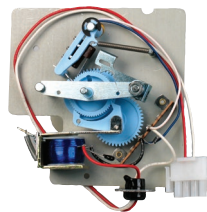
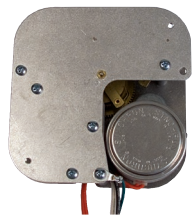
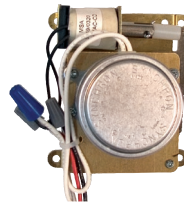
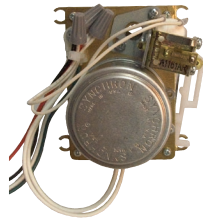
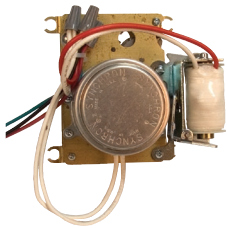


Universal Master Manual

Master/Secondary Clock Protocols

February 2017



Synchronous Wired – Code 01 *AllSync Plus Compatible

120vac/24vac is used to operate the clocks normally. Applying an eight second command signal on the corrective line from 57 minutes, 54 seconds to 58 minutes, 02 seconds will cause an hourly correction. Application of a command on the corrective line from 5:58:02 through 5:58:08 in addition to the hourly correction will result in a twelve hour correction.

Types of secondary clocks covered under this type are as follows:

Cincinnati	*D10, *D12
Simplex & IBM	77* Series, 82* Series, 2310-92* Series, 6310- 2* Series
Latham	Type SS*
Edwards	*010 & *012
Dukane	24SS* Series
Faraday/Standard	2315*, 2316, 2335, 2336, 2370, 2372, 2380, 2382* Series

Synchronous Wired – Code 06 *AllSync Plus Compatible

115vac/24vac is continuously furnished to the clock run motor. 115vac is furnished to the clock correction coil for 55 seconds each hour from XX:58:05 to XX:59:00 to cause hourly corrections. Ten 115vac signals are furnished to the clock correction coil (each for 95 seconds) beginning at 5:05:00, 5:07:00, 5:09:00, 5:11:00, 5:13:00, 5:15:00, 5:17:00, 5:19:00, 5:21:00 and 5:23:00 to cause the 12-hour correction. The final 12-hour signal ends at 5:24:35 (well before the 5:30 lockout).

Types of secondary clocks covered under this type are as follows:

Cincinnati	*D-8, WS*
Honeywell	ST402A*
Faraday/Standard	2310*, 2311*, 2320*, 2321*, 2330*, 2331*, 2313*, 2314*, 2333*, 2334* and 1310 through 1431

National Synchronous – Wired Code 18 *AllSync Plus Compatible

Relay SK1 is normally operated to pass source power through to the clock run motors. Each hour from HH:00:00 to HH:00:28 relay SK2 is operated which passes source power through to the clock correction coils for 28 seconds and causes hourly correction. Every 12 hours from 6:00:00 to 6:27:27 relay SK2 is again operated to pass source power through to the clock correction coils for 27 minutes causing 12 hour correction.

Types of secondary clocks covered under this type are as follows:

National Time	EX-HH and EX-LL
Dukane	240* Series
Rauland	2460 Series

Reference Note: SK1: Normally operates to pass source power through to the clock run motors
SK2: Normally operates to pass source power through to the reset motors or correction mechanism

Note: * indicates prefix or suffix of alpha and/or numeric characters (size, shape, mounting, etc.) that are not relevant to the master clock timing protocol.

Dukane Synchronous Wired – Code 22

During normal operation power (either 115vac or 24vac) is furnished to the clock run motor through relay SK1. Power is removed from the run motor during power failures and while SK1 de-energizes during Fall Daylight Savings changes. Each hour from X:57:00 to X:57:55 relay SK2 energizes to furnish a 24vdc signal to the correction coil. This 55 second signal causes all secondaries to advance to the 58th minute thus synchronizing the seconds and minutes with the master. The 12 hour correction occurs twice daily beginning at 5:59:00. Every other minute from 5:59:00 through 6:19:55 relay SK2 energizes to furnish (11) 55 second 24vdc signals to the clock correction coils (i.e. 5:59:00 to 5:59:55, 6:01:00 to 6:01:55,, 6:19:00 to 6:19:55). These 11 signals cause all secondaries, that are within 11 hours behind, to advance to 5:58:00. Hours, minutes and seconds will be synchronized to the master after the next hourly correction (at 6:58:00). Clocks that were more than 11 hours behind, previous to 12 hour correction, will require two (2) 12 hour corrections to advance to 5:58:00.

