

INSTALLATION MANUAL FOR FIELD SELECTABLE ANALOG CLOCKS SAA SERIES



SPECIFICATIONS

- Time base: 60 Hz (3-wire system)
Quartz (2-wire system)
- Power input: 85 . 135 VAC / 60 Hz
7 . 28 VAC / 60 Hz
- Current consumption:
- 15 mA @110 VAC
20 mA @ 24 VAC
- Correction: 10 mA (current consumption)
- Display: 12 hour format. Hour, minute and second hands
- Color: Standard Black (custom colors available)
- Clock Size: 12+diameter, 1.3+ depth. 16+diameter, 1.6+depth
- Case: Shallow profile, smooth surface metal case
- Crystal: Shatter-proof, side molded polycarbonate crystal in 12+and 16+
- Compliance: UL, cUL listed and FCC approved

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DIGITAL COMMUNICATION 3-WIRE SYSTEM

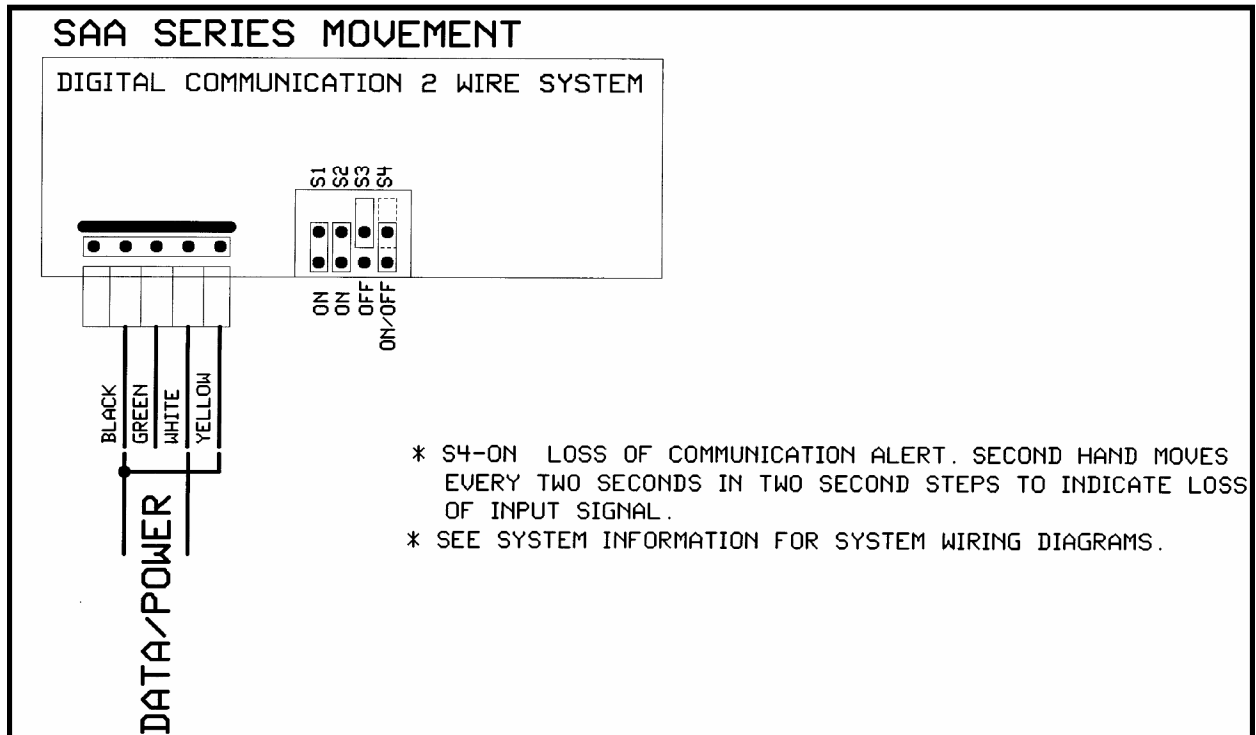
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SAA SERIES WIRING INFORMATION

Digital Communication 2-Wire System



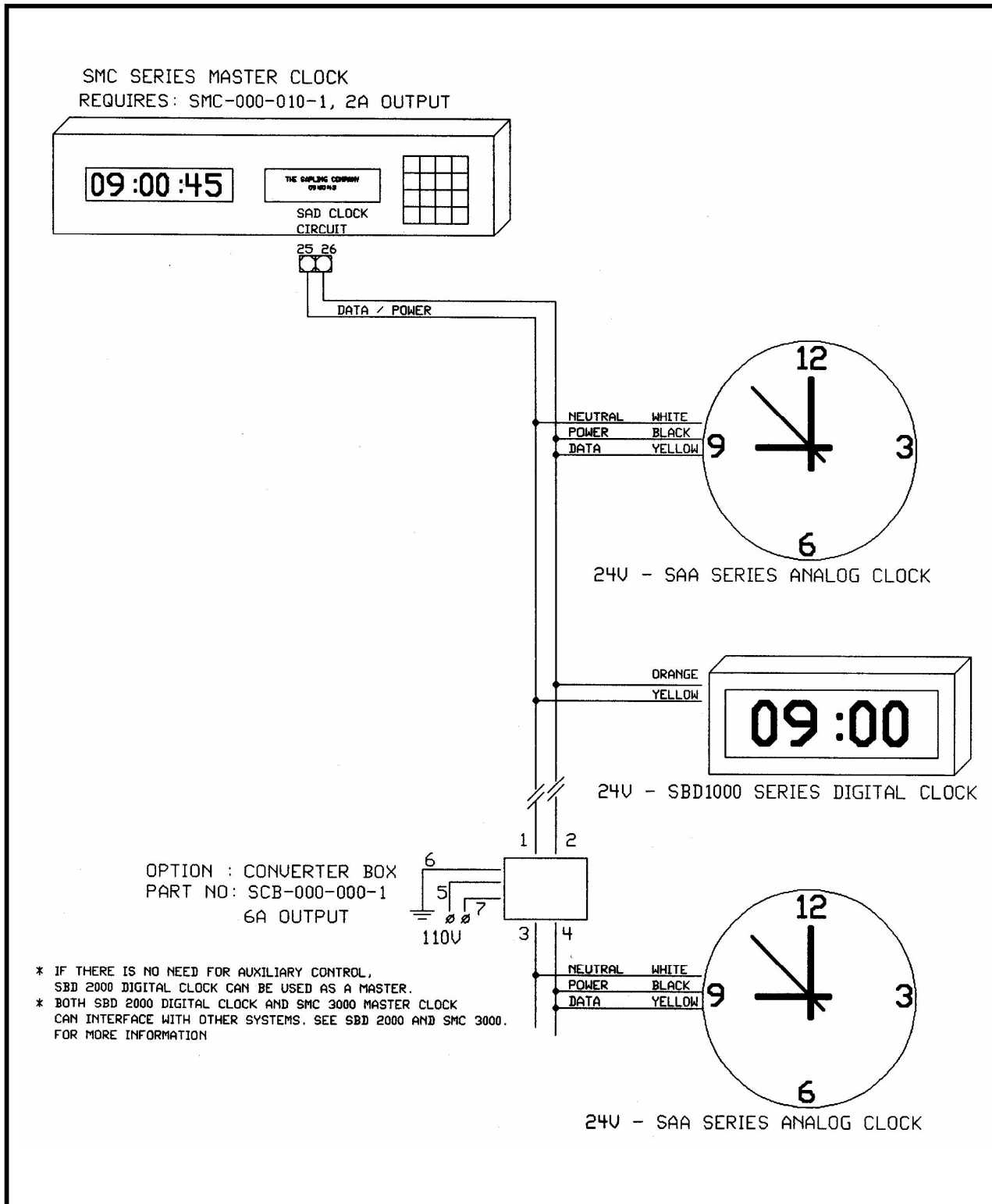
DESCRIPTION

The Sapling 2-Wire Digital Communication system provides immediate correction for time changes. It allows the user to mix Sapling's SAA analog clocks and digital clocks on the same two wires. The Digital Communication system runs on 24 volt power. In order to generate the necessary voltage, a Sapling converter box (part # SCB-000-000-1) is required, or if using an SMC series master clock, the optional 24 volt power supply (part # SMC-000-010-1) must be installed.

