

MODELS 763-7-0130-01 763-7-0130-02 SECTION 3

TIME/COUNT MODULE

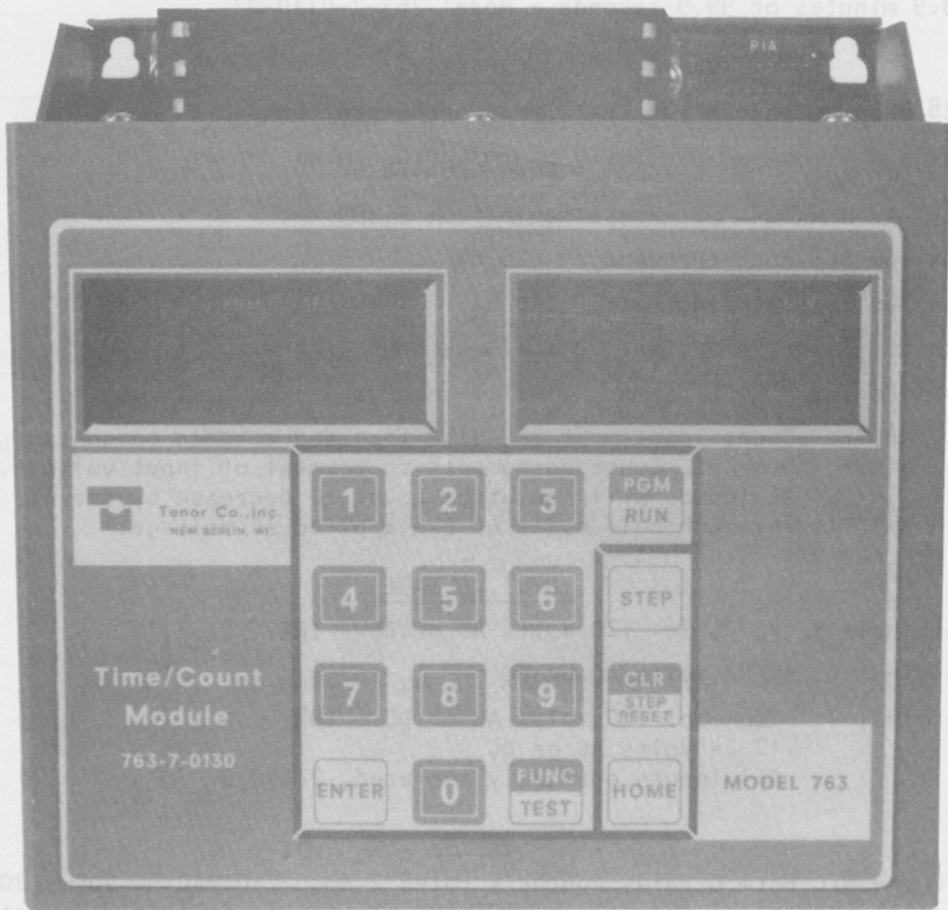
763-7-0130-01  
763-7-0130-02

Main Power: 120 VAC ± 10% 50/60 Hz  
Fusing: Internal - 3AG, 1/2 Amp, 250 V, slow-blow  
Operating Temperature Range: 0° - 60° C

Wire Termination: Screw terminals with self-lifting captive pressure pads. Will accept two (2) #12 AWG wires.

TIME RANGES

99 hours, 59 minutes or 99 minutes, 59 seconds - Model 763-7-0130-01



### 3.0 TIME/COUNT MODULE ELECTRICAL SPECIFICATIONS

MODELS 763-7-0130-01 and 763-7-0130-02

#### GENERAL

Main Power: 120 VAC  $\pm$  10% 50/60 Hz, 0.4 Amp Max  
Fusing: Internal - 3AG, 1/2 Amp, 250 V, slow-blow  
Operating Temperature Range: 0<sup>o</sup> - 60<sup>o</sup> C  
Wire Termination: Screw terminals with self-lifting captive pressure pads. Will accept two (2) #12 AWG wires.

#### TIME RANGES

99 hours, 59 minutes or 99 minutes, 59 seconds - Model 763-7-0130-01  
99.9 minutes or 99.9 seconds - Model 763-7-0130-02

#### CAPACITY

128 Programmable Steps (H-127)-Microprocessor based.

#### DOWN COUNTER

Presettable from 9,999 - 0

Maximum AC input frequency: 125 Hz  
Maximum DC switching rate: 250 Hz  
Minimum input "ON" time: 2 milli-seconds  
Minimum input "OFF" time: 2 milli-seconds

NOTE: Count input must be noise-free and contain no contact bounce. Count decrements on removal of input voltage. AC inputs will cause the count to decrease by one (1) for each half cycle of the applied AC voltage.

#### INPUT VOLTAGE

Terminals 3, 4, 7, 5: 120 Volts AC or DC  $\pm$  10%.  
Terminal 6: 12-24 Volts AC or DC  
Terminal 7: (Common) 120 Volts AC or DC  $\pm$  10%  
12-24 Volts AC or DC  
All inputs optically isolated, 2,500 V

#### OUTPUT

N/O and N/C Form C relay contacts rated 2 Amp, 250 VAC/30 VDC. 20 million mechanical operations, 500,000 electrical full load operations. Plug-in serviceability.

