KI-1628B

Rauland Telecenter® 1100 2524 Controller Installation

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General Information

Description

The Rauland 2524 combines the full features of a master clock with intercom control functions. 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). As an intercom control center, it enables a user to "dial" room speakers, displays the number of a room calling in, and provides software zones for bell tones and paging. For security applications, it can automatically check the wiring to room stations every hour (or manually at any time) and enable an intercom user to monitor selected rooms in order to listen for disturbances.

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.

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 × 5/8" black machine screw.	B0439
4	#10 Flat Washer.	WJ0305
4	Fiber Washer.	WL0315
4	Tinnerman for #10-32 mounting screw.	AB3640
1	Intercom-functions label.	N1710

Specifications

Programming Capacity:	Up to 350 Events and 100 Holidays. Up to 500 Room Stations.
LED Digit Displays:	Mode, Time or Station Number, 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).
Panel Finish:	Textured charcoal gray, with white numerals and function designations.

Planning

The attached wiring diagrams show typical installations for the 2524: used as a master clock only, and used in typical clock-and-intercom applications. You will also find helpful information in the next subsection, "Associated Equipment."

Zones

What may require closer attention in more complex installations is the wiring to the 2524's "Zone/Output" terminals. For a thorough explanation of "zones," consult the 2524 programming manual, KI-1629. 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 fill out the "Zones Chart" (in the programming manual), which should be kept with this manual.

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.

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.

Intercom Equipment

Director Control Panels: The combination of the 2524 and a Director intercom system provides a sophisticated communications control center. The intercom panels enable the user to talk and listen to rooms, and to distribute program material (from optional program sources and over optional power amplifiers). The 2524 shows call-ins on its display, enables the user to dial rooms on its keypad, and provide software zones for paging (and time tones). All of the station-related functions also require optional speaker relay modules and room speakers.

Speaker Relay Modules: These panels carry out the zoning and calling commands from the 2524 by connecting the proper rooms. The TC4130, like the TC4120 (SCC25), has a chassis for rack-mounting. The TC4131, like the TC4110 (SC25), is designed to be mounted on the back of Rauland switch panels, such as the SW Series.

Telephone: A CRT3 Staff Telephone can be used for communicating with room stations and paging. The 2524 will show call-ins on its display and signal them with "beeps." Again, this requires optional relay modules for switching the speakers on. Also required is a TC4160 (VCM2 Voice-Controlled Module), which is an amplifier unit that automatically switches from "listen" to "talk" when the telephone user begins speaking. For a more complete display of call-ins (and for a remote location), install a TC4200 Vacuum Fluorescent Display. See the attached wiring diagram KM0983.

Music: The 2524 can distribute a program or music source connected to its "Program" input for continuous listening. It can also distribute a program source connected to its "Music" input as part of a class-change event. Besides the relay modules and

RP1: This potentiometer must be adjusted for the 2524 to respond to call-ins (see "Calibrating RP1" in this manual).

SC25: This 26-pin connector must be connected to all optional speaker relay panels in the system. It conveys the data for switching the speaker relays.

Answer: Momentarily connecting this input to a circuit ground instructs the 2524 to connect a remote telephone to a station that is calling in. If this and a ground terminal are wired across the phone's hook switch (use the "Aux" terminals on the CRT3), lifting the handset will immediately connect it to the caller. It is also necessary to keep the "Reset" terminal (described next) connected to a circuit common throughout the communication. See the attached KM0983.

Logging Messages

Print-out	Explanation
<.CALL 126 11:37AM 4-5-90	Station *126* placed *normal call* at 11:37 AM 4/5/90.
<.ANSW 126 11:38AM 4-5-90	Call from Station *126 answered.*
<.EMER 129 11:45AM 4-5-90	Station *129* placed *emergency call.*
<.ANSW 129 11:45AM 4-5-90	Call from Station *129 answered.*
<.ZONES 1234 12:45PM 4-5-90	Event occured on *Zones 1, 2, 3,* and *4* at 12:45 P.M. on 4/5/90.
<.FAULT 101 1:00PM 4-5-90	Fault detected at station *101.*
<.TIME 00:00:00 midnight.	Synchronization command sent at

Reset: This must remain connected to a circuit common while the remote phone is paging or in communication with a room station. Connect this input and a ground terminal across the hook switch of a remote phone (the "Aux" terminals on a CRT3 Staff Telephone). Note that this output is active when it is high: it disconnects the paging and intercom amplifiers and releases the speaker relays unless it is grounded. See the attached KM0983.

Page In: Momentarily connecting this input to a circuit common instructs the 2524 to connect a remote telephone to all room stations for an All-Page announcement. This takes

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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 intercom activities, event execution, and faulty lines (see the sample log below). For the wiring to the cable, see the attached KM0991.

Page button would disconnect the room and engage the paging function. It is also necessary to keep the "Reset" terminal (described immediately above) connected to a circuit common throughout a page. See the attached KM0983.

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.

S-Bus: These screw terminals are for the balanced 25-volt speaker audio lines. They must be connected to the S-Bus terminals of all the optional relay panels in the system. Refer to the attached wiring diagrams for more details.

IC Amp: Connect the intercom-amplifier output of an optional Director master control panel to these screw terminals. The 2524 can then internally connect this audio to the S Bus, which runs from it to the optional relay panels. Refer to the attached KM0983 and KM0984 for more details.

A Amp: These screw terminals are used to receive the output of the "A" Channel amplifier. The 2524 internally connects this to the S Bus for program-distribution and paging functions. Refer to the attached system wiring diagrams for more details.

Music Amp: Connect the output of the music amplifier to these screw terminals to provide music after clock tones (controlled by the event programming). If there is a remote phone, install an external relay as shown in KM0983. Connect the VCM2's "S" terminals to this relay's normally closed contacts, and the music amplifier to its normally open contacts. With this arrangement, lifting the remote telephone off-hook causes the 2524 to internally connect the C Bus with the S Bus. When an event calls for music, the "Music" terminal pulls in the external relay, connecting the music amplifier's output to these "Music Amp" terminals; the 2524 internally connects these terminals to the S Bus.

Since only one source of programming can be distributed at a time, the "A" Channel amplifier may be wired in parallel to this input, as shown in the attached system wiring diagrams. However, if the customer wants to use a different program source for program-distribution and the music associated with clock tones, connect a separate music amplifier and source to these terminals.

LCD: These three terminals are connected to the corresponding terminals on an optional TC4200 Vacuum Fluorescent Display.

Music: This output is used to control an optional external relay when there is a remote phone (see the attached KM0983). When a clock event calls for music after a tone, this terminal is internally grounded, which activates the external relay (see the "Music Amp" terminals, above).

Beep: The 2524's built-in Sonalert® beeper will signal call-ins. If a signal is desired in another location (e.g., by a remote phone that does not have an associated TC4200 display), the 2524 can also drive an external 6-VDC Sonalert type of sounding device. Connect the device's positive lead to the "Beep" terminal and its negative lead to a ground terminal.

Busy: These outputs can used to connect an external indicator (LED, lamp, etc.), which could be used by the remote phone to show when the 2524 is being used for communications or programming. The device will be activated whenever the front-panel keypad is used, and will remain on until that function has ended. The "+" terminal can provide up to 45 milliamperes of current.

Page Out: This output is wired to a Director master control panel when a remote phone is installed (see the attached KM0983). When the remote phone performs an All-Page, the 2524 connects this output to the circuit common. This, in turn, causes the master control panel to feed the remote phone's audio into the "A" Channel amplifier.

+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 a 2417 Correction Adapter Module.

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

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

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, you can install 2418 or 2419 Buffers (see the "Accessories" descriptions 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" programming in the

No special treatment is required if other equipment is mounted next to it.

Step 1. Locate 3½ inches of rack space where 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

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, then the secondary clocks for this code must be connected to *Out 5* (for the "X" corrections) and *Out 6* or the "Y" correc-tions).

Telecenter® Systems

Instead of sending tones directly to room speakers, 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 5000 and 5500 systems provide only four zones for time tones. In the TC5000, each of these zones consists of two or three paging zones: for example, the first time-tone zone consists of paging zones 1 and 2, and the fourth time-tone zone consists of paging zones 7-9. The TC5500 simply uses its first four paging zones for time tones. On a TC5000 or TC5500 system, the 2524 also synchronizes the system clock.

Use the appropriate table at the top of next page 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 Wiring Connections

TCIV MIO "B" Connector Pin	2524 "Zone/Output" Terminal Pin	Time Zone
2	1A	1
4	2A	2
6	3A	3
8	4A	4
10	5A	5
12	6A	6
*14	7A	7
*16	8A	8
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.

TC5000 and TC5500 Wiring Connections

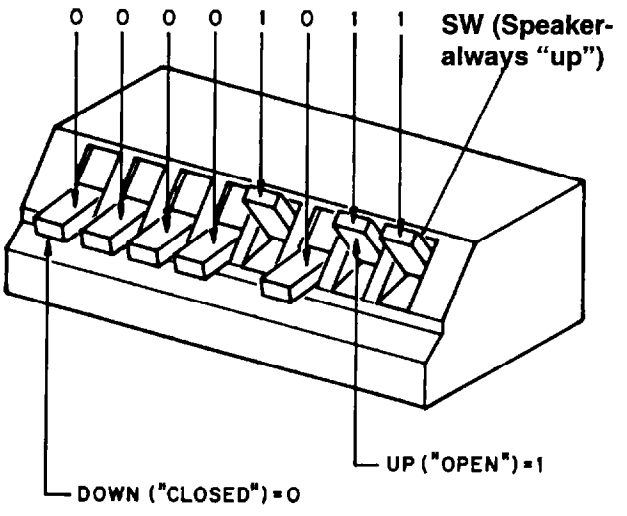
TC5000 or TC5500 Terminal	2524 "Zone/Output" Terminal Pin	TC5500 Zones*	TC5000 Zones
1	1A	1	1 and 2
2	2A	2	3 and 4
3	3A	3	5 and 6
4	4A	4	7, 8, and 9
5	DIG	[N.A.]	[N.A.]
-0V	GND and 1B-4B		

* *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.

Configuring Speaker Boards

When connecting the 2524 directly to speaker control boards like the TC4130 (see the attached KM0983-KM0985), be sure to set each board's DIP switch according to the "SC DIP-Switch Settings" table below. This DIP switch is on the PCB, near the flat-cable connector.

Setting each switch assigns a number to each board, which is essential to the system's identifying individual room lines. Note that the leftmost key is marked "NC" on the circuit board because it is not connected (and so its setting has no effect).



Important: The rightmost key, marked "SW" on the circuit board, must always be in the up ("1") position. This indicates that the board is controlling speakers, the only option for staff stations in a 2524 system.

SC DIP-Switch Settings

SC No.	DIP Key	Phys. No.	SC No.	DIP Key	Phys. No.
0	0000000(1)	1-25	10	0001010(1)	251-275
1	0000001(1)	26-50	11	0001011(1)	276-300
2	0000010(1)	51-75	12	0001100(1)	301-325
3	0000011(1)	76-100	13	0001101(1)	326-350
4	0000100(1)	101-125	14	0001110(1)	351-375
5	0000101(1)	126-150	15	0001111(1)	376-400
6	0000110(1)	151-175	16	0010000(1)	401-425
7	0000111(1)	176-200	17	0010001(1)	426-450
8	0001000(1)	201-225	18	0010010(1)	451-475
9	0001001(1)	226-250	19	0010011(1)	476-500

Turning on the 2524

When the power is applied to the 2524, it displays: "Mode" 0, "Time" (the current time), and "Sched" a flashing "P" (to indicate that there was a power failure). 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-1629).