For System Wiring Diagram, see pages 4, 5 and 6.
For answers to Frequently Asked Questions, see page 7.
For Troubleshooting Answers, see page 8.
For Installation Instructions, see pages 21 and 22.

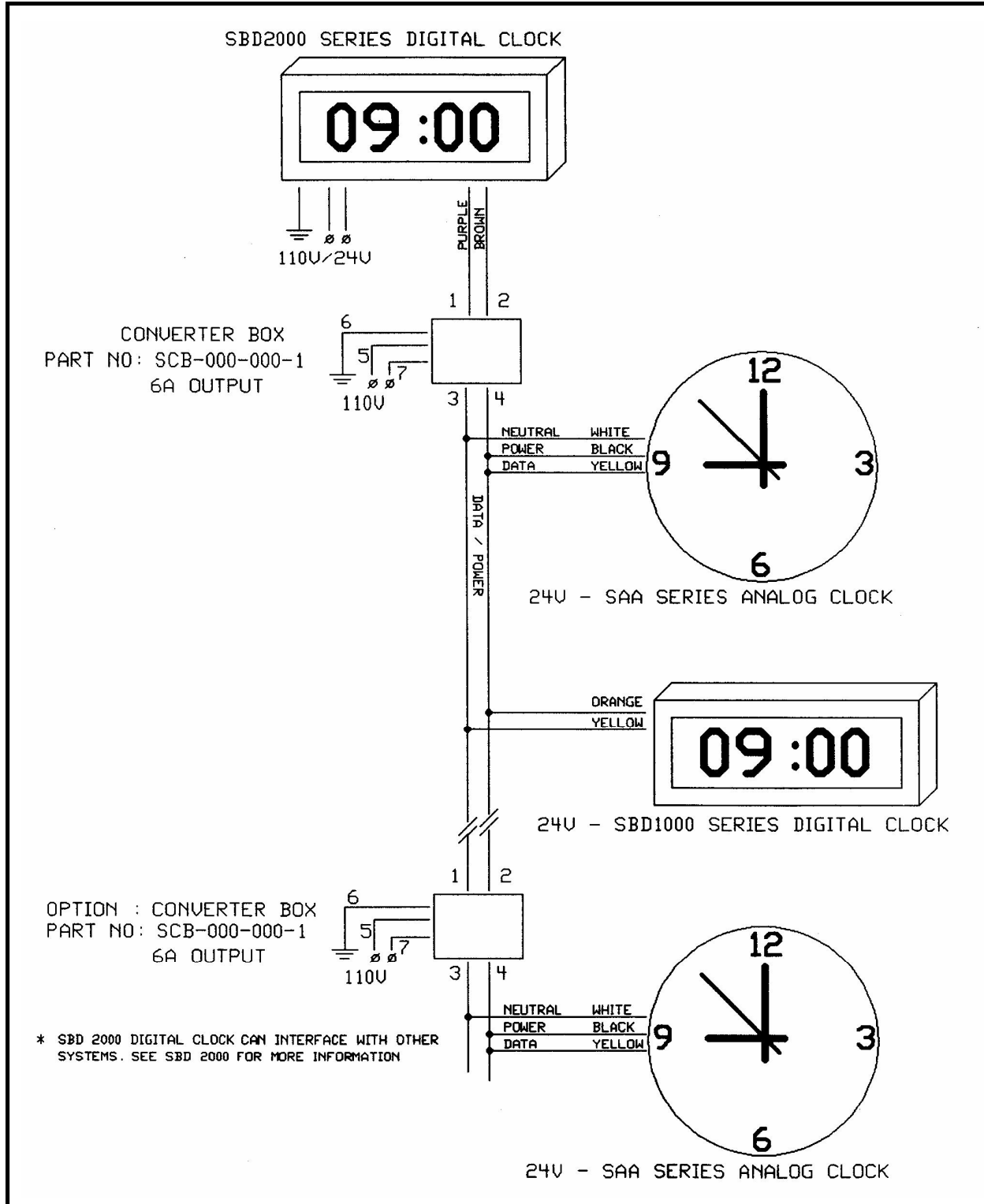
2-WIRE DIGITAL COMMUNICATION SYSTEM WIRING INFORMATION

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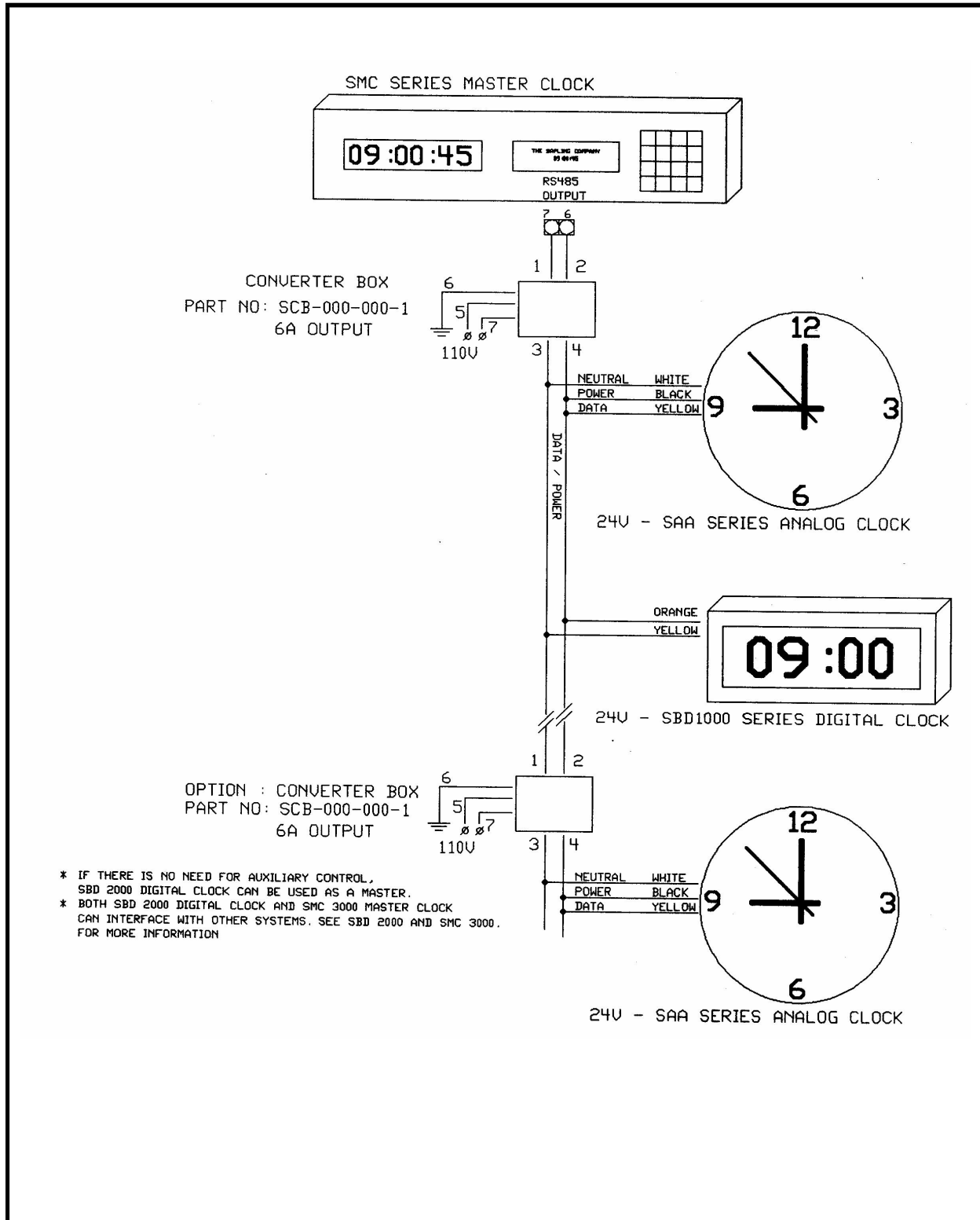
2-WIRE DIGITAL COMMUNICATION SYSTEM WIRING INFORMATION