Duration: Switched for 245 milli-seconds in stand-alone mode. Maintained until step address changes when connected to stepper or electro-mechanical drum programmer.

### 3.0 TIME/COUNT MODULE ELECTRICAL SPECIFICATIONS (continued)

#### MEMORY

CMOS Ram (Battery back-up) 168 hour minimum retention of program and Time/Count remaining in the current step.

Replaceable battery.

#### READOUT

Time/Count: 4 digit numeric display with range indicators.

3 digit display in time ranges only for Model 763-7-0130-02

Program Step: 3 digit alpha numeric display (H-127)

Optional remote readout identical to built-in readout.

### 3.1 TIME/COUNT MODULE I/O FUNCTION

#### TERMINAL NUMBER

#### DESCRIPTION

1 - L1

Power required for the Module is

2 - L2

120 VAC  $\pm$  10%, 50 - 60 Hz.

3 & 4

Step Reset Input. Applying 120 Volts between terminals 3 and 4 resets the Module to the programmed Time/Count value. With power applied at this input, the display continually shifts from "Sr", Step Reset, to the programmed value.

5

Time Inhibit/Count Input. (120 Volts)

6

Time Inhibit/Count Input. (12-24 Volts)

7

Time Inhibit/Count Input. (Common). During the run mode, with timed steps, a 120 Volt input between terminals 5 and 7 or 12-24 Volt between terminals 6 and 7, causes the timer to remain at the value present when the input was applied. During this input, the display continually shifts from "IH", Time Inhibit, to the value of time remaining.

During the Count Mode 120 VAC applied to terminals 5 and 7 or 12-24 VAC applied to terminals 6 and 7 will cause the counter to decrease by one count for each half cycle of the applied AC signal. 120 VDC applied to terminals 5 and 7, or 12-24 VDC applied to terminals 6 and 7 will cause the counter to decrease by one count for each DC pulse applied.

8

N.O. - Normally Open Relay Contact

9

Comm. - Common Relay Contact

### 3.1 TIME/COUNT MODULE I/O FUNCTION (continued)

<u>TERMINAL NUMBER</u>	<u>DESCRIPTION</u>
10	<p><u>N.C.</u> - Normally Closed Relay Contact When used with the PSC-763 Stepper Module the relay is energized at the end of the programmed time or count, and remains closed until the Stepper Module advances to the next step.</p> <p>In stand-alone operations, the relay is energized either at the end of the programmed time or count, or upon receiving a step command from the key pad, and remains closed for 245 milliseconds.</p>

NOTE: The case of the Time/Count Module should always be grounded to ensure good noise immunity. Grounding of the case can easily be accomplished by connecting ground to the terminal block mounting screw adjacent to terminal block position #1(L1). DO NOT connect ground to terminal block position #2(L2).

### 3.2 GENERAL DESCRIPTION

The 763 Time/Count Module (See Figure 1.19) is a microprocessor based programmable sequential timer/counter. It is compatible with the Tenor Model PSC-763 Programmable Sequence Controller, Tenor Drum Programmers and may also be used as a stand-alone timer/counter.

Capability for 128 sequential steps (H-127) exists, although fewer steps may be used. Timing in any of the time bases, operation as a down counter, or "no operation" where the PSC-763 system waits for an external step command, are programmable for any step. A programmed "no operation" in the stand-alone mode results in the module returning to the "Home" position.

The Time/Count Module is easily programmed through an on-board key pad. Programs can be altered at any time, even while the system is running.

The standard module is supplied with digital LED displays which indicate the step number and programmed value. A built-in battery back-up permits retention of step and time or count value upon AC power line failure. This is enabled by switching Battery Enable "ON". If long time power down conditions (greater than 2 weeks) are possible, the Battery Enable Switch should be turned "OFF" to prevent a deep discharge condition which may damage the battery. The users program will then be lost. If the battery is discharged or if the module is unprogrammed, "H-PROG" will be displayed when power is applied to the Time/Count Module.

#### OPERATING MODES

(Models 763-7-0130-01 and 763-7-0130-02)

There are two general operating modes of the 763 Time/Count Module which apply to both models. These are the "connected" mode, where the Time/Count Module is connected to a PSC-763 Stepper Module or electro-mechanical drum programmer and the "stand-alone" mode.

### 3.2 GENERAL DESCRIPTION-OPERATING MODES (continued)

#### "Stand-Alone" Mode

In this mode the Time/Count Module sequences by itself step by step and is not connected to any other modules. There are two (2) time functions, a count function, and a "Return to Home" (H) function. The "Return to Home" function allows the unit to return to the first step and repeat the program. All unprogrammed steps contain the "Return to Home" function, thus it is not necessary to add one to the end of the program. The output relay will never be activated during a "Return to Home" step.

Zero (0) time or count may also be programmed when it is desired to skip a step. All unprogrammed time or count functions are pre-defined as zero (0) value, or alternatively a zero (0) may be entered through the keyboard. The output relay will be activated during a zero time or count step.