Adjusting the Call-in Sensitivity

You must adjust Pot *RP1* on the 2524 for call-in sensitivity before running the unit in the "Comm" mode or activating the call-scanning function in Mode E. Use Comm Mode 5 programming to make this adjustment (see KI-1629, the 2524 programming manual).

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.

Supervision

When this function is enabled, the unit scans the speaker stations every hour for shorted, open, or grounded lines. This scanning will start on the hour and proceed when no other activities are taking place (e.g., paging and music events) until either all lines are scanned or the first faulty line is found. If it finds a fault, it will flash an "F" in the "Sched" window, and display the station number in the "Time" windows. Push → to continue scanning. You can also have the 2524 do a cycle of scanning at any time by pressing *Manual* while the unit is in the "Comm" Mode.

Even as it is displaying faults one-by-one in its "Sched" window, the 2524 will immediately send a complete list of all faults to its serial port. Thus, you can obtain an immediate and permanent record of the faults by connecting a serial printer or a computer to this port (the "In-Gnd-out" terminals—see "Output Terminals," above, and the attached KM0991).

Monitoring

When this function is activated by the operator, the 2524 connects each selected room station, one by one, to the Director control panel's speaker. Each station will remain connected for one to 15 seconds, depending upon the programming. This enables the operator to listen briefly to each room for a disturbance that might call for action. See the 2524 programming manual, KI-1629, for details on selecting the rooms, setting the connection time, and enabling the function, and the 2524 operation manual, KI-1630, for details on using the function.

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 Speaker Relay Panels

In this case, the Clock Mode E programming will specify a number greater than "0" for SC25s.

First, the 2524 sends out the time tone by:

1. Activating the appropriate "Zone/Output" relays.
2. Activating the external tone generator and connecting it to the input of the program amplifier.
3. Connecting the S Bus to the output of the program amplifier.
4. Pulling in the speaker panels' relays for the appropriate zones.

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

5. Deactivating the "Zone/Output" relays.
6. Switching the S Bus to the output of the music source.
7. Deactivating the external tone generator, disconnecting it from the program amplifier, and connecting the music source in its place.

Finally, the 2524 ends the event by:

8. De-energizing the speaker panels' relays.
9. Connecting the S Bus to a Director control panel or the output of a program amplifier.

Without Speaker Relay Panels

In this case, Clock Mode E programming specifies "0" for the number of SC25s, and its outputs are connected to a Telecenter® 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:

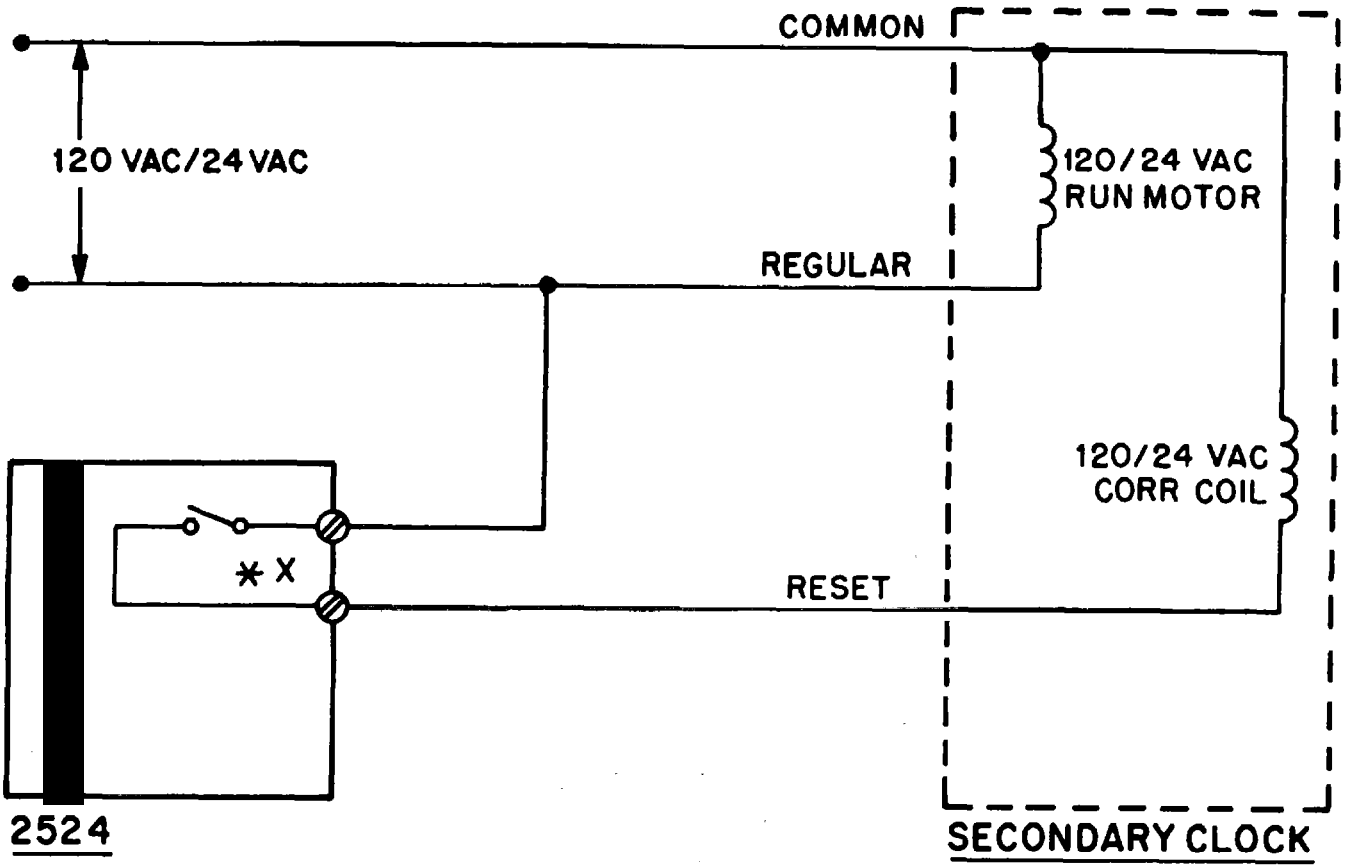
4. Disconnecting the Off Bus from the output of the music source.

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, 76, 81, and 86 Series		
Stromberg: E3109 and WS310	Synchronous-Wired	4
National: and 060-12E-SRLV *(NN = any two-digit number).*		
Dukane: 24BF209, 24BF212 707-8 and 707-9 types.	Synchronous-Wired (old type)	6
Simplex: 77M-45 Series	Synchronous-Wired (dual-motor)	7
IBM: 77M-45 Series		

Secondary-Clock Manufacturer and Model	Clock Type	Reference Figure
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
IMB: 77M-59 Series		
Cincinnati: D10 and D12		
Latham: SS12 Types		
Edwards: 010		
Dukane: 24SS Series		

Secondary-Clock Manufacturer and Model	Clock Type	Reference Figure
Standard Electric Time: AR2	Minute Impulse	13
IBM: 55, 60, 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	16
Stromberg: 2-wire (58th-minute correction)	Minute Impulse	17
Standard Electric Time: AR2A	Minute Impulse	18
Standard Electric Time: AR3A	Minute Impulse	19

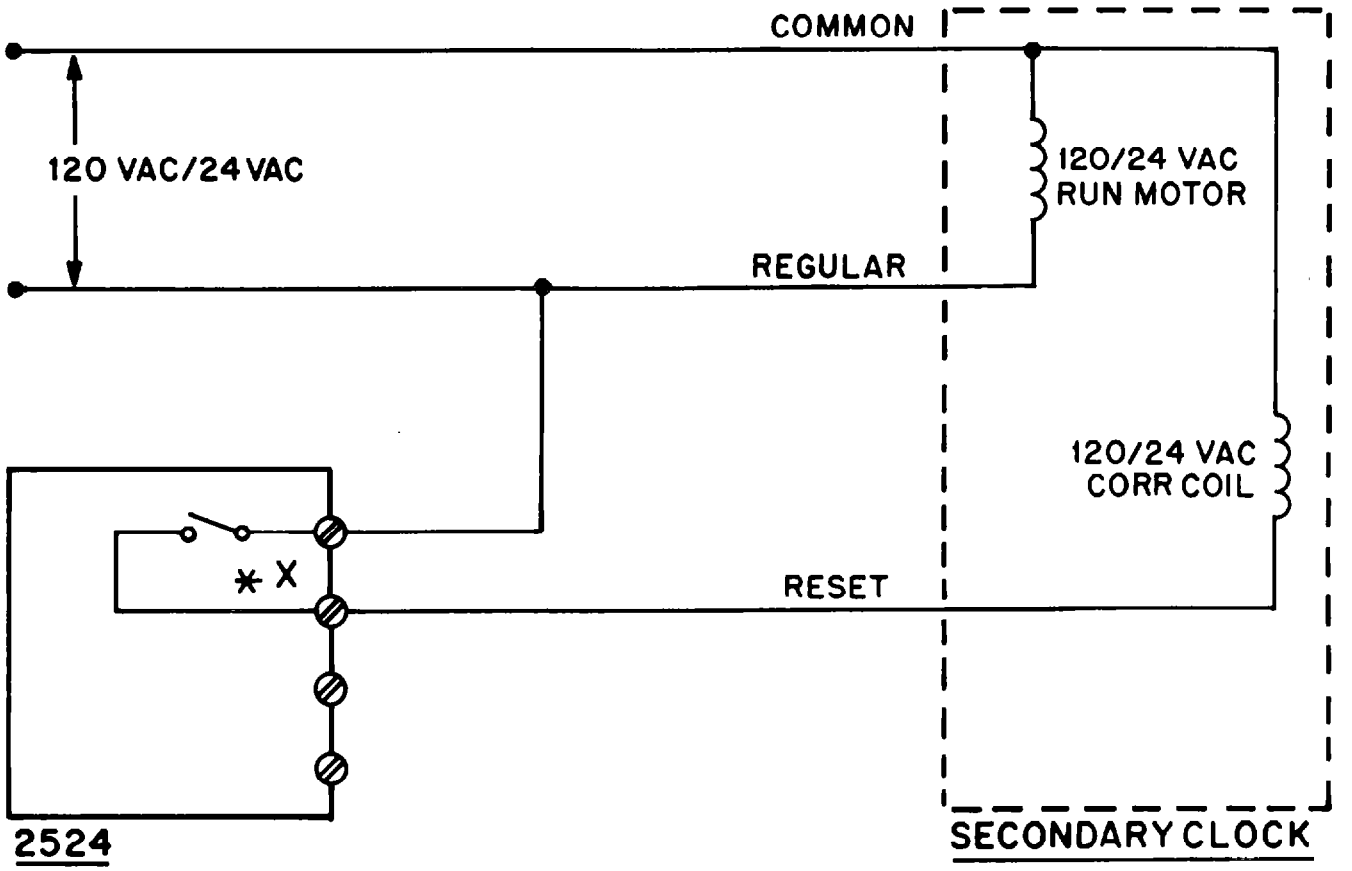
Secondary-Clock Manufacturer and Model	Clock Type	Reference Figure
Cincinnati: D6 (two-wire polarized, 12-hour corrective))	Minute Impulse	20
Edwards: 06		
Amano: (Made by Standard Time)	Minute Impulse	21
Rauland: Digital Secondary using 24 VAC	Minute Impulse	22
Rauland: Digital Secondary using 120 VAC	Minute Impulse	23
Rauland: Digital Secondary using Serial Output (DIG) and 24 VAC	Minute Impulse	24
Rauland: Digital Secondary using Serial Output (DIG) and 120 VAC	Minute Impulse	25
Franklin: Mark 5M	Minute Impulse	26



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.

