Fast Clock
w/ Loconet® Interface

> Fast time clock with AM/PM indication
> Fast clock rate/ratio adjustable from 1 to 16
> Principle or slave with Loconet® sync
> Actual/real time clock with AM/PM indication
> Duration clock
> Event counter
> Brightness adjustment
> 1" display characters

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1 Introduction

The primary function of the fast clock is to provide model train operator with a clock display that can keep scale time. This scale time can range from a 1 to 1 up to a 16 to 1 rate with respect to actual time.

2 Getting Started

2.1 Front Panel Control

When the fast clock is first powered on it enters the fast clock mode which shows scale time with a rate or ratio of 4 to 1.

There are four push button on the front panel of the fast clock to control it's operation. The Mode Up and Mode Down button are used to changed modes. Once the desired mode is displayed push the select button once to display the state of the mode. In the fast clock and actual clock modes the Set Hours and Set Minutes buttons are used to set the time. Press and hold the button until the desired hour or minute is displayed.

Fast Clock Modes		
Mode #	Display	Description
1	1 : FC	Fast clock
2	2 : DC	Duration clock
3	3 : EC	Event counter
4	4 : LL	Light Level
5	5 : SL	Principle/slave
6	6 : Fr	FC ratio
7	7 : AC	Actual clock

For reference only. Can not be changed.

CV#	Function/Default Value		CV#	Function/Default Value	
128	1:1 MAXNTHS	134	168	11:1 MAXNTHS	245
129	1:1 ADJMIN	5	169	11:1 ADJMIN	6
130	1:1 ADJHR	47	170	11:1 ADJHR	18
131	1:1 ADJDAY	1	171	11:1 ADJDAY	3
132	2:1 MAXNTHS	195	172	12:1 MAXNTHS	246
133	2:1 ADJMIN	3	173	12:1 ADJMIN	11
134	2:1 ADJHR	54	174	12:1 ADJHR	39
135	2:1 ADJDAY	7	175	12:1 ADJDAY	1
136	3:1 MAXNTHS	216	176	13:1 MAXNTHS	247
137	3:1 ADJMIN	42	177	13:1 ADJMIN	24
138	3:1 ADJHR	36	178	13:1 ADJHR	36
139	3:1 ADJDAY	5	179	13:1 ADJDAY	1
140	4:1 MAXNTHS	226	180	14:1 MAXNTHS	248
141	4:1 ADJMIN	32	181	14:1 ADJMIN	44
142	4:1 ADJHR	57	182	14:1 ADJHR	51
143	4:1 ADJDAY	3	183	14:1 ADJDAY	6
144	5:1 MAXNTHS	232	184	15:1 MAXNTHS	248
145	5:1 ADJMIN	25	185	15:1 ADJMIN	9
146	5:1 ADJHR	10	186	15:1 ADJHR	44
147	5:1 ADJDAY	8	187	15:1 ADJDAY	11
148	6:1 MAXNTHS	236	188	16:1 MAXNTHS	249
149	6:1 ADJMIN	21	189	16:1 ADJMIN	38
150	6:1 ADJHR	18	190	16:1 ADJHR	15
151	6:1 ADJDAY	2	191	16:1 ADJDAY	10
152	7:1 MAXNTHS	239			
153	7:1 ADJMIN	27			
154	7:1 ADJHR	41			
155	7:1 ADJDAY	8			
156	8:1 MAXNTHS	241			
157	8:1 ADJMIN	16			
158	8:1 ADJHR	29			
159	8:1 ADJDAY	8			
160	9:1 MAXNTHS	243			
161	9:1 ADJMIN	34			
162	9:1 ADJHR	12			
163	9:1 ADJDAY	1			
164	10:1 MAXNTHS	244			
165	10:1 ADJMIN	12			
166	10:1 ADJHR	35			
167	10:1 ADJDAY	4			

7 Summary of Configuration Variables

For reference only. Can not be changed.

CV#	Function/Default Value		CV#	Function/Default Value	
1	Output 1 Address	182	41	Pri Input 3 Address	183
2	Display Brightness	255	42	Pri Input 3 Type	3
3	Slave/Master	1	43	Pri Input 3 Transition	2
4	Fast Clock Ratio	3	44	Pri Input 4 Address	184
5	reserved	0	45	Pri Input 4 Type	3
6	reserved	0	46	Pri Input 4 Transition	2
7	Manufacturer Version No.	-	47	reserved	0
8	Manufacturer ID	25	48	reserved	0
9	Output 1 Address Adder	3	49	reserved	0
10	reserved	0	50	reserved	0
11	reserved	0	51	reserved	0
12	reserved	0	52	reserved	0
13	reserved	0	53	reserved	0
14	Output 2 Address	183	54	reserved	0
15	Output 2 Address Adder	3	55	reserved	0
16	Output 3 Address	184	56	reserved	0
17	Output 3 Address Adder	3	57	reserved	0
18	Output 4 Address	185	58	reserved	0
19	Output 4 Address Adder	3	59	reserved	0
20	Output 5 Address	186	60	reserved	0
21	Output 5 Address Adder	3			
22	Output 6 Address	187			
23	Output 6 Address Adder	3	83	Aux Input 1 Address	185
24	Output 7 Address	188	84	Aux Input 1 Type	3
25	Output 7 Address Adder	3	85	Aux Input 1 Transition	2
26	Output 8 Address	189	86	Aux Input 2 Address	186
27	Output 8 Address Adder	3	87	Aux Input 2 Type	3
28	reserved	0	88	Aux Input 2 Transition	2
29	reserved	0	89	reserved	0
30	reserved	0	90	reserved	0
31	reserved	0	91	reserved	0
32	reserved	0	92	Aux Input 4 Address	189
33	reserved	0	93	Aux Input 4 Type	131
34	reserved	0	94	Aux Input 4 Transition	2
35	Pri Input 1 Address	182	95	reserved	0
36	Pri Input 1 Type	3	96	reserved	0
37	Pri Input 1 Transition	2	97	reserved	0
38	Pri Input 2 Address	182			
39	Pri Input 2 Type	131			
40	Pri Input 2 Transition	2			