When a time or count step reaches zero (0), the output relay will be activated for 245 milli-seconds as the unit goes to the next step. The next step begins immediately while the relay is activated.

All functions have certain restrictions that apply and these should be observed for proper operation of the unit.

#### "Connected" Mode"

In this mode the Time/Count Module will be connected to a sequencer via a bus cable and there will be a connection from the Time/Count Module output relay contacts to the "step" input of the sequencer. The sequencer provides the step number for the Time/Count Module.

There are two (2) time functions, a count function, and a "No Operation" (NOP) function that may be used. The "No Operation" function is used when no timing or counting is required in a step. The output relay will never be activated in a "NOP" step. The Time/Count Module will remain in the "NOP" step until an external signal causes the sequencer to "step" or the STEP pad on the key pad is depressed. The other three (3) functions will cause the output relay to be activated when the time or count reaches zero (0). The relay will remain activated until the sequencer advances to the next step and the step address on the "bus cable" has remained stable for 30 milli-seconds. At this point, the relay will be turned off and the next step begins. All unprogrammed steps contain a "NOP" function.

It is also possible to program a zero (0) time or count step by entering a zero (0). This will cause the system to skip the step. All unprogrammed time or count functions are pre-defined as zero value. The output relay will be activated during a zero time or count step.

All functions have some restrictions on their use which are listed in the section on operating restrictions.

#### OPERATING RESTRICTIONS

(Models 763-7-0130-01 and 763-7-0130-02)

Both models have some limitations or operating quirks that the user should be aware of before programming the unit. Failure to observe these limitations may result in a system that does not perform correctly or gives the appearance of a faulty Time/Count Module.

### 3.2 GENERAL DESCRIPTION-OPERATING RESTRICTIONS (continued)

#### "Stand-Alone" Mode

##### 1. Minimum Step Time

In the stand-alone mode, the output relay is activated for 245 milli-seconds and must be off for 15 milli-seconds. Thus the minimum time spent in a step must be 260 milli-seconds. Operation with step times less than 260 milli-seconds will result in the output relay being continuously activated.

For Model 763-7-0130-02, the minimum time that should be programmed into a step is 0.3 seconds.

When using the count function in either model, there is a restriction on minimum number of counts that may be programmed into a step for a given count rate. (At the maximum rate of 250 Hz, the minimum number of counts is 65). Refer to Figure 1.20 for the minimum number of counts per step versus count frequency. Figure 1.20 assumes the input is switched DC. If AC voltages are used, you must double the frequency before using Figure 1.20 because the counter will decrement on each half cycle of the applied AC signal. (A 60 Hz AC voltage yields a count frequency of 120 Hz and the minimum number of counts would be 32).

##### 2. Zero Value Steps

When a zero (0) value time or count step is programmed, the unit will skip that step. The output relay will be activated from the previous step and remain activated through the zero value step. Because the relay never turns off, an application that uses the output relay to sequence something could get out of synchronization with the Time/Count Module if zero value steps are used.

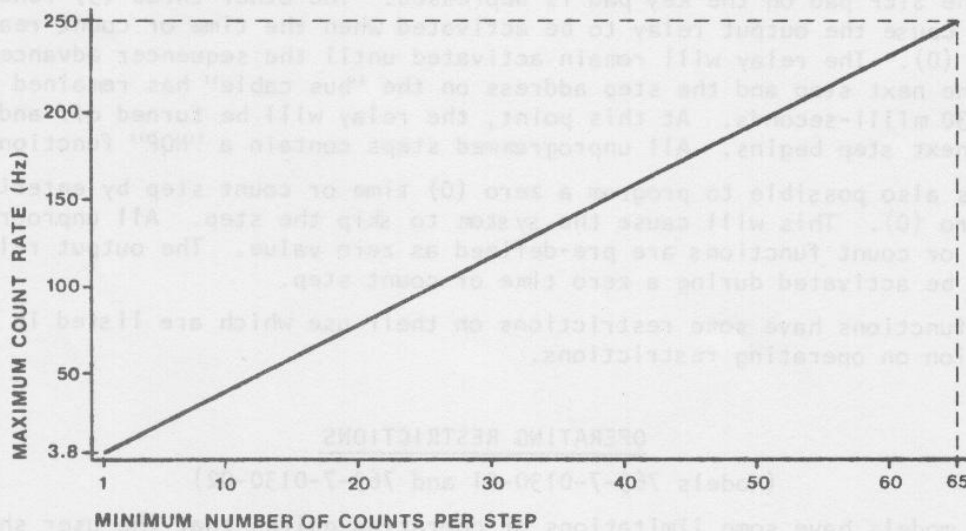


Figure 1.20 Maximum Count Rate Versus Minimum Counts per Step.  
Minimum number of Counts per Step =  $0.260 \times$  Maximum rate in Hz.  
Minimum Step Time is 260 milli-seconds.