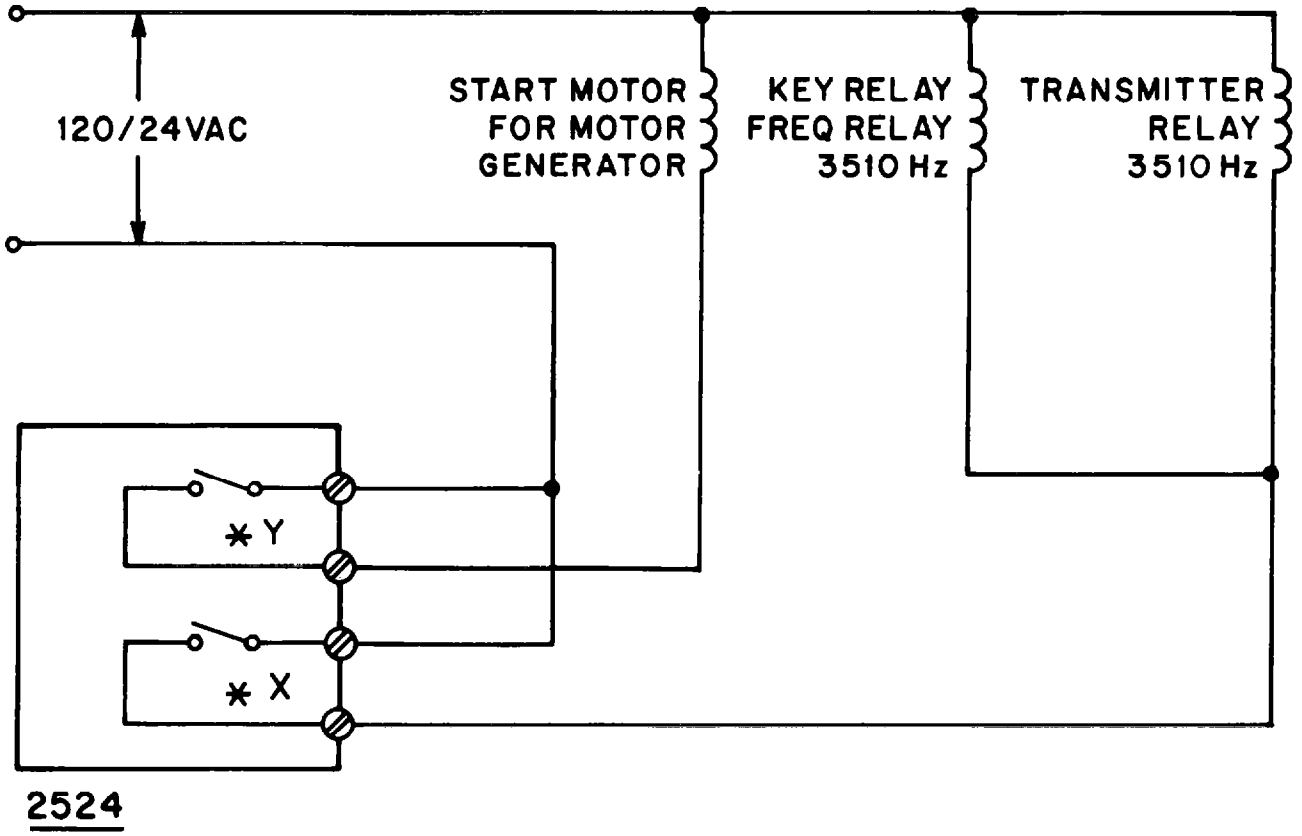
Figure 1.



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.

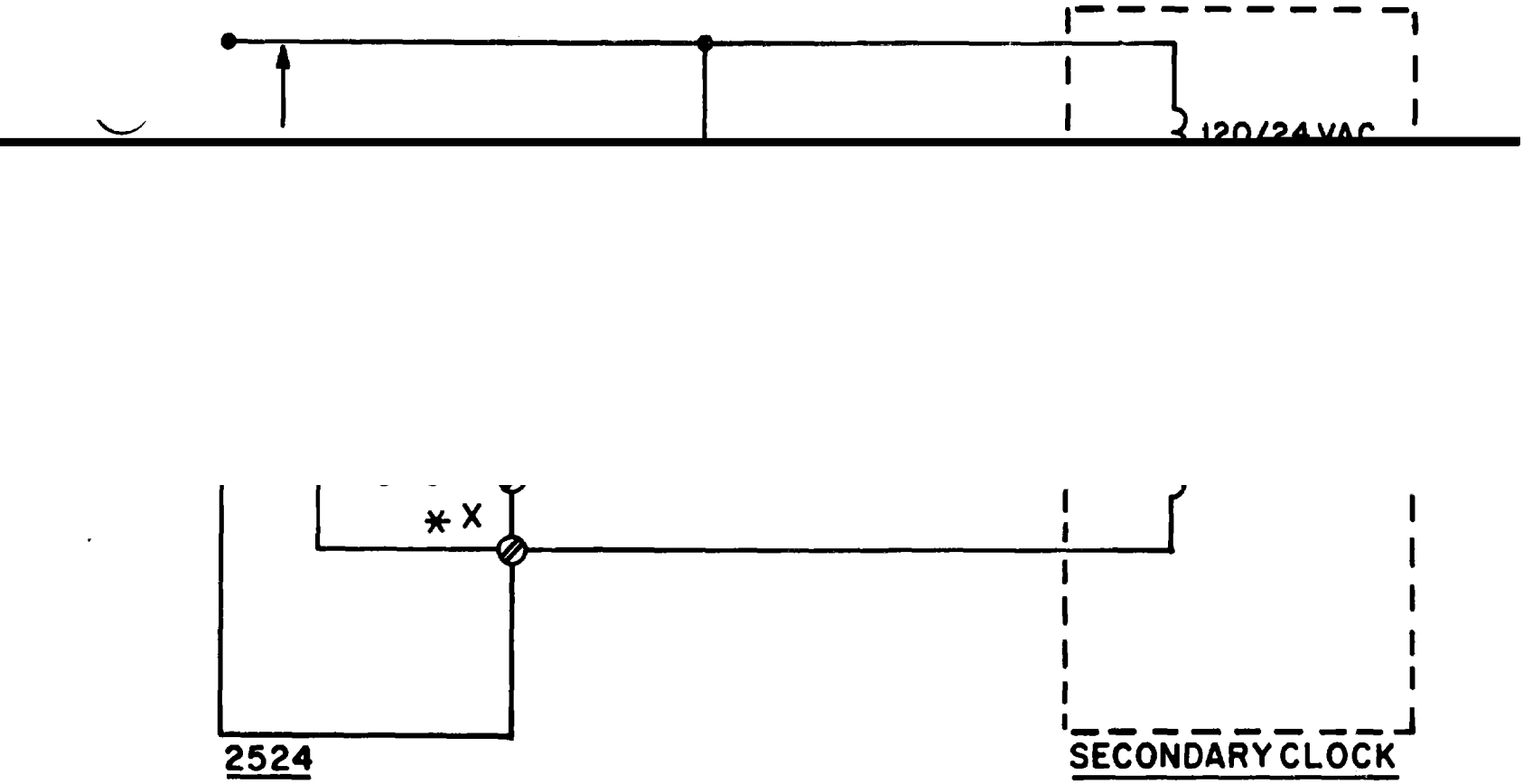
Figure 2.



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.

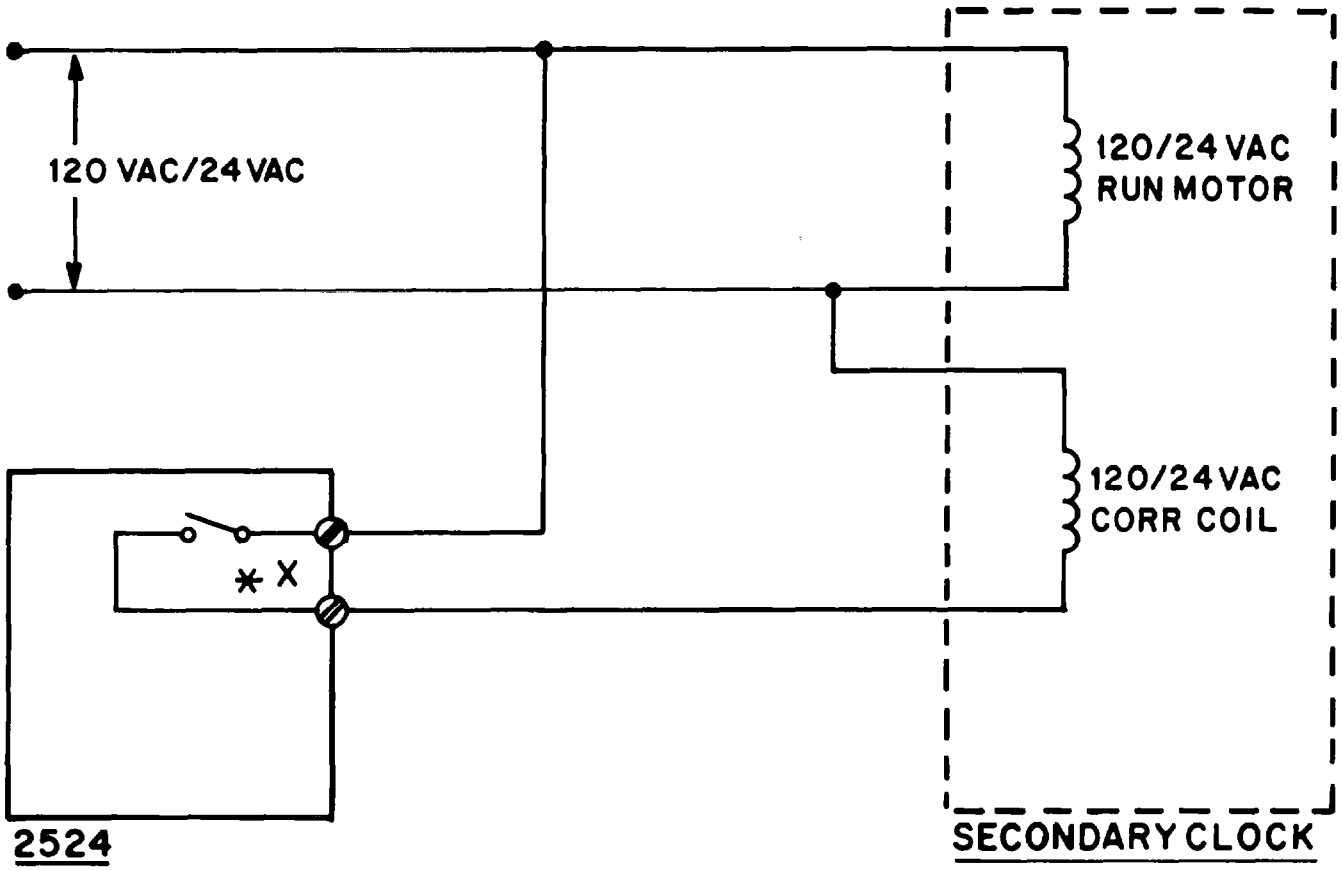
Figure 3.



