Rauland

2524 Master Clock
Clock-Function Installation and Drawings

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Table of Contents

General Information

Description

The Rauland 2524 combines the full features of a master clock with intercom-control ability. As a master clock, it can correct virtually any secondary clocks and control up to 350 "events" (such as ringing bells or turning lights and equipment on and off).

The unit's LEDs and keypad make it easy to enter and check all programming. Of special note is the ease with which any part of the programming can be accessed and changed without having to cycle through many other parts and without having to re-enter everything else.

Manuals

This manual tells how to install the 2524 for clock functions only. Instructions on programming and operating the 2524 for clock functions only are in KI-1733.

Communications Functions

For information on communications functions, refer to the following manuals:

2524 *Clock and* **Communications** *Installation* **KI-1628**
2524 *Clock and Communications Programming* **KI-1629**
2524 *Clock and Communications* *Operation* **KI-1630**

These manuals cover both communications and clock functions.

Unpacking

The *2524 is* shipped with all the hardware needed to mount it in a rack. Locate the following items before discarding the packing material:

Qty.	Description	Rauland Part No.
4	#10-32 x ⅝" black machine screw.	B0439
4	#10 Flat Washer.	WJ0305
4	Fiber Washer.	WL0315
4	Tinnerman for #10-32 mounting screw.	AB3640

Specifications

Programming Capacity:
Up to 350 Events and 100 Holidays.
LED Digit Displays:
Mode, Time, and Schedule.
LED Indicators:
AM and **PM**
8 Zones/Outputs
7 Days,
Music, Clock, and Communication (COMM).
Keyboard:
18 Buttons: "0 through 9," Left and Right Cursors, **four functions,** *Clock-Comm* select, and *Manual.*

outputs:
8 Zone/Output contacts, each with a relay (120-VAC, 5-Amp resistive).
Power Failure Back-up:
Five-year, 3-volt lithium battery.
Power Required:
120-230 volts, 50 or 60 Hz, 20 watts.
Dimensions:
19" (48.3 cm) panel, 3" (8.9 cm) high, 9" (24.1 cm) deep (including rear conduit box).
Net Weight:
9 lbs. (4.1 kg).

Planning

The attached wiring diagrams show typical installations for the 2524 used as a master clock. There is also helpful information further on, in "Associated Equipment."

Zones

What may require closer attention in more complex installations is the wiring of the 2524's *Zone/Output* terminals. For a thorough explanation of "zones," consult the 2524 clock-programming manual, KI-1733. Briefly, remember that outputs used for clock corrections or equipment control cannot be used for other "events," such as clock tones and music on class changes. You will also need to coordinate the wiring of secondary **clocks** with the "Mode A" and clock-code programming mode. Be sure to till out the "Zones Chart" (in the programming manual), which should be kept with this manual.

Logging Messages

Print-out	Explanation
<Zones 1234 12:45PM 9-30-92	The event occurred on Zones 1, 2, 3, and 4 at 12:45 p.m. on 9/30/92.
<Time 00:00:00	A synchronization command was sent at midnight.

Associated Equipment

This list is representative only. The 2524 is designed to be highly flexible. Therefore, it is not practicable to list every possible application in this manual. What is listed, the attached wiring diagrams, and the descriptions of the outputs should cover most applications and give you some ideas for working out special installations.

Clock Equipment

Secondary Clocks: The 2524 can correct all of Rauland's secondary analog and digital clocks. It can also correct all of the widely distributed clocks from other manufacturers (see the list and the wiring diagrams at the end of this manual). Finally, you should be able to program a special correction code for virtually any other clocks that are not handled by the standard codes.

Clock Power Supplies: Rauland's 2415 24-VAC and 2416 120-VAC Power Supplies can handle up to 25 secondary clocks per unit. To power more than 25 digital clocks, refer to the wiring diagrams at the end of this manual.

Buffers: The 2524's outputs each have a relay that can handle up to five amperes of current at up to 120 VAC or 30 VDC. Should the equipment you connect to a given output require more power, you can accommodate it by using buffers. The 2418 AC Buffer can switch up to 10 amperes at 110 VAC, and the 2419 DC Buffer can switch up to five amperes at 60 VDC (the higher voltage is needed by minute-impulse clocks). Wiring two or more buffers to split the load increases the total load that the output can handle.

2417 Correction Module: This is used to enable the 2524's "DIG" output to control a power supply with up to 25 digital secondary clocks. Using this module can free output terminals for device control.

Output Terminals

In the following descriptions, the 2524's rear terminals are described in order, from left to right, as viewed from the rear of the chassis.

In-Gnd-Out: These four wire-wrap terminals (there are two "GND" pins) can be wired to a standard RS-232 cable and connected thence to a computer or a modem for remote programming, or to a serial printer to provide a log of event executions (see the sample log below). For the wiring to the cable, see the attached KM0991.

In: Connecting another master clock here enables it to control the time in this unit. When the 2524 receives a valid synchronization signal from another Rauland master clock, it changes its time to 12:01 a.m.

Gnd: This is a circuit common, which also serves as the ground.

+5V: This output can be used as an auxiliary power supply (5 VDC, 100mA). Its most common application is to power a 2417 Correction Adapter Module, which is used with the "DIG" output (explained next).

DIG: This output sends serial data pulses that can be used to control digital secondary clocks. This application requires one, but can drive up to five, 2417 Correction Adapter Modules.

GND: A chassis ground, which also serves as the circuit common. It should be used when connecting a 2417 Correction Adapter Module to a 2524.

OUT1–OUT8: These eight pairs of screw terminals are for the relay contacts, to which you can connect signaling devices, secondary clocks, equipment, or relay panels. Each relay is normally open, can handle up to five amperes of current at 30 VDC or 120 VAC, and has an arc-suppression circuit connected across it.

~GND~: These three screws on the far right are for connecting the unit to 120-VAC power. The middle terminal is for chassis ground, and the two outer (~) terminals are for the hot and neutral lines.

The following terminals are used when the 2524 controller is used in the communications mode of operation. Refer to the 2524 ChronoCom Installation manual (KI-1628) for more information on these terminals.

RP1: Used to adjust for priority calls in ChronoCom systems.

A Amp: The connection of the main power amplifier.

Music Amp: The connection of a music amplifier.

Answer: Used to answer call-ins with a remote phone. (*Note:* not available on TL systems.)

LCD (Z, +, –): The output used to drive a remote VFD display or an LCD Sidecar Display.

Reset: Used to reset the system after an all-page or an intercom call. (*Note:* not available on TL systems).

Music: Output of a control signal that can activate a 12-volt external DPDT relay for switching music audio to the Off-Bus (e.g., switching music on class change on a Telecenter IV or V system).

Page In: Allows a remote phone to be used for all-page. (*Note:* not available on TL systems.)

Page Out: This output is grounded to control all-page from a remote telephone with an MCZ300 panel on earlier Chrono-Com Systems.

S-Bus: The connection used for the audio signal in Chrono-Com and ChronoCom TL systems.

Beep: The output that activates the signaling of calls by an external device.

IC Amp: The connection for the TC4160 Intercom Amplifier on the ChronoCom Communication Systems.

Busy: The signal present when the front keypad of the 2524 controller is being used.

Installation

Jumpers

Before enclosing the unit in a rack, make sure that its internal jumpers are set the way you want them. The Baud-rate jumper affects only a computer that can be connected for diagnosing and programming the 2524 (using the optional T2524 Diagnostic Program). If you want to "disable" the programming (to prevent future tampering), you'll have to program the 2524 with the jumper in the "EN" ("enable") position before changing the jumper to the "DIS" setting and enclosing the unit (see the clock-programming manual, KI-1733). The jumper locations are shown in the attached drawing IL0341.

Rack Mounting

The 2524 is designed for mounting in a standard 19-inch rack. No special treatment is required if other equipment is mounted next to it.

Step 1. Locate 3½ inches of rack space where the 2524 will be mounted. Slide the four supplied #10 Tinnerman clips over the mounting holes in the channel rails. (If the channel rails holes are tapped, do not use these clips.)

Step 2. Prepare the mounting screws by placing a black flat washer and then a fiber washer over each one (all supplied).

Step 3. Position the 2524 in the rack, align its front-panel mounting holes with the Tinnerman clips, and use the four prepared machine screws to secure it to the channel rails.

Wiring

Follow the attached wiring diagrams and refer as necessary to the earlier descriptions of the terminals and accessories. What follows here are a few helpful details.

Screw-Terminal Cover

To access the screw terminals, remove the shield from the bottom of the electrical box that is attached to the rear of the chassis (on the right, as viewed from the rear). Remove the two sheet metal screws, then disengage the cover's tabs from the slots in the 2524's chassis by sliding the cover to the left and then pulling it straight back. Reverse this process to re-secure the cover.

For a permanent installation and to protect against shock hazard, run the 120-VAC wires through conduit attached to one of the cover's knockouts. If you are running both high- and low-voltage wires, use separate conduits and knockouts. For any low-voltage wires run in conduit, use the knockout nearest the *Zone/Output* terminals. The 120-VAC wires should be 14-AWG or heavier-gauge, and they should have an added six-inch loop inside the cover.

Signaling Devices and Equipment

The attached KM0987 shows how signaling devices and equipment can be connected for each zone. If two or more signaling devices are required for a given zone, they can be connected in parallel and share the connections to the relay terminals for that zone. For loads that exceed the built-in relays' rating, install 2418 or 2419 Buffers (see "Associated Equipment" in the earlier part of this manual).

The 2524 can activate these devices for up to 59 seconds or "latch" them on for any number of minutes, up to a week. For more information, refer to "Clock Mode 5" in the 2524 clock-programming manual, KI-1733.

Correctable Secondary Clocks

The 2524 can simultaneously correct two different types of secondary clocks through its *Zone/Output* terminals and Clock Mode A programming. The tables and "Figure" drawings at the back of this manual show how to hook up virtually every widely-distributed secondary clock. It is also possible to make a custom code for a clock (in Clock Mode B programming).

Use the secondary-clock table to find the associated drawing for each type of clock. The drawing will tell you the standard code and show the wiring needed.

If only one correction code is used, then *Out 7* and *Out 8* must be used to connect the secondary clocks. *Out 7* will send out the "X" corrections, and *Out 8* will send out the "Y" corrections.

If a second correction code is programmed, the secondary clocks for this code must be connected to *Out 5* (for the "X" corrections) and *Out 6* (for the "Y" corrections).

Separate Telecenter® Systems

The 2524 can be wired to a Telecenter system and cause the latter to send the tones. In this arrangement, the Telecenter software defines the zones. Telecenter V systems have eight zones, so the 2524 can control them individually. In contrast, Telecenter 5500 systems provide only its first four paging zones for time tones. On a TC5500 system, the 2524 also synchronizes the system clock.

Use the appropriate table below for the wiring. Note that the "A" side of each *Zone/Output* terminal used is connected to the corresponding zone input on the Telecenter system, but the "B" sides are jumpered together and connected to a common on the Telecenter system.

Telecenter® IV and V Connections

TCV CIO "B"Cnct. Pin	TCIV MIO "B" Cnct. Pin	2524 "Zone/Output" Term. Pin	Time Zone
21	2	1A	1
23	4	2A	2
25	6	3A	3
27	8	4A	4
29	10	5A	5
31	12	6A	6
•33	•14	7A	7
•35	•16	8A	8
36	N/A	DIG	Clock Sync.
37	18	1B—8B	[common]

Notes:

1. The "MIO" is the Main Input/Output Board in the Telecenter IV.

2. The MIO has wire-wrap terminals, and the 2524 has screw terminals.

3. Use 22-AWG tinned cable for all connections.

4. Do *not* connect the TCIV ribbon cable to the 2524.

5. * Usually the 2524's "Zone/Output" terminals are used for correcting secondary clocks and so are not available for connection to a Telecenter system.

TC5500 Connections

TC5500 Terminal	2524 "Zone/Output" Terminal Pin	TC5500 Zones**
1	1A	1
2	2A	2
3	3A	3
4	4A	4
5	DIG	[N.A.]
0V	Gnd and 1B—4B	

** *Note:* On the TC5500, Zone 9 can be programmed (#20*) to (a) ring with only Zone 1, 2, 3, or 4, (b) ring when any of those Zones ring, or (c) not ring at all.

Telecenter System 21

See the Telecenter System 21 drawings manual, KI-1767.

Turning on the 2524

When power is applied to the 2524, it displays "0" in the "Mode" window, the current time in the "Time" window, and a flashing "P" (to indicate that there was a power failure) in the "Sched" window. The unit comes up in the Clock mode of operation. Push any key to stop the flashing "P."

Note: When the clock is turned on for the first time or at any time when the battery was "disabled," the "Time" windows may show random numbers. In this case set the date and the time (Clock Modes 1 and 2—see KI-1733).

Functional Descriptions

This section explains the way the 2524 operates some special features. The regular operations are explained in the section on the individual outputs, above.

Music Events

A clock event can specify that a time tone be followed by one to fifteen minutes of music. The 2524 handles this in two different ways, depending upon whether or not it is using speaker relay panels.

With Separate Telecenter® Systems

In this case, Clock Mode E programming specifies "0" for the number of SC25s, and its outputs are connected to a Telecenter system to provide time-tone signals. Since the 2524's ribbon cable does not connect to the speaker relay boards, it cannot send music to individual rooms or to zone circuits. However, it can control the music output terminal on the rear of the 2524 and activate it during the programmed music duration of each event on the 2524 Master Clock. An external DPDT relay may be connected to this terminal and can switch a dedicated music amplifier to the "Off" Bus on any one speaker relay panel (TC4130) or to all speaker-relay panels in the system.

First, the 2524 will activate the Telecenter system's time tones by:

    1. Activating the appropriate "Zone/Output" relays.

Next, the 2524 ends the tones and sends out the music (or other program source) by:

    2. Deactivating its "Zone/Output" relays.
    3. Switching the Off Bus to the music source's output.

Finally, the 2524 ends the event by:

    4. Disconnecting the Off Bus from the output of the music source.

As Controller of Telecenter 1100 Communications Systems

Music during class change is a built-in feature of the 2524 controller in Telecenter 1100 systems. For each programmed event, the music can be sent out to any or all zones for 1 to 15 minutes. Music may also be sent to any desired room by dialing the program from a keypad.
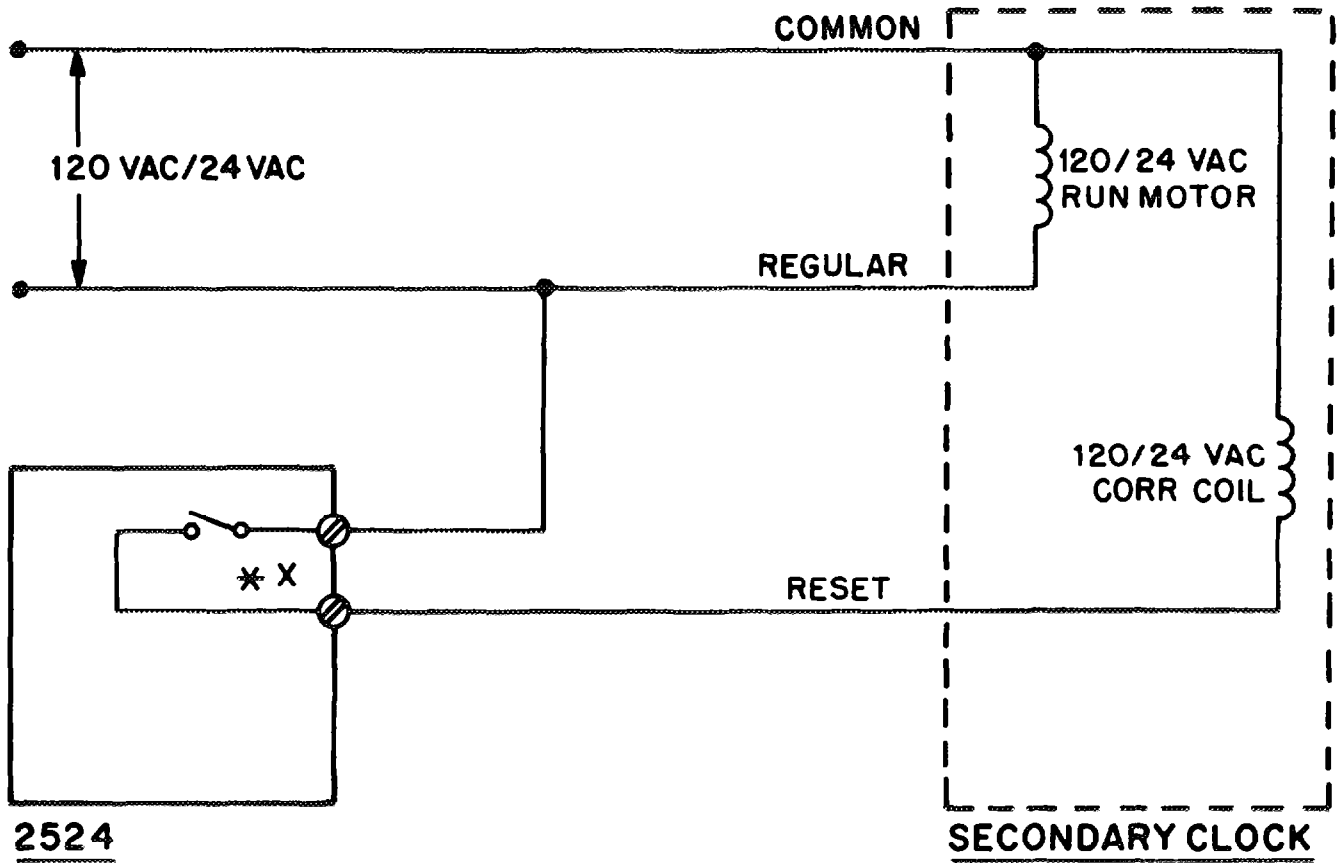
Secondary-Clock Codes: Table and Wiring Diagrams

Secondary-Clock Manufacturer and Model	Clock Type	Reference Figure
Rauland Analog: 2460 Series	Synchronous-Wired	1 or 2
National: 010-NNE-SRAX, 010-NNE-SRAXLV, 023-NNE-SRAX, 023-NNE-SRAXLV, 030-NNE-SRAX 030-NNE-SRAXLV, 060-12E-SRAX, and 060-12E-SRAXLV (NN = any two-digit number).		
Dukane: 24030, 24023, 24050, 24060 and 24010 types.		
Simplex: 2310-91XX 56 and 76 Series	Electronic-Coded	3
IBM: 56, 61, 66, 76, 81, and 86 Series		
Stromberg: E3109 and WS310	Synchronous-Wired	4
National: 010-NNE-SR, 010-NNE-SRLV, 023-NNE-SR, 023-NNE-SRLV, 030-NNE-SR 030-NNE-SRLV, 060-12E-SR, and 060-12E-SRLV (NN = any two-digit number).	Synchronous-Wired	5
Dukane: 24BF209, 24BF212 707-8 and 707-9 types.	Synchronous-Wired (old type)	6

