after which the command is automatically cancelled.

KEYPAD LOCK-OUT — Simultaneous pressing these two keys in the RUN MODE will lock the keypad. With the keypad locked, all programmed information can be viewed in the program mode but cannot be changed. When viewing information in the program mode with the keypad locked, the display will alternate the time or count setpoint value with the words Loc P. Secondary keypad functions of Step Reset, Step Advance, Inhibit and Clear Cycles cannot be performed with the keypad locked. The keypad lock-out may be turned off by pressing these same two keys in the RUN MODE.

DIP SWITCH SETTINGS

Figure 1 shows the location of the four-switch DIP assembly. In the charts below, an X under a particular switch number indicates that the switch is to be on; an O indicates the switch is to be off. A switch placed in the on position is closed, while a switch placed in the off position is open.

COUNT INPUT RATE

Switch 1 determines the maximum count rate. Always use the slower count rate if the application permits. The slower count rate provides the greatest noise rejection.

Sw 1	Count Input Rate
O	Count – 500/Min AC/DC
X	Count – 5000/Min AC/DC

COUNT/TIME – INHIBIT SETTING

Switch 2 allows the count/time inhibit input to be active either on the application or removal of voltage.

Sw 2	Count/Time-Inhibit Operation
O	Counts rising edge – Time inhibited when on.
X	Counts falling edge – Time inhibited when off.

STANDARD OR REVERSE START

Switch 3 allows the unit to run with either the application or removal of voltage at the control terminal. If Standard Start is selected, the unit will run with the application of voltage at the control terminal and will reset when voltage is removed. With Reverse Start, the unit will run with the removal of voltage at the control terminal and will reset when voltage is applied. When programmed for Reverse Start, voltage must first be applied to the control terminal and then removed in order for the unit to run. If power is lost while running a sequence in the Reverse Start mode, the unit will "remember" the step number and time or count value and will begin running from this point when power is reapplied.

Sw 3	Standard or Reverse Start
O	Standard Start
X	Reverse Start

KEYPAD LOCKOUT

Switch 4 allows the user to select a hardware lockout of the keypad. When it is in effect, it functions exactly like the keypad lockout previously described that was invoked through the keypad. The only difference is that the message on the display now shows the words Loc S which means that the keypad is locked from the switch rather than Loc P which means that the keypad is locked from the front panel. If the keypad is locked from both sources, the message will read Loc B. Note: Switch 4 should not be placed in the on position until the complete desired sequence has been programmed.

Sw 4	Keypad Lockout
O	Keypad Lockout Off
X	Keypad Lockout On

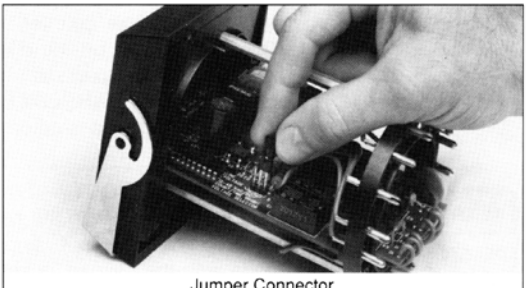
COUNT/TIME INHIBIT VOLTAGE SELECTOR

Figure 2 shows a jumper labeled JP1 which allows the user to select the operating voltage of the count/time – inhibit input. In the position labeled "line voltage", the input will work on the same voltage as the control input (120 VAC or 240 VAC depending on the model). In the other position, the input will accept voltages in the range 12-48 VDC/24 VAC.

CAUTION: Do not apply line voltage to the count/time – inhibit input if the jumper is set in the low-voltage position.

DIP Switch Assembly

Figure 1



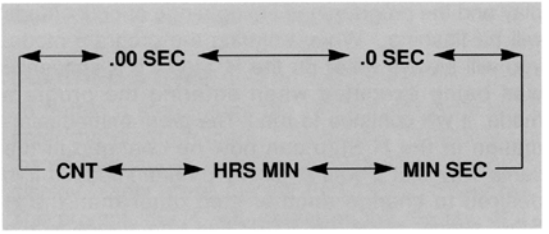
Jumper Connector.
Place connector on front two pins for line voltage operation.
Place connector on rear two pins for low voltage operation.