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.

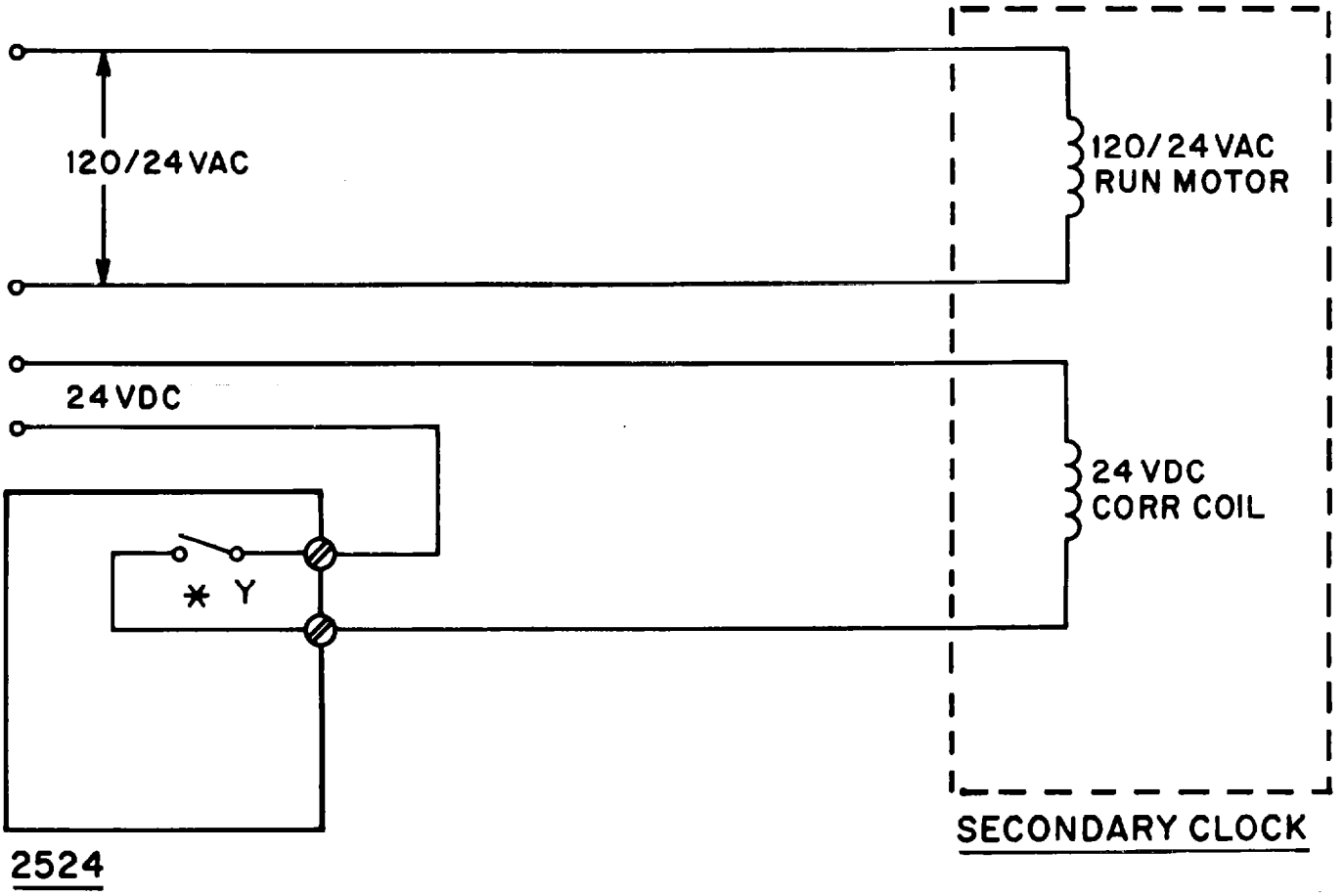
Figure 4.



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.

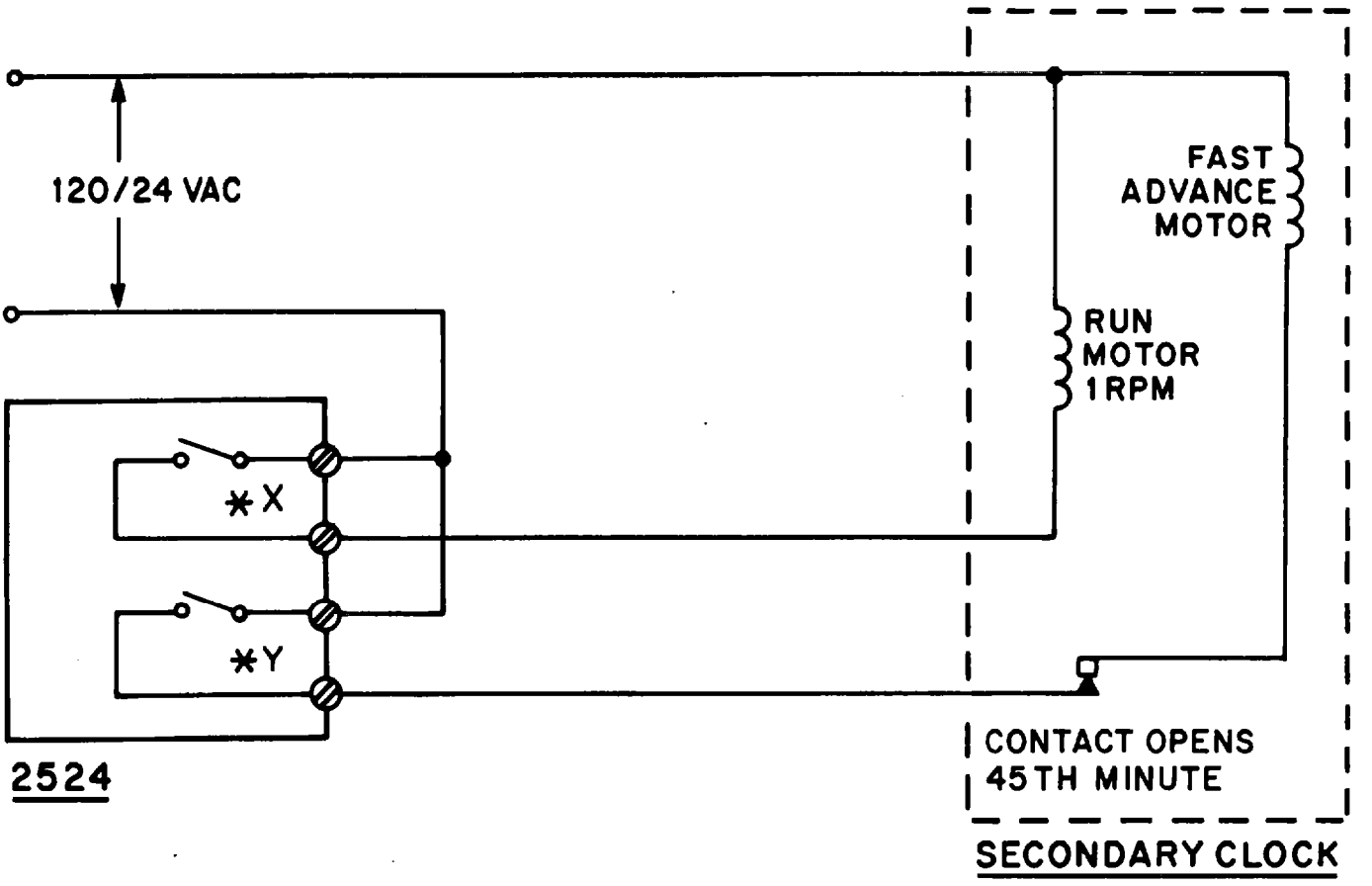
Figure 5.



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.

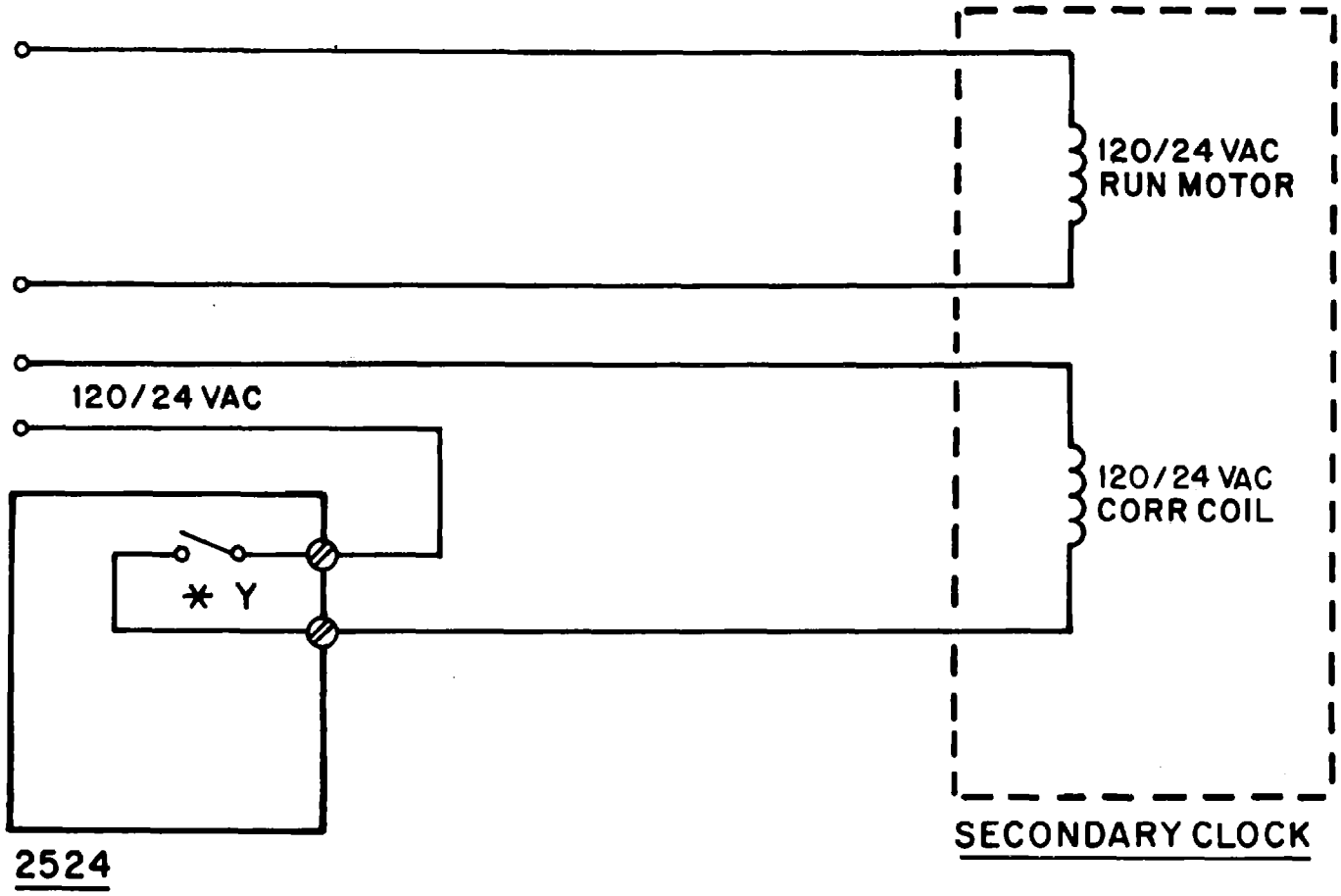
Figure 6.