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2-WIRE DIGITAL COMMUNICATION SYSTEM WIRING INFORMATION

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1. **Do I need to power up all the clocks at the same time?**
No, you do not have to power up all the clocks at the same time. Clocks that are connected at the time of system power up will begin running and receiving correction signals from the master clock. Clocks that are added to the system after the initial power up should be set to 12:00 (see question #2 below).
2. **I'm adding a new clock into a working system, do I have to set the entire system back to 12:00?**
No. Set only the new additional clock to 12:00. This clock will reset itself automatically upon receiving a reset signal from the Master Clock. **DO NOT SET THE ADDITIONAL CLOCK TO THE SYSTEM TIME.** Set it to 12:00 prior to installation.
3. **The clock has been powered and running and I would like to reset the clock back to 12:00. How do I do this?**
In order to correctly set the clock to 12:00, you **MUST** first set the second hand by pressing the button on the side of the movement until the second hand reaches 12:00. You must reset the second hand even if the second hand is already set on 12:00. Afterwards set the hour and minute hands to 12:00 using the hour and minute set knob.
4. **Do I need to reset the clocks to 12:00 after a power failure?**
No. All the system clocks will automatically adjust themselves to the correct time upon receiving a correction signal from the master clock after a power failure.
5. **What happens after powering up the clocks?**
After the clocks accept the communication signal from the master clock, each individual clock will determine the fastest way to adjust to the correct time. The clock may run faster to catch up to the system time, or it may stop running and wait, and then begin operating again once the system time matches the displayed time on the clock.

If jumper # 4 is in the ON position (a jumper is connected to both pins) and the clock does not receive a correction signal from the master clock for 300 consecutive seconds, the clock will signal this loss of communication by moving the second hand once every two seconds in two second increments. To disable this feature, simply remove the pin from jumper #4, thereby setting it to an OFF position.

2-WIRE DIGITAL COMMUNICATION SYSTEM TROUBLESHOOTING:

1. The clock is not running, what do I do?

- a) Make sure your installation includes a converter box (SCB-000-000-1) or a SMC Series Master Clock with the 50 watt power supply (SMC-000-010-1).
- b) Measure the voltage between the power (black) wire and the neutral (white) wire. The voltage should measure 10-36 volts rms.
- c) Make sure the ground wire is not touching other wires.
- d) Make sure the dip switches are set in the correct pattern for the 2-wire system. Jumper pins #1 and #2 should be connected. Pin #3 is not connected, and Pin #4 is optional.

If you fail to follow the instructions in (b), the fuses can be blown.

2. The clock is not receiving a reset signal from the Master Clock, what do I do?

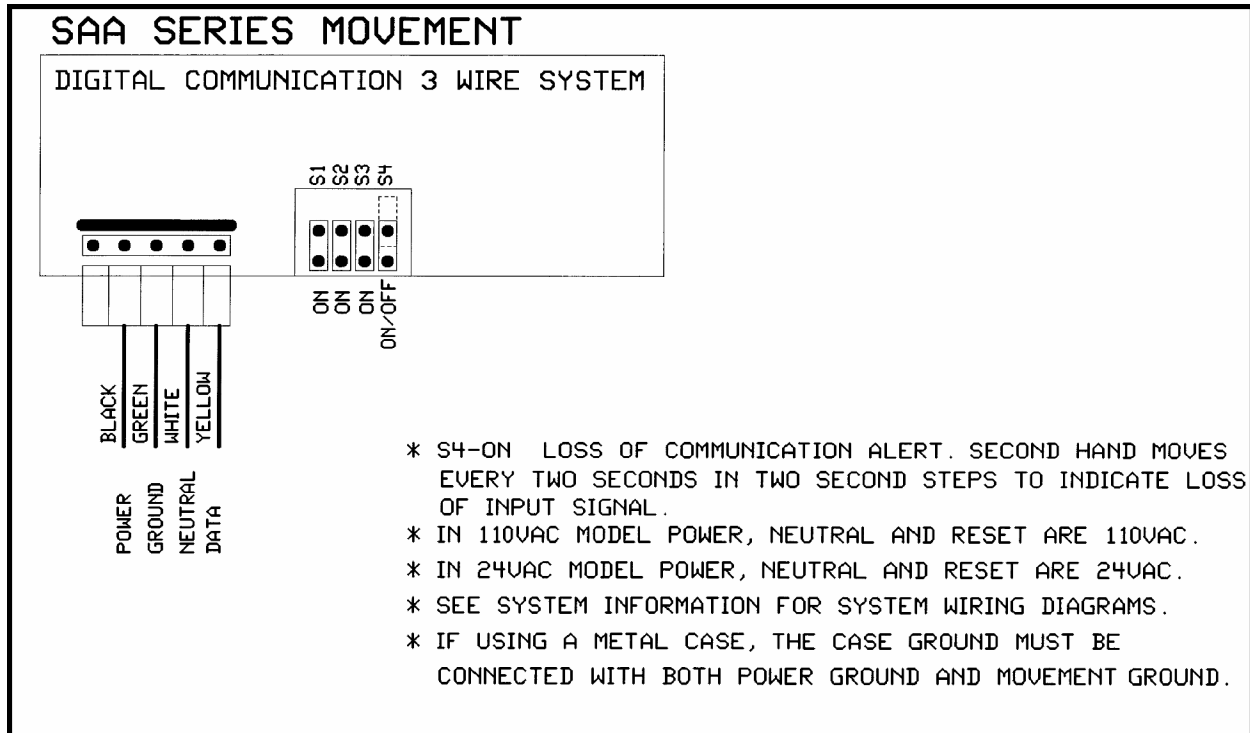
- a) Make sure that the yellow reset wire is securely connected to the black power wire. The voltage between the yellow reset wire and the white neutral wire must measure between 10-36 volts rms.
- b) Make sure that the wires coming from the master clock and power supply are in the right polarity. If the polarity is reversed, the clock will run at normal speed, but will receive a correction signal.

3. There is data noise bleeding into the intercom line, what do I do?

Reduce the transmission rate from the master clock to once a minute.