Types of secondary clocks covered under this type are as follows:

Dukane 24A*, 24B*, 24C*, 24D* and 24E* Series

Stromberg Synchronous Wired (56th min.) – Code 19

120vac/24vac is used to operate the clocks normally. Relay SK1 is normally operated to supply run motor power. Relay SK2 activates each hour from HH:56:10 to HH:56:18 causing an 8 second signal to be transmitted on the correction line for hourly correction. Relay SK2 activates each 12 hours from 11:56:36 to 11:56:50 causing an additional 14 second signal to be transmitted on the correction line for 12 hour correction.

Types of secondary clocks covered under this type are as follows:

Stromberg WX*

Simplex Straight Frequency – Code 15

Clock correction and bell circuit operations are generated by sequentially applying various frequencies onto the 120vac. A unique frequency is assigned to each bell and clock correction circuit. Each bell and clock correction circuit is provided with a receiver circuit which applies the associated bell or clock frequency (3510 Hz normally used for clock signals). The time sequence of applying the frequencies to the 120vac is shown below and is controlled by the bell and system relays in the master unit:

Relay	From	To
Bell circuit 1	H:MM:00	H:MM:05
Bell circuit 2	H:MM:05	H:MM:10
Bell circuit 3	H:MM:10	H:MM:15
Bell circuit 4	H:MM:15	H:MM:20
Bell circuit 5	H:MM:20	H:MM:25
Bell circuit 6	H:MM:25	H:MM:30
SK2 (hourly correction)	H:57:54	H:58:02
(12 hour correction)	5:57:54	5:58:08
SK1 (hourly correction & 12 hour correction)	H:57:00	H:59:00
(Bells)	35 sec of min previous to Bell	30 sec of Bell time

Note: Bells must be programmed 1 minute ahead of desired time. Bells will be inhibited during the 58th minute and **manual clock corrections**.

Note: * indicates prefix or suffix of alpha and/or numeric characters (size, shape, mounting, etc.) that are not relevant to the master clock timing protocol.

2-Wire Reverse Polarity Minute Impulse (59th min.) – Code 07

From the 58th second to 00 seconds each minute, a 24vdc pulse is transmitted to the secondary clocks. From the 59th minute through the 49th minute the pulse is transmitted with line AB positive with respect to PC. From the 50th minute to the 59th minute the pulse is transmitted with line AB negative with respect to PC. Clocks which are fast and reach the 59th minute ahead of the master will stop since, at this time, they will respond only to pulses transmitted with line AB positive with respect to PC. During the 59th minute from 10 seconds through the 50th second a total of 20 rapid pulses are transmitted to advance all slow clocks. During the rapid pulsing line AB is negative with respect to PC.

Types of secondary clocks covered under this type are as follows:

Lathem	Type ISC* (2-wire hourly only correction)
Cincinnati Model	*D3
Edwards	*03
Faraday	2373* Series, 2383* Series
Simplex	2310-90* Series, 6310-90* Series

2-Wire Reverse Polarity Minute Impulse (59th min.) with 12 Hour Correction – Code 12

Normal pulsing will be sent out on lines A & C from second 58 through second 00 each minute. From minute 59 through minute 49, line A will be positive with respect to line C. From minute 50 through minute 58, except from 4:49 through 5:55 AM & PM, line C will be positive with respect to line A. To provide hourly corrections, 20 rapid pulses occurring at a 0.5 Hz rate are transmitted on lines A & C, line C positive with respect to line A, during the 59th minute of each hour from second 10 through second 50. To provide twelve hour corrections, 20 rapid pulses occurring at a 0.5 Hz rate are transmitted from second 10 through second 54 of each minute from 5:00:10 through 5:30:54 AM & PM.

Types of secondary clocks covered under this type are as follows:

Cincinnati	*D6
Edwards	*06
Faraday	2376*, 2386*

Standard Electric Time AR-2 2-Wire Dual Voltage – Code 17

Each minute from 58 seconds to 00 seconds a pulse of low voltage (24vdc) will be transmitted. The secondary clocks will receive the pulses until the 58th minute. At this time from 50 seconds to 00 seconds a higher voltage pulse (48vdc) will be required to advance to the hour.