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.

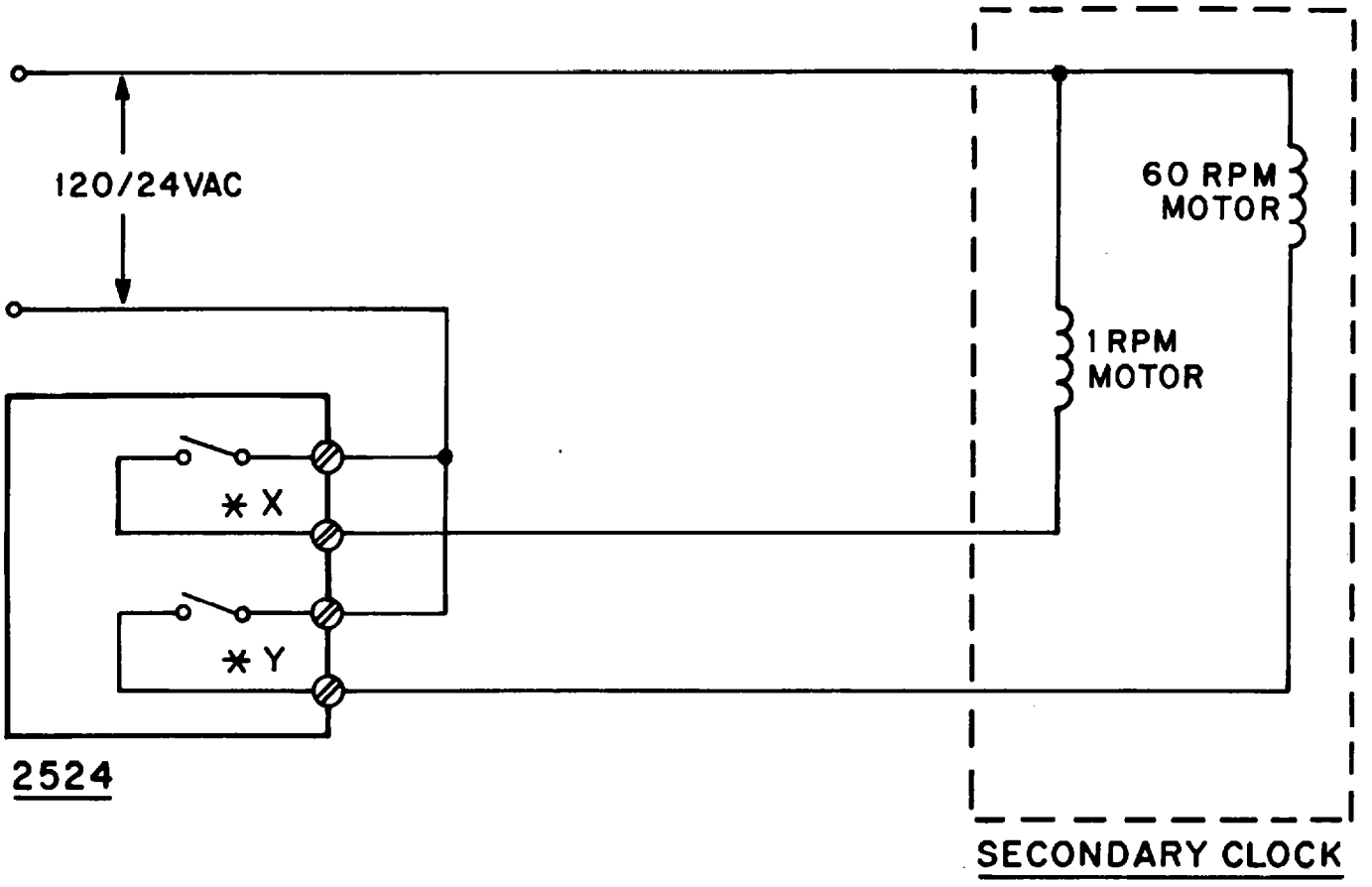
Figure 7.



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.

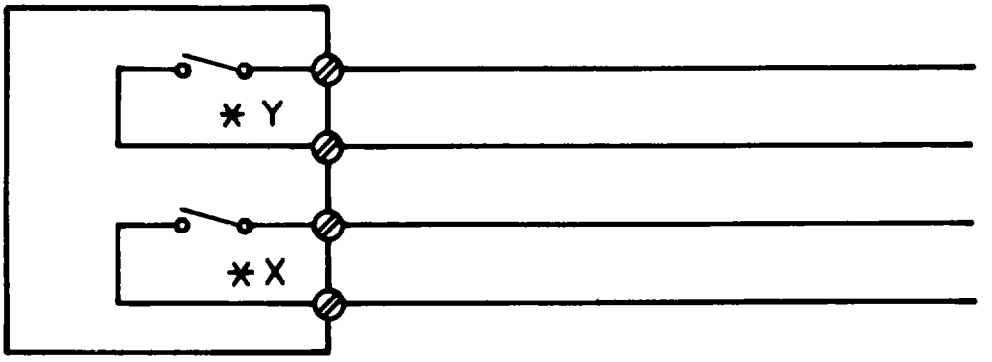
Figure 8.



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.

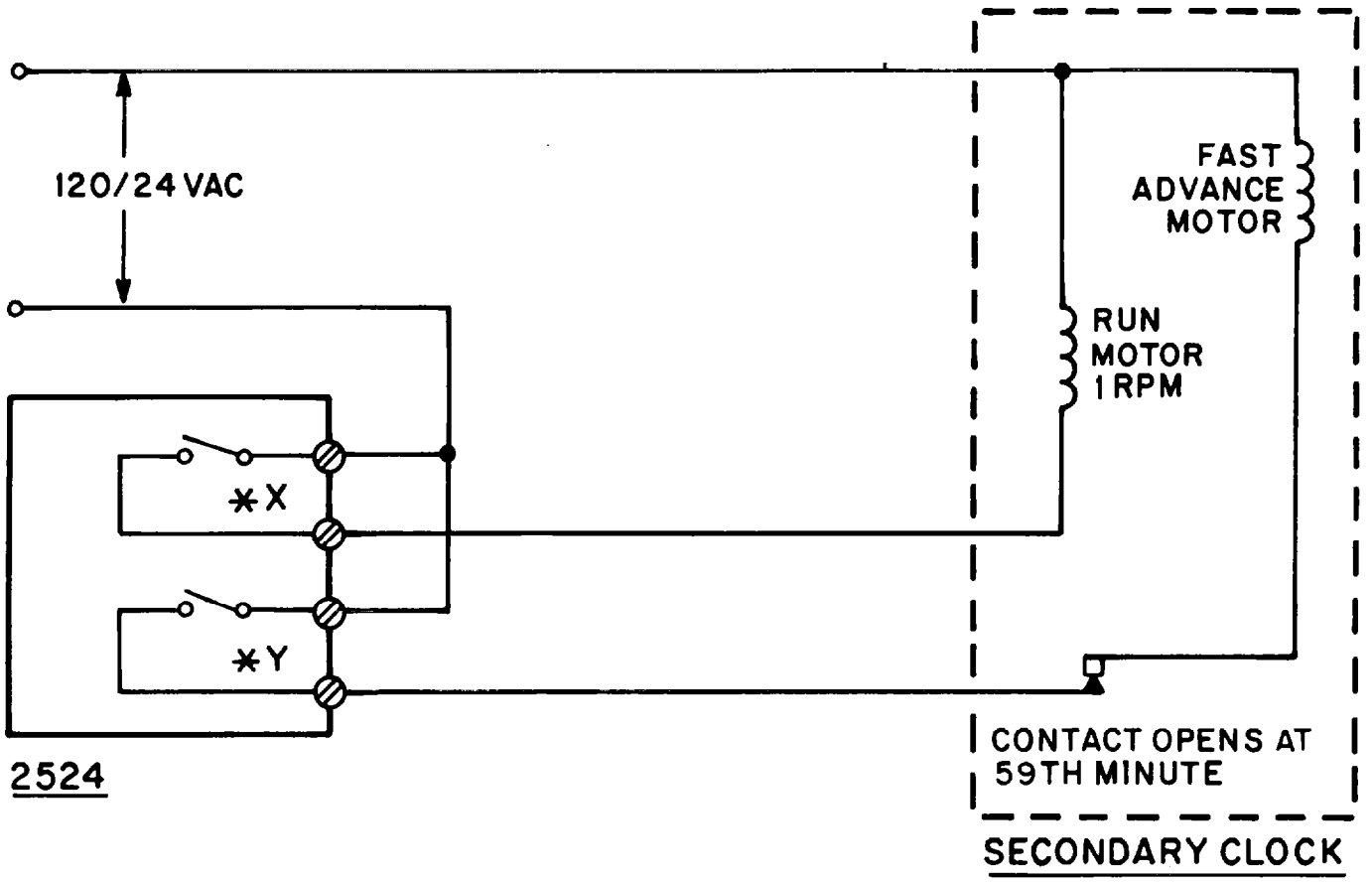
Figure 9.



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.