SAA SERIES WIRING INFORMATION

Digital Communication 3-Wire System

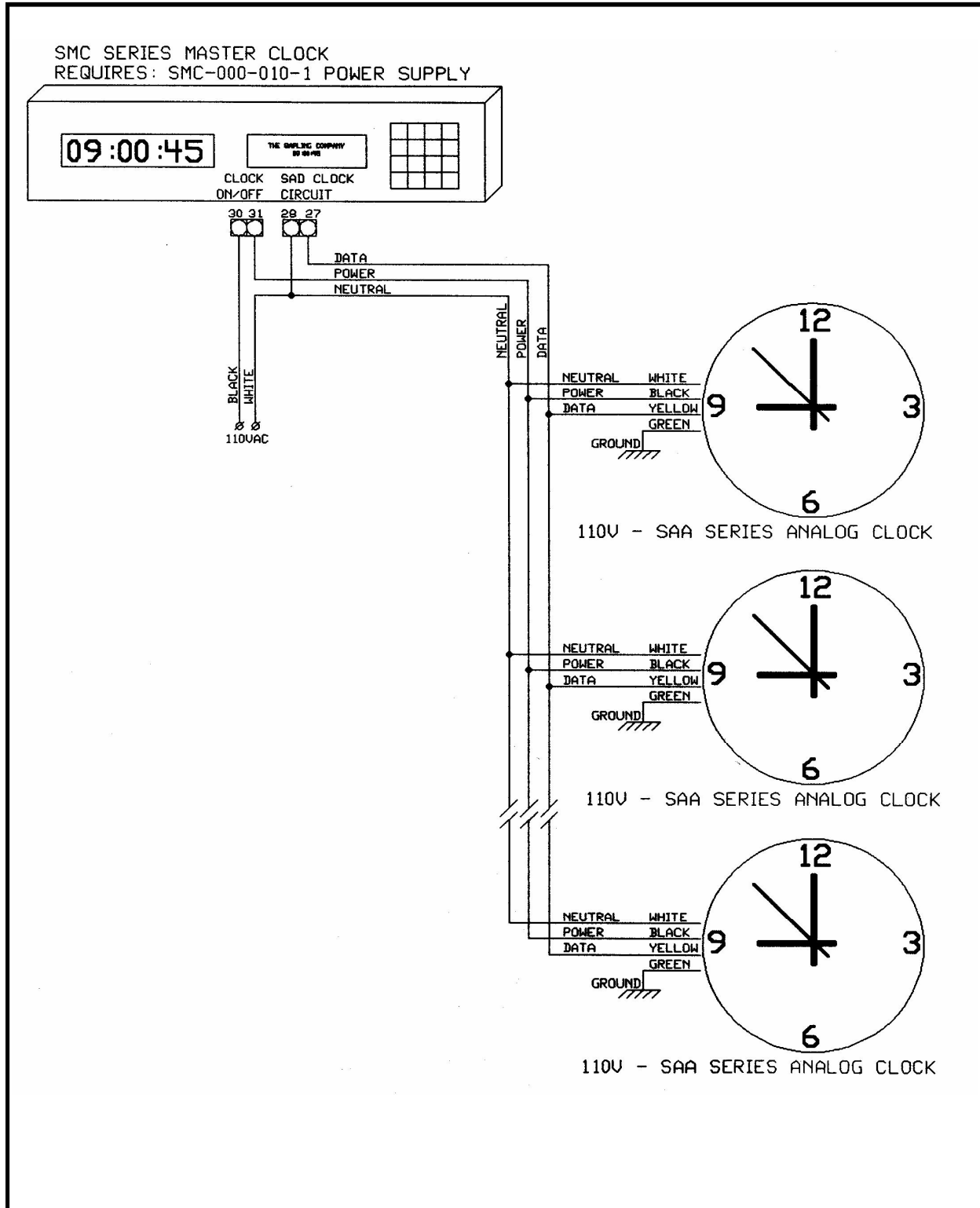


DESCRIPTION

The Digital Communication system provides immediate correction for time changes. The Digital Communication system runs on 110 VAC or 24 VAC and can use Sapling 2000 or 3000 series master clocks that require 24 volt power supply (part # SMC-000-010-1).

For System Wiring Diagram, see pages 10 and 11.
 For answers to Frequently Asked Questions, see page 12.
 For Troubleshooting Answers, see page 13.
 For Installation Instructions, see pages 21 and 22.

3-WIRE DIGITAL COMMUNICATION SYSTEM 110 VOLT WIRING INFORMATION



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3-WIRE DIGITAL COMMUNICATION SYSTEM

Frequently Asked Questions



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1. **Do I need to power up all the clocks at the same time?**
No, you do not have to power up all the clocks at the same time. Clocks that are connected at the time of system power up will begin running and receiving correction signals from the master clock. Clocks that are added to the system after the initial power up should be set to 12:00 (see question #2 below).
2. **I'm adding a new clock into a working system, do I have to set the entire system back to 12:00?**
No. Set only the new additional clock to 12:00. This clock will reset itself automatically upon receiving a reset signal from the Master Clock. **DO NOT SET THE ADDITIONAL CLOCK TO THE SYSTEM TIME.** Set it to 12:00 prior to installation.
3. **The clock has been powered and running and I would like to reset the clock back to 12:00. How do I do this?**
In order to correctly set the clock to 12:00, you **MUST** first set the second hand by pressing the button on the side of the movement until the second hand reaches 12:00. You must reset the second hand even if the second hand is already set on 12:00. Afterwards set the hour and minute hands to 12:00 using the hour and minute set knob.
4. **Do I need to reset the clocks to 12:00 after a power failure?**
No. All the system clocks will automatically adjust themselves to the correct time upon receiving a correction signal from the master clock after a power failure.
5. **What happens after powering up the clocks?**
After the clocks accept the communication signal from the master clock, each individual clock will determine the fastest way to adjust to the correct time. The clock may run faster to catch up to the system time, or it may stop running and wait, and then begin operating again once the system time matches the displayed time on the clock.

If jumper # 4 is in the ON position (a jumper is connected to both pins) and the clock does not receive a correction signal from the master clock for 30 consecutive seconds, the clock will signal this loss of communication by moving the second hand once every two seconds in two second increments. To disable this feature, simply remove the pin from jumper #4, thereby setting it to an OFF position.

3-WIRE DIGITAL COMMUNICATION SYSTEM

Troubleshooting:

1. The clock is not running, what do I do?

- a) Measure the voltage between the power (black) wire and the neutral (white) wire. The voltage should measure 85-135 volts in the 110 volt model or 7-28 volts in the 24 volt model.
- b) Make sure the transformer is an **isolated** transformer if using a 24 volt model.
- c) Make sure the ground wire is not touching other wires.

If you fail to follow the instructions in b and c listed above, the fuses can be blown.

- d) Make sure the dip switches are set in the correct pattern for the 3-wire system. Jumper pins #1, #2 and #3 should be connected. Pin #4 is optional.