Note: * indicates prefix or suffix of alpha and/or numeric characters (size, shape, mounting, etc.) that are not relevant to the master clock timing protocol.

Standard Electric Time AR-2A 2-Wire Dual Voltage – Code 04

Each minute from 58 seconds to 00 seconds a pulse of low voltage (24vdc) will be transmitted. The secondary clocks will receive the pulses until the 59th minute. At this time from 50 seconds to 00 seconds a higher voltage pulse (48vdc) will be required to advance to the hour.

Types of secondary clocks covered under this type are as follows:

Standard Electric Time SWC-2-1 through SWC-2-10

Cincinnati D-1 – Code 21

Each minute from 58" to 00" either a 24vdc or 60vdc pulse is transmitted on line A to advance the secondary clocks. From the 2nd minute through the 58th minute a 24vdc pulse is transmitted on line A. A 60vdc pulse is transmitted from the 59th minute through the first minute. Hourly correction occurs during the 59th minute through the first minute from 10" to 50". During each minute of the 3 minute correction period, twenty 24vdc pulses (one second ON and one second OFF) are transmitted on line A to advance all clocks which are not at the 59th minute. Clocks which are at the 59th minute will respond only to the 60vdc pulses.

Types of secondary clocks covered under this type are as follows:

Cincinnati *D1

2-Wire Reverse Polarity Minute Impulse (59th min.) with 12 Hour Correction – Code 38

Each hour from the 59th minute through the 49th minute a 2 second pulse starting at the 58th second and ending at 00 seconds will be transmitted on both the AB and PC (with AB positive with respect to PC) causing all clocks to advance each minute. From the 50th minute to the 59th minute, transmission will be such that PC is positive with respect to AB. Clocks which are less than 10 minutes fast will stop at the 59th minute since their SR contacts transfer and require a pulse with AB positive with respect to PC to advance at this time. Each hour, starting at the 59th minute and 10 seconds, a total of 20 rapid pulses will be transmitted with line PC positive with respect to AB. Clocks which are slow will be advanced at this pace. Each 12 hour period from 6:02 through 6:34, twenty-three (23) rapid pulses will be transmitted each minute, line PC positive with respect to line AB, with transmission starting at 10 seconds after and ending at 55 seconds after. Clocks which are more than 1 hour slow will be rapidly advanced to correct time.

Types of secondary clocks covered under this type are as follows:

Lathem ISC* (with 12 hour correction installed)

Note: * indicates prefix or suffix of alpha and/or numeric characters (size, shape, mounting, etc.) that are not relevant to the master clock timing protocol.

Pulse Alternating (24vdc)

No correction available on SiteSyncIQ or AllSync. Contact technical support for possible alternative.

Each minute from 59 seconds to 00 seconds a 24vdc signal is applied on lines A or B causing the wall clocks to advance one minute. The polarity of the pulse is alternated each minute to cause A to be positive with respect to B one minute, then B positive with respect to A the next minute, etc. During power failures pulses shall not be issued to the clocks; however, the master shall accumulate the number of minutes lost. Upon power restoration, the master shall rapidly issue pulses, 30 per minute, to correct the clocks.

Types of secondary clocks covered under this type are as follows:

Franklin	Mark 5M BIPI
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3-Wire Minute Impulse (59th min.) – Code 02

From the 58th second to 00 seconds each minute a 24vdc pulse is transmitted to the secondary clocks. From the 59th minute through the 49th minute the pulse is transmitted on both the A and B lines. From the 50th minute to the 59th minute the pulse is transmitted on the A line only. Clocks which are fast and reach the 59th minute ahead of the master will stop since, at this time, they will respond only to pulses transmitted on the B line. During the 59th minute from 10 seconds through the 50th second a total of 20 rapid pulses are transmitted on the A line to advance all slow clocks.

Types of secondary clocks covered under this type are as follows:

Lathem	Type ISC* (3-wire hourly only correction)
Cincinnati	*D2, *D4
Edwards Impulse	*02, *04
Simplex & IBM	55*, 75* & 80* Series; 2310-90* Series, 6310-90* Series

Minute Impulse (44th min.)

No correction available on SiteSyncIQ or AllSync. Contact technical support for possible alternative.