Secondary-Clock Manufacturer and Model	Clock Type	Reference Figure
Simplex: 77M-45 Series	Synchronous-Wired (dual-motor)	7
IBM: 77M-45 Series		
Honeywell: ST 402, 403, 404, 410, 411, 412, 413, 802, 803, 804, 810, 811, 812, and 813	Synchronous-Wired	8
Faraday: 1310, 1311, 1320, and 1321		
Cincinnati: D8		
Standard/Faraday: New Types Models 2310, 2331		
Standard Electric Time: GRC and FMT Series	Synchronous-Wired (dual-motor)	9
Couch: C452014 through C452019, and C452133 through C452145		
Miscellaneous Application	Minute Impulse	10
Simplex: 77M-59 Series	Synchronous-Wired (dual-motor)	11
IBM: 77M-59 Series		

Secondary-Clock Manufacturer and Model	Clock Type	Reference Figure
Simplex: 2310-92XX 57 and 77 Series	Synchronous-Wired	12
IBM: 57, 62, 67, 77, 82, and 87 Series		
Cincinnati: D10 and D12		
Lathem: SS12 Types		
Edwards: 010		
Dukane: 24SS Series		
Standard Electric Time: AR2	Minute Impulse	13
IBM: 55, 60, 65, 75, 80, and 85 Series	Minute Impulse	14
Simplex: 2310-90XX 55 and 75 Series		
Dukane: 24ISC Series		
Cincinnati: D3 (two-wire polarized)	Minute Impulse	15
Cincinnati: D1	Minute Impulse	16
Stromberg: 2-wire (58th-minute correction)	Minute Impulse	17

| Secondary-Clock Manufacturer and Model	Clock Type	Reference Figure
Standard Electric Time: AR2A	Minute Impulse	18
Standard Electric Time: AR3A	Minute Impulse	19
Cincinnati: D6 (two-wire polarized, 12-hour corrective))	Minute Impulse	20
Edwards: 06		
Amano: (Made by Standard Time)	Minute Impulse	21
Rauland: Digital Secondary using 24 VAC	Digital	22
Rauland: Digital Secondary using 120 VAC	Digital	23
Rauland: Digital Secondary using Serial Output (DIG) and 24 VAC	Digital	24
Rauland: Digital Secondary using Serial Output (DIG) and 120 VAC	Digital	25
Franklin: Mark 5M	Bi-Polar Impulse	26
Wiring more than 25 digitals for 24 VAC	Special Application	27
Wiring more than 25 digitals for 120 VAC	Special Application	28
Rauland: Wiring for 24 VAC	Special Application	29

COMMON

120 VAC/24 VAC

REGULAR

120/24 VAC RUN MOTOR

120/24 VAC CORR COIL

RESET

2524

SECONDARY CLOCK

Correction Code (Mode A)	Correction Timing	
	Hourly	12-Hour
#01	"X" is activated for 25 seconds every hour From X:00:00 To X:00:25.	"X" is activated for 24 minutes; 25 seconds every 12 hours (for 25 seconds on and 35 seconds off) From 6:00:00 To 6:24:25.

* See "Correctable Secondary Clocks" (under "Wiring") to determine the output terminals.

Figure 1.
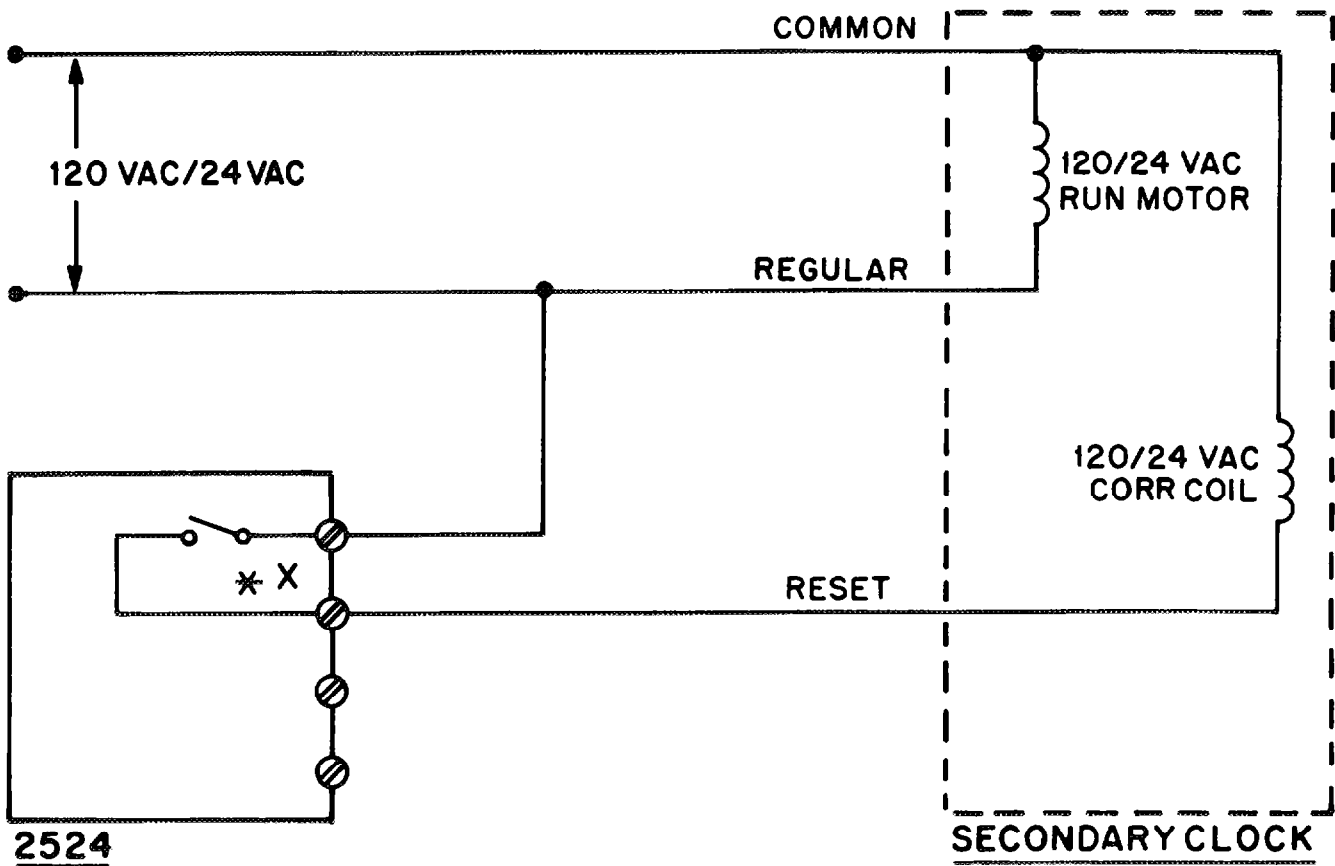
Correction Code (Mode A)	Correction Timing	
	Hourly	**12-Hour**
#02	"X" is activated for 25 seconds every hour From X:00:00 To X:00:25.	"X" is activated for 24 minutes every 12 hours From 6:00:25 To 6:24:25.

* See "Correctable Secondary Clocks" (under "Wiring") to determine the output terminals.

Figure 2.
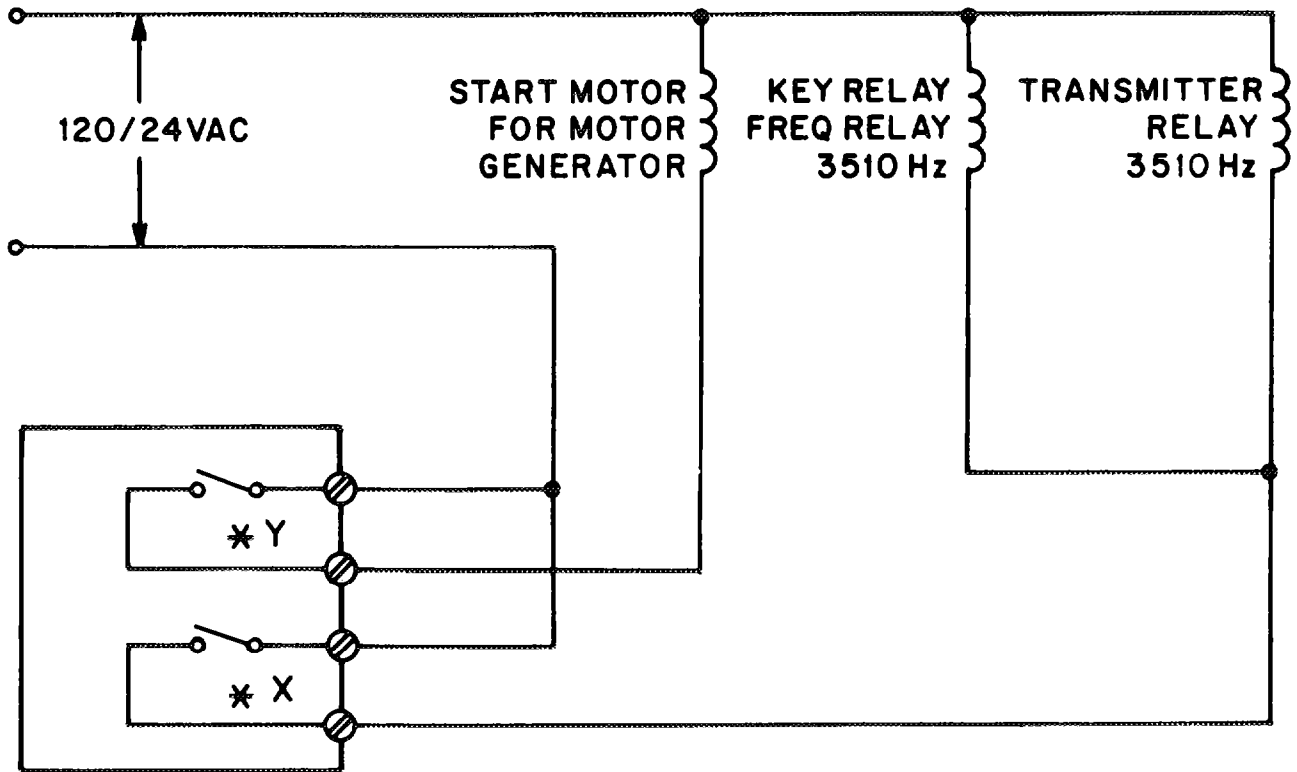
Correction Code (Mode A)	Correction Timing	
	Hourly	**12-Hour**
#03	"Y" is activated for 38 seconds every hour From X:57:39 To X:58:17. "X" is activated for 8 seconds every hour From X:57:54 To X:58:02.	"X" is activated for 14 seconds every 12 hours From 5:57:54 To 5:58:08.

* See "Correctable Secondary Clocks" (under "Wiring") to determine the output terminals.

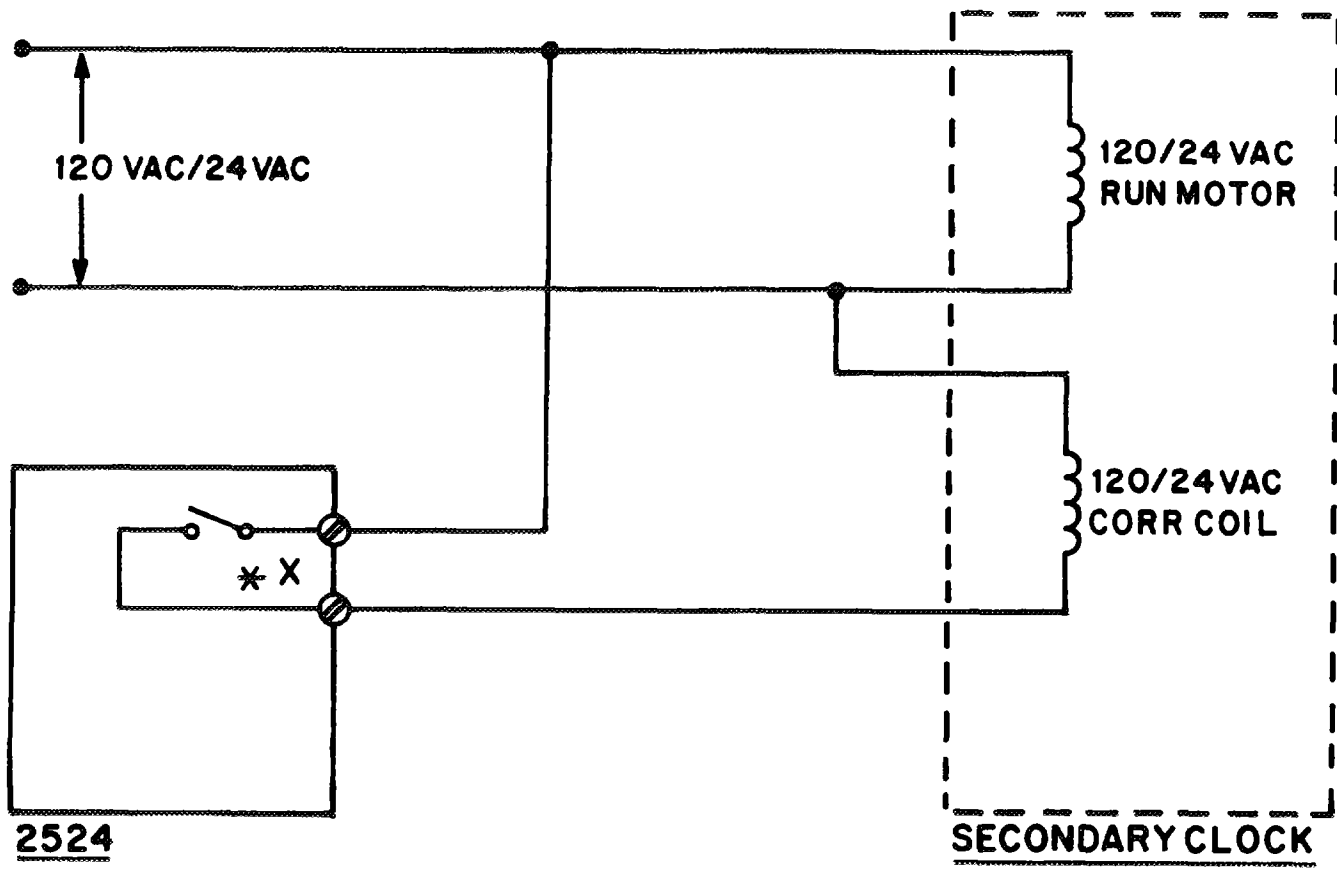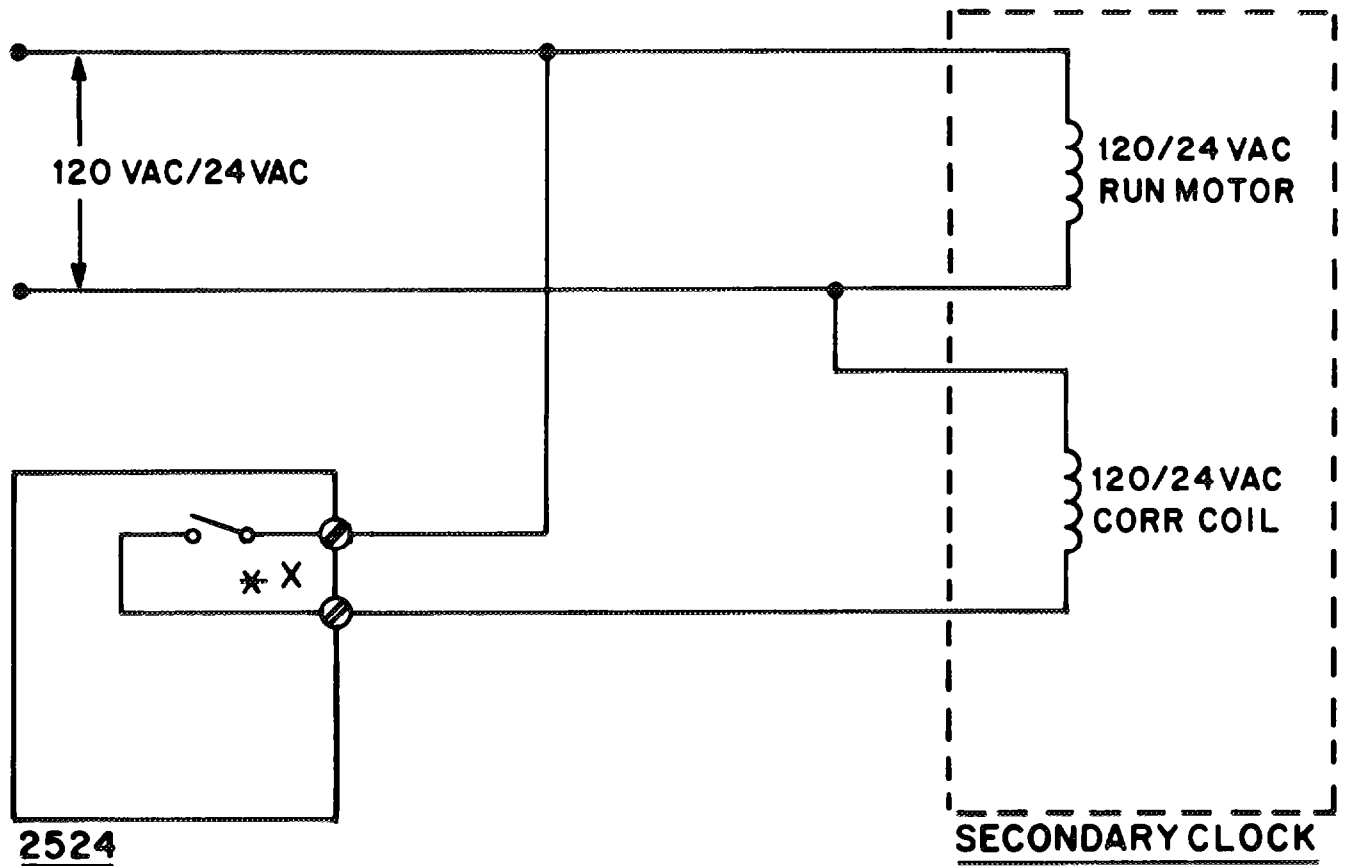*Figure 3.*

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120 VAC/24 VAC      │                         │          │  ⌇ 120/24 VAC         │
                    │                         │          │  ⌇ RUN MOTOR          │
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     └───────────────────────────────┘
     2524                                                 SECONDARY CLOCK
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Correction Code (Mode A)	Correction Timing	
	Hourly	12-Hour
#04	"X" is activated for 10 seconds every hour From X:56:05 To X:56:15.	"X" is activated for 45 seconds every 12 hours From 11:56:00 To 11:56:45.

* See "Correctable Secondary Clocks" (under "Wiring") to determine the output terminals.

Figure 4.