2. The clock is not receiving a reset signal from the Master Clock, what do I do?

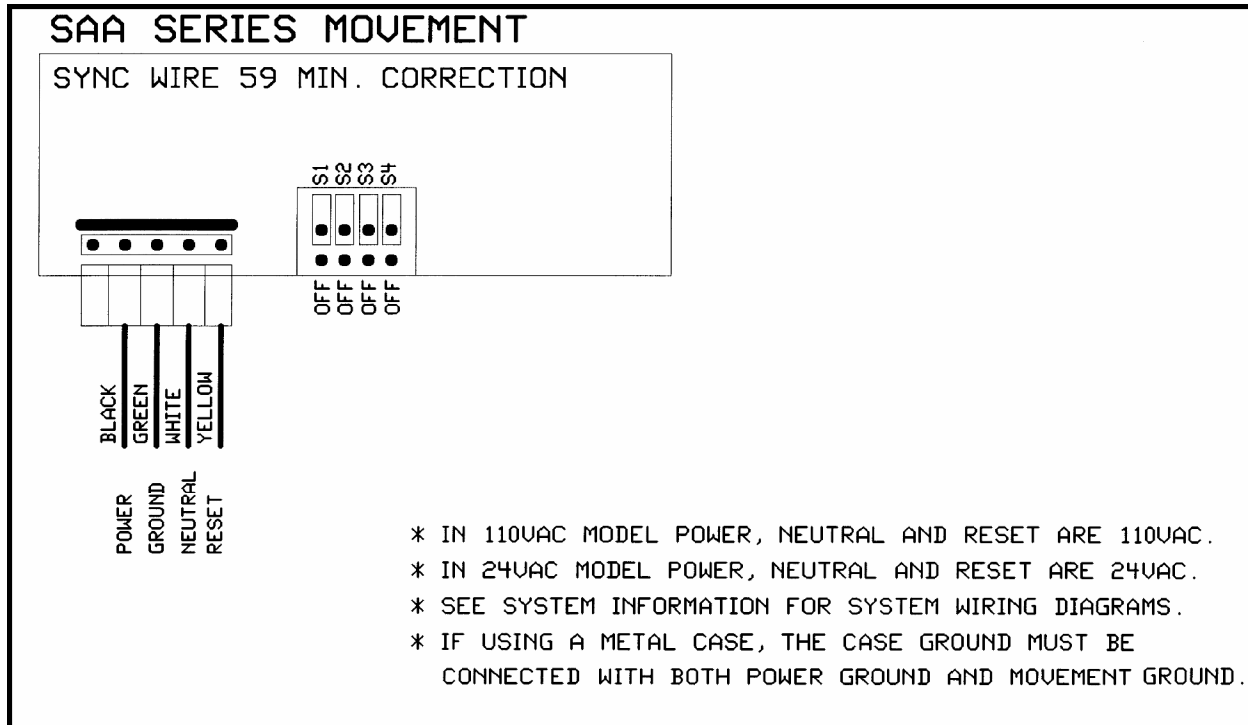
- a) Make sure there is a 50 watt power supply (SMC-000-010-1) installed in SMC Series Master Clock.
- b) Make sure that the voltage between the yellow reset wire and the white neutral wire varies between 0 volts ó 24 volts.
- c) Make sure that the wires coming from the master clock and power supply are in the right polarity. If the polarity is reversed, the clock will run at normal speed, but will not receive a correction signal.

3. There is data noise bleeding into the intercom line, what do I do?

Reduce the transmission rate from the master clock to once a minute

SAA SERIES WIRING INFORMATION

Synchronous Wire 59 Min Correction



DESCRIPTION

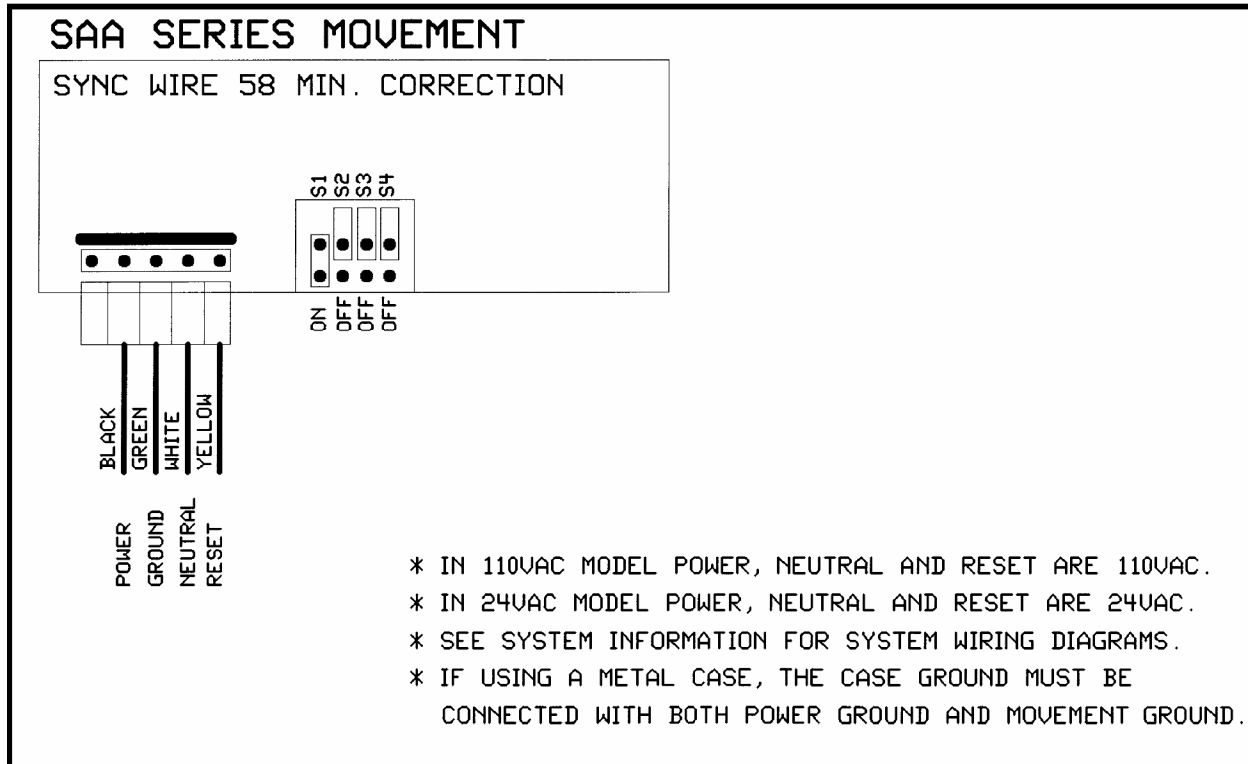
SAA 59 MINUTE CORRECTION

110 VAC/24 VAC 60 Hz is used to run the clock normally. Applying an 8 second reset signal from 57 minutes and 54 seconds will cause an hourly correction. Applying a 14 second reset signal from 5:57:54 will cause a daily correction.

For System Wiring Diagram, see pages 17 and 18.
 For answers to Frequently Asked Questions, see page 19.
 For Troubleshooting Answers, see page 20.
 For Installation Instructions, see pages 21 and 22.

