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 Show time now	Demo - mode specified for each tube					
  Set time, hours only (DST change)		Set date				
  Bottom tube display mode - used for both time and date displays, both AM and PM		Memory address display (for debugging)				
   Set time, seconds set to zero		Duration of time & date displays, in seconds - 0 displays indefinitely				
    Set exact time		Show year (the digit entered doesn't matter)				
					Bottom tube - separate mode during time and date, AM and PM	Show date now 
 + 	If pressed simultaneously, enters demo mode with a randomly chosen mode for each tube (100..615 - stationary modes are never chosen)					

- All entries must have exactly the number of digits shown. Add leading zeros to shorter numbers.
- The LED on the top rear of the clock indicates the status of entries - a brief green flash when a digit key is pressed, a longer green flash when a complete command is accepted, and a long red flash when an error occurs (wrong number of digits, or a value that's out of range).
- To cancel an incomplete entry, press additional digits to reach a total of thirteen. At this point (which is longer than any valid command), the LED will flash red, and the entry buffer will be cleared.
- Hours are always entered in 24-hour format. Add 12 to hours after noon.
- The memory display (nnn#) shows the contents of the specified memory address on the left (hundreds), top (tens), and right (ones) tubes. It is a debugging feature that I didn't bother to remove. 024 is the most interesting address to display.
- The year display (n#) is intended just for verifying that the date was entered correctly - the tube labelling doesn't allow a very readable display of the year. It is shown two digits at a time, on the top and right tubes; the bottom tube is stationary at its left center position while the first two digits of the year are displayed, and at its right center during the last two digits. The left tube is not used.
- When initially plugged in, or after a detected power failure, all four tubes will alternately spin and remain stationary for a period of 8 seconds. This process ensures that they are displaying the correct value.
- A very brief power outage, or a brown-out, may cause the tubes to lose track of their correct position. This is an unfortunate feature of Dekatrons - there is generally only one position in which the lit dot can be verified (the top center position of each tube, in this clock). To ensure that an incorrect display does not last indefinitely, any tube that has not passed its top center within the last 2 minutes will quickly spin to that position, then back to its proper position.

# Dekatron Clock #1 Tube Mode Numbers

These 3-digit codes are used with several of the keypad commands to specify the behavior of a single tube. The nn part of the code is a number in the range 00 through 39, inclusive.

**0nn** Tube remains stationary at position nn. Do not use for extended periods of time; this is intended for setting a starting position for a following 1nn or 2nn spin mode.

**1nn** Clockwise spin; advances one position each (nn+1)/120 second.

**2nn** Counter-clockwise spin; advances one position each (nn+1)/120 second.

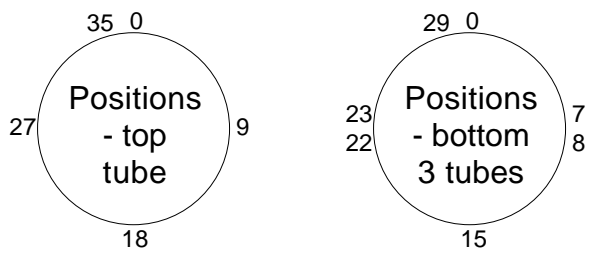
Note that spin speeds have a different meaning for the top tube, since it has more positions than the other tubes (36 vs. 30). To get the same rotation rate for all tubes, you need to choose speeds with a ratio of 5 to 6: mode 104 for the top tube and mode 105 for the others, or 109/111, 114/117, etc.

**3nn** Small pendulum; swings ±4 dots from position nn.

**4nn** Medium pendulum; swings ±7 dots from position nn.

**5nn** Large pendulum; swings ±14 dots from position nn.

All pendulum modes have a period of 2 seconds, and cross the specified center position exactly on the second.



**600 thru 615** Synchronized spins: these modes produce a tube position as a function of the current time. For example, mode 606 is equivalent to the second hand of an analog clock. They may not produce the expected results if used on the top tube, since they don't take into account that it has 36 display positions instead of 30.

CW spin	CCW spin	Moves	Completes revolution every
600	608	every 1/60 second	1/2 second
601	609	every 1/30 second	second
602	610	every 1/15 second	2 seconds
603	611	every 2/15 second	4 seconds
604	612	3 positions each second	10 seconds
605	613	every second	30 seconds
606	614	every 2 seconds	minute
607		Slow random spin - changes position once per second	
615		Fast random spin - changes position 8 times per second	

- The initial display of the clock is the time for 5 seconds, alternating with the date for 3 seconds. These durations can be changed via the nn# command. Either duration can be set to zero, to inhibit the automatic switching. This is not recommended for the date display, as it would result in tubes that didn't change position for extremely long periods of time - this isn't good for tube life.
- Time display shows the hours on the top tube, tens of minutes on the left, and ones of minutes on the right. The bottom tube can be set to show the seconds or any other display mode.
- Date display shows the month on the top tube, tens of days on the left, and ones of days on the right. It is distinguished from a time display by having two adjacent dots lit in these three tubes. The bottom tube mode can be set differently for time and date displays to make them even more distinguishable.