### 3.2 GENERAL DESCRIPTION-OPERATING RESTRICTIONS (continued)

#### "Connected Mode"

##### 1. Minimum Step Time

When the 763 Time/Count Module is connected to a sequencer, there is a delay between steps equal to the turn-on time of the sequencer plus approximately 32 milli-seconds of delay in the Time/Count Module. A new step begins after the relay is turned off. The relay must remain off long enough for the sequencer to recognize the off input. This turn-off time is the minimum step time. Step times less than the required turn-off time will cause the system to lock-up. Lock-up is discussed in the zero value section.

Both models of the Time/Count Module can lock-up when using the count function if the time spent in the step is less than the minimum step time. For the PSC-763 Stepper Module, a typical turn-off time is 100 milli-seconds. Electro-mechanical drum programmers may require more than 100 milli-seconds for turn-off. The count rate will determine the minimum number of counts that is required to give the minimum step time. If the turn-off time of the sequencer isn't known, the minimum step time may be assumed to be the same as the "stand-alone" mode. (See "Stand-Alone" section for determining minimum number of counts).

The Model 763-7-0130-02 Time/Count Module can lock-up when using the time function if the step time is less than the minimum step time. It may be possible to program step times of 0.1 second, however, the turn-off time of the sequencer must be considered.

Although it may be possible to program multiple successive 0.1 second steps with either model, the cycle time from step to step will be longer than 0.1 second (it may be closer to 0.2 seconds) due to the delays in the sequencer and Time/Count Module. Time sensitive applications should consider the effects of the delay between steps. Also any application that uses the convenience relay in the sequencer should be certain that the "ON" time of that relay is set to be less than the fastest step time.

##### 2. Zero Value Steps

When a zero (0) value step is programmed, the Time/Count Module will turn on its relay immediately. A zero value step will cause the system to lock-up unless precautions are taken. Lock-up is caused by failing to ensure adequate turn-off time for the sequencer input circuitry. It occurs as the Time/Count Module enters a zero value step. The output relay turns on as the step preceding the zero value step reaches zero, thus telling the sequencer to step. When the Time/Count Module recognizes that the sequencer has stepped, it turns off its relay and enters the zero value step. Since this step is at zero value, it immediately turns on the relay again allowing virtually no off time to accumulate. The Time/Count Module has told the sequencer to step but the sequencer fails to recognize the command thus leaving the Time/Count Module waiting for a new step number that never comes.

The only way to recover from lock-up is to supply the sequencer with a reset to Home input. Lock-up can be prevented by insuring sufficient time is spent in a step for the sequencer to recognize the off input.

### 3.3 PROGRAMMING THE TIME/COUNT MODULE

(Models 763-7-0130-01 and 763-7-0130-02)

#### PREPARING TO PROGRAM

It is best to prepare a Program Data Sheet in advance, listing step numbers and corresponding values to be programmed. With this Program Data Sheet the memory can be easily programmed and upon completion of entering the program, information will be retained for future reference.

#### INTRODUCTION TO PROGRAMMING

Upon initial power-up, the display will read "H-PROG". This display indicates that the unit is unprogrammed. This display will also be present when the battery is discharged.

The basic procedure for programming or changing a step is to: Enter the program mode, access the step to be programmed or changed, select a function, enter its value, press the ENTER key, and exit the programming mode. The left display window will show the step number and what mode the unit is in. The right display shows the step value or function along with the appropriate status indicators. If a mistake is made during the steps entry, the CLEAR (CLR) key can be pressed, causing both displays to go blank. Everything pertaining to that step must be re-entered, including the step number.

#### ENTERING THE PROGRAM

1. Depress the PGM/RUN pad once to access the program mode.

A status indicator "PGM", located above the step number display will confirm that programming of the module can begin. The displays will indicate the step number and programmed value for each step during the programming sequence. If a step has not been programmed, it will contain either a NOP or a return to Home function. The unit will display the Home step first. If this is not the step you want to program, you can access the proper step by pressing the STEP key, the step number, and the STEP key again.

2. Depress the FUNC/TEST pad to sequence through and select one of the following functions:

#### Model 763-7-0130-01

##### "Connected Mode"

- A. Min/Sec
- B. Hrs/Min
- C. Count
- D. NOP

##### "Stand-Alone Mode"

- Min/Sec
- Hrs/Min
- Count
- H

#### Model 763-7-0130-02

##### "Connected Mode"

- A. Sec.
- B. Min.
- C. Count
- D. NOP

##### "Stand-Alone Mode"

- Sec.
- Min.
- Count
- H

ENTERING THE PROGRAM - CONTINUED

- Depress the numbered pads to enter the value from left to right. (NOP and return to Home functions do not require this step).

Be sure to include any trailing zeros that may be required to complete a value. (i.e. 15 hours would be entered as 15:00 hours/minutes). When using the Model 763-7-0130-01 with either time function, a number greater than 59 in the two (2) right most digits will cause these digits to flash indicating an invalid entry. The same thing will occur if the maximum range (99:59) is exceeded.

- Depress the ENTER pad to store the entry.

Upon pressing the ENTER pad, the entry is stored in the units memory and the unit will automatically advance to the next step. The remaining steps may be programmed in the same manner. See the following examples.