Figure 2

ENTERING A NEW SEQUENCE

Whenever the 765 is in an unprogrammed condition, the display will show the H step and four dashes. This will occur when the unit is powered up for the first time or after the user memory has been erased.

To enter the program mode, press the PROGRAM/RUN key. The PGM annunciator will now be illuminated on the display and one of the timing ranges or the count mode will be flashing. The desired timing range or count mode must now be selected for the H step. The choices can be viewed by pressing either the DOWN ARROW/OFF key or the UP ARROW/ON key. Either key will scroll through the menu but will scroll in the opposite direction. The five choices available in the menu are as follows:

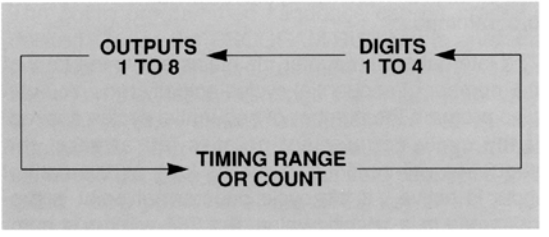


When the desired timing range or count mode is shown on the display, press the LEFT ARROW/ ENTER key. This will enter the desired timing range or count mode into memory and cause the right digit to flash indicating that its value can now be changed. Use the DOWN ARROW/OFF or UP ARROW/ON key to change the value of this digit. This value will roll over from 9 to 0 or from 0 to 9, depending on which key is used. When the desired value is shown on the display, press the LEFT ARROW/ENTER key. This will enter the desired value into memory and cause the next digit to the left to flash.

The remaining three digits are programmed in a manner similar to the first. Note that when the time range is programmed for HRS MIN or MIN SEC, the digit to the right of the colon will roll over between 0 and 5. If the value of a digit does not require changing, simply press the LEFT ARROW/ENTER key to advance to the next digit. Depressing the DOWN ARROW/OFF or UP ARROW/ON key for longer than one second will cause continuous incrementing or decrementing of the digit until the key is released.

When the last digit is programmed and the LEFT ARROW/ENTER key has been pressed, Output 1 will begin flashing indicating that it now can be programmed. This output can be programmed to be either on or off by using the UP ARROW/ON and DOWN ARROW/OFF keys. When programmed to be on, the word ON will appear under the number. When programmed to be off, the area under the output number will be blank. When the desired output status is indicated on the display, press the LEFT ARROW/ENTER key. This will enter this desired output status into memory and cause the next output number to flash.

The remaining outputs are programmed in a manner similar to the first. If the status of an output does not require changing, simply press the LEFT ARROW/ENTER key to advance to the next output. When Output 8 has been programmed and the LEFT ARROW/ENTER key has been pressed, the programmed timing range or count mode will begin flashing. Additional changes and/or corrections can now be made. By using the LEFT ARROW/ENTER key, you can scroll through the programmed timing range or count mode, the four digits and the eight outputs as follows:



If all programmed information for this step is as desired, press the STEP key. This will enter all programmed information into permanent memory and advance the unit to the next step. Prior to pressing the STEP key, all programmed information was stored in a temporary memory. This prevents the execution of partial information. When all programming for that step is complete and the STEP key is pressed, all programmed information for that step is transferred from the temporary memory to the permanent memory where it can be executed.

Programming of this next step and all additional steps is performed in exactly the same manner as the first step. It is not necessary to advance through all of the outputs when programming a step. It is only necessary to advance through those outputs that require a status change. For example, if a step requires that Outputs 1 and 2 be turned on, after programming Output 2 to the "on state", the STEP key can be pressed which will then enter all programmed information for that step into permanent memory and advance to the next step.

The programmed timing range or count mode is automatically carried over to the next step where it can be left as is or changed as desired. This helps to reduce the number of key entries required when the sequence utilizes mainly one timing range. For example, if the displayed timing range does not require changing, simply press the LEFT ARROW/ENTER key to advance to programming of the set point.