120 VAC/24 VAC

120/24 VAC RUN MOTOR

120/24 VAC CORR COIL

2524

* X

SECONDARY CLOCK

Correction Code (Mode A)	Correction Timing	
	Hourly	12-Hour
#05	"X" is activated for 25 seconds every hour From X:00:00 To X:00:25.	Not Applicable

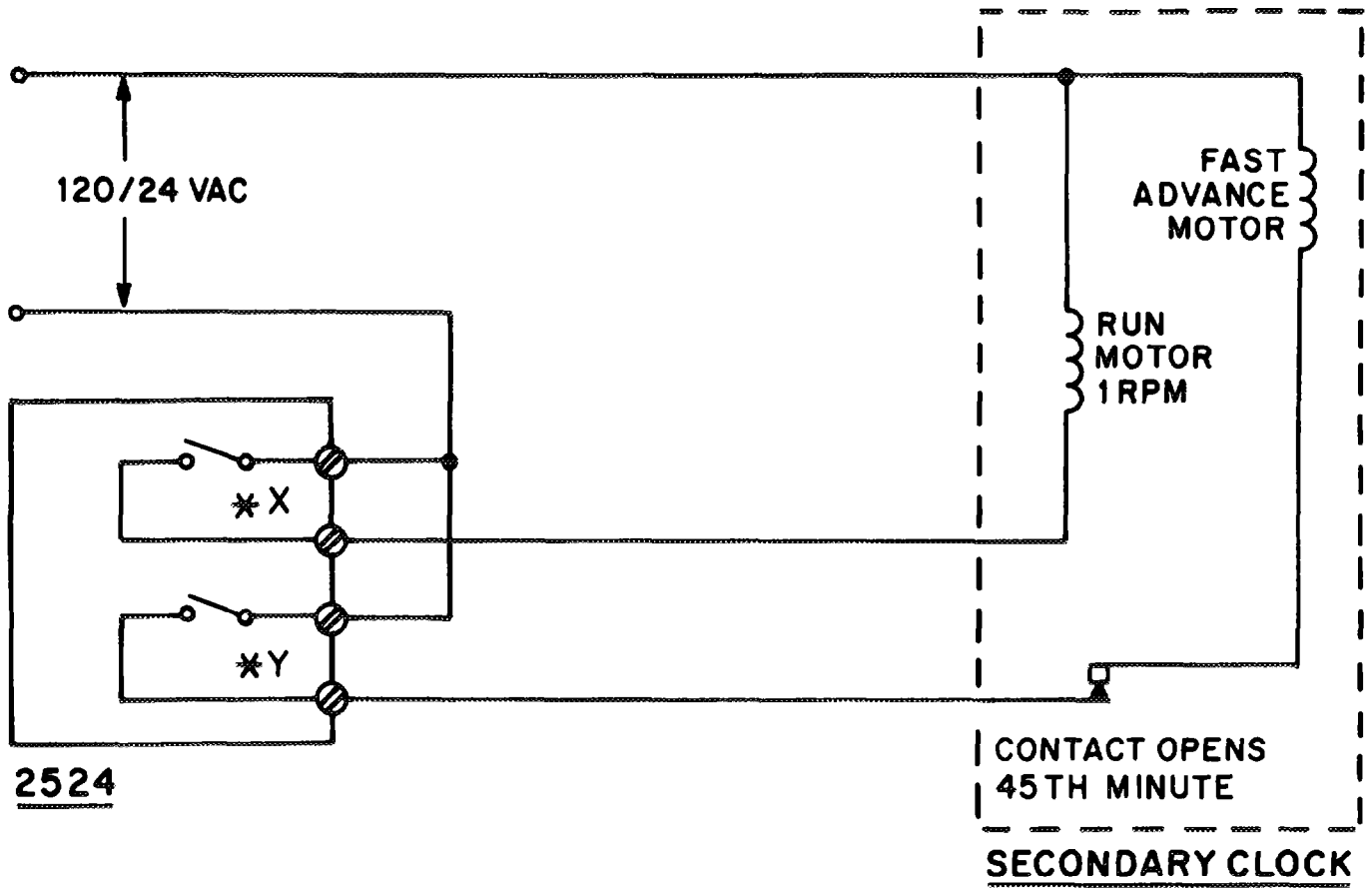* See "Correctable Secondary Clocks" (under "Wiring") to determine the output terminals.

Figure 5.

120/24 VAC

120/24 VAC
RUN MOTOR

24 VDC

24 VDC
CORR COIL

* Y

2524

SECONDARY CLOCK
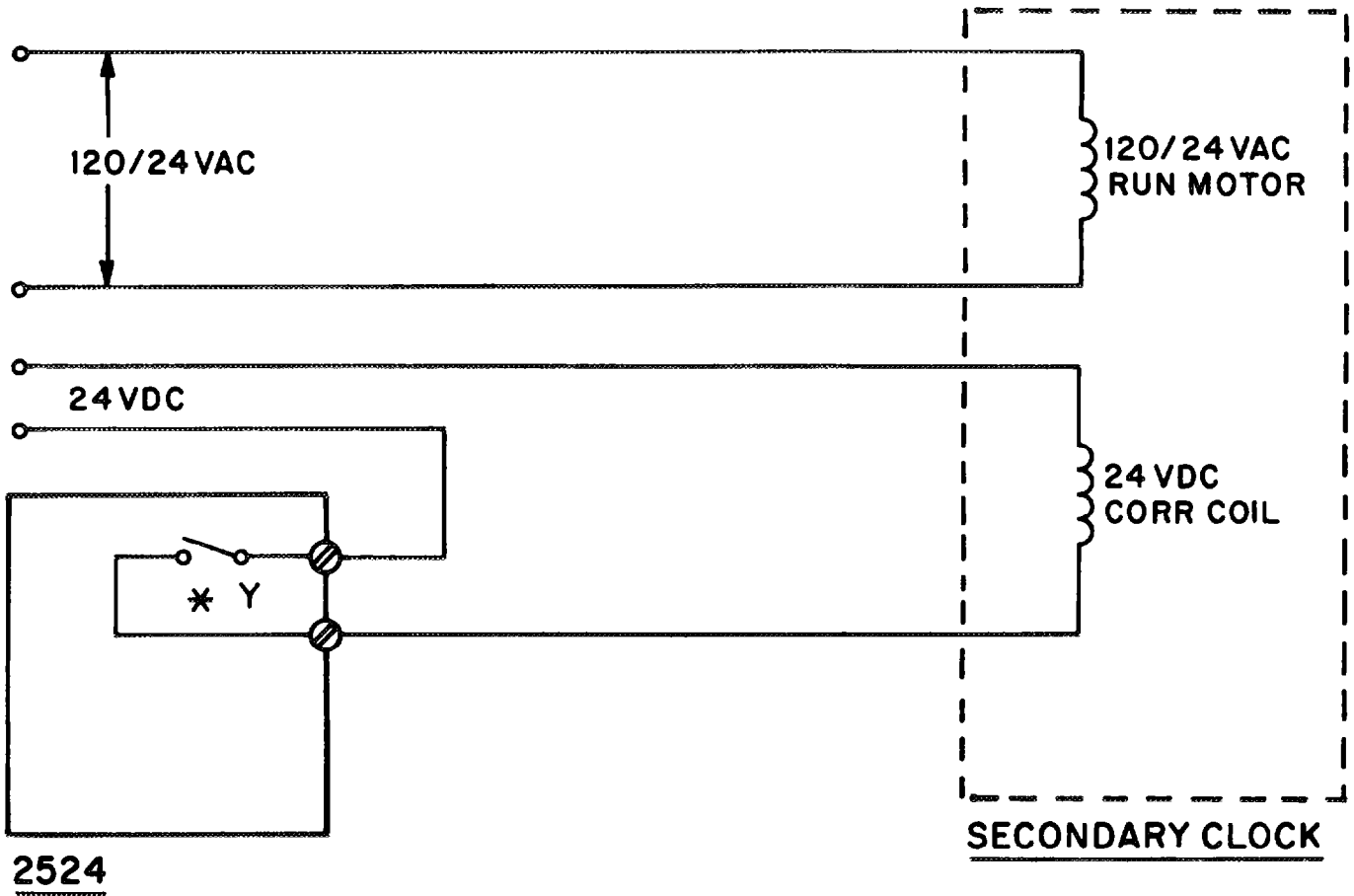
Correction Code (Mode A)	Correction Timing	
	Hourly	12-Hour
#06	"Y" is activated for 57 seconds every hour From X:57:03 To　　X:58:00.	"Y" is activated in 11 cycles (57 seconds on, 63 seconds off) From 5:59.03 To　　6:20:00.

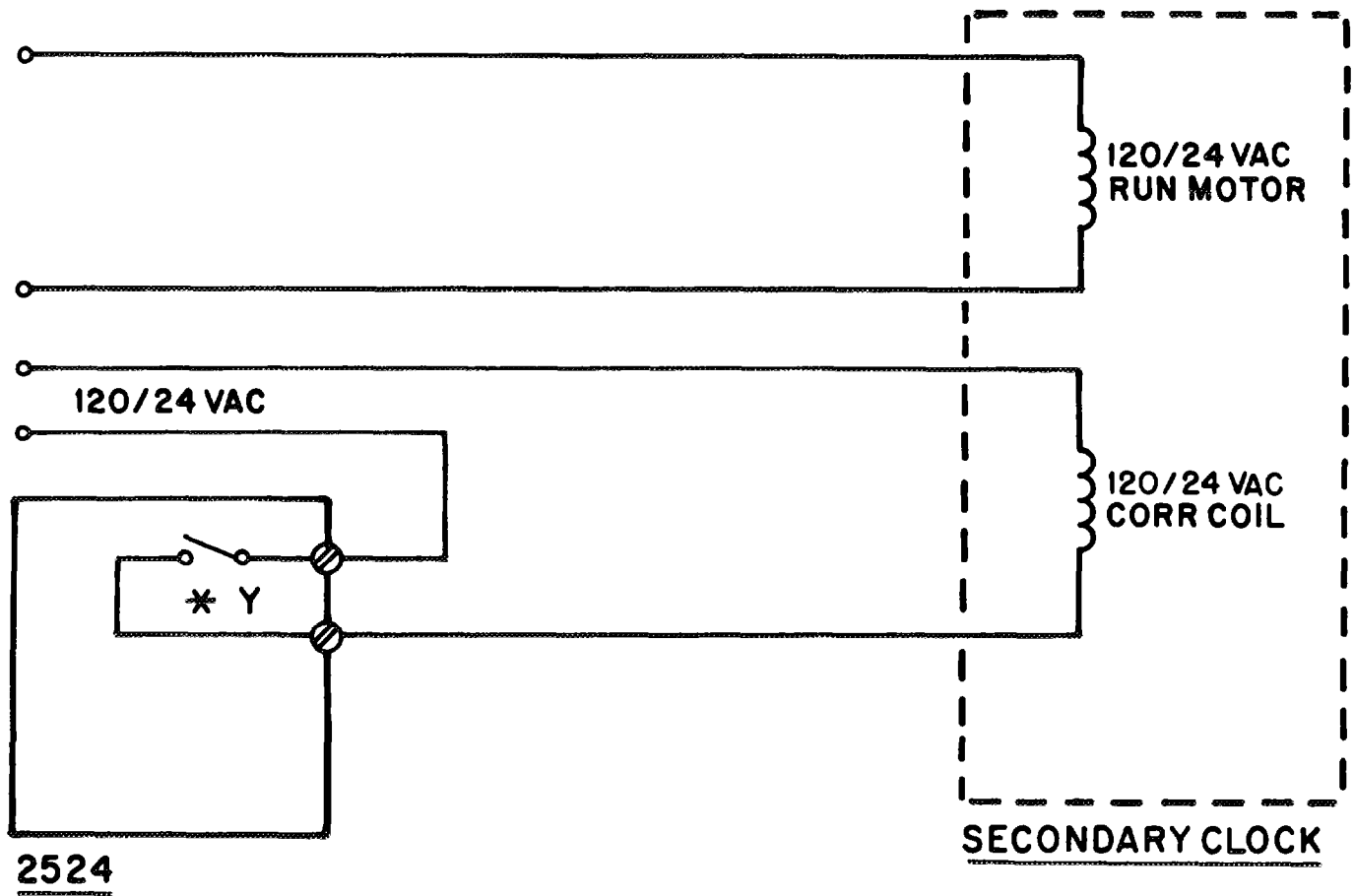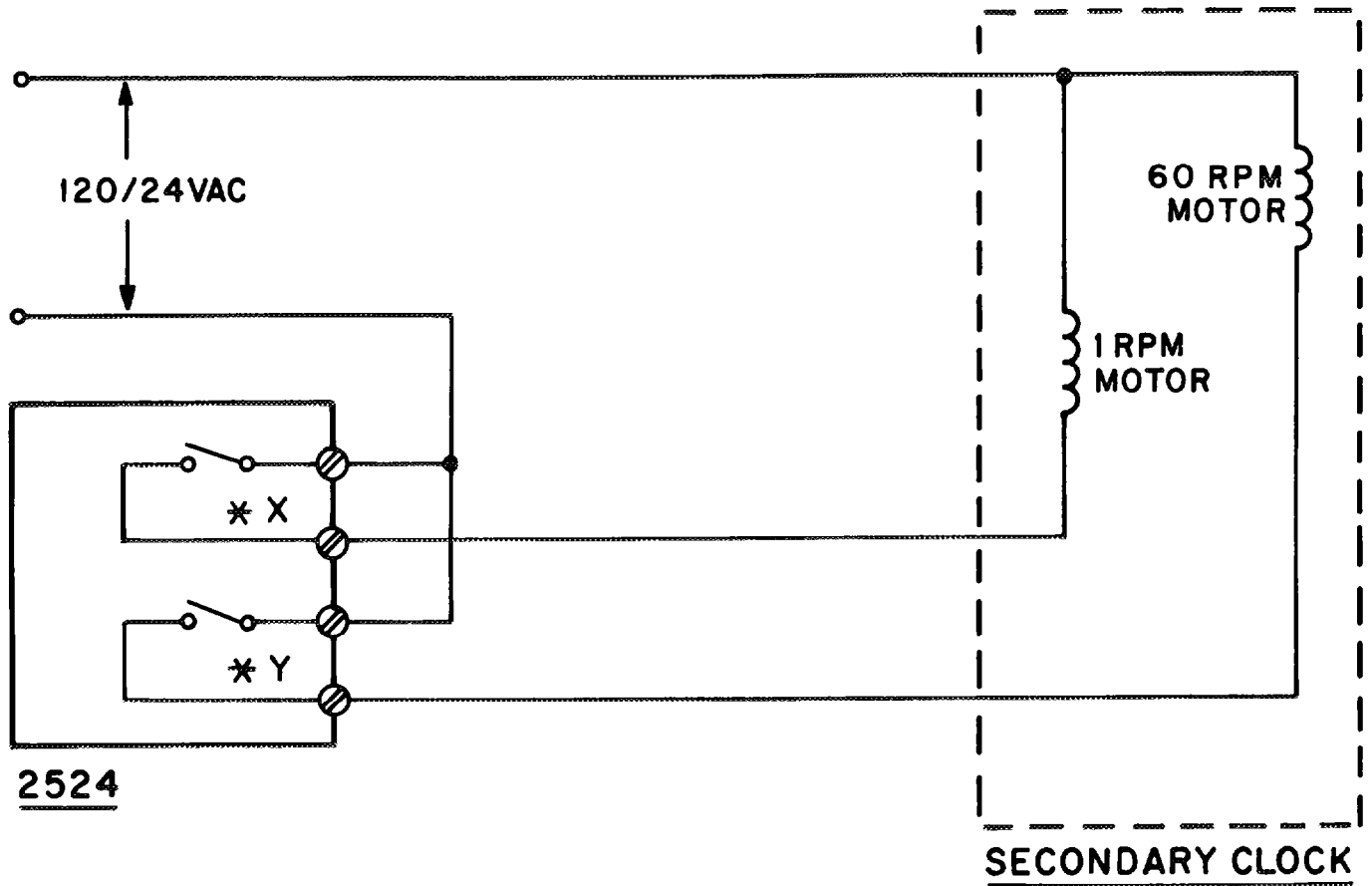* See "Correctable Secondary Clocks" (under "Wiring") to determine the output terminals.

Figure 6.

120/24 VAC

FAST
ADVANCE
MOTOR

RUN
MOTOR
1 RPM

*X

*Y

2524

CONTACT OPENS
45TH MINUTE

SECONDARY CLOCK

Correction Code (Mode A)	Correction Timing	
	Hourly	12-Hour
#07	"X" is activated for 59 minutes, 6 seconds every hour From X:44:59 To (X+1):44:05. "Y" is activated for 54 seconds every hour From X:44:05 To X:44:59.	Not Applicable

* See "Correctable Secondary Clocks" (under "Wiring") to determine the output terminals.

Figure 7.

120/24 VAC RUN MOTOR

120/24 VAC

120/24 VAC CORR COIL

✱ Y

2524

SECONDARY CLOCK

Correction Code (Mode A)	Correction Timing	
	Hourly	12-Hour
#08	"Y" is activated for 55 seconds every hour From X:58:05 To X:59:00.	"Y" is activated on and off 12 times (65 seconds on and 25 seconds off) every 12 hours From 5:05:00 To 5:22:35.

* See "Correctable Secondary Clocks" (under "Wiring") to determine the output terminals.

Figure 8.

Figure 9.

Correction Code (Mode A)	Correction Timing	
	Hourly	12-Hour
#09	"X" is activated for 59 minutes, 25 seconds every hour From X:00:00 To X:59:25. "Y" is activated for 35 seconds every hour From X:59:25 To X:00:00.	"Y" is activated for 16 minutes every 12 hours From 5:12:00 To 5:28:00.