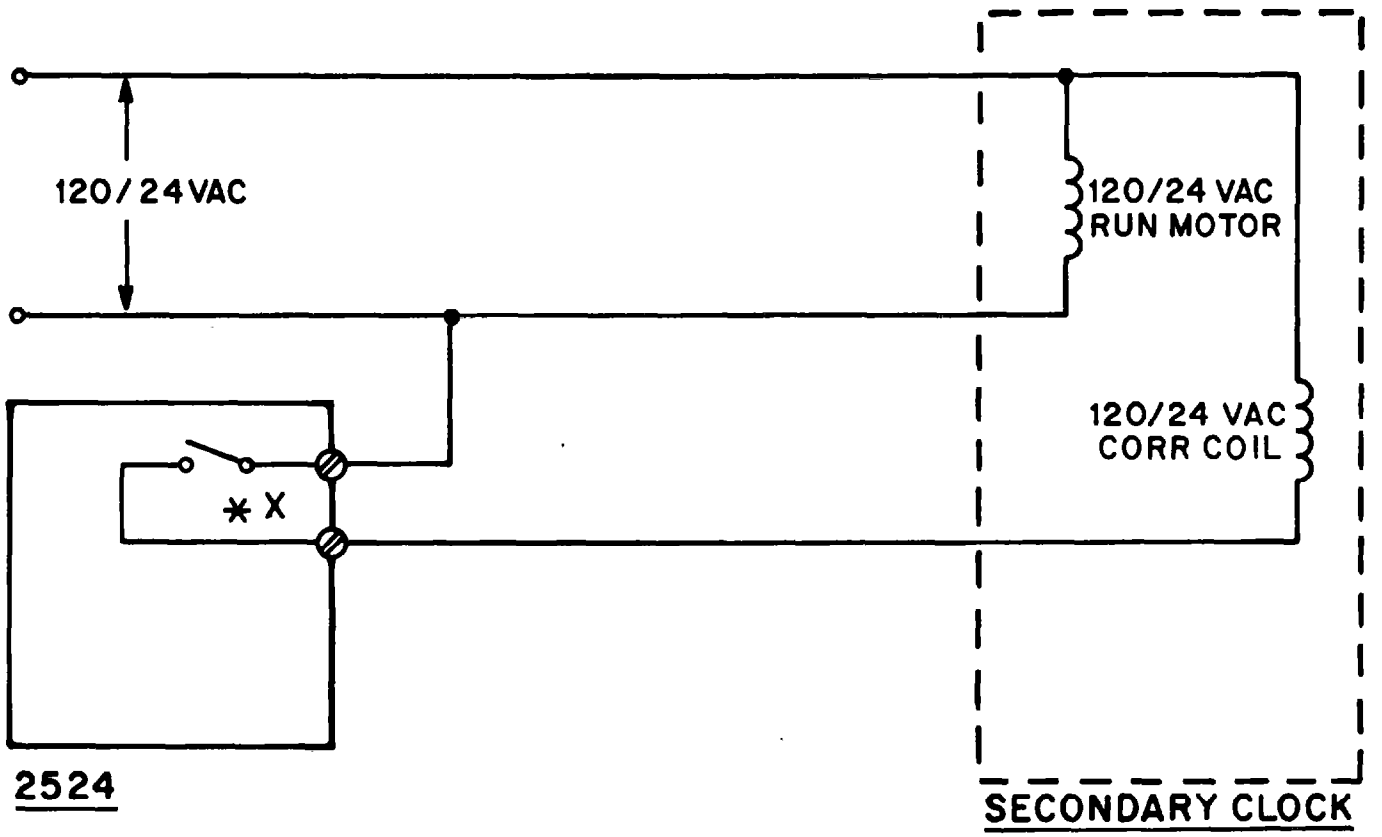
Figure 10.



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.

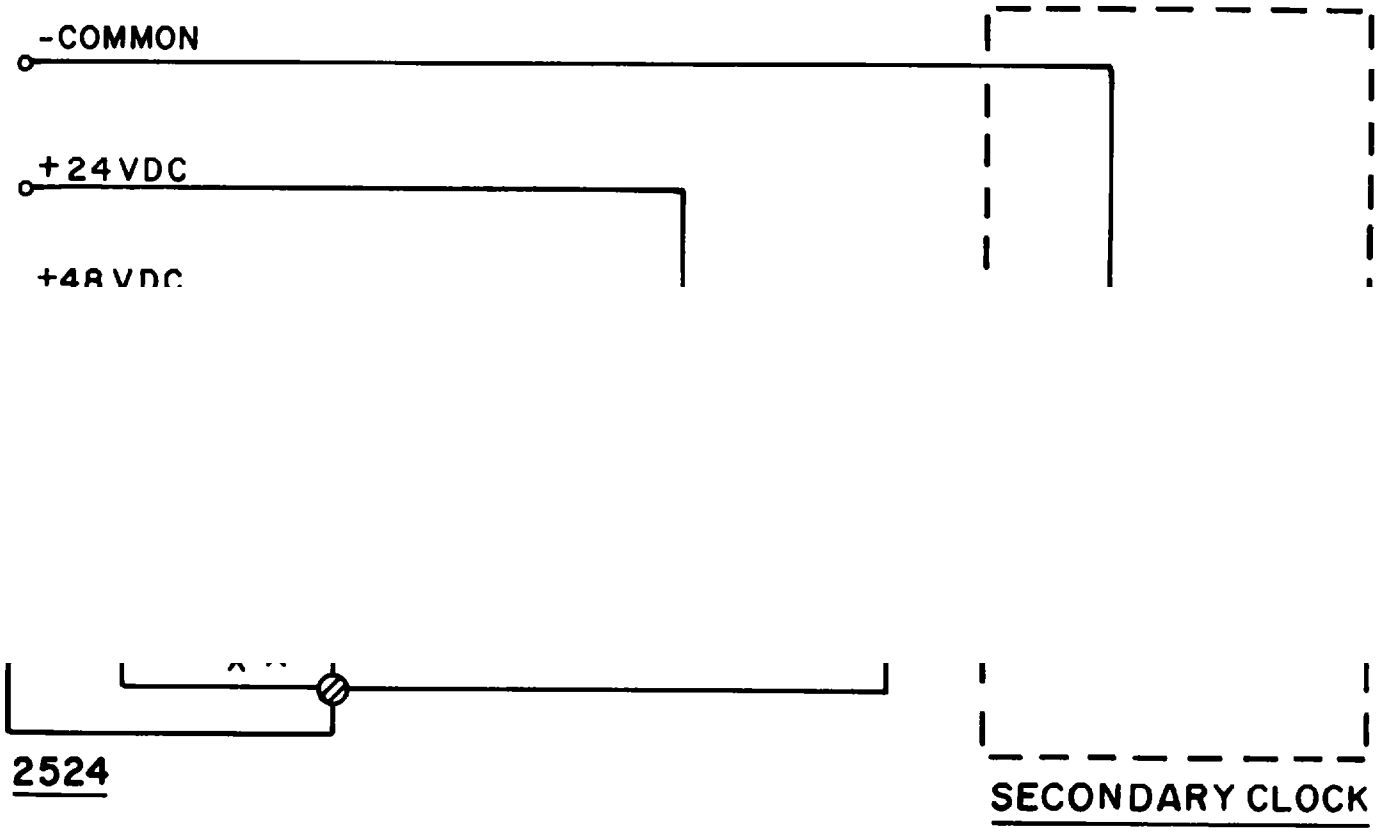
Figure 11.



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.

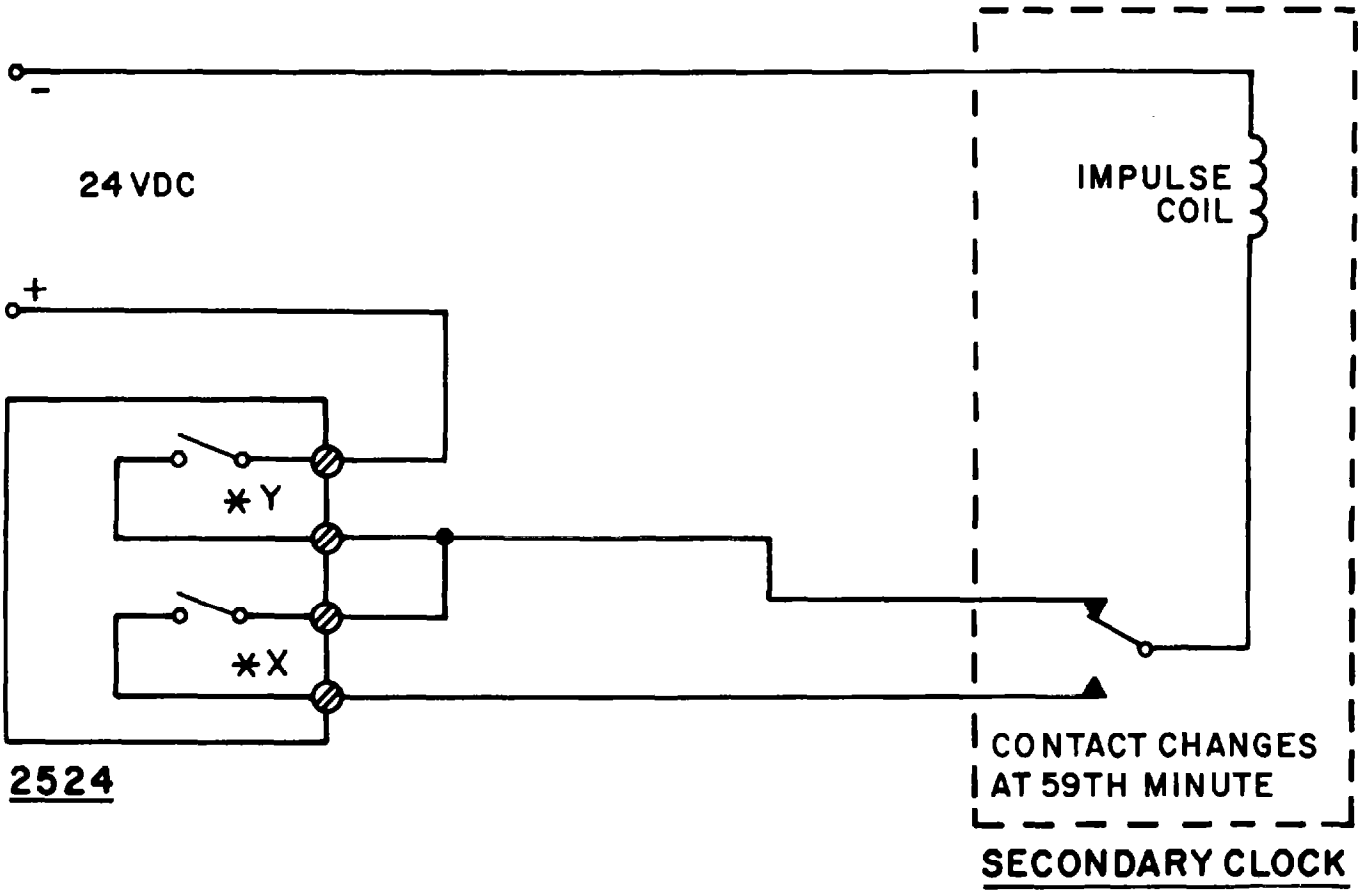
Figure 12.



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.