When the last step of the desired sequence has been programmed, simply enter all zeros for the set point of the next step and press the STEP key. Because a step with all zeros for the set point cannot be executed, the 765 recognizes that the previous step was the last legitimate step of the desired sequence. When the STEP key is pressed, the CYC annunciator will be illuminated and the right digit will be flashing, indicating that the internal cycle counter can now be programmed.

The internal cycle counter maintains a running total of the number of sequential cycles actually run. You can also program the number of sequential cycles desired. If the cycle counter set point is left at zero, the sequence will continue to run as long as the control input is active. If the cycle counter set point is programmed to a specific value, the 765 will run a number of sequential cycles equal to that number and then stop. The word End will then appear on the display.

The cycle counter set point is programmed similarly to a time or count set point. As previously mentioned, the right digit will be flashing, indicating that its value can now be changed. Use the DOWN ARROW/OFF or UP ARROW/ON key to change the value of this digit. When the desired value is shown on the display, press the LEFT ARROW/ENTER key. This will enter this desired value into memory and cause the next digit to flash. Similarly, program the other three digits if desired. After programming the fourth digit, the first digit will again flash, allowing a change to be made if desired. When the desired set point for the cycle counter is displayed, you can press the STEP key to again view the H Step or you can press the PROGRAM/RUN key to exit the program mode. All programming for the desired sequence is now complete.

CHANGING AN EXISTING SEQUENCE

An existing sequence can be changed at any time, even while the existing sequence is being executed. To change an existing sequence, press the PROGRAM/RUN key to enter the program mode. The PGM annunciator will now be illuminated on the display and the programmed timing range or count mode will be flashing. When entering the program mode, you will always enter on the H Step. If a sequence was being executed when entering the program mode, it will continue to run. The programmed information in the H Step can now be changed in the same way that it was originally programmed. If it is desired to change another step other than the H Step, simply press the STEP key to advance to the desired step. You can change the direction of stepping by simultaneously pressing the STEP key and the DOWN ARROW/OFF key or the UP ARROW/ON key. The directional arrows will also change accordingly to display the correct direction of stepping. This is very useful if you have a very long sequence and it is desired to change a step close to the end of the sequence. By reversing the direction of stepping, you can step from H to 99 to 98 etc. If power is removed and reapplied to the unit, the direction of stepping will always default to stepping forward. It will also default to stepping forward when the program mode is exited and re-entered.

If the step that is being changed is also currently being executed, the new programmed information will be picked up the next time that the step is executed. If it is desired to pick up this new programmed information immediately, simply use the secondary keypad function of STEP RESET. When all desired changes have been made, press the PROGRAM/RUN key to exit the program mode.

INSERTING A STEP

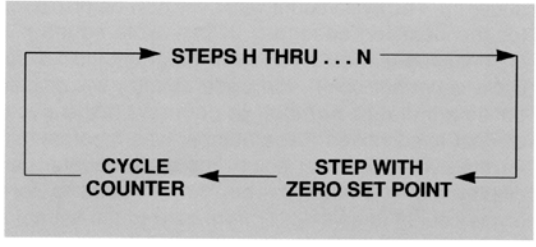
A new step can be inserted or an existing step can be deleted from an existing sequence. To insert a new step, press the PROGRAM/RUN key to enter the program mode. Press the STEP key until the desired step number to be inserted appears on the display. Now press the INSERT/DELETE key. The prompt "inS?" will appear on the display. If it is desired to insert a new step, press the LEFT ARROW/ENTER key. The step shown on the display and all subsequent steps will have their step numbers automatically increased by one. The programmed information for the old step will disappear from the display allowing new information to be programmed for this new step. This new step is now programmed as previously described on page seven. Upon completion, the PROGRAM/RUN key can be pressed to exit the program mode or you can remain in the program mode to make other changes as required.