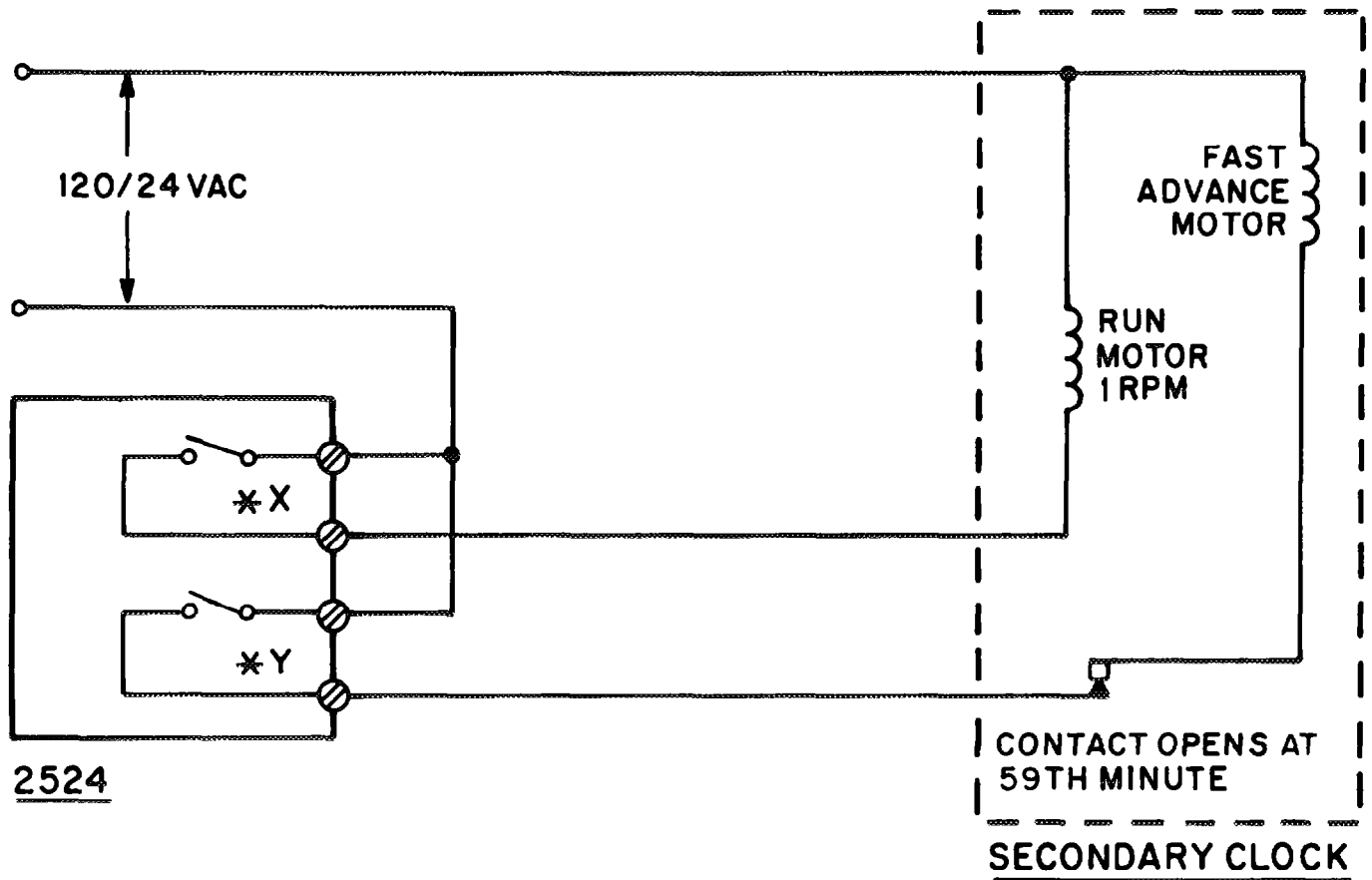* See "Correctable Secondary Clocks" (under "Wiring") to determine the output terminals.
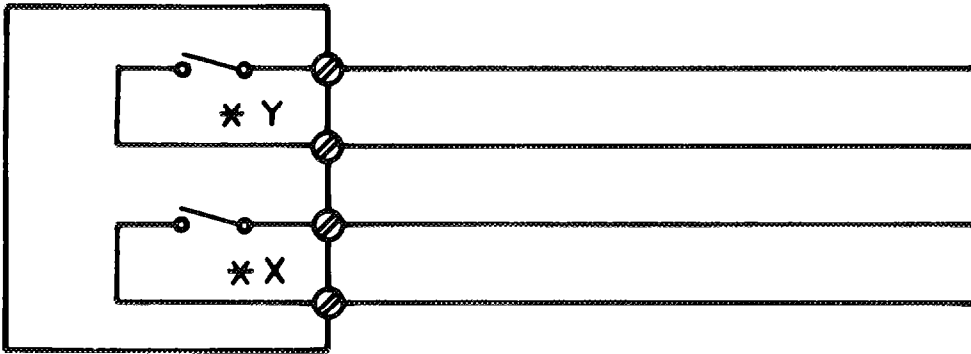
Correction Code (Mode A)	Correction Timing	
	Minute Impulse	Hourly and 12-Hour
#10	"Y" is activated for 2 seconds every minute From X:XX:58 To X:XX:00. "X" is pulsing at the rate of 1 second on and 1 second off.	Not Applicable

* See "Correctable Secondary Clocks" (under "Wiring") to determine the output terminals.

Figure 10.

120/24 VAC

FAST ADVANCE MOTOR

RUN MOTOR 1 RPM

*X

*Y

2524

CONTACT OPENS AT 59TH MINUTE

SECONDARY CLOCK

Correction Code (Mode A)	Correction Timing	
	Hourly	12-Hour
#11	"X" is activated for 59 minutes, 6 seconds every hour From X:58:59 To (X+1):58:05. "Y" is activated for 54 seconds every hour From X:58:05 To X:58:59.	Not Applicable

* See "Correctable Secondary Clocks" (under "Wiring") to determine the output terminals.

Figure 11.
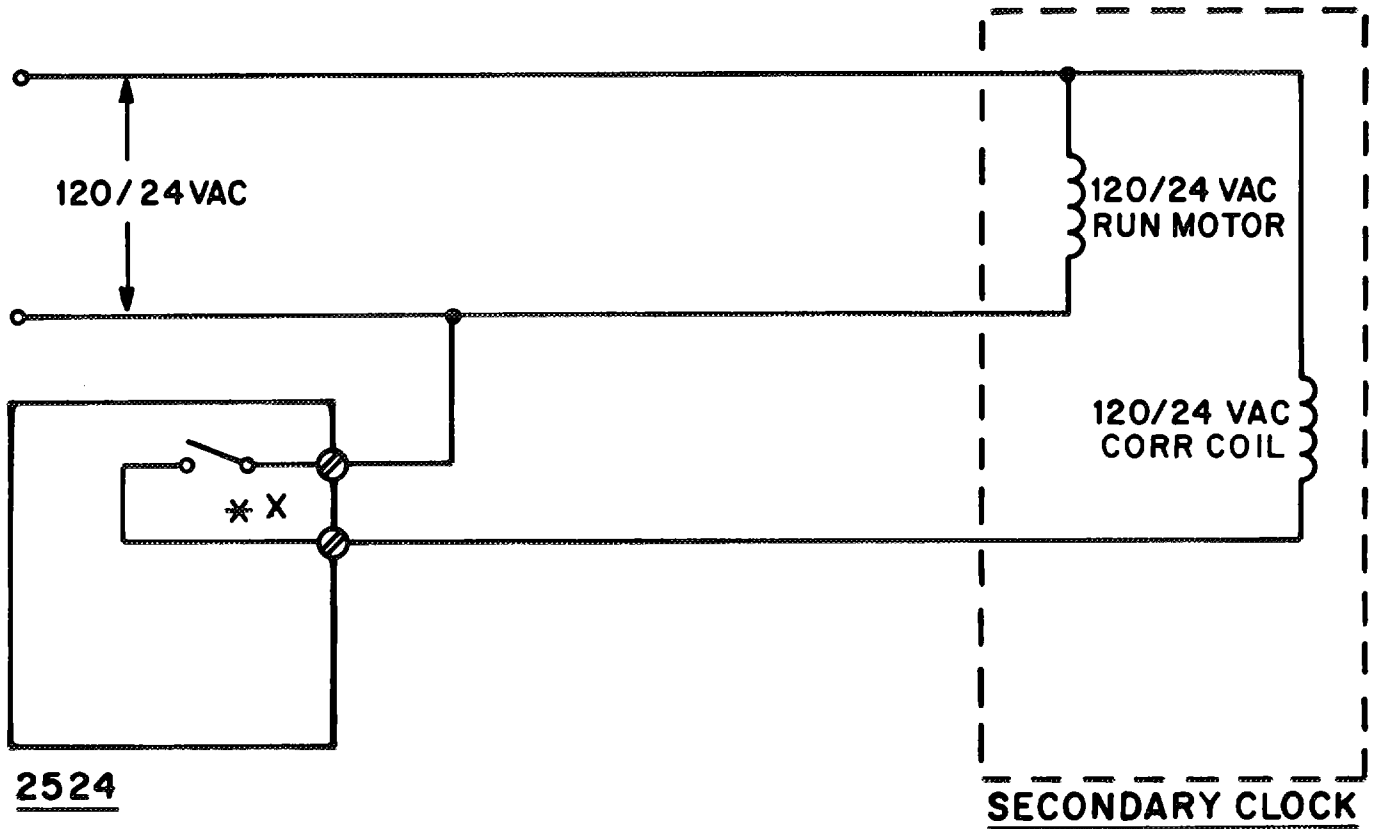
Correction Code (Mode A)	Correction Timing	
	Hourly	**12-Hour**
#12	"X" is activated for 8 seconds every hour From X:57:54 To X:58:02.	"X" is activated for 14 seconds every 12 hours From 5:57:54 To 5:58:08.

* See "Correctable Secondary Clocks" (under "Wiring") to determine the output terminals.
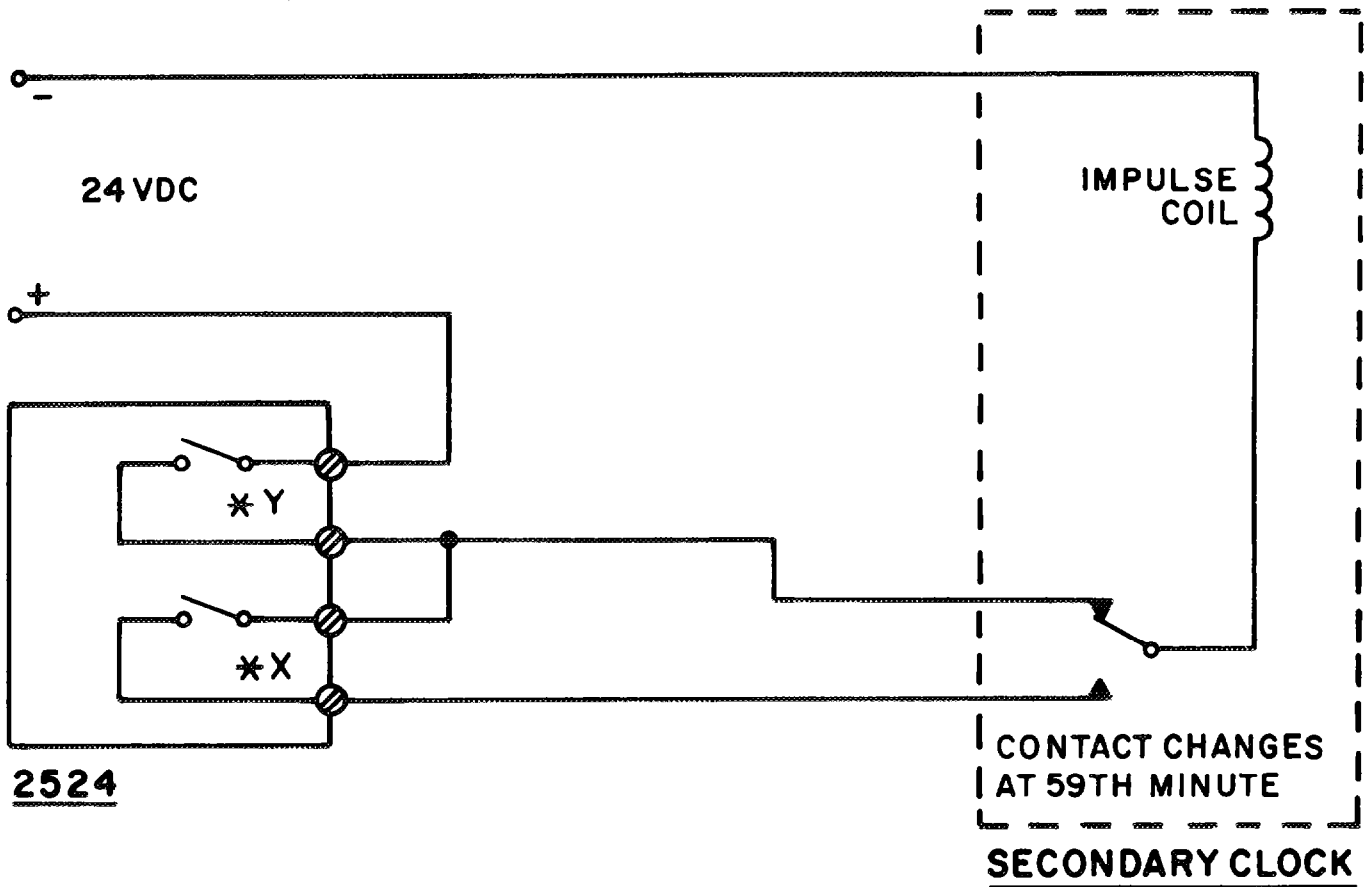
Figure 12.
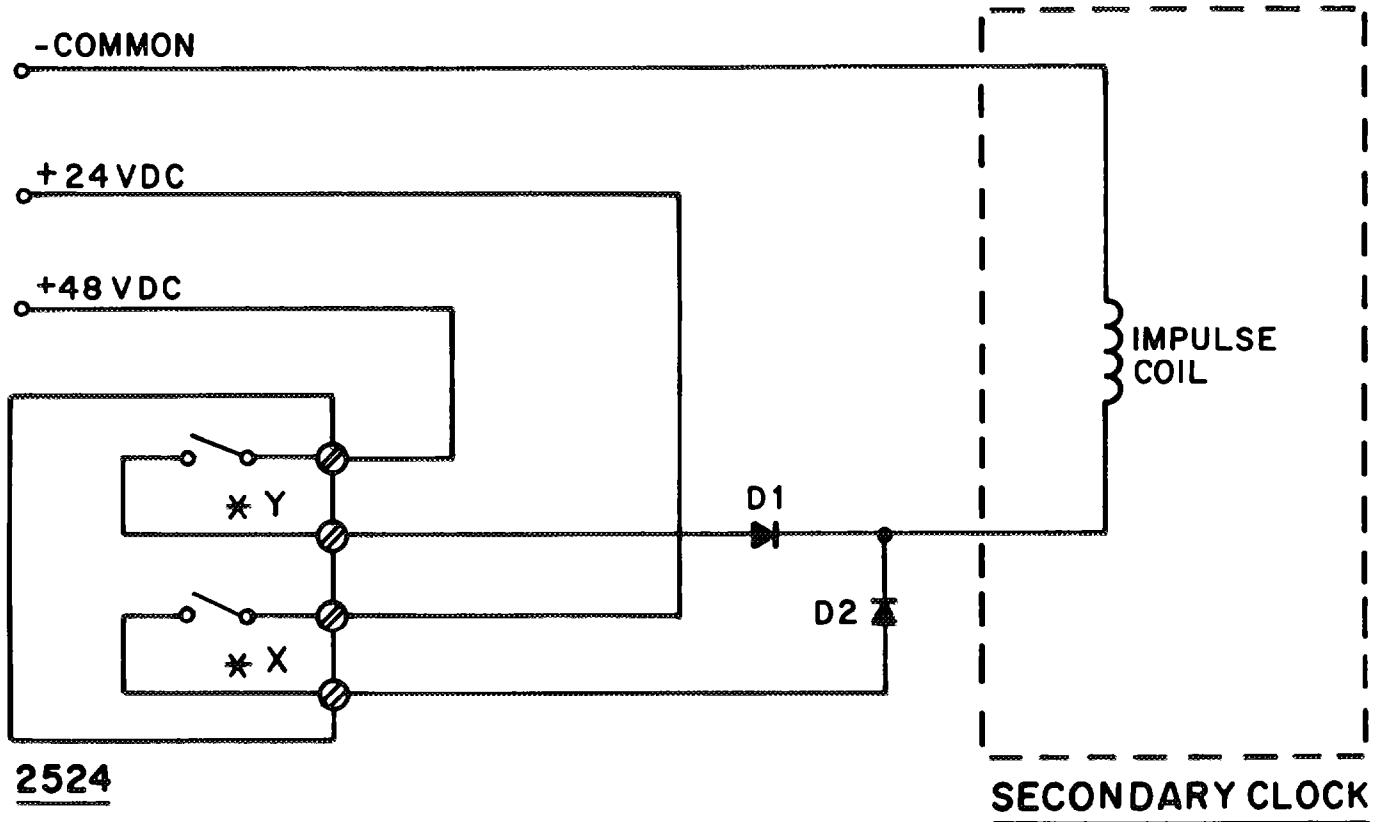
-COMMON

+24VDC

+48VDC

2524

D1

D2

IMPULSE
COIL

SECONDARY CLOCK

D1 AND D2 ARE 1N3210 OR EQUIVALENT.

Correction Code (Mode A)	Correction Timing	
	Minute Impulse	Hourly
#13	"X" is activated for 2 seconds every minute From X:XX:58 To X:XX:00.	"Y" is activated for 10 seconds every hour From X:59:40 To X:59:50.

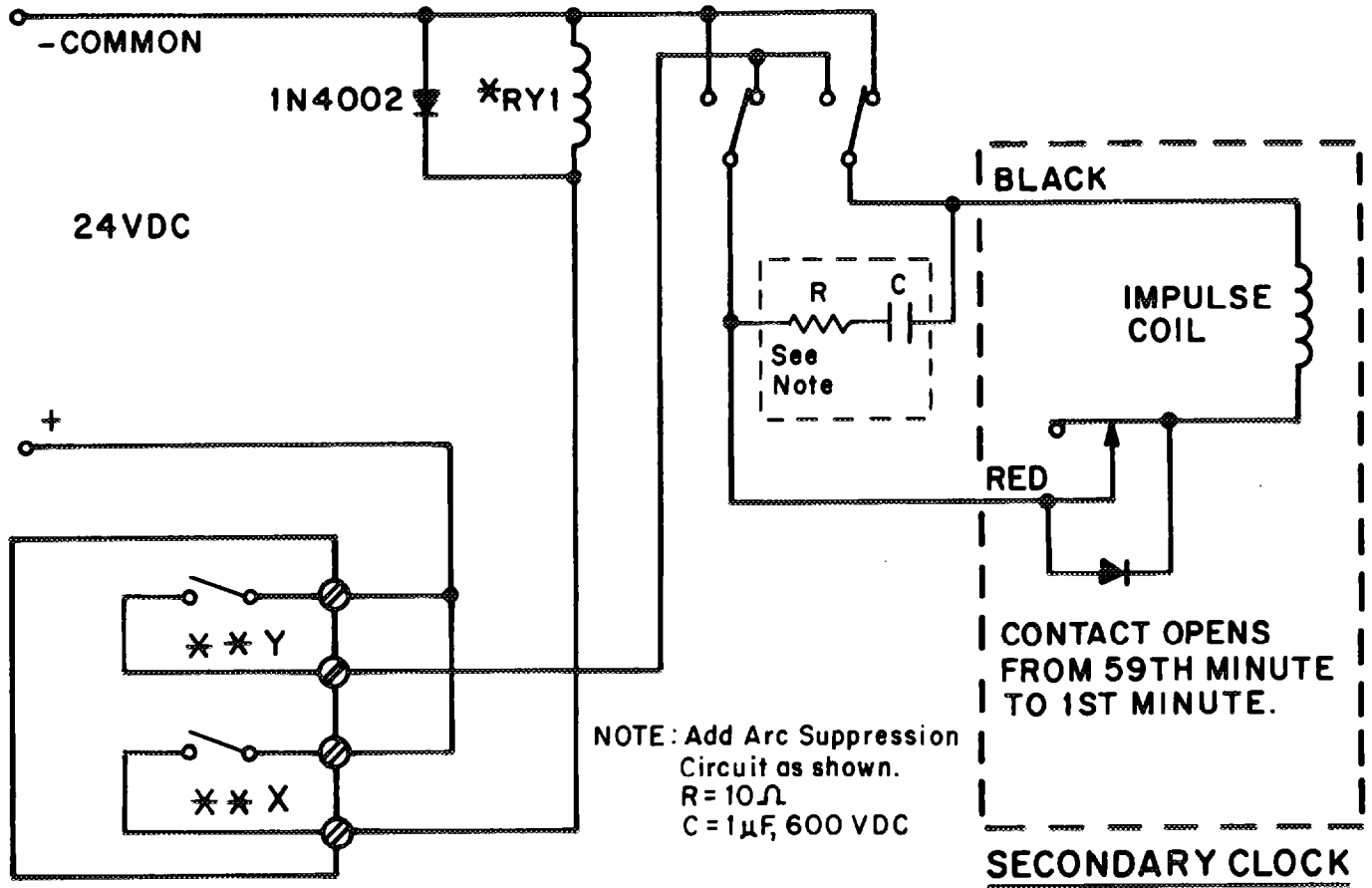* See "Correctable Secondary Clocks" (under "Wiring") to determine the output terminals.