3 Operation

3.1 Fast Clock
The fast time clock can be set to have a rate or ratio of from 1 : 1 up to 16 : 1. A ratio of 1 : 1 is the same time rate as the actual clock. However, since the time base of the fast clock rates is the microprocessor clock speed and not the 60 HZ standard, the 1 : 1 rate will not keep the exact same time as the actual clock. The time is reset if there is a power failure.

3.2 Duration Clock
The duration clock can be used to measure the time between two actions or event. Connection to the internal 5 pin connector is required to use this feature. When the input is grounded the duration clock starts. The clock can be paused by removing the input from ground. Connecting the input to ground again will cause the clock to resume. To reset the clock to zero press the Select button. The maximum time is 59 minutes and 59 seconds. Once 59:59 is reached the clock starts over.

3.3 Event Counter
The event count can be used to count a number if actions or events. Connection to the internal 5 pin connector is required to use this feature. Each time the input is grounded the event counter will increase by one. To reset the counter to zero press the Select button. The maximum count is 255. Once 255 is reached the counter starts over.

3.4 Light Level
The light level is the display brightness. There are eight levels. The fast clock remembers the setting if there is a power failure.

3.5 Principle/Slave
The fast clock can be set to operate as a principle (master) or slave. The factory default is slave. The fast clock remembers the setting if there is a power failure.

3.6 Fast Clock Ratio
The fast clock ratio or rate determines how much faster the faster clock runs than the actual time. The rate or ratio can be set from 1 : 1 up to 16 : 1. The fast clock remembers the setting if there is a power failure.

3.7 Actual Clock
The actual clock keeps the real or actual time. It's time base is the 60 Hz that comes from the VAC power supply. The time is reset if there is a power failure.

The fast clock time, actual clock time, duration clock and event count can all operate at the same time.

3.8 Remote control
When the serial bus is connected all the features of the fast clock can be controlled by issuing turnout (switch) commands from the throttle. For this reason the range of turnout address from 950 to 959 should be reserved for fast clock operation.

Turnout Command Summary		
Address	**Direction**	**Description**
950	throw (t)	Mode down
950	close (c)	Mode up
951	throw (t)	Select, adjust hours, clear
951	close (c)	Stop adjusting hours
952	throw (t)	Adjust minutes
952	close (c)	Stop adjusting minutes
953	throw (t)	Start/stop duration clock
953	close (c)	Clear duration clock
954	throw (t)	Increment event counter
954	close (c)	Clear event counter
957	close (c)	Restarts fast clock like when power is turned on, no setting are changed

3.9 System Restart
If there is more than one fast clock in use there is the possibility that either the mode or the time could become out of sync. The fast clock can be restarted like at power on by push both the Mode Up and Mode Down buttons at the same time. Optional a turnout command can be issued as shown in section 3.8.

Any settings such as fast clock rate or principle/slave will not be changed. The fast clock and actual clock times will be reset.

4 Configuration Variables (CVs)

The fast clock is configured with CVs. They are programmed at the factory and the user can not change them. Section 7 lists them for a technical reference.

5 Connections

5.1 Power
The power connector is a standard 2.1 mm plug. The fast clock require a 9 VAC power supply with at least 150 ma current rating. The 60 Hz AC voltage is used for the actual clock to maintain it's accuracy.

5.1 Internal Connections
There is a 5 pin screw terminal located inside the fast clock. It is use for the duration clock and event counter. There is also a system restart pin and ground pin. To activate an input connect it to ground

Duration clock
Event counter
N/C
Restart
Ground

Fast Clock circuit board
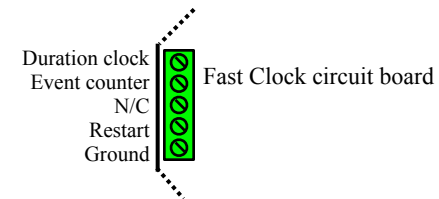
6 Applications

6.1 Principle/Slave
The fast clock can be configured as either a principle (master) or slave.

When a fast clock is set to principle it will send a time sync Loconet message every few minutes. This allows other slave fast clocks to be time synced to the principle. There should only be one unit set as the principle.

If there are multiple units connected via the serial bus, the unit to be set as the principle must be disconnected from the serial bus. If not all the units will respond to the button commands.

The principle unit cannot be synced to another principle unit.

6.2 Time synchronization of Fast Clock
If more than one fast clock is used, it may be desired to set one to be a Principle or master and the other as slave. The fast clock is set from the factory to be a slave. That means that if it is connected to Loconet it will receive time synchronization information from a principle or master. The fast time of the slave will be in sync with the fast time as displayed by the principle. The principle can also be a Digitrax system with fast clock capability or JMRI connected to the serial bus.