DELETING A STEP

To delete a step, press the PROGRAM/RUN key to enter the program mode. Press the STEP key until the desired step number to be deleted appears on the display. Now press the INSERT/DELETE key twice The prompt "dEL?" will appear on the display. If it is desired to delete this step, press the LEFT ARROW/ENTER key. The step shown on the display will be deleted and all subsequent steps will have their step numbers automatically decreased by one. Upon completion, the PROGRAM/RUN key can be pressed to exit the program mode or you can remain in the program mode to make other changes as required.

VIEWING A PROGRAMMED SEQUENCE

The programmed sequence can be viewed at any time, even while the sequence is been executed. Press the PROGRAM/RUN key to enter the program mode. The H Step will be shown on the display. Press the STEP key to advance through the programmed sequence. After the last step of the programmed sequence is displayed, pressing the STEP key will then display the step number that was entered with all zeros as the set point indicating the end of the sequence. Pressing the STEP key again will display the programmed Cycle Counter set point. When the STEP key is now pressed, the H Step will again be displayed. Pressing of the STEP key will scroll through the programmed sequence as follows:



When viewing of the programmed sequence is complete, press the PROGRAM/RUN key to exit the program mode. If the programmed sequence was being executed when entering the program mode, it will continue to execute undisturbed while the sequence is being viewed.

ERASING THE PROGRAMMED SEQUENCE

The entire programmed sequence can be erased if desired. Press the PROGRAM/RUN key to enter the program mode. The programmed H Step will now be shown on the display. Change the programmed time or count set point digits to all zeros. The 765 will recognize this as a desire to erase the programmed sequence because a set point of zero cannot be executed. Now press either the STEP key or the PROGRAM/RUN key. Before actually erasing the programmed sequence, a prompt of "Pg Clr?" will appear on the display. If it is really desired to erase the programmed sequence, press the LEFT ARROW/ENTER key. The entire programmed sequence will be erased and the display will now show the H Step and four dashes indicating the unprogrammed condition.

CYCLE COUNTER FUNCTIONS

VIEWING THE CYCLE COUNTER

As previously mentioned, the 765 contains an internal cycle counter which maintains a running total of the number of sequential cycles actually run. This cycle counter can be viewed in the run mode at any time without disturbing the execution of the sequence. Simply press the UP ARROW/ON key to view the cycle counter (this key has the word CYCLES printed under it). The cycle count value will now be displayed for the next ten seconds. If the cycle counter is uncontrolled (i.e. all zeros were programmed for the cycle count set point), the cycle counter will display an accumulated number of counts. If the cycle counter is controlled (i.e. a number was programmed for the cycle count set point), the cycle counter can display either a number from the set point to zero (cycle counts remaining) or from zero to the set point (cycle counts accumulated). When viewing the cycle counter in the controlled mode, simply press the INSERT/DELETE key (this key has the words UP/DOWN printed under it). This will change the display between cycle counts remaining and cycle counts accumulated. The directional arrow on the display will also change.

The cycle count value will be displayed for ten seconds, after which the display will revert back to the time or count value. If desired, the cycle count value can be displayed indefinitely by depressing the UP ARROW/ON Key for 5 seconds. The display will now continuously show the cycle count value. To change the display back to the time or count value, press the DOWN ARROW/OFF key (this key has the words TIME/CNT printed under it). The display will revert back to the time or count value.