- Depress the PGM/RUN pad to exit the program mode.

The "PGM" status indicator will turn off indicating you are now in the run mode. This program will now continue to run even if you again enter the program mode and change its contents.

PROGRAMMING EXAMPLE - MODEL 763-7-0130-01 ("Connected Mode")

Program the following steps:

	<u>STEP</u>	<u>VALUE</u>		
	H	1 Second		
	1	15 Minutes		
	2	Count 90		
	3	99 hours, 59 minutes		
<u>KEY SEQUENCE</u>		<u>STATUS INDICATORS</u>	<u>VALUE DISPLAY</u>	
-Power up-			H	PROG
PGM/RUN		PGM	H	NOP *
Func/Test		PGM & Min/Sec	H	: 0
1		PGM & Min/Sec	H	: 1
Enter		PGM	1	NOP *
Func/Test		PGM & Min/Sec	1	: 0
1, 5, 0, 0		PGM & Min/Sec	1	15:00
Enter		PGM	2	NOP *
Func/Test, Func/Test, Func/Test		PGM & COUNT	2	0
9, 0		PGM & Count	2	90
Enter		PGM	3	NOP *
Func/Test, Func/Test		PGM & Hrs/Min	3	: 0
9, 9, 5, 9		PGM & Hrs/Min	3	99:59
Enter		PGM	4	NOP *
PGM/RUN		Min/Sec	H	: 1

\*In the stand-alone mode, NOP would be replaced with an "H".

ENTERING THE PROGRAM - CONTINUED

NOTE: When in the time modes, if a number greater than 59 is displayed in the two (2) right most digits the display will flash. If 99 hours, 59 minutes or 99 minutes, 59 seconds is exceeded, the display will again flash indicating an over range condition. As shown in the above example, the display flashed momentarily until the 5 and 9 were entered. At this point the 99 was in the left most digits and the flashing ceased.

PROGRAMMING EXAMPLE - MODEL 763-7-0130-02 ("Connected Mode")

Program the following steps:

<u>STEP</u>	<u>VALUE</u>	<u>STATUS INDICATORS</u>	<u>VALUE DISPLAY</u>
H	1.1 Second		H PROG
1	1.5 Minute		H NOP *
2	Count 90		H .0
3	99.5 Seconds		H 1.1
			1 NOP *
			1 .0
			1 1.5
			2 NOP *
			2 0
			2 90
			3 NOP *
			3 .0
			3 99.5
			4 NOP *
			H 1.1

\*In the stand-alone mode, NOP would be replaced with an "H".

EXAMINING THE PROGRAM

To confirm that the programmed DATA is in fact stored in the memory, it can be checked by the following procedure:

1. Access the Program Mode. (Press PGM/RUN if PGM indicator is not on.)
2. Reset the unit to Home by depressing the HOME pad. The unit will now display the value programmed in the "H" step.

### EXAMINING THE PROGRAM - CONTINUED

3. To advance the program to the next step depress the ENTER pad. The entire program can now be examined in this manner.
4. To examine a step without sequencing through the entire program, depress the STEP pad, the STEP number, and the STEP pad again. The programmed instruction for that step and the step number will be displayed. The ENTER pad may be depressed to advance to the next step. The programmed instruction will not be disturbed.

When the program has been confirmed, the PGM pad should be depressed to exit the program mode.

**WARNING:** Care must be exercised when performing the next operation to verify that no dangerous system condition exists.

After the module has been put in the run mode, it may be stepped manually through the program by depressing the STEP pad. Keep in mind that the output relay will be energized each time the STEP pad is depressed. (Except for steps containing NOP or H functions.)

### CHANGING THE PROGRAM

Changing a program is accomplished by performing the following sequence:

1. Access the program mode. (PGM indicator should come on.)
2. Depress the STEP pad, the Step number requiring change, and the STEP pad again.
3. The module will now display the Step number and program instructions.
4. Depress the Func/Test pad until the desired function is illuminated by the LED indicator.
5. Enter the new value with the appropriate key pads and depress the enter pad. The display will advance to the next step. The new program instruction has been entered and will be executed in the next program cycle. If the new program instruction is to be initiated immediately, and the unit is performing this step, simply depress the PGM/RUN pad to exit the program mode and then depress the CLR/STEP RESET pad. This allows you to alter programs while the Time/Count Module is executing this program.

### SUMMARY OF KEY FUNCTIONS AND RESPONSES

A summary of Key Functions and Responses with respect to given modes of operation are shown in Figure 1.21.