SAA SERIES WIRING INFORMATION

Synchronous Wire 58 Min Correction



DESCRIPTION

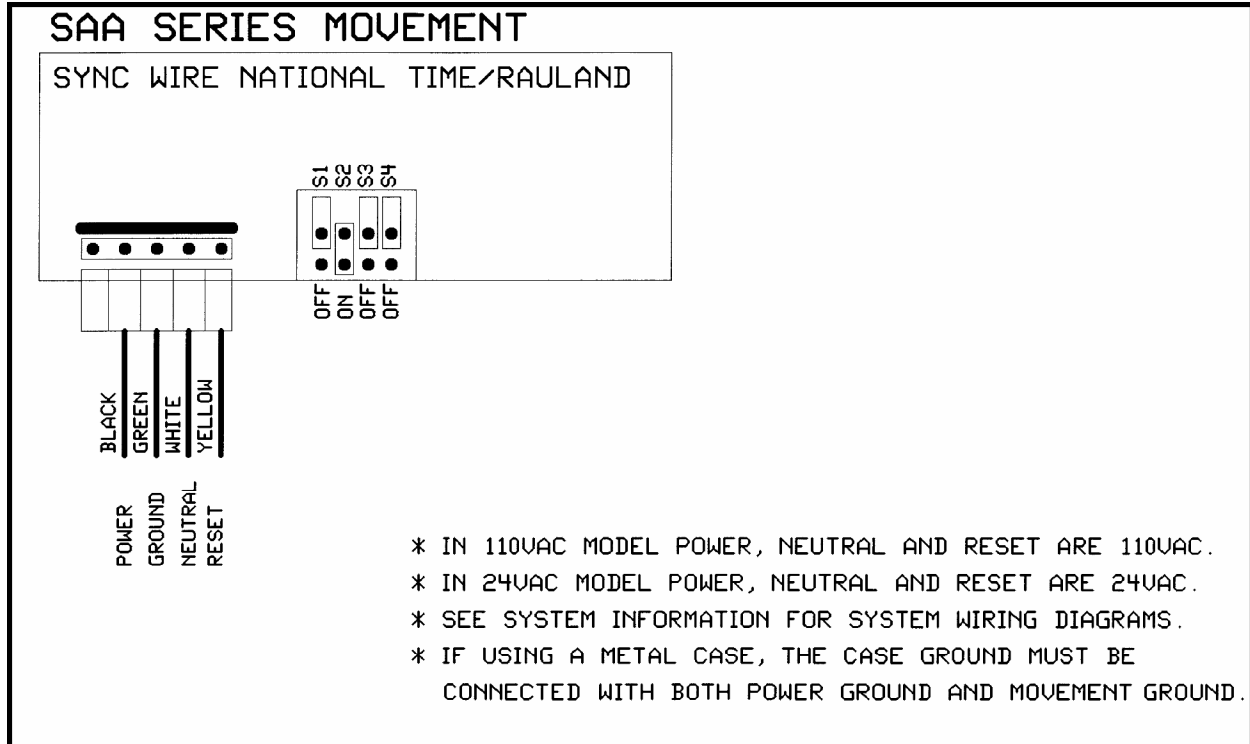
SAA 58 MINUTE CORRECTION

110 VAC/24 VAC 60 Hz is used to run the clock normally. Applying a 55 second reset signal from 58 minutes and 05 seconds will cause an hourly correction. Applying a 55 second reset signal when hours equal 05 or 17 and minutes equal 03, 07, 11 15, 19 ,23 31, 35, 43 and 47 and seconds equals 05 will cause a daily correction.

For System Wiring Diagram, see pages 17 and 18.
 For answers to Frequently Asked Questions, see page 19.
 For Troubleshooting Answers, see page 20.
 For Installation Instructions, see pages 21 and 22.