CLEARING THE CYCLE COUNTER

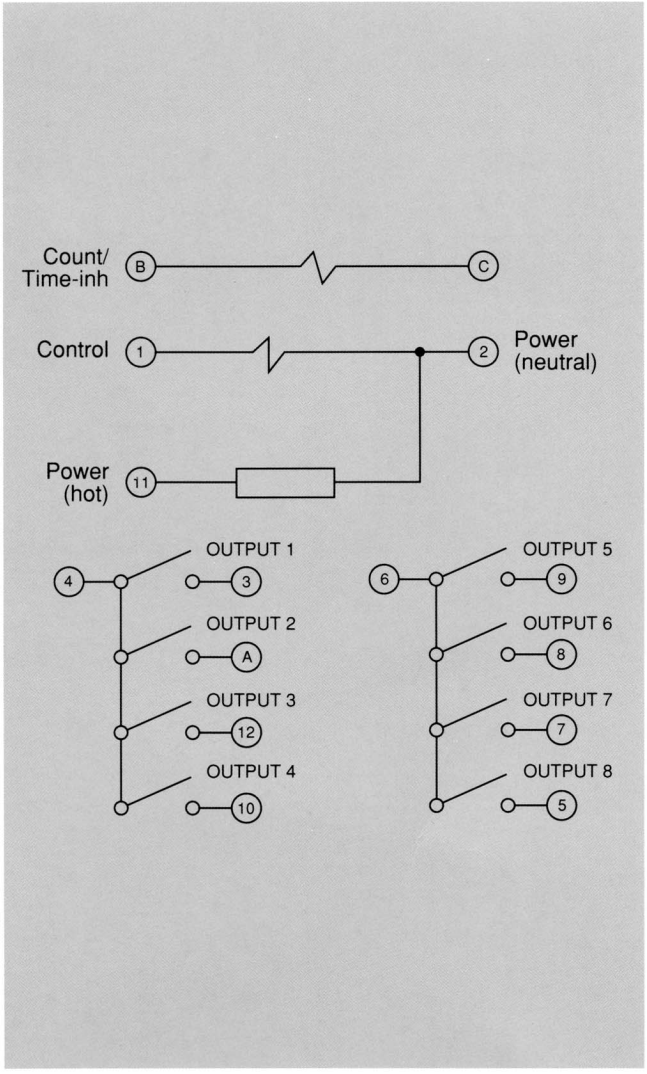
If the cycle counter is operated in the uncontrolled mode (i.e., all zeros were programmed for the cycle count set point), it will continue to accumulate a total count of the number of sequential cycles actually run unless it is reset through the keypad. To clear the cycle counter, press the LEFT ARROW/ENTER key (this key has the words CLR CYCLES printed under it). The prompt “Clr?” will appear on the display. Press the LEFT ARROW/ENTER key again. The total in the cycle counter is cleared and it will begin counting again from zero.

If the cycle counter is operated in the controlled mode, it will automatically be cleared every time the control input is reset. If it is desired to manually clear it, follow the procedure outlined above for clearing the cycle counter.

MAINTENANCE

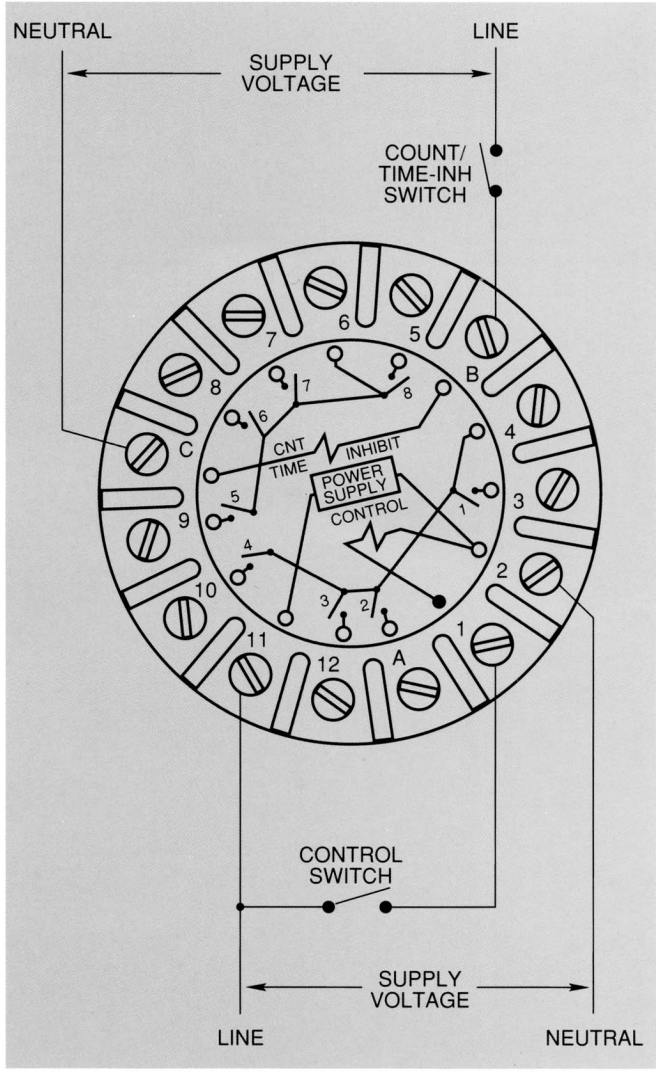
The only user replaceable item in the 765 is the fuse located on the main power board. This fuse is identified as F1. The value of this fuse is 1/8 amp on 120 volt models and 1/16 amp on 240 volt models. Contact the Tenor Company for replacement fuses.