MODE OF OPERATION					
KEY	"H PROG" Being Displayed	PROGRAM	RUN (Connected Mode)	RUN (Stand-Alone Mode)	TEST
<u>PGM</u> <u>RUN</u>	Enters Program Mode	Enters Run Mode	Enters Program Mode	Enters Program Mode	Enters Program Mode
STEP	Key Ignored	Prepares for Step Entry and Enters Step number	Advances to next Step	Advances to next Step	Energizes all LED segments or permits stepping thru individual LED segments
<u>CLR</u> <u>Step</u> <u>Reset</u>	Key Ignored	Clears Step and value display	* Resets to beginning of present step	* Resets to beginning of present step	Leaves test mode
HOME	Key Ignored	Displays Home Instruction	Key Ignored	* Returns Program to Home Step	Key Ignored
<u>Func</u> <u>Test</u>	Enters Test Mode	Sequences Functions	Enters Test Mode	Enters Test Mode	Re-enters test mode and clears display
ENTER	Key Ignored	Enters instruction if valid	Key Ignored	Key Ignored	Enters test if valid
0-9	Key Ignored	Enters digit into step or value display	Key Ignored	Key Ignored	Enters test Specified by digit if valid

\*These keys are momentary action. Holding the key depressed will not cause the unit to remain in step reset or home.

Figure 1.21 Key Functions and Responses

### 3.4 DIAGNOSTIC TESTS

Should the unit ever appear to be malfunctioning, there are a series of (6) diagnostic tests that may be performed. These diagnostics are internal to the Time/Count Module and are accessible via the appropriate key sequences.

To access a test you must be in the run mode. Depress the Func/Test Pad (the TEST LED will illuminate), depress the appropriate test number, which will be displayed, then depress the ENTER pad. You are now ready to execute the test.

DIAGNOSTIC TEST TABLE

<u>Test Number</u>	<u>Diagnostic</u>
1	Display Test
2	Keyboard Test
3	Input Test
4	Relay Test
5	Program Memory Test
6	Software Revision Level Test

#### TEST 1 - DISPLAY TEST

The test consists of two parts. The first part illuminates all segments and all status indicators on the display simultaneously. The second part turns on only one segment at a time and sequences through them individually.

The STEP pad causes the test to alternate between the two parts.

The TEST pad is active in part two and causes the display to sequence to the next segment.

The CLR pad can be used at any time to terminate the test.

If a program was being executed at the time this test was initiated, the program execution continues without interruption.

If any segment or status indicator is not on during part one, or more than one (1) segment or indicator is on during part two, then there is fault in the unit.

#### TEST 2 - KEYBOARD TEST

This test will fill the 7 digits of the display with a unique character as each key of the keyboard is pressed. The characters displayed are:

TEST 2 - KEYBOARD TEST - CONTINUED

<u>PAD PRESSED</u>	<u>CHARACTER DISPLAYED</u>
0	0
1	1
2	2
3	3
4	4
5	5
6	6
7	7
8	8
9	9
PGM/RUN	P
STEP	S. (Decimal point distinguishes from 5)
CLR/RST	(Nothing Displayed-Terminates Test)
HOME	H
FUNC/TEST	F
ENTER	E

The test is terminated by the CLR pad.

If a program was being executed at the time this test was initiated, the program execution continues without interruption.

If the character displayed is not the one expected, there is a fault in the unit.

TEST 3 - INPUT TEST

This test displays the status of all external inputs, and the power line frequency.

The STEP pad causes the test to sequence through the following inputs in a cyclic fashion; i.e. pressing the STEP pad while the line frequency is being displayed will cause the 763 bus input to be displayed.

	<u>INPUT</u>	<u>DISPLAY</u>	
		<u>CONNECTED MODE</u>	<u>STAND-ALONE MODE</u>
1.	763 Bus Input	BUS 000 to 127*	BUS 127*
2.	Stand-Alone Input	SA OFF	SA ON
3.	Time-Inhibit Input	IH ON or OFF	IH ON or OFF
4.	Step-Reset Input	Sr ON or OFF	Sr ON or OFF
5.	Line Frequency	LF 50H or 60H	LF 50H or 60H

\*Will also display a small "r" if the bus reset line is active.

The Bus input display shows the address being received on the 763 Bus, along with a small "r" if the reset line is active. This address will range from 0 to 127 in the connected mode and corresponds to the step number. With nothing connected to the Time/Count Modules bus connectors, this input should read 127.

### TEST 3 - INPUT TEST - Continued

The Stand-Alone input display must show "SA OFF" while the Time/Count Module is connected to a sequencer. If it does not, you will not be able to program the NOP function. This may indicate a faulty Bus Cable, bad connector, improper wiring (Pin 2 of the Bus Connector must be connected to pins 7, 10, or 15 if the Time/Count Module is connected to something other than a PSC-763 Stepper Module), or a problem in the Time/Count Module.

The line frequency display shows either 50H or 60H. The other inputs are displayed with the word "ON" or "OFF" to indicate their current status. All displays except line frequency are dynamically updated, i.e. they change as the input changes.

The CLR pad will terminate the test.

If a program was being executed at the time this test was initiated, the program execution continues without interruption.

### TEST 4 - RELAY TEST

This test exercises the relay output.

**WARNING:** Care must be exercised when performing this test, to be sure that no dangerous system conditions exist.

Remove wires on outputs before performing this test. This will prevent outputs from turning on devices which could endanger personnel.

	<u>DISPLAY</u>	<u>RELAY</u>	<u>CONTACTS</u>
The 1 pad will turn the relay on.	Rel On	Closed	Open
The 0 pad will turn the relay off.	Rel Off	Open	Closed

The CLR pad will terminate the test.