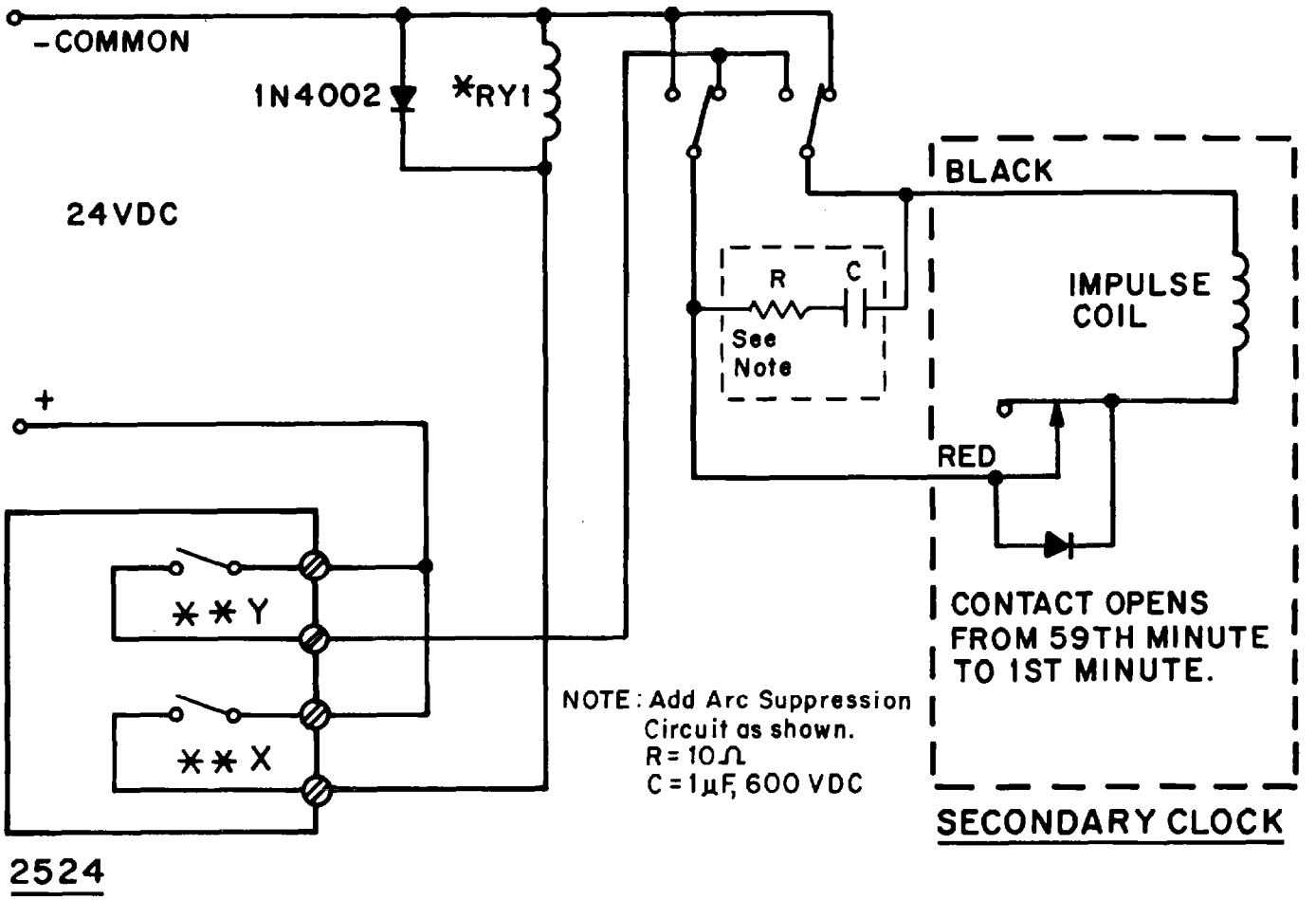
Figure 13.



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.

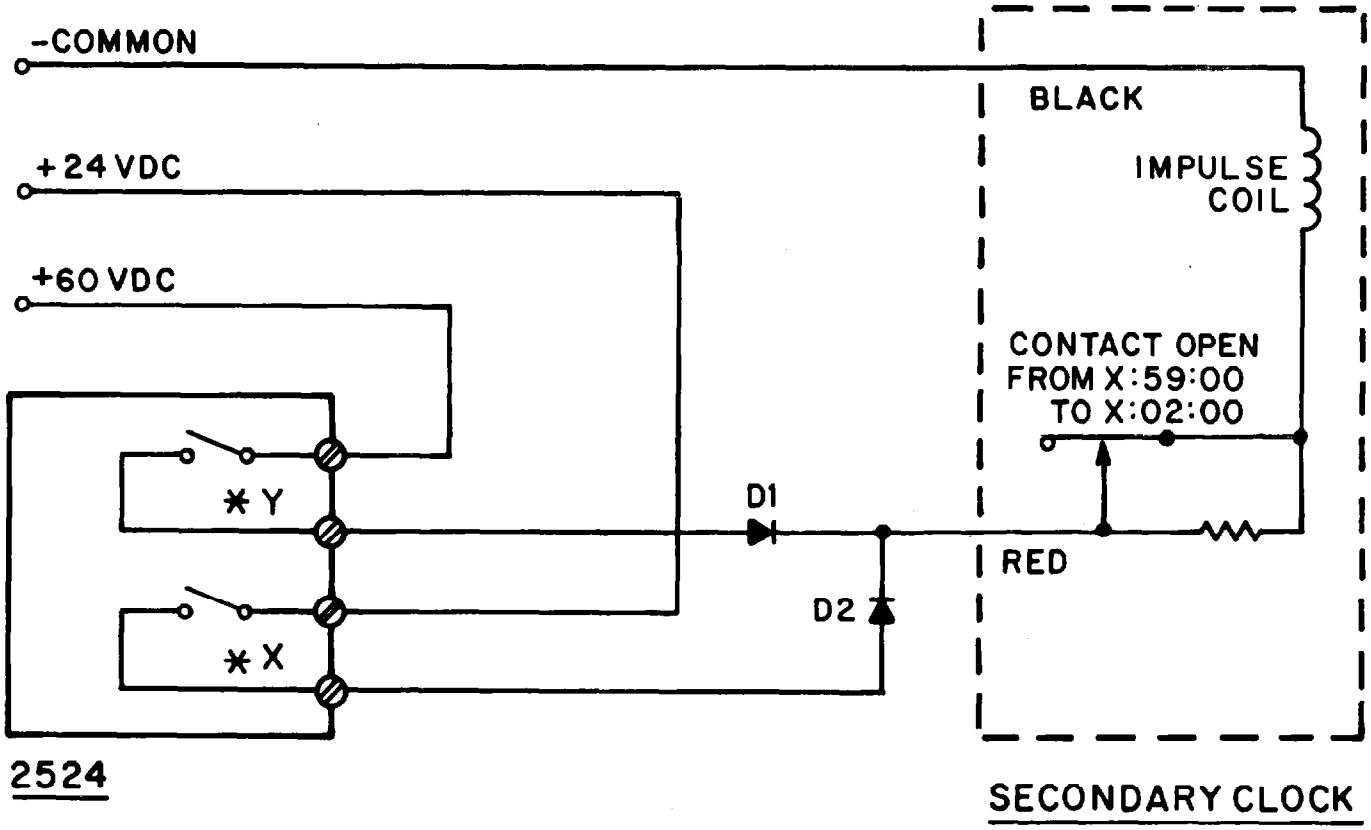
Figure 14.



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.

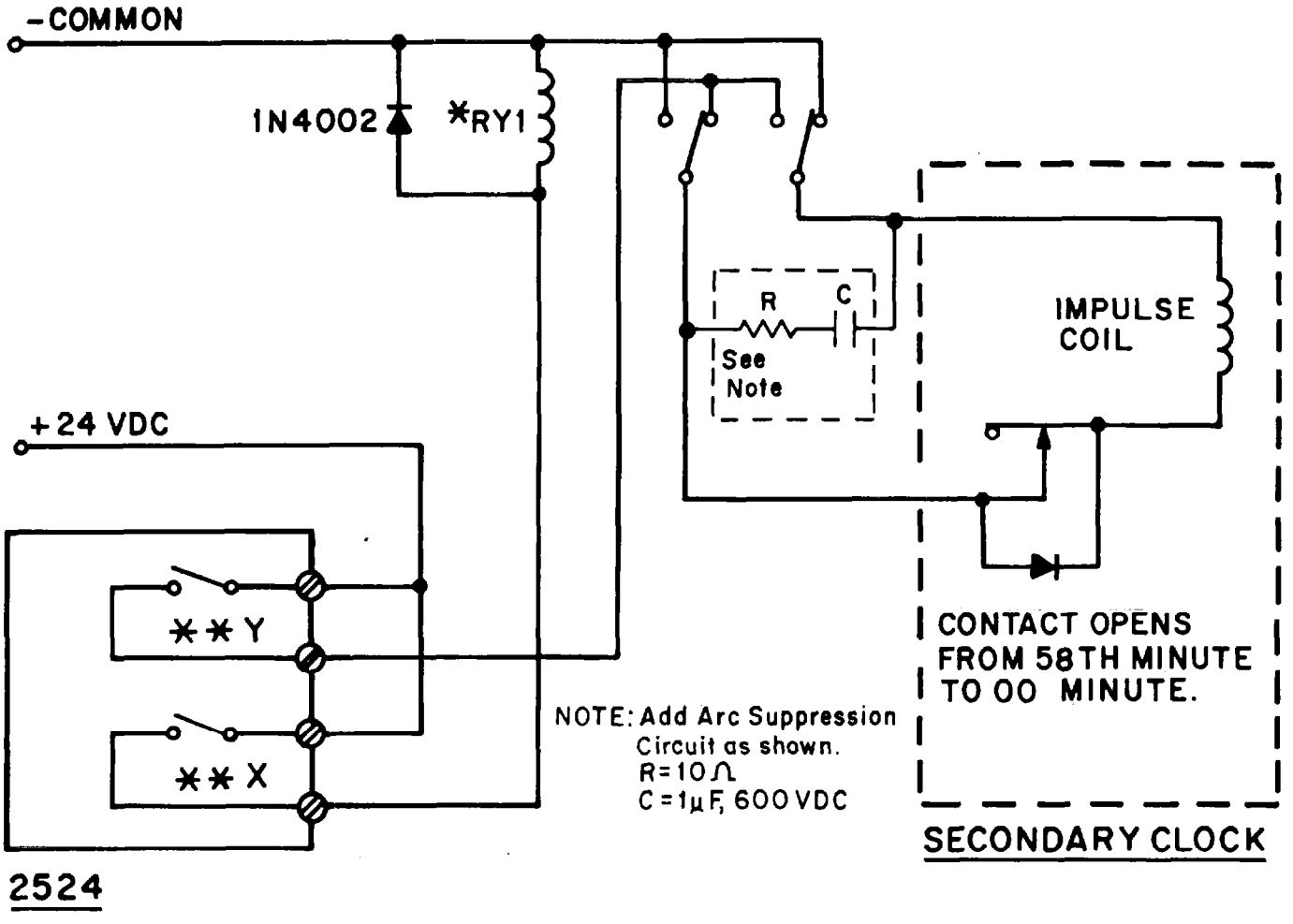


D1 AND D2 ARE 1N3210 OR EQUIVALENT.

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.