INTERNAL SCHEMATIC



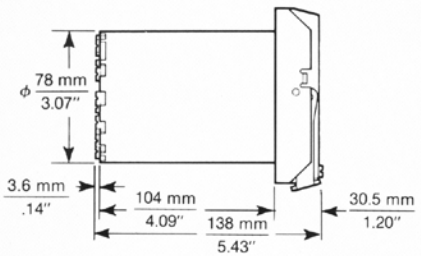
NOTE: THE TOTAL CURRENT THROUGH EACH GROUP OF FOUR OUTPUTS CANNOT EXCEED 10 AMPS.

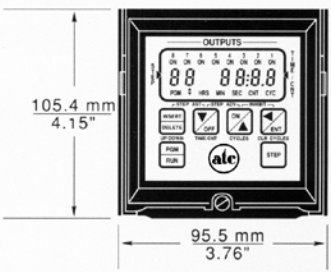
WIRING CONNECTIONS



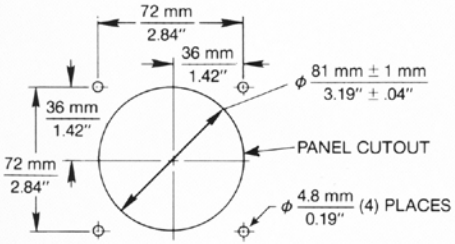
NOTE: IT IS MANDATORY THAT THE METAL BRACKET ON THE FRONT OF THE CASE BE CONNECTED TO EARTH GROUND. MOUNTING THE 765 IN A GROUNDED METAL PANEL IS SATISFACTORY.

EXTERNAL DIMENSIONS

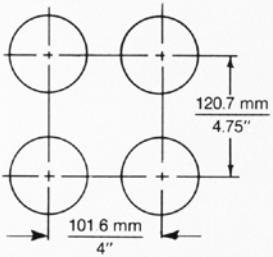




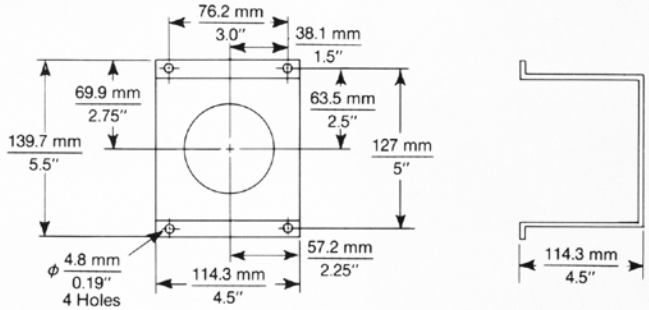
MOUNTING DIMENSIONS



MINIMUM DIMENSIONS – MULTIPLE MOUNTINGS



MODEL 600-3-3950 SURFACE MOUNTING BRACKET



ORDERING INFORMATION

Mini-Sequencer 120 VAC	765-8-1000
Mini-Sequencer 240 VAC	765-8-1001
Gasket (1/8" thick)	651-3-0128
Gasket (1/4" thick)	651-3-0129

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