SAA SERIES WIRING INFORMATION

Synchronous Wire, National Time and Rauland Correction



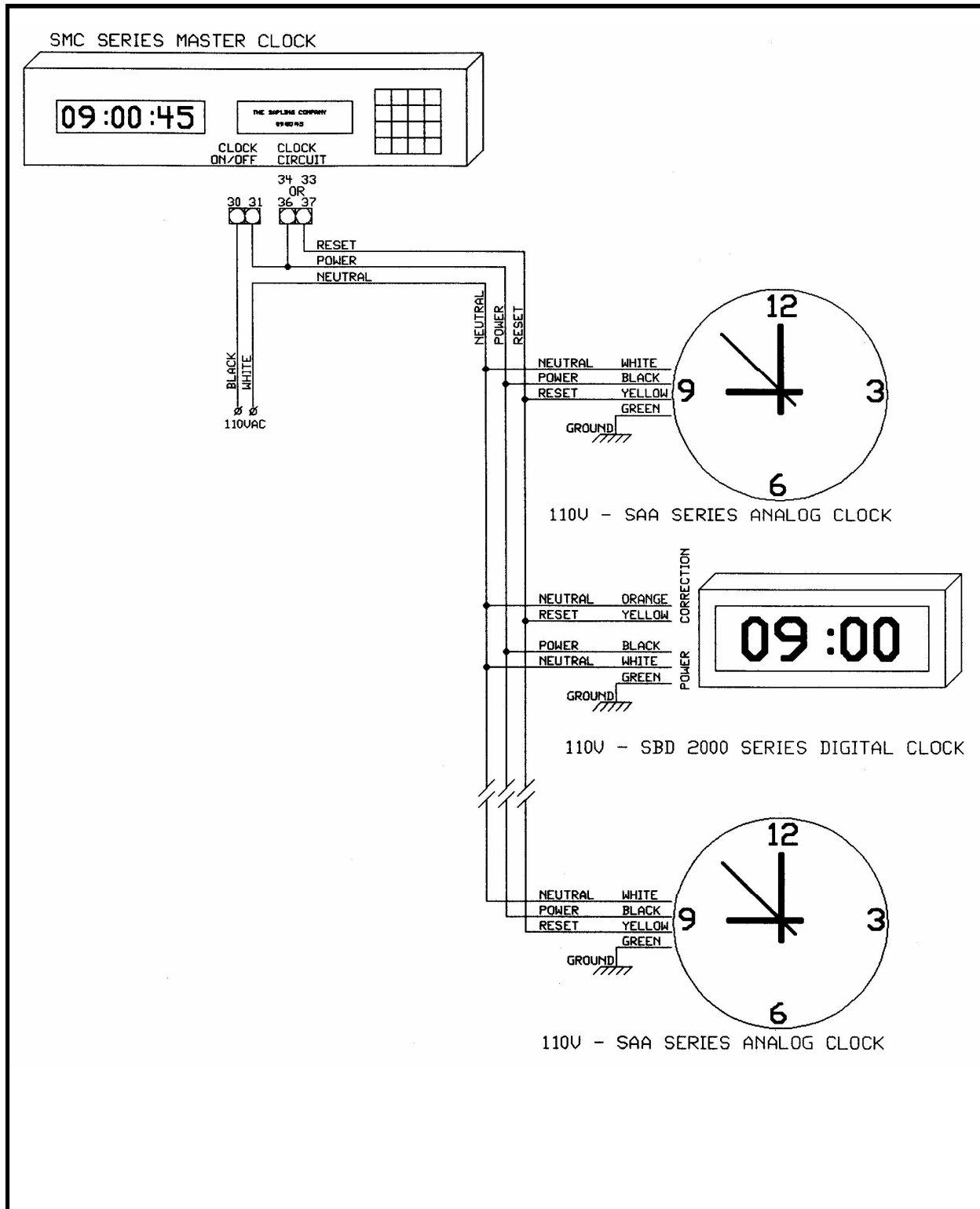
DESCRIPTION

SAA NATIONAL TIME AND RAULAND CORRECTION

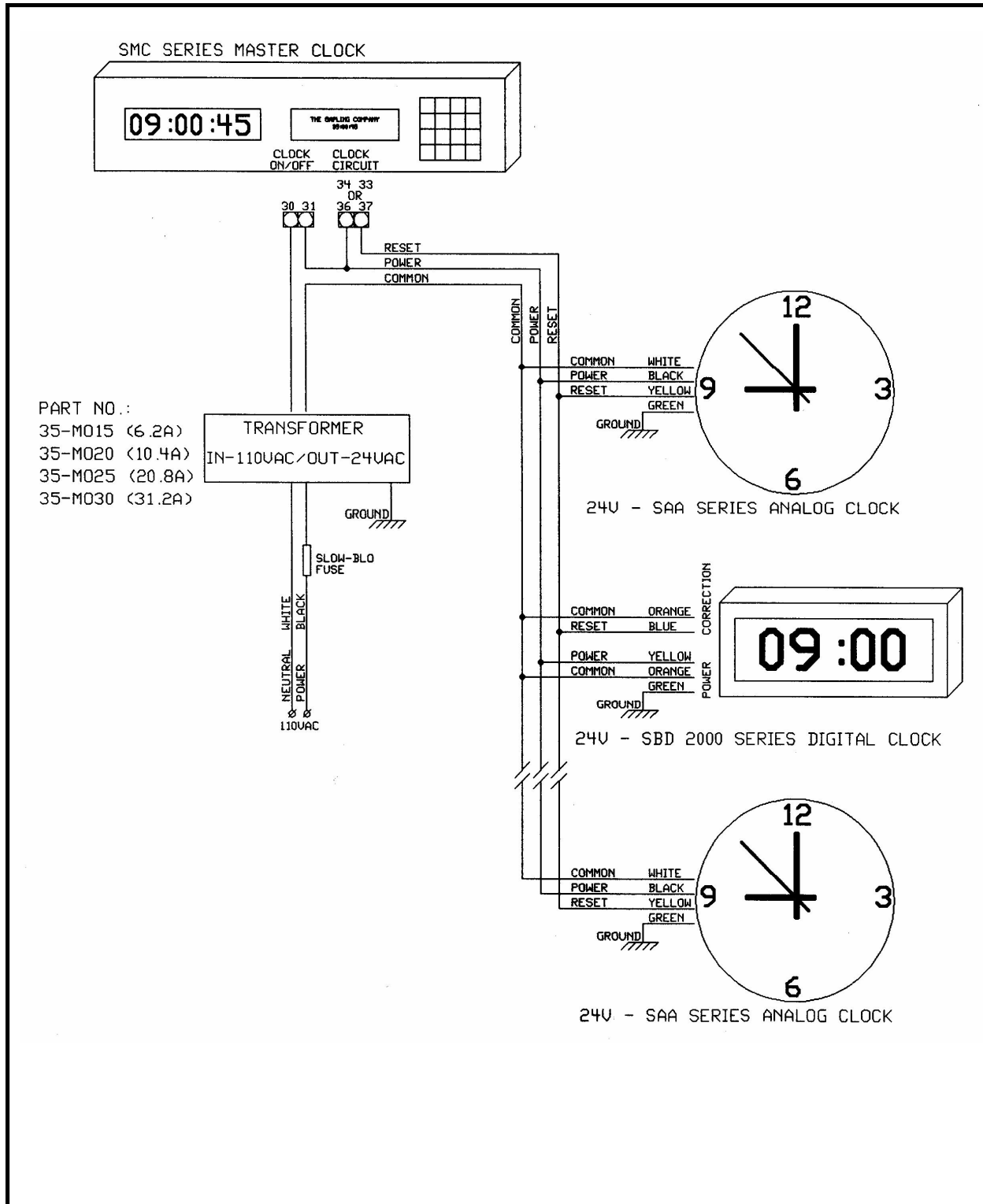
110 VAC/24 Vac 60 Hz is used to run the clock normally. Applying a 25 second reset signal when minutes equal 00 and seconds equal 00 will cause an hourly correction. Applying a 24 minute reset signal when hours equal 06 or 18 and minutes equal 00 and second equals 25 will cause a daily correction.

For System Wiring Diagram, see pages 17 and 18.
 For answers to Frequently Asked Questions, see page 19.
 For Troubleshooting Answers, see page 20.
 For Installation Instructions, see pages 21 and 22.

SYNC-WIRE SYSTEM 110 VOLT WIRING INFORMATION



SYNC-WIRE SYSTEM 24 VOLT WIRING INFORMATION



SYNC-WIRE SYSTEM

Frequently Asked Questions

1. **Do I need to power up all the clocks at the same time?**
No, you do not have to power up all the clocks at the same time. Clocks that are connected at the time of system power up will begin running and receiving correction signals from the master clock. Clocks that are added to the system after the initial power up should be set to 12:00 (see question #2 below).
2. **I'm adding a new clock into a working system, do I have to set the entire system back to 12:00?**
No. Set only the new additional clock to 12:00. This clock will reset itself automatically upon receiving a reset signal from the Master Clock. **DO NOT SET THE ADDITIONAL CLOCK TO THE SYSTEM TIME.** Set it to 12:00 prior to installation.
3. **The clock has been powered and running and I would like to reset the clock back to 12:00. How do I do this?**
In order to correctly set the clock to 12:00, you **MUST** first set the second hand by pressing the button on the side of the movement until the second hand reaches 12:00. You must reset the second hand even if the second hand is already set on 12:00. Afterwards set the hour and minute hands to 12:00 using the hour and minute set knob.
4. **Do I need to reset the clocks to 12:00 after a power failure?**
No. All the system clocks will automatically adjust themselves to the correct time upon receiving a correction signal from the master clock after a power failure.
5. **What happens after powering up the clocks?**
After powering up the system, the clocks will run at a normal speed for up to one hour. After the clocks accept the communication signal from the master clock, each individual clock will determine the fastest way to adjust to the correct time. The clock may run faster to catch up to the system time, or it may stop running and wait, and then begin operating again once the system time matches the displayed time on the clock.

After receiving a correction pulse, the clock will enter a correction mode and will run at a faster rate. It will calculate the time required to reach the correct system time and will add it automatically in the adjustment.

For example, the time of the clock shows 5:40:00, when the clock receives a daily correction signal to reset the clock to 5:58.08. The clock will run at a faster rate until the clock reaches 6:01.00. This includes the correct time **plus** the time it takes the clock to make the adjustment.

Synchronous-Wire Analog Clocks / SAS Series Troubleshooting:

1. The clock is not running, what do I do?

- a) Measure the voltage between the power (black) wire and the neutral (white) wire. The voltage should measure 85-135 volts in the 110 volt model or 7-28 volts in the 24 volt model.
- b) Make sure the transformer is an **isolated** transformer if using a 24 volt model.
- c) Make sure the ground wire is not touching other wires.

If you fail to follow the instructions in b and c listed above, the fuses can be blown.

- d) Make sure the dip switches are set in the correct pattern for the sync-wire correction signal you are using. For 58-minute correction, only jumper pin #1 should be connected. For National Time/Rauland correction, only jumper pin #2 should be connected. For 59-minute correction, none of the jumper pins should be connected.