Figure 13.

24 VDC

IMPULSE COIL

2524

SECONDARY CLOCK

CONTACT CHANGES AT 59TH MINUTE

Correction Code (Mode A)	Correction Timing	
	Minute Impulse	Hourly
#14	"Y" is activated for 2 seconds every minute From X:XX:58 To X:XX:00.	"Y" is activated for 16 cycles (1 second on, 2 seconds off) From X:59:02 To X:59:48. "X" is activated for 50 minutes every hour From X:59:50 To (X+1):49:50

* See "Correctable Secondary Clocks" (under "Wiring") to determine the output terminals.
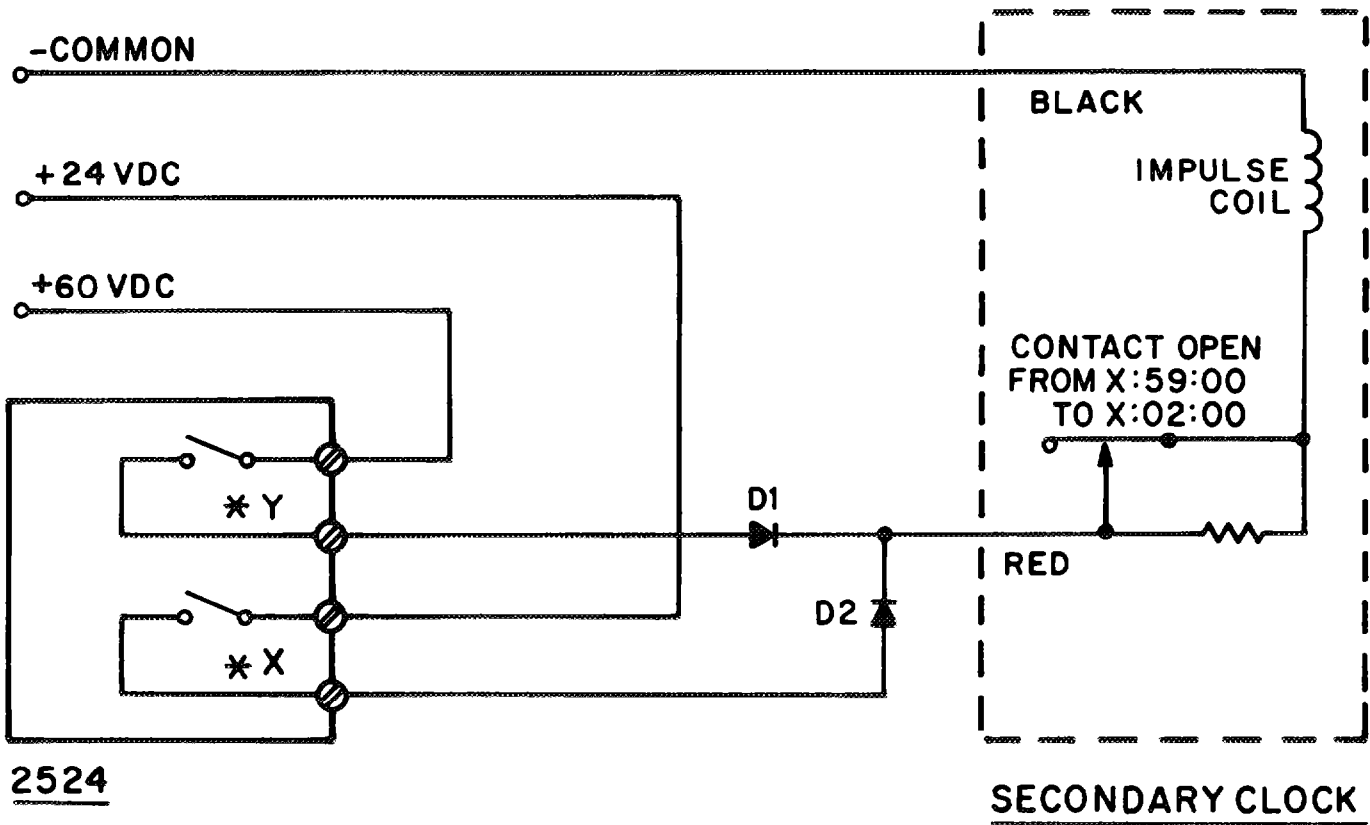
Figure 14.

-COMMON

1N4002 *RY1

24VDC

+

Y

X

2524

NOTE: Add Arc Suppression
Circuit as shown.
R = 10Ω
C = 1μF, 600 VDC

R C

See
Note

BLACK

IMPULSE
COIL

RED

CONTACT OPENS
FROM 59TH MINUTE
TO 1ST MINUTE.

SECONDARY CLOCK

Correction Code (Mode A)	Correction Timing	
	Minute Impulse	**Hourly Correction**
#14	"Y" sends a positive pulse to the impulse coil for 2 seconds every minute From X:XX:58 To X:XX:00.	"Y" is activated for 16 cycles (1 second on, 2 seconds off) From X:59:02 To X:59:48. "X" activates the external relay, reversing the polarity of the pulses, for 50 minutes From X:59:50 To (X+1):49:50.

* RY1 is a customer-provided 24-VDC DPDT relay.
** See "Correctable Secondary Clocks" (under "Wiring") to determine the output terminals.

Figure 15.
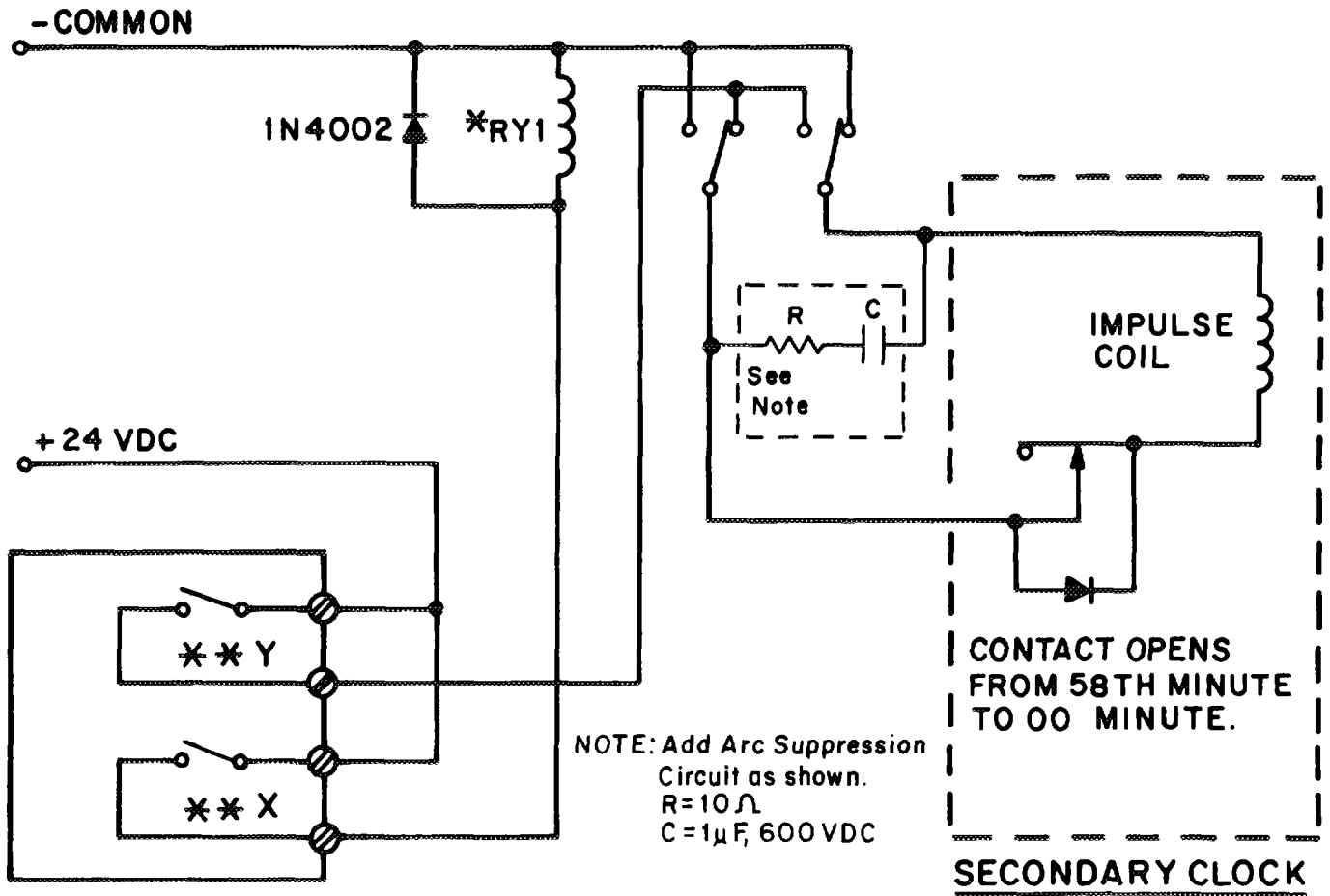
D1 AND D2 ARE 1N3210 OR EQUIVALENT.

Correction Code (Mode A)	Correction Timing	
	Minute Impulse	Hourly

#15	"X" is activated for 2 seconds every minute
	
	From X:XX:58
	To X:XX:00.
	
	(provides 24-VDC pulses)
		"X" is activated 16 cycles (1 second on, 2 seconds off)
		
		From X:59:02
		To X:59:48.
		
		"Y" is activated for 3 times each hour (for 2 seconds on, 58 seconds off)
		
		From X:59:58 To (X+1):00:00;
		          X:00:58 To X:01:00;
		          X:01:58 To X:02:00.
		
		(provides 60-VDC pulses)

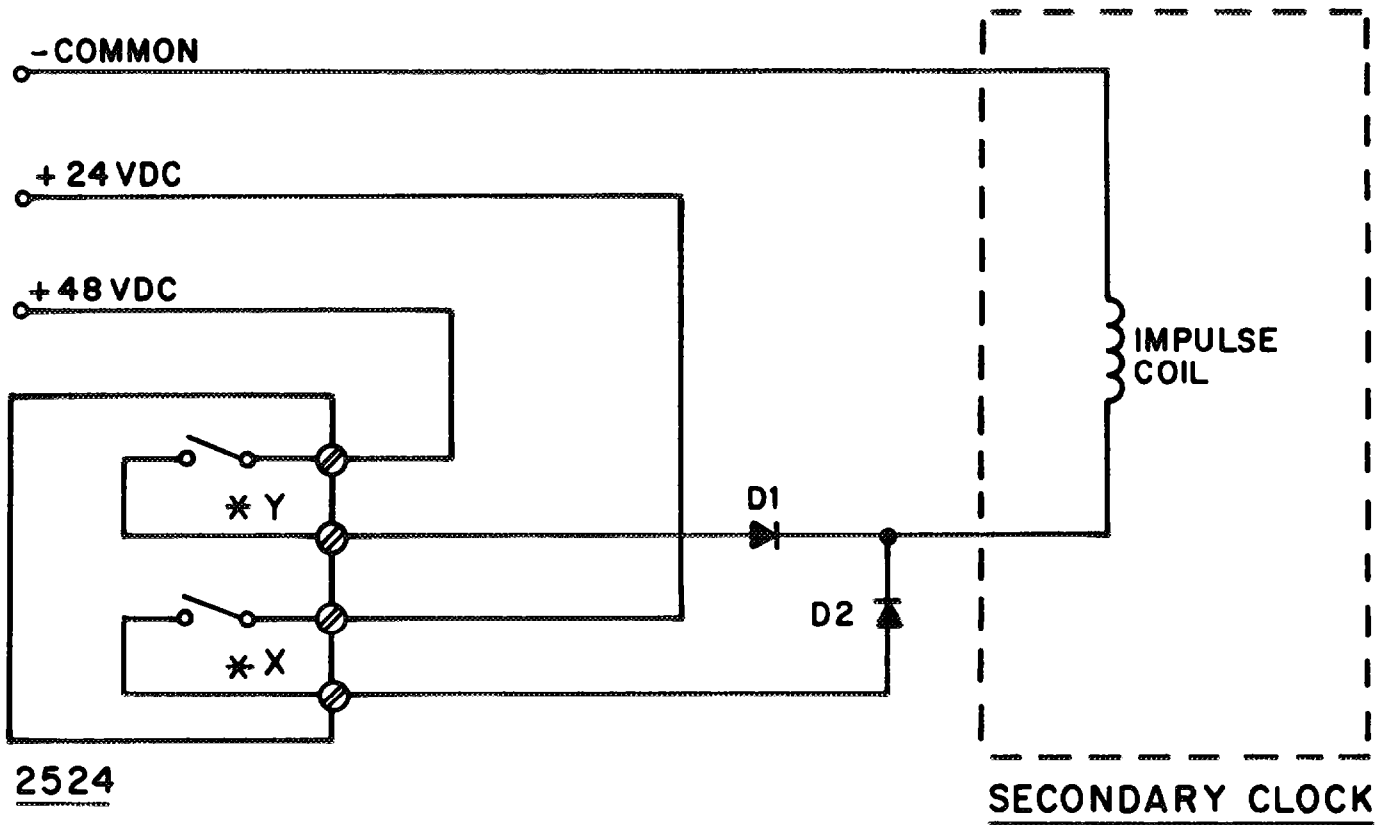* See "Correctable Secondary Clocks" (under "Wiring") to determine the output terminals.

Figure 16.

-COMMON

1N4002 *RY1

+24 VDC

★★ Y

★★ X

2524

R   C

See
Note

NOTE: Add Arc Suppression
Circuit as shown.
R = 10 Ω
C = 1μF, 600 VDC

IMPULSE
COIL

CONTACT OPENS
FROM 58TH MINUTE
TO 00 MINUTE.

SECONDARY CLOCK

Correction Code (Mode A)	Correction Timing	
	Minute Impulse	**Hourly**
#16	"Y" sends a positive pulse to the impulse coil for 2 seconds every minute. From X:XX:58 To X:XX:00.	"Y" is activated for 15 cycles (1 second on, 2 seconds off). From X:58:10 To X:58:55. "X" activates the external relay, reversing the polarity of the pulses, for 7 minutes every hour From X:51:50 To X:58:50.

* RY1 is a customer-provided 24-VDC DPDT relay.
** See "Correctable Secondary Clocks" (under "Wiring") to determine the output terminals.
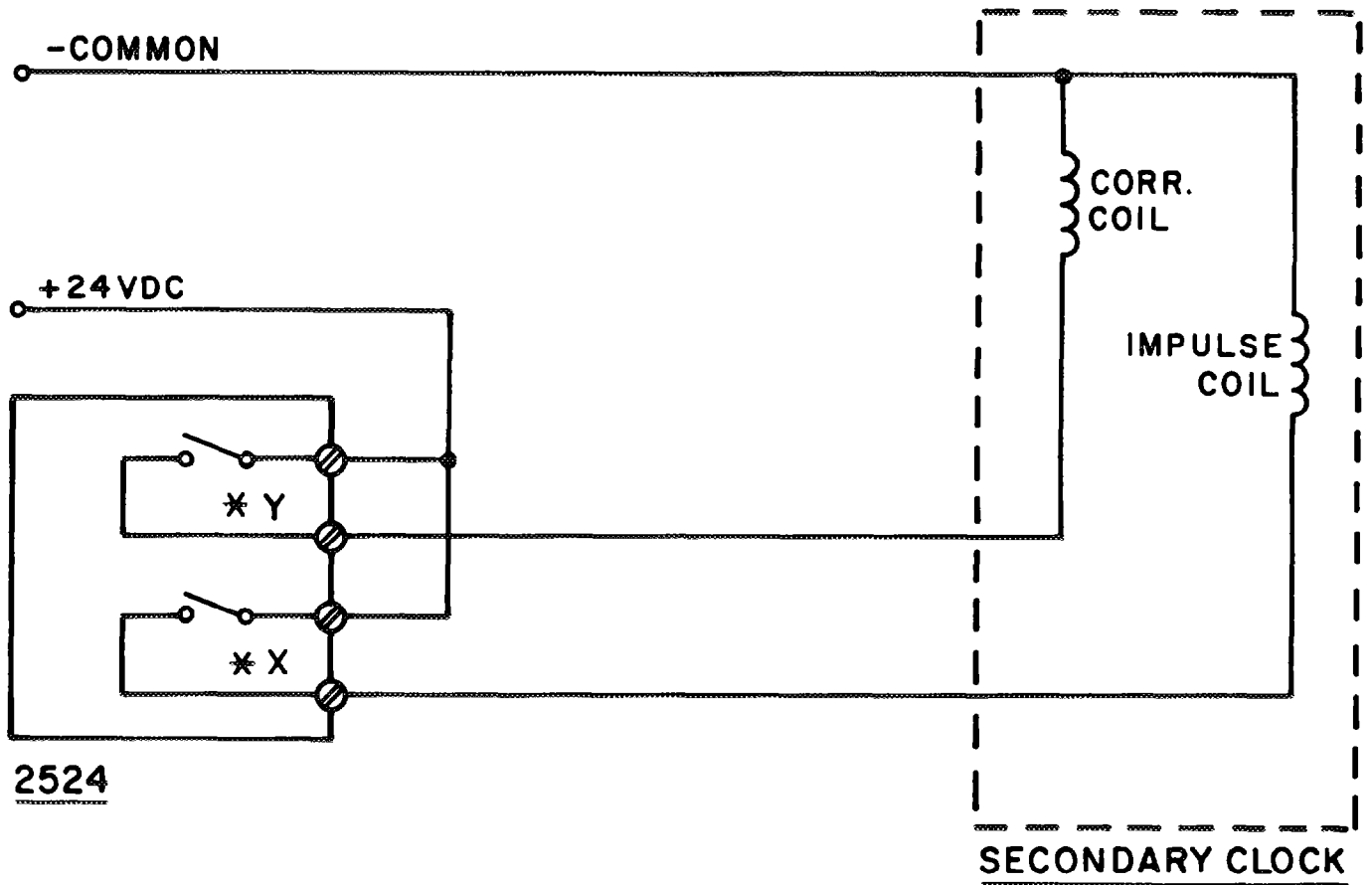
Figure 17.