You should be able to hear the relay click as you switch it OFF and ON. If you do not or the contacts don't switch when they should, then there is a fault in the unit.

Program execution is suspended during this test to eliminate the interaction of the program turning the relay on and off.

When the test is terminated with the CLR pad, the program returns to the point of interruption and continues on.

This test has one peculiarity which the user should be aware of. If a power failure should occur while this test is in operation, the suspended state of the user program cannot be returned to when the power is restored. Also, when the power is restored, "H-PROG" is displayed which normally indicates that there is no user program in memory. In this case, however, the user program is still in memory (providing the power outage was not

#### TEST 4 - RELAY TEST - CONTINUED

long enough to discharge the battery). Pressing the PGM/RUN pad will cause the unit to enter the program mode and display the home instruction. Pressing the PGM/RUN pad a second time will cause the unit to enter a run mode and begin execution of the program from home step.

This peculiarity should not cause any great hardship as the relay test is intended for use at the time of system installation, before the unit is ever programmed.

#### TEST 5 - PROGRAM MEMORY TEST

NOTE: This test destroys any program that was in the Memory.

This test should be run in the event that you can't program a step correctly or the unit will not retain its memory. The test checks the two CMOS RAM chips which hold the user program. A single "1" bit is shifted through the memory which is filled with "0's". For each position of the "1", the entire memory is scanned to make sure that the particular bit location and only that bit location contains a "1". The address of the memory location (0-255) containing the test bit is shown on the display on the left. The test is repetitive and the number of complete tests is shown on the display on the right. If at any time an error is detected, the test stops running and one of the following messages is displayed.

- 1) U8 Bad
- 2) U9 Bad

Should this occur, contact the factory for repair information.

The CLR pad will exit the test and cause "H-PROG" to be displayed. The unit is then ready to accept a program.

Since this is a destructive test, a safety feature has been incorporated. When this test has been initiated with the ENTER pad, "PSH RUN" is displayed and the unit waits. If the RUN pad is pressed at this point, the program memory will be filled with "0's" and the test will begin. If any other key is pressed while "PSH RUN" is displayed, the unit will exit the test mode without disturbing the user program.

If a program was being executed at the time this test was initiated, the program execution continues while "PSH RUN" is being displayed. If the test is terminated at this point, the program execution will continue without ever having been interrupted. If the RUN pad is pressed while "PSH RUN" is displayed, program execution is immediately terminated and testing begins.

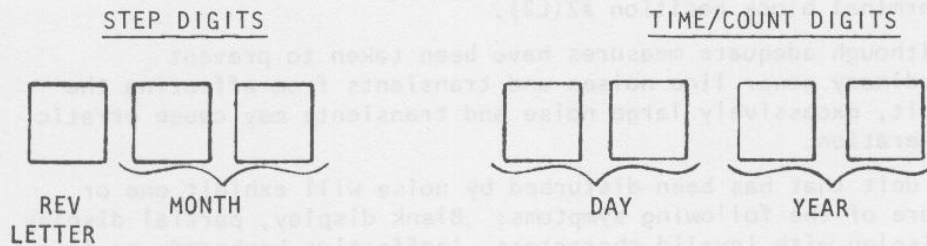
One complete test of the memory takes about 40 seconds.

#### TEST 6 - SOFTWARE REVISION LEVEL TEST

This test is not a diagnostic as such. It will merely cause the software revision letter and date to be displayed.

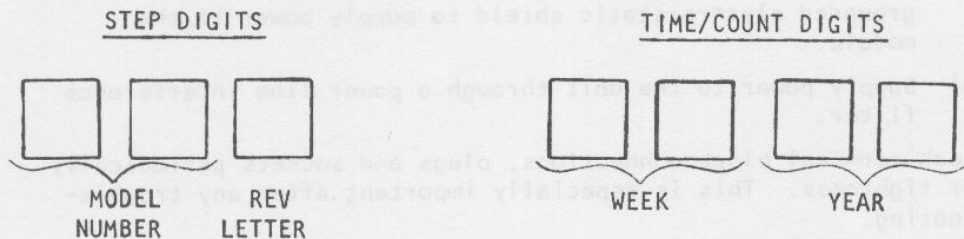
TEST 6 - SOFTWARE REVISION LEVEL TEST - continued

MODEL 763-7-0130-01



--OR--

MODEL 763-7-0130-01, 763-7-0130-02



3.5. MAINTENANCE

**WARNING:** Keep personnel clear of machinery and equipment that can be hazardous if activated by the control system during maintenance or troubleshooting. Use generally accepted safe practices for electrical equipment maintenance.

The 763 Time/Count Module is virtually maintenance free. There are, however, a few basic preventive measures that can be followed to assure long and trouble free operation.

1. Install the unit in an enclosure free of dust and contaminants.
2. Avoid dropping, jarring, or high vibration installation.
3. The humidity should be maintained to prevent condensation. Relative humidity less than 30% can cause static build-up which might damage the CMOS circuitry.
4. Avoid locations where the ambient temperature may go beyond 0° to +60°C or that are subject to direct sunlight.