2. The clock is not receiving a reset signal from the Master Clock, what do I do?

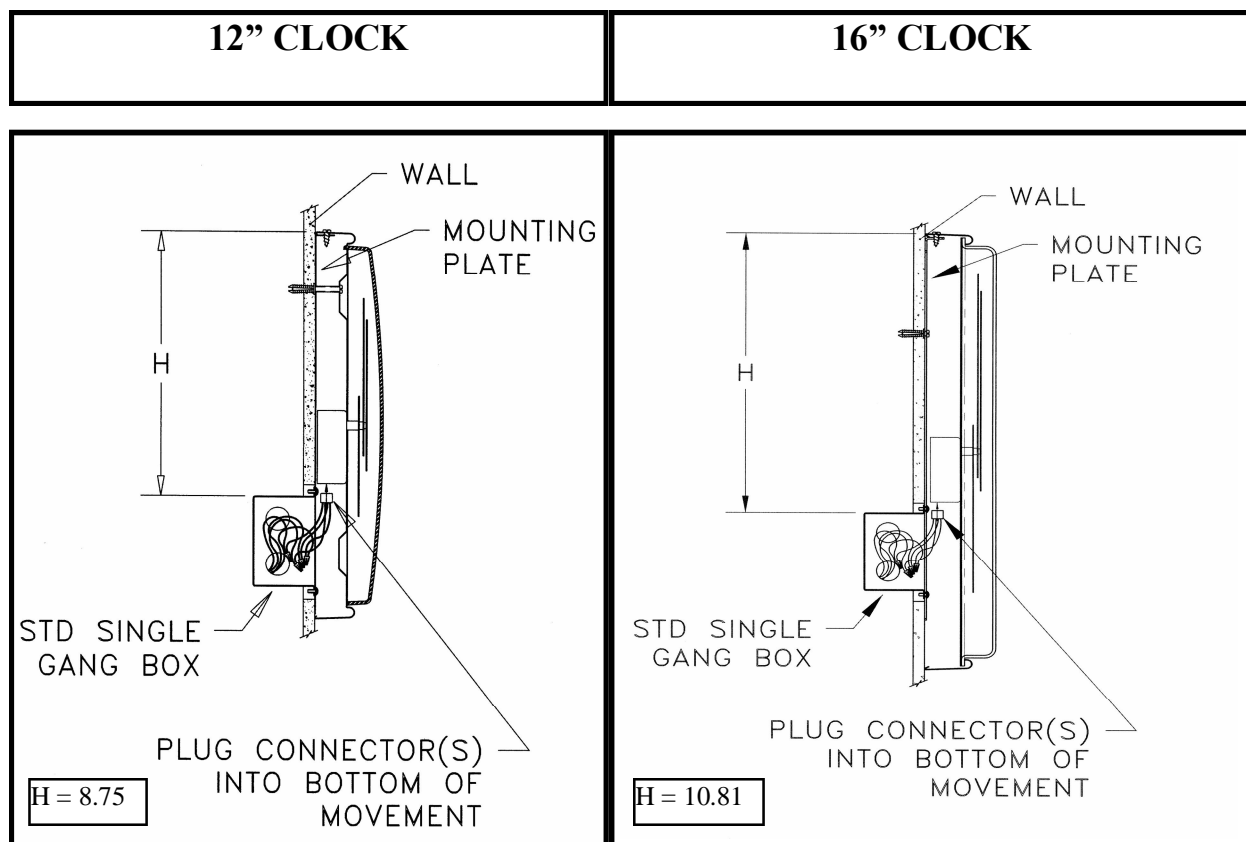
- a) Make sure during reset that the neutral (white) wire and the reset (yellow) wire are receiving the proper voltage (24 or 110 voltage).
- b) Make sure that when not applying a reset signal, the voltage between the reset (yellow) wire and the neutral (white) wire is zero (both AC & DC). Also, make sure the clock is disconnected from the master clock while taking this measurement.

Some Master Clocks (other brands than Sapling) have some leakage through the relay circuit that doesn't allow the voltage to drop to zero. In this case, an external bypass relay is necessary to insure that the voltage during non-reset time is zero. Please contact Sapling for more information.

SAA SERIES INSTALLATION INSTRUCTIONS – WALL MOUNT



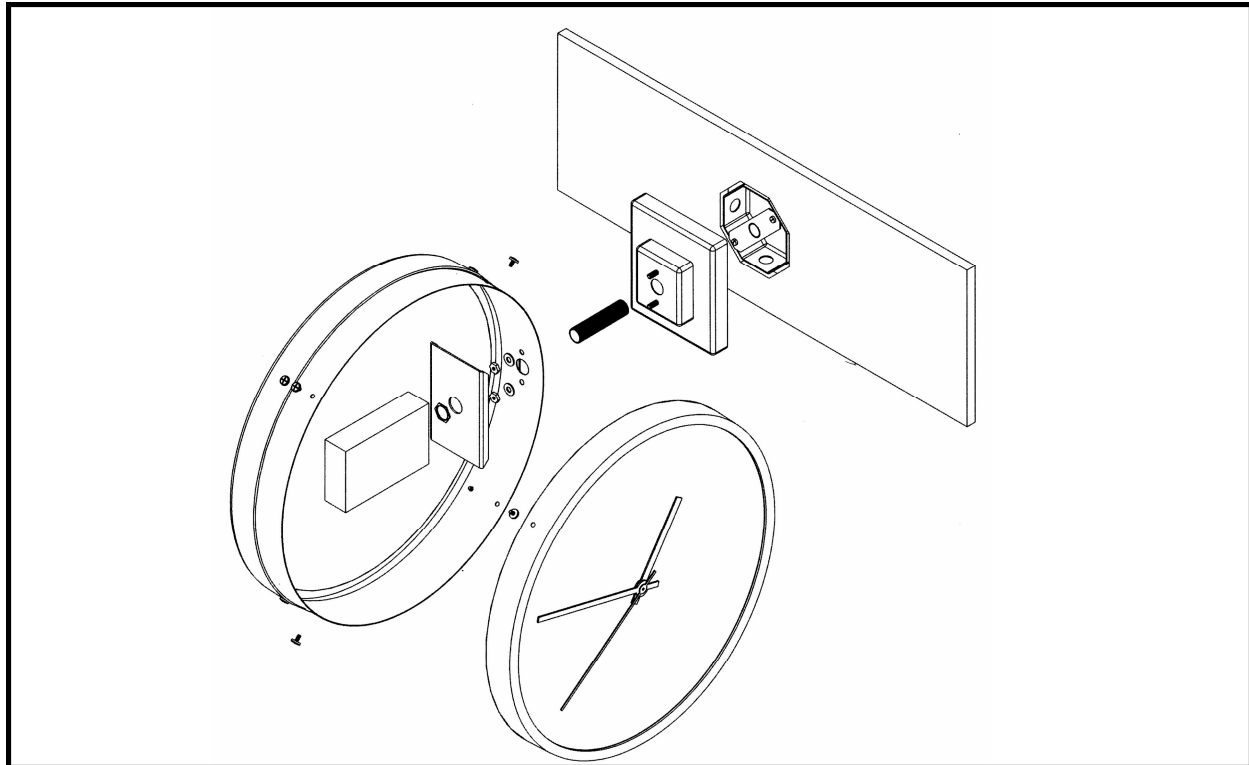
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INSTRUCTIONS

1. **IMPORTANT:** If using a low voltage system (24 volt) make sure that the transformer is an **isolated** transformer.
2. **IMPORTANT:** Clock must be set to 12:00 prior to installation.
3. Connect the wiring as shown on the wiring diagram.
4. Mount the back plate to a single gang box using the 2 machine screws #6-32 included in the kit for 12" clock and 16" clock. 16" requires the screw to connect to the ground wire.
5. Mount the plastic anchor into the back plate, through the large hole towards the top of the plate.
6. Insert the sheet metal screw (#10) into the plastic anchor. Screw should protrude approximately 1" for 12" clock. Screw should go in all the way for the 16" clock.
7. Plug the connector into the movement.
8. Insert the ground tab into the clock (12" clock).
9. Hang clock on the protruding screw (12" clock).
10. Put screw #8-32 through hole on top of clock into hole at the top of the plate.

DOUBLE MOUNTED CLOCK



INSTRUCTIONS

1. **IMPORTANT:** If using a low voltage system (24 volt) make sure that the transformer is an **isolated** transformer.
2. **IMPORTANT:** Clock must be set to 12:00 prior to installation.
3. Screw hanger/mounting rod (included in the kit) into the mounting plate (also included in the kit).
4. Insert wires through hanger/mounting rod.
5. Install mounting plate using 2 #6-32 screws into double gang box. 16ö requires the screw to connect to the ground wire.
6. Remove one clock face (open the 4 screws around the clock).
7. Insert clock housing onto hanger/mounting rod.
8. Insert the support bracket onto the hanger/mounting rod.
9. Screw the 2 nuts included in kit onto hanger/mounting rod and secure clock housing to wall.
10. Connect the wiring as shown on the wiring diagrams.
11. Plug connectors into the movement.
12. Insert ground tab into the case (12ö clock).
13. **IMPORTANT:** Make sure the second clock is also set to 12:00 prior to installation.
14. Repeat numbers 10 and 11 for second clock.
15. Mount second clock to case and replace screws previously removed.