D1 AND D2 ARE 1N3210 OR EQUIVALENT.

Correction Code (Mode A)	Correction Timing	
	Minute Impulse	Hourly
#17	"X" is activated for 2 seconds every minute From X:XX:58 To X:XX:00. Except for the 59th minute.	"Y" is activated 10 seconds every hour From X:59:40 To X:59:50.

* See "Correctable Secondary Clocks" (under "Wiring") to determine the output terminals.
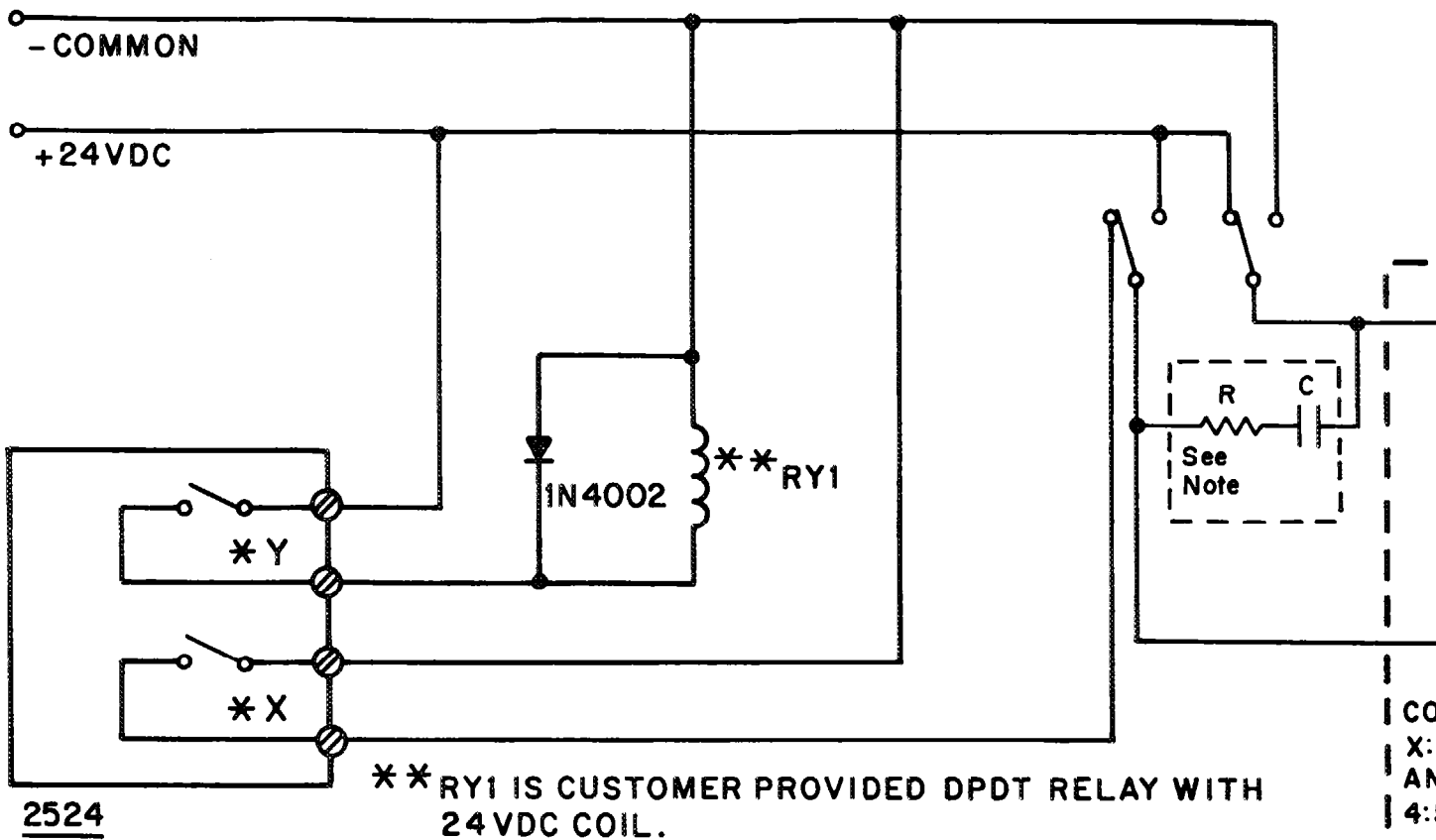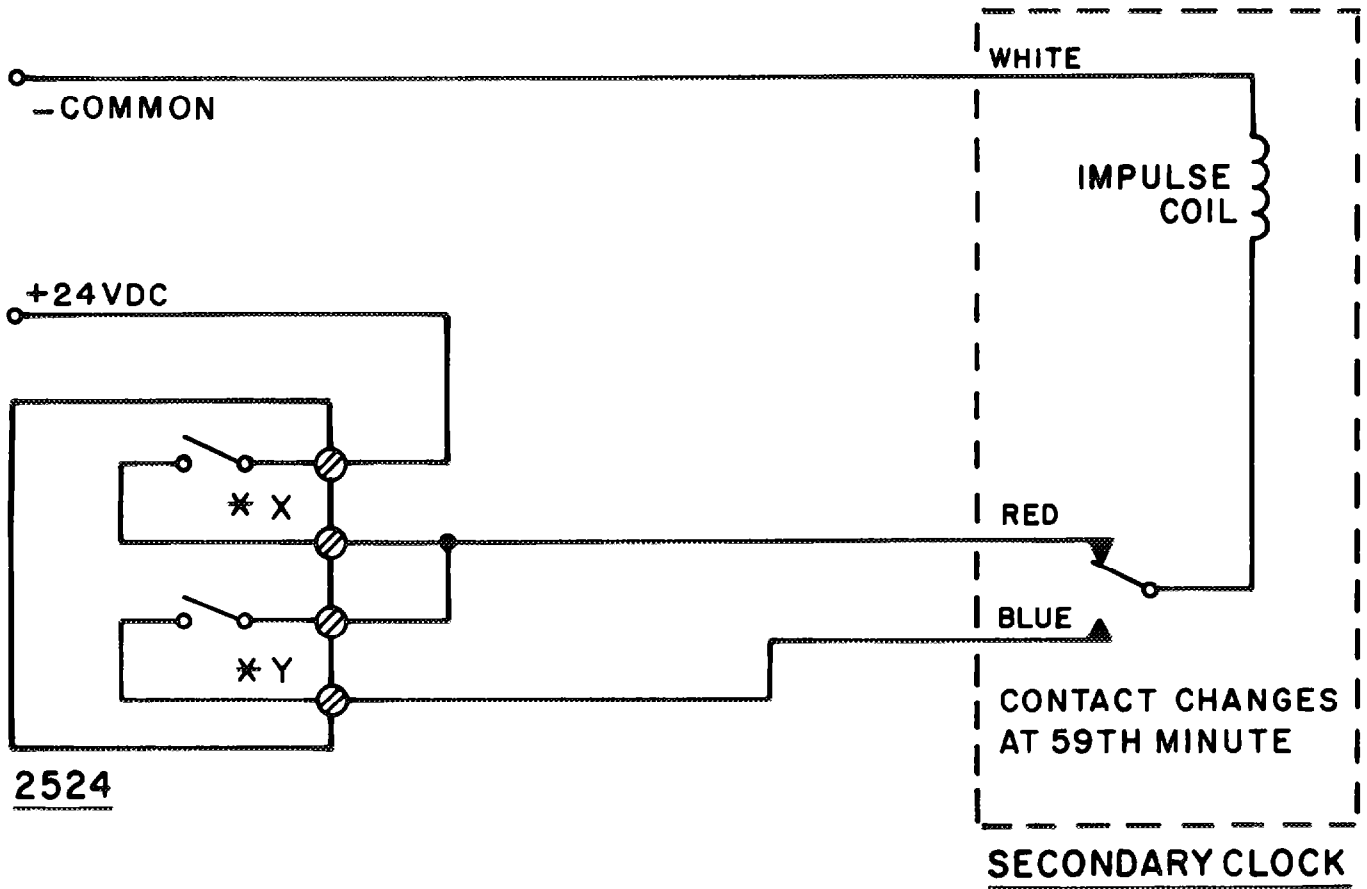
Figure 18.

Correction Code (Mode A)	Correction Timing	
	Minute Impulse	Hourly
#17	"X" is activated for 2 seconds every minute From X:XX:58 To X:XX:00. **Except** for the 59th minute.	"Y" is activated for 10 seconds every hour From X:59:40 To X:59:50.

* See "Correctable Secondary Clocks" (under "Wiring") to determine the output terminals.

Figure 19.

- COMMON

+24VDC

*Y

*X

2524

1N4002   ** RY1

R   C

See
Note

CO
X:
AN
4:

SE

** RY1 IS CUSTOMER PROVIDED DPDT RELAY WITH
24 VDC COIL.

Correction Code (Mode A)	Impulse	Correction Timing		
	Minute	Hourly		12-Hour
#18	"Y" is activated for 2 seconds every minute for 52 minutes From X:59:58 To (X+1):51:00.	"X" is activated for 2 seconds every minute for 8 minutes From X:51:58 To X:59:00. then for 19 cycles (2 seconds on, 1 second off From X:59:01 To (X+1):00:00.		"X" activates for 25 minutes (2 seconds on, 1 second off) From 5:00:00 To 5:25:00.

* See "Correctable Secondary Clocks" (under "Wiring") to determine the
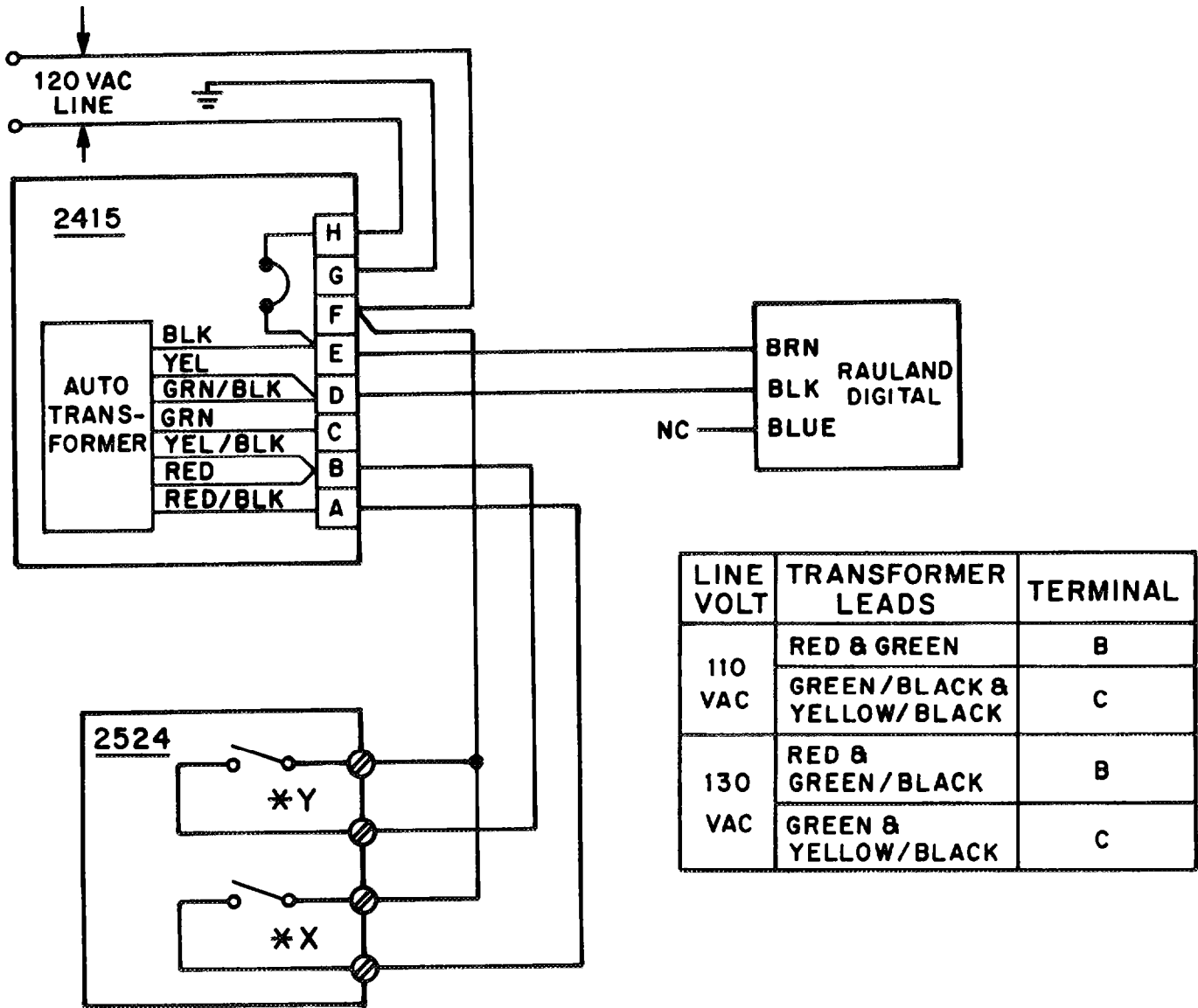output terminals.

Figure 20.

―COMMON

+24VDC

* X

* Y

2524

WHITE

IMPULSE COIL

RED

BLUE

CONTACT CHANGES AT 59TH MINUTE

SECONDARY CLOCK

Correction Code (Mode A)	Correction Timing	
	Minute Impulse	Hourly
#19	"X" is activated for 2 seconds every minute From X:XX:58 To X:XX:00.	"X" is activated for 18 cycles (1 second on, 2 seconds off) From X:58:04 To X:58:56. "Y" is activated for 8 minutes every hour From X:59:00 To (X+1):07:00.

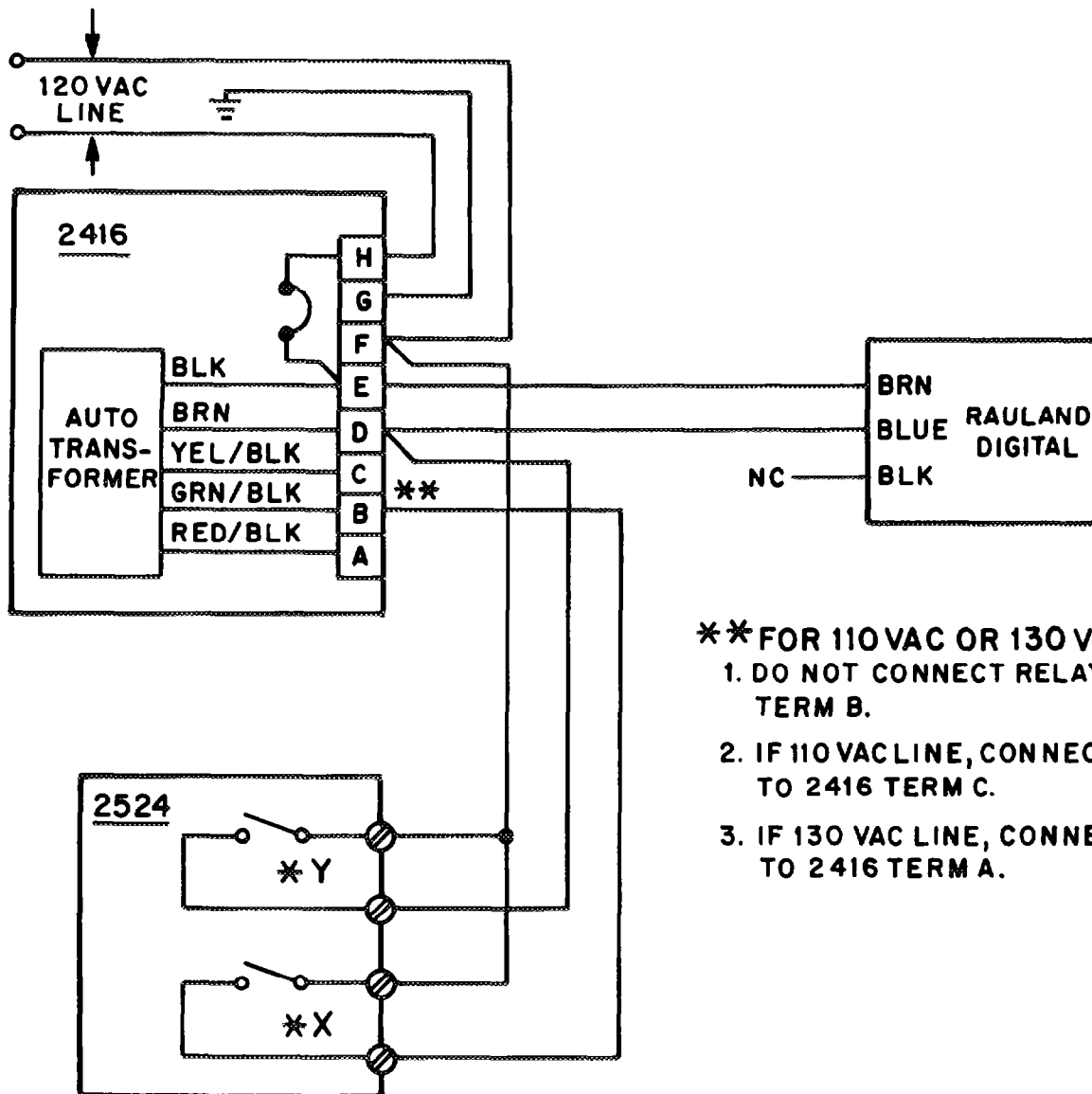* See "Correctable Secondary Clocks" (under "Wiring") to determine the output terminals.

Figure 21.