From the 58th second to 00 seconds each minute a 24vdc pulse is transmitted to the secondary clocks. From the 44th minute through the 34th minute the pulse is transmitted on both the A and B lines. From the 35th minute to the 44th minute the pulse is transmitted on the A line only. Clocks which are fast and reach the 44th minute ahead of the master will stop since, at this time, they will respond only to pulses transmitted on the B line. During the 44th minute from 10 seconds through the 50th second a total of 20 rapid pulses are transmitted on the A line to advance all slow clocks.

Note: * indicates prefix or suffix of alpha and/or numeric characters (size, shape, mounting, etc.) that are not relevant to the master clock timing protocol.

3-Wire Minute Impulse (58th min.) – Code 05

From the 58th second to 00 seconds each minute a 24vdc pulse is transmitted to the secondary clocks. From the 58th minute through the 48th minute the pulse is transmitted on both the A and B lines. From the 49th minute to the 58th minute the pulse is transmitted on the A line only. Clocks which are fast and reach the 58th minute ahead of the master will stop since, at this time, they will respond only to pulses transmitted on the B line. During the 58th minute from 10 seconds through the 50th second a total of 20 rapid pulses are transmitted on the A line to advance all slow clocks.

3-Wire Minute Impulse (59th min.) with 12 Hour Correction – Code 16

Each hour from the 59th minute through the 49th minute a 2 second pulse starting at the 58th second and ending at 00 seconds will be transmitted on both the A and B lines causing all clocks to advance each minute. From the 50th minute to the 59th minute, transmission will be on the A line only. Clocks which are less than 10 minutes fast will stop at the 59th minute since they transfer to the B line at this time. Each hour starting at the 59th minute and 10 seconds a total of 20 rapid pulses will be transmitted on the A line. Clocks which are slow will be advanced at this pace. Each 12 hour period from 6:02 through 6:34, twenty-three (23) rapid pulses will be transmitted each minute on the A line, with transmission starting at 10 seconds after and ending at 55 seconds after. Clocks which are more than 1 hour slow will be rapidly advanced toward correct time.

Types of secondary clocks covered under this type are as follows:

Lathem ISC* (with 12 hour correction installed)

Electric Time AR-3 Three-wire Impulse

Each minute from the 58th second to 00 seconds a 24vdc pulse is transmitted on line A until the 58th minute. During the 58th minute from 50" to 00" the pulse is transmitted on line B to advance clocks to the 59th minute.

Standard Electric Dual-Motor Code 03 *AllSync Plus Compatible

120vac/24vac applied to the run motor will cause normal operation. A 15 minute correction signal on the correction motor line will cause a 12 hour correction from 5:12:00 to 5:28:00. This will occur twice daily (AM and PM). Run motor power is connected during the 12 hour correction. A 29 second signal is applied to the correction motor line from XX:59:30 to XX:59:59 to cause hourly corrections. During hourly corrections, power is disconnected from the run motor line.

Types of secondary clocks covered under this type are as follows:

Standard Electric Time CR & GRC 109106 through 109155, J109106 through J109155 and
105047 through 105066
Faraday 2420 through 2431 Series

Note: * indicates prefix or suffix of alpha and/or numeric characters (size, shape, mounting, etc.) that are not relevant to the master clock timing protocol.

Simplex 59th Minute Dual-Motor – Code 09

Normally power is applied to the 1rpm run motor. Each hour from HH:58:05 through HH:58:59, power is removed from the 1rpm run motor and applied to the fast advance motor.

Simplex 45th Minute Dual-Motor – Code 10

Normally power is applied to the 1rpm run motor. Each hour from HH:44:05 through HH:44:59, power is removed from the 1rpm run motor and applied to the fast advance motor.

“Auto-Set” Dual-Motor - Type E-1

No correction available on SiteSyncIQ or AllSync. Contact technical support for possible alternative.

During normal operation, 115vac is applied between the run motor and common lines to operate the clocks until the 58th minute. At HH:58:00 of each hour the 115vac is replaced by 115vdc between the correction and common lines for a period of 200ms with the common line being positive. This pulse initiates hourly corrections to correct clocks which are less than 60 minutes slow. At 5:58:09AM and PM an additional 115vdc 200ms pulse is transmitted to cause correction of clocks which are slow 60 minutes or more.

Types of secondary clocks covered under this type are as follows:

Edwards

2700 Series

Note: * indicates prefix or suffix of alpha and/or numeric characters (size, shape, mounting, etc.) that are not relevant to the master clock timing protocol.