### 3.5 MAINTENANCE - CONTINUED

5. The case of the Time/Count Module should always be grounded to ensure good noise immunity. DO NOT connect ground to terminal block position #2(L2).

Although adequate measures have been taken to prevent ordinary power line noises and transients from affecting the unit, excessively large noise and transients may cause erratic operation.

A unit that has been disturbed by noise will exhibit one or more of the following symptoms: Blank display, partial display, display with invalid characters, ineffective keyboard, or loss of memory (displays "H-Prog").

In locations where excessive noise may be a problem, take one or more of the following countermeasures.

- (1) Ground the case of the unit through an exclusive use ground wire going directly to earth ground.
  - (2) Use an 1:1 ratio noise isolation transformer with a grounded electro-static shield to supply power to the module.
  - (3) Supply power to the unit through a power line interference filter.
6. Check terminal block connections, plugs and sockets periodically for tightness. This is especially important after any troubleshooting.
  7. The Nickel Cadmium battery must be charged for a minimum of 24 hours if it is to provide back-up power for a one (1) week. If extended power down conditions (greater than 2 weeks) are possible, the Battery Enable Switch should be turned "OFF" to prevent a deep discharge condition which may damage the battery.
  8. Battery life is dependent on ambient temperature, frequency of power switching, discharge time, etc. Because of this, it is recommended that the battery be replaced every two (2) years during scheduled maintenance downtime even though it may be possible to use a battery for 5 or 6 years.

### 3.6 USER SERVICEABLE ITEMS

**WARNING:** Keep personnel clear of machinery and equipment that can be hazardous if activated by the control system during maintenance or troubleshooting. Use generally accepted safe practices for electrical equipment maintenance.

IT IS RECOMMENDED THAT THESE ITEMS BE REPLACED WITH ALL POWER OFF.

#### A. BATTERY (Tenor Part Number 670-3-8080)

The battery is located behind the top cover plate.

1. With all power OFF, remove the three (3) #6-32 screws located above the terminal block and carefully lift out the top cover plate.
2. Turn the Battery Enable Switch OFF.
3. Carefully remove the old battery by pulling it out of the PC board.
4. Install the new battery, observing the proper polarity.

**WARNING:** DO NOT substitute a non-rechargeable battery-- Serious damage could occur.

5. Turn the Battery Enable Switch ON.
6. Position the cover on the module.
7. Replace screws in cover.
8. The battery must charge for 24 hours before being fully charged.

#### B. FUSE - 3AG, 250V., 1/2 A. slow-blow, Littlefuse #313.500 (Tenor Part Number 700-3-3062)

The fuse is mounted on the bottom cover plate.

WITH ALL POWER OFF

1. Remove the five (5) #6-32 screws that secure the bottom cover plate.
2. Remove the bottom cover plate.
3. Replace the fuse and position the cover on the module.
4. Replace the screws that secure the cover plate.

#### C. RELAY (Tenor Part Number 700-3-1804)

The relay is located in a socket behind the bottom cover plate.

### 3.6 USER SERVICEABLE ITEMS - CONTINUED

#### WITH ALL POWER OFF

(Including power to the relay contacts)

1. Remove the five (5) #6-23 screws that secure the bottom cover plate.
2. Move the bottom cover plate out of the way.
3. Bend the two (2) locking tabs that hold the relay into the socket down.
4. Lift the relay out of the socket.
5. Notice the pin spacing is different on each side of the relay and socket. Insert the new relay into the socket, taking care to match up the pin spacings.
6. Snap the locking tabs up into an upright position.
7. Position the cover plate on the module.
8. Replace the screws that secure the cover plate.

### 3.7 SPARE PARTS

1 Battery	Part No. 670-3-8080
1 Output Relay	Part No. 700-3-1804
1 Bus Connection Cable 12"	Part No. 700-3-5046
1 Bus Connection Cable (Specify Length)	Part No. 760-6-4121
1 3AG fuse, 1/2 AMP, 250 V. Slow-Blow Type	Part No. 700-3-3062

Should you require service other than that involving the parts listed above, consult the factory.

SPARE PARTS ORDERING INFORMATION

Each module contains two identification plates:

1. Catalog Name/Number Plate
2. Serial Number Plate

Name/number plates generally are located on module covers. Serial number plates generally are located on sides (outside) of bases.

To aid in furnishing the proper spare parts, please show both numbers.

EXAMPLE: Parts for a Time/Count Module 763-7-0130

Serial Number - 763-1234-T1-0681

1 Each Battery - Part Number 670-3-8080

All Prices: F.O.B. New Berlin, Wisconsin

Terms: As Arranged

Minimum Billing: \$50.00

Factory: Tenor Company, Inc.  
17020 West Rogers Drive  
New Berlin, Wisconsin 53151

(414) 782-3800

Prices and all terms and conditions of sale are subject to change without notice. Prices are net and do not include any applicable State, Federal or Excise Taxes which are payable by purchaser.

All orders are subject to acceptance by Tenor Company at its home office.