LINE VOLT	TRANSFORMER LEADS	TERMINAL
110 VAC	RED & GREEN	B
	GREEN/BLACK & YELLOW/BLACK	C
130 VAC	RED & GREEN/BLACK	B
	GREEN & YELLOW/BLACK	C

Correction Code (Mode A)	Correction Timing
#20	• Correction every 24 hours at 12:01 a.m. • Correction when the time is set • Correction when power is restored after a power failure

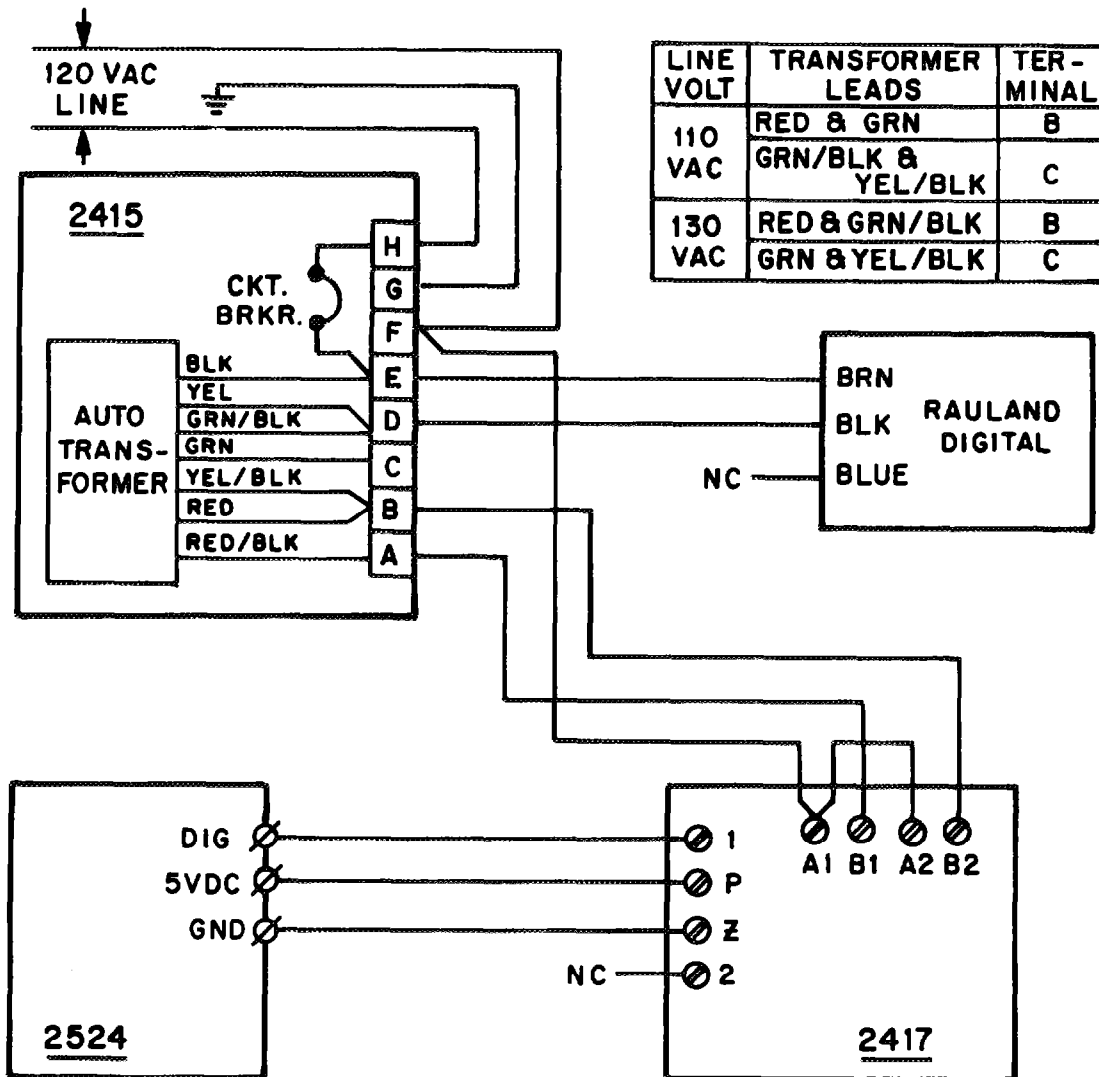* See "Correctable Secondary Clocks" (under "Wiring") to determine the output terminals.

Figure 22.

FOR 110 VAC OR 130 VAC LINE:
1. DO NOT CONNECT RELAY "X" TO 2416 TERM B.
2. IF 110 VAC LINE, CONNECT RELAY "X" TO 2416 TERM C.
3. IF 130 VAC LINE, CONNECT RELAY "X" TO 2416 TERM A.

Correction Code (Mode A)	Correction Timing
#20	● Correction every 24 hours, at 12:01 a.m. ● Correction when the time is set ● Correction when power is restored after a power failure

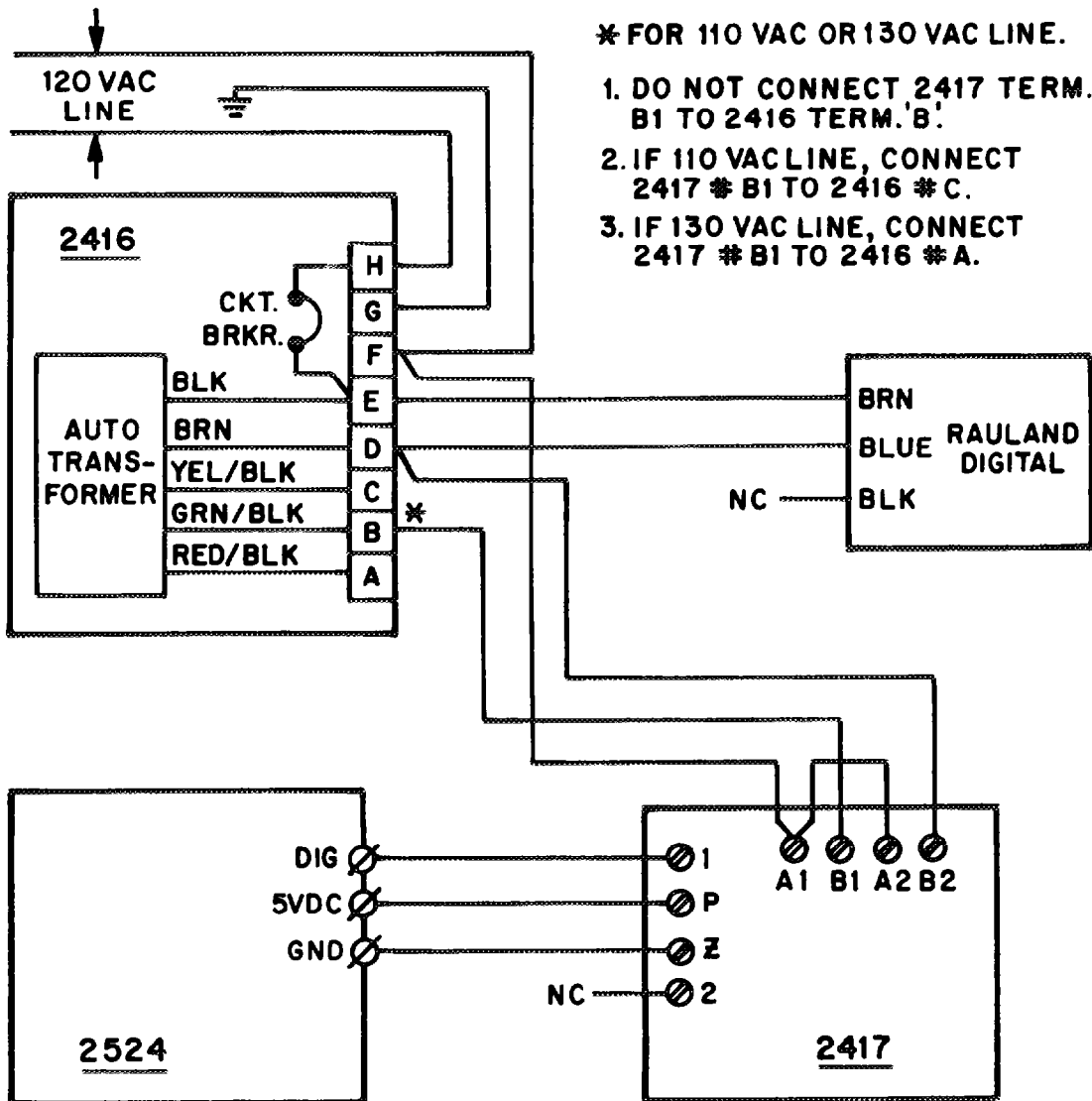* See "Correctable Secondary Clocks" (under "Wiring") to determine the output terminals.

Figure 23.

LINE VOLT	TRANSFORMER LEADS	TER-MINAL
110 VAC	RED & GRN	B
	GRN/BLK & YEL/BLK	C
130 VAC	RED & GRN/BLK	B
	GRN & YEL/BLK	C

Correction Code (Mode A)	Correction Timing
None (See Note)	● Correction every 24 hours, at 12:01 a.m. ● Correction when the time is set ● Correction when power is restored after a power failure

Note: The "DIG" output is always available regardless of the zone configuration or the Correction Codes used.
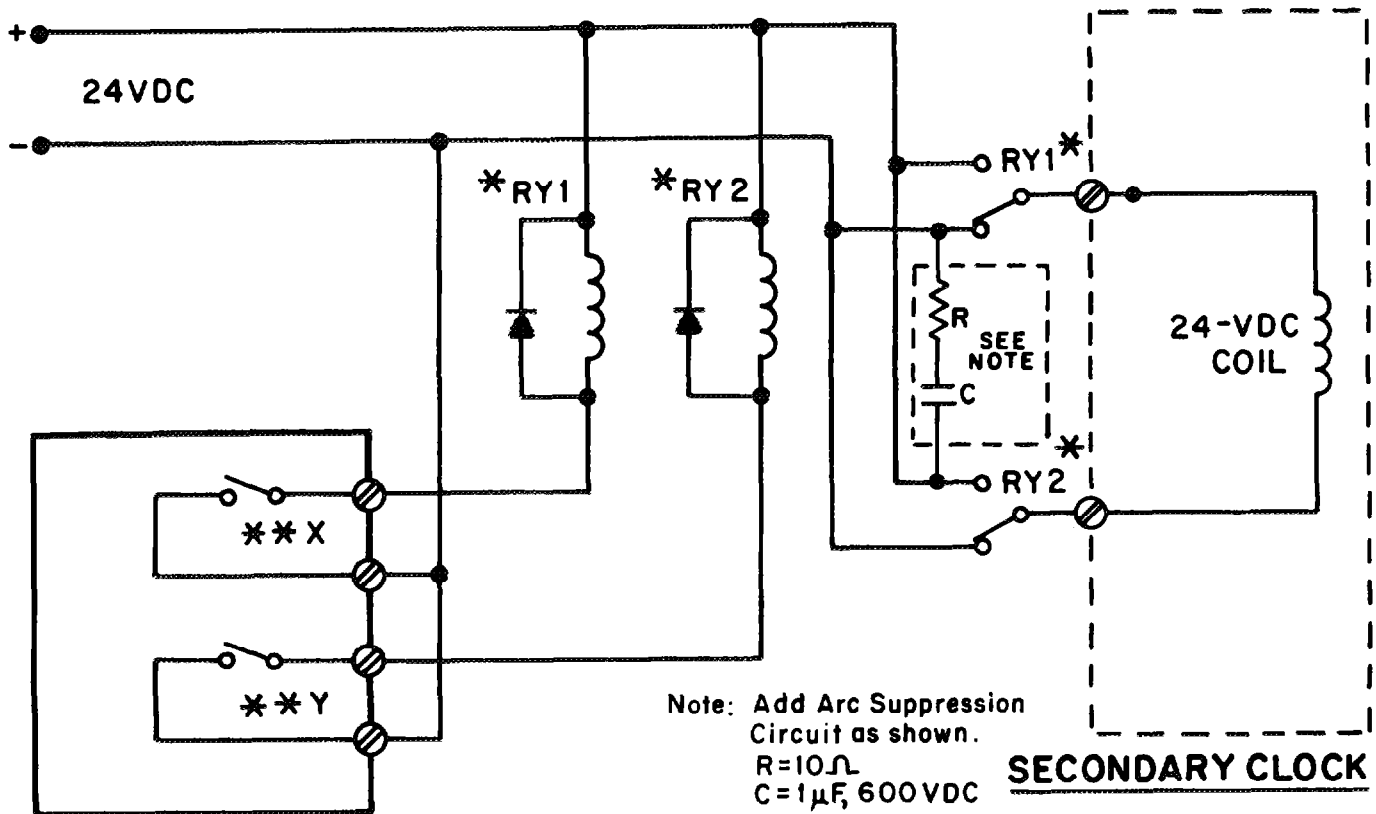
Figure 24.

* FOR 110 VAC OR 130 VAC LINE.

1. DO NOT CONNECT 2417 TERM. B1 TO 2416 TERM. 'B'.
2. IF 110 VAC LINE, CONNECT 2417 * B1 TO 2416 * C.
3. IF 130 VAC LINE, CONNECT 2417 * B1 TO 2416 * A.

Correction Code (Mode A)	Correction Timing
None (see Note)	• Correction every 24 hours, at 12:01 a.m. • Correction when the time is set • Correction when power is restored after a power failure

Note: The "DIG" output is always available regardless of the zone configuration or the Correction Codes used.
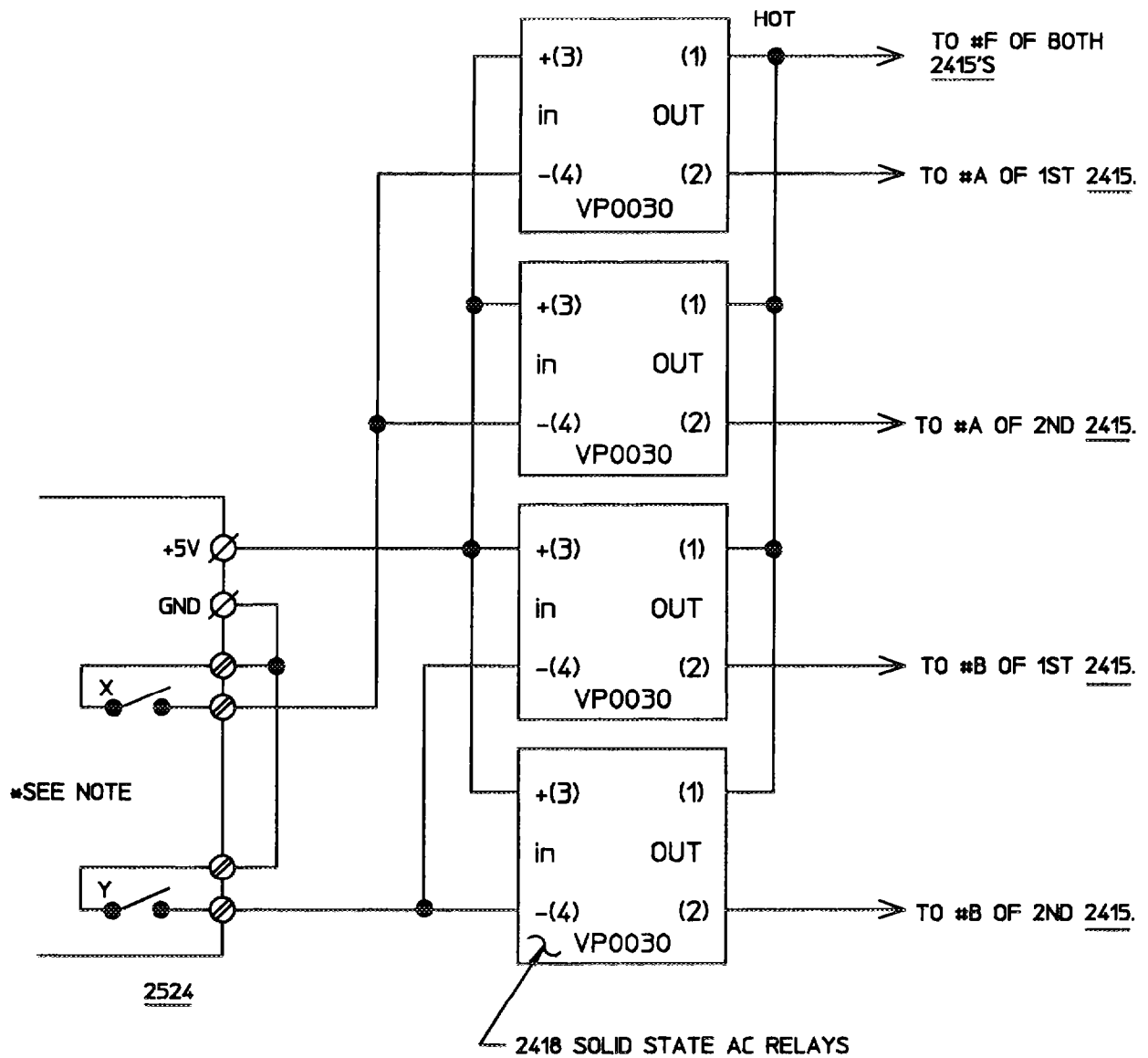
Figure 25.

24VDC

*RY1 *RY2

RY1*
RY2

R SEE NOTE C

24-VDC COIL

Note: Add Arc Suppression Circuit as shown.
R = 10Ω
C = 1μF, 600VDC

SECONDARY CLOCK

2524

X X X
X X Y

Correction Code (Mode A)	Correction Timing	
	Minute Impulse	Hourly
#22	"X" is activated for 2 seconds every even minute (2 seconds on, 118 seconds off, 30 cycles per hour) From X:00:58 To X:58:58. "Y" is activated 2 seconds every odd minute (2 seconds on, 118 seconds off, 30 cycles per hour) From X:01:58 To X:59:58.	Not Applicable

* RY1 and RY2 are customer-provided 24-VDC SPDT relays.
** See "Correctable Secondary Clocks" (under "Wiring") to determine the output terminals.
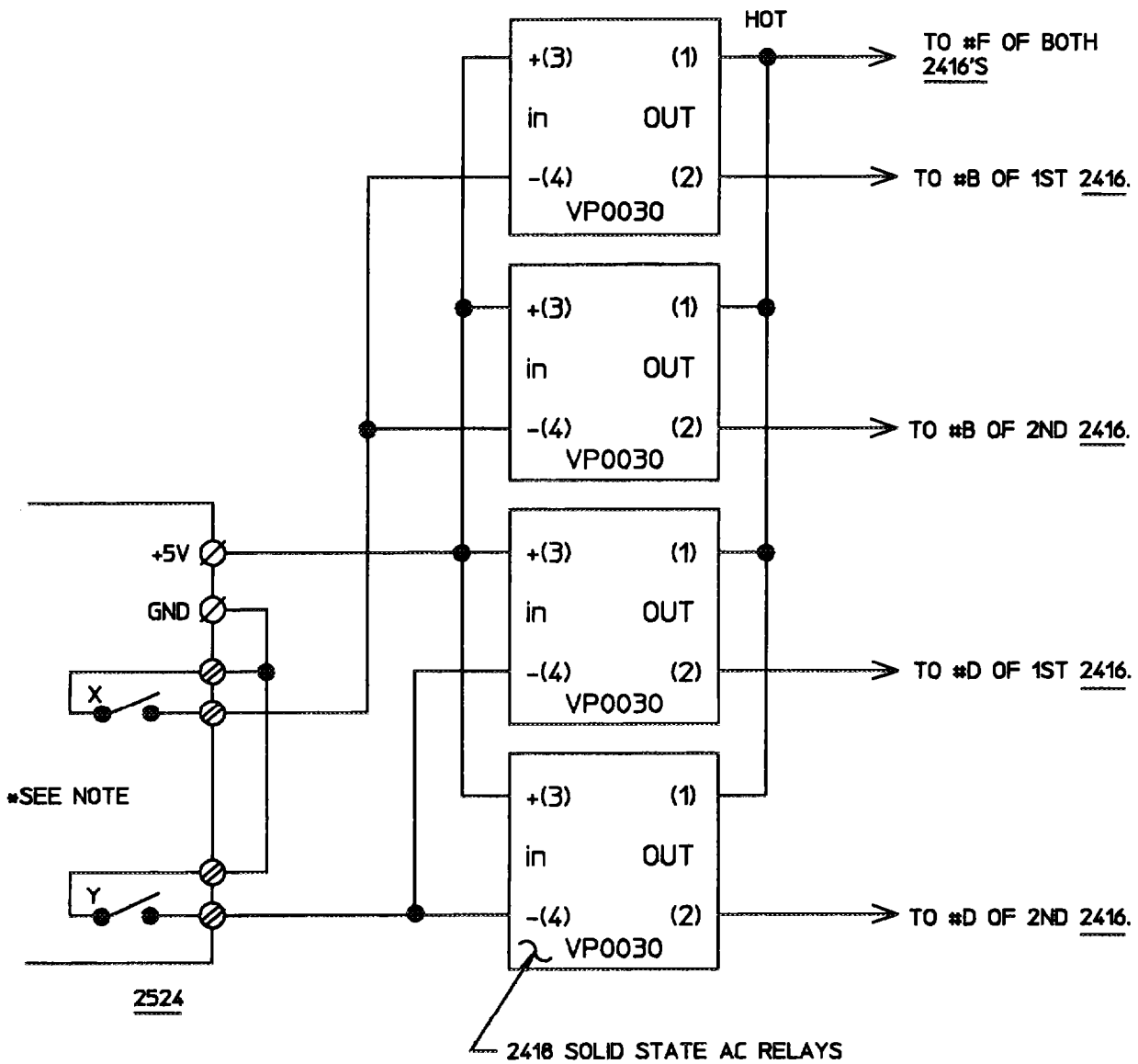
Figure 26.

KM0990 [A]

VP0030

+(3)　　　(1)

in　　　OUT

-(4)　　　(2)

HOT

TO #F OF BOTH
2415'S

TO #A OF 1ST 2415.

TO #A OF 2ND 2415.

TO #B OF 1ST 2415.

TO #B OF 2ND 2415.

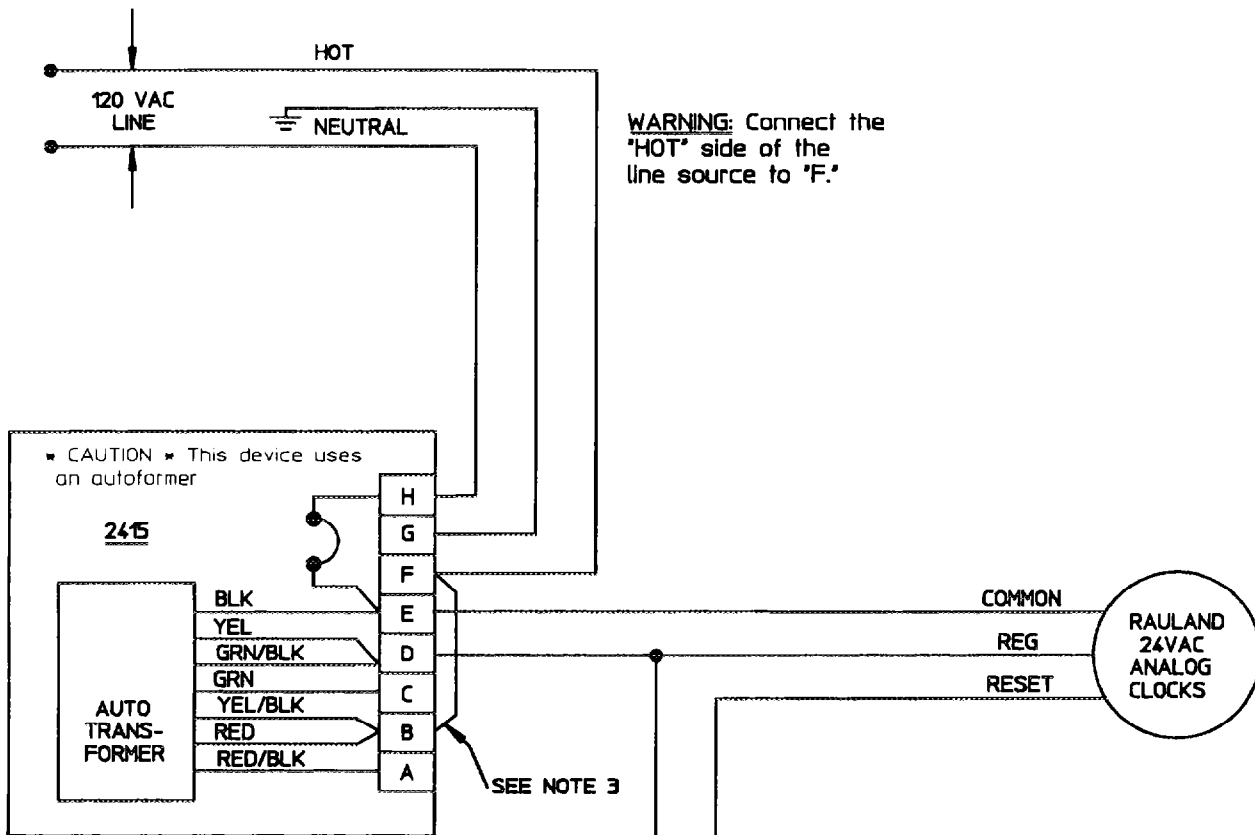2418 SOLID STATE AC RELAYS

+5V

GND

X

Y

*SEE NOTE

2524

*NOTE: THE 2524 IS PROGRAMMED FOR A
CODE "20" CLOCK CORRECTION.

CONNECTING MORE THAN 25 DIGITAL CLOCKS TO A 2524
MASTER CLOCK AND A 24-VAC POWER SUPPLY.

KM1094 ⬚O⬚

FIGURE 27

CONNECTING MORE THAN 25 DIGITAL CLOCKS TO A 2524
MASTER CLOCK AND A 120-VAC POWER SUPPLY.
KM1095 [0]

FIGURE 28

HOT

120 VAC LINE

⏚ NEUTRAL

WARNING: Connect the 'HOT' side of the line source to 'F.'

* CAUTION * This device uses an autoformer

2415

H	
G	
F	
E	
D	
C	
B	
A	

AUTO TRANS-FORMER

BLK
YEL
GRN/BLK
GRN
YEL/BLK
RED
RED/BLK

SEE NOTE 3

COMMON

REG

RESET

RAULAND 24VAC ANALOG CLOCKS
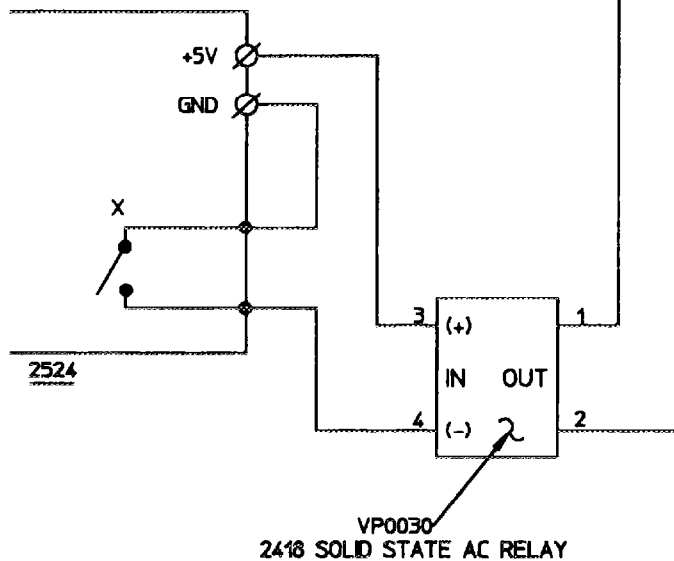
NOTES:
1. THE 2524 MASTER CLOCK IS PRE-PROGRAMMED TO OUTPUT RAULAND ANALOG CORRECTION SIGNAL ON RELAY #7 IN THE SIX ZONE MODE OF OPERATION.
2. MAXIMUM OF 25 CLOCKS ON THE 2415 POWER SUPPLY.
3. THE JUMPER BETWEEN TERMINALS 'F & B' IS NECESSARY TO PROVIDE 24VAC OUTPUT.

+5V

GND

X

2524

3 (+)

IN   OUT

4 (−)

1

2

VP0030
2418 SOLID STATE AC RELAY

24VAC WIRING FOR RAULAND ANALOG SYNCHRONOUS CLOCKS
KM1093 [0]

FIGURE 29
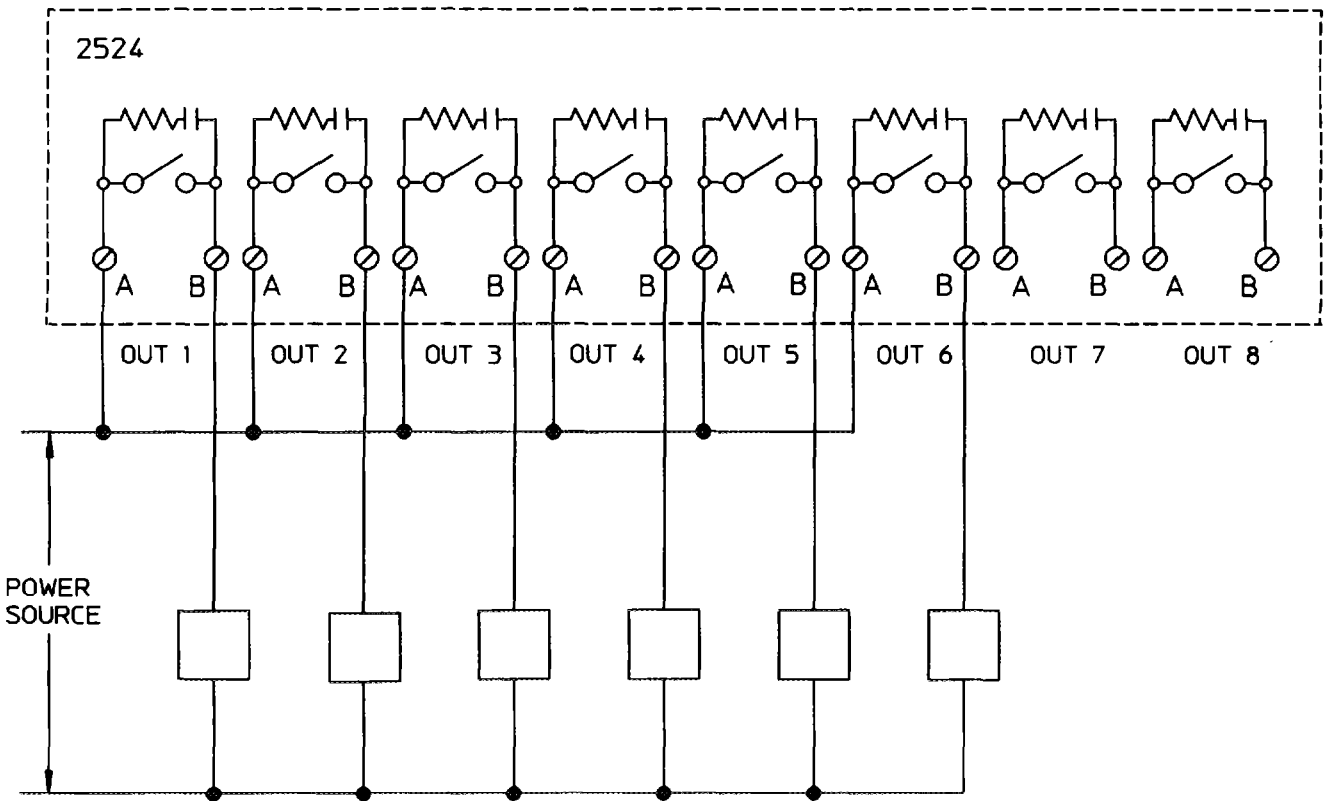
NOTES:
1. "Mode A" programming determines how many outputs are available as clock zones.
2. Each box (□) represents a load (signaling device or equipment). Each load's current should be limited to 5 amperes (resistive) at 30 VDC or 125 VAC.
3. "Out 7" and "Out 8" are normally used for clock correction but may be used for loads instead.

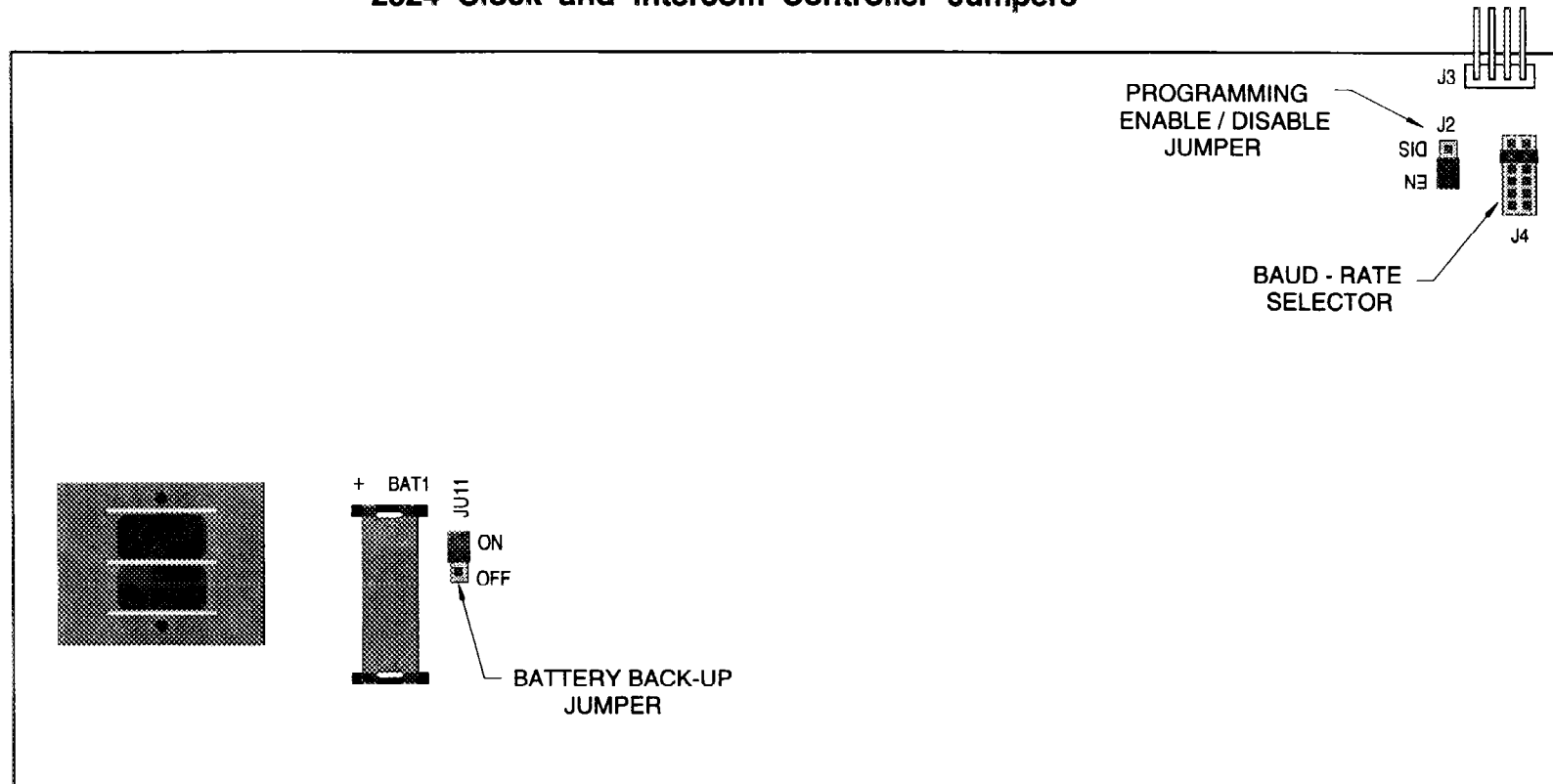2524 Master Clock
Connecting Signaling Devices and Equipment

KM0987 [A]

Modem,
Computer, or
Serial Printer

Black

Red

RS-232 Connector (25-pin)

IN GND G
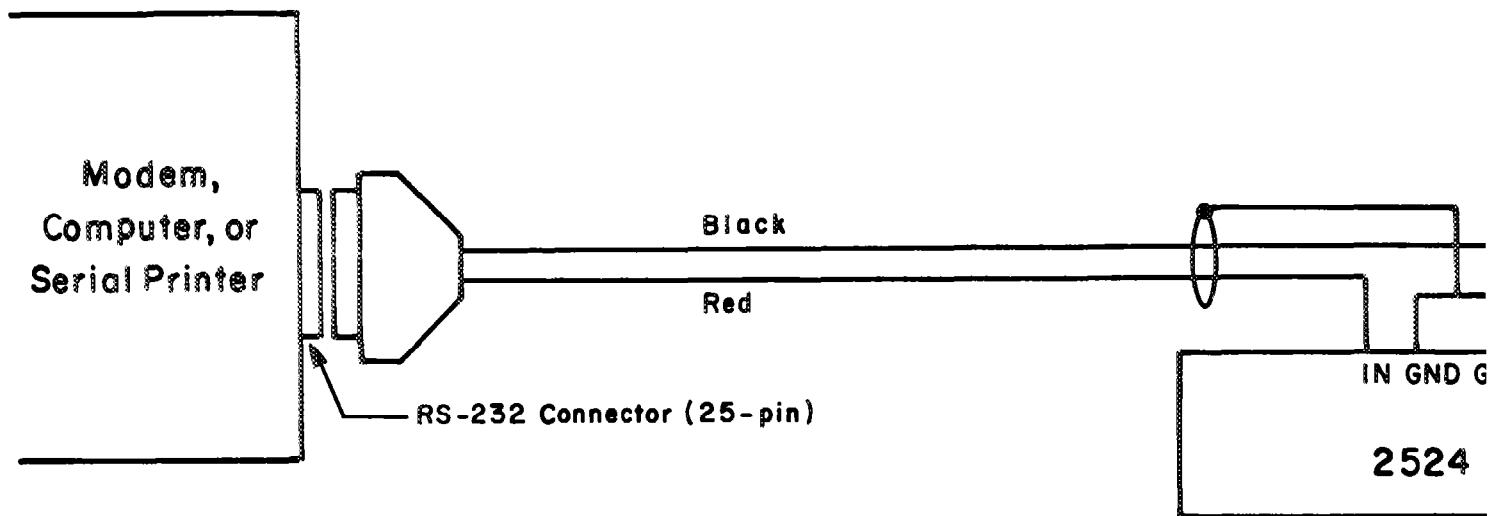
2524

Shielded Pair	Pin	Function in Device
Black	3	Recv.
Red	2	Xmt.
Shield	7	Gnd.

NOTES:

1. The data transmission settings on the 2524 and device must match. The 2524's factory settings 1200 baud, 1 stop bit, no parity, and 8 data bits.

2. The pin connections shown here apply only to a 2 RS-232C connector.

2524 Clock and Intercom Controller Jumpers

PROGRAMMING
ENABLE / DISABLE
JUMPER

J3

J2

DIS

EN

J4

BAUD - RATE
SELECTOR

+ BAT1

JU11

ON

OFF

BATTERY BACK-UP
JUMPER

IL0341