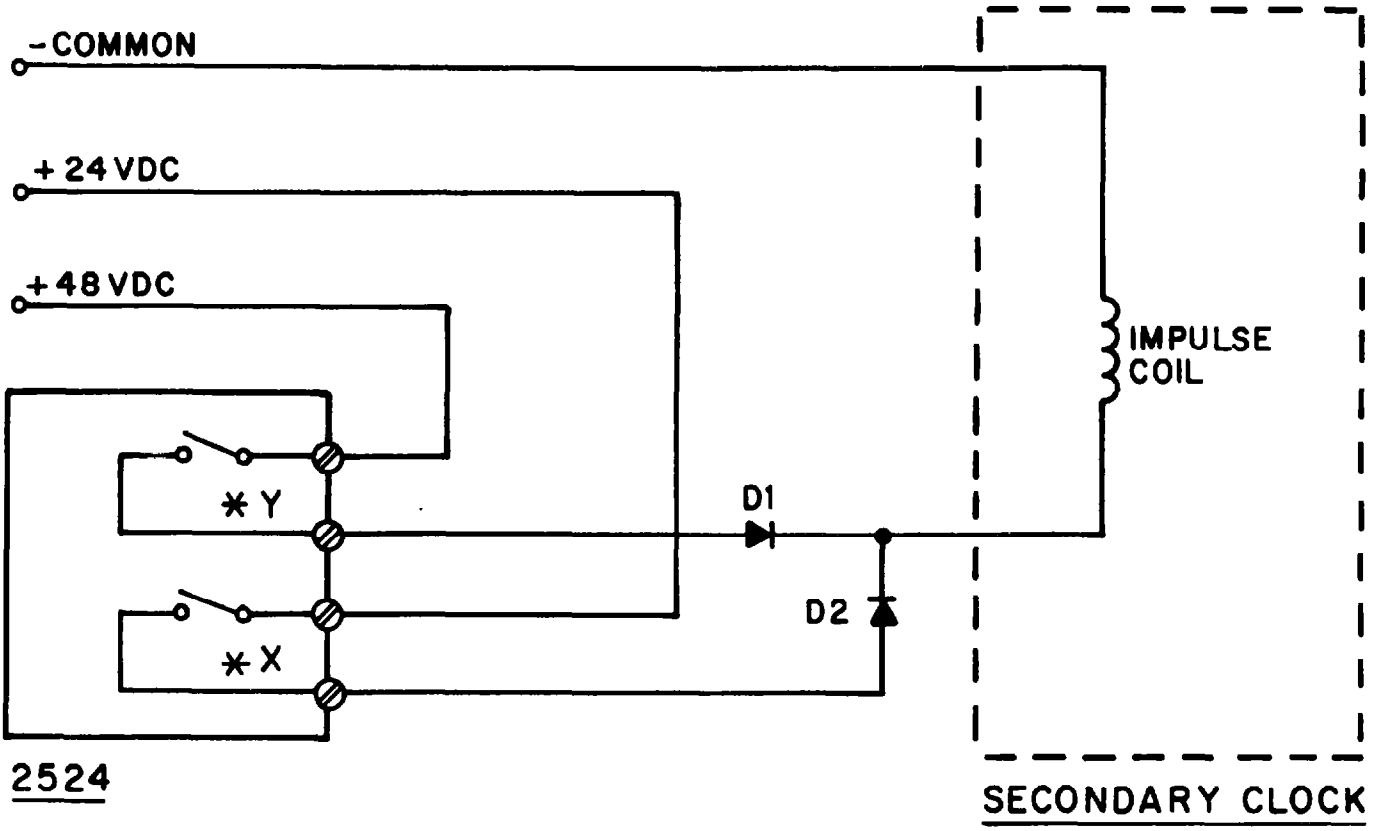
Figure 16.



Correction Code (Mode A)	Correction Timing	
	Minute Impulse	Hourly
	"Y" sends a positive pulse to the im-	"Y" is activated for 15 cycles (1 second on, 2
		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.

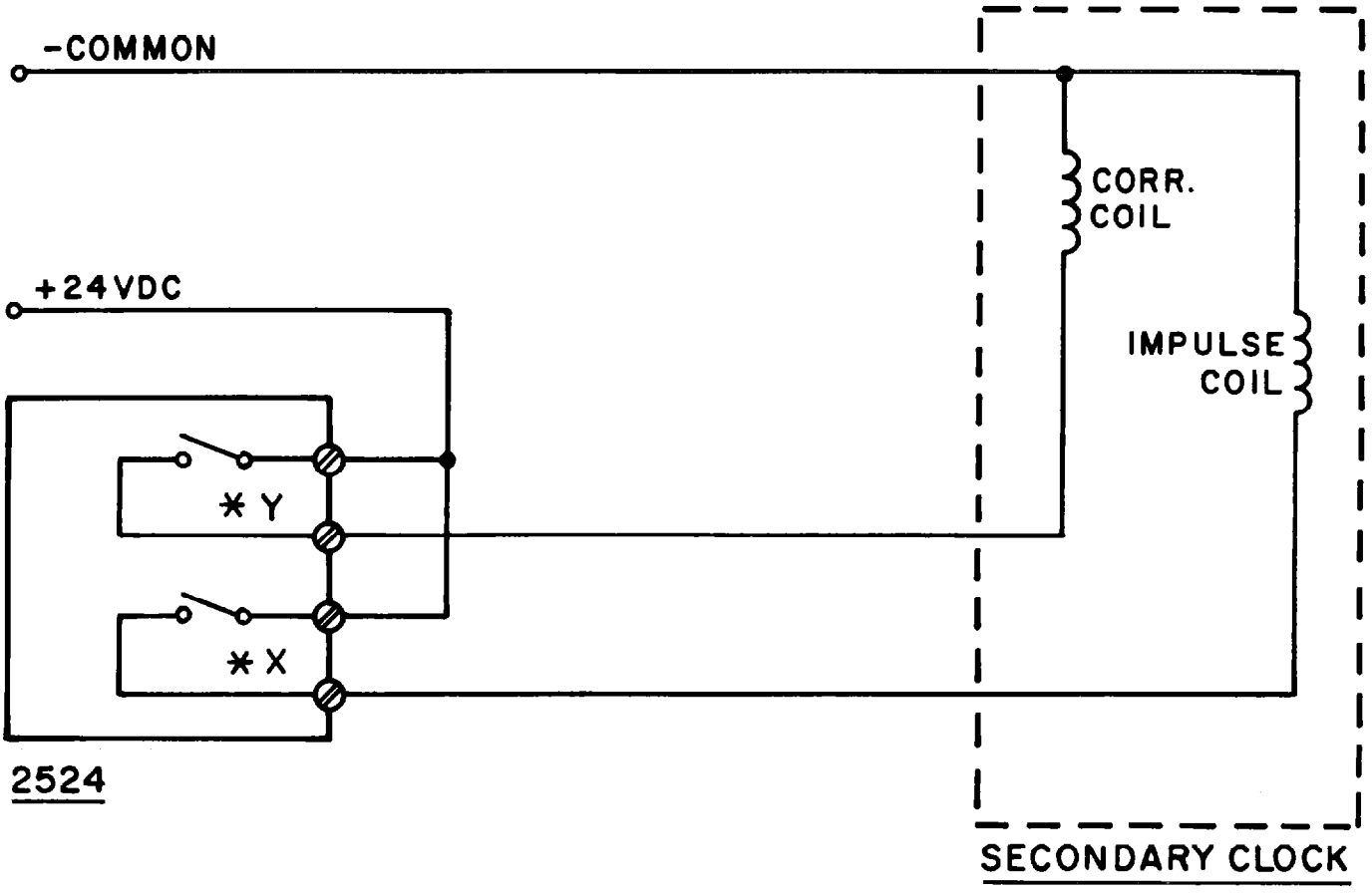


D1 AND D2 ARE 1N3210 OR EQUIVALENT.

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.

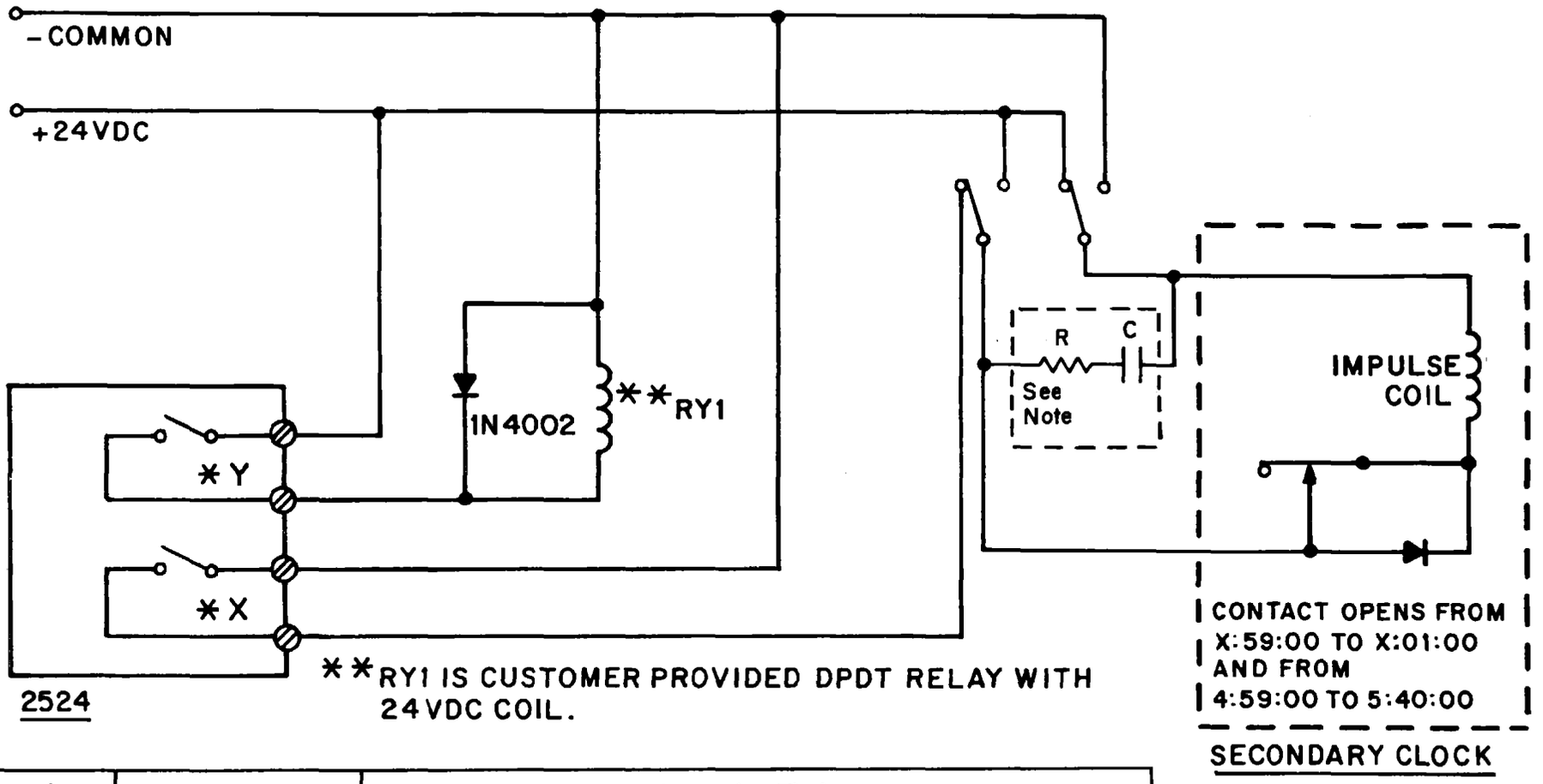
Figure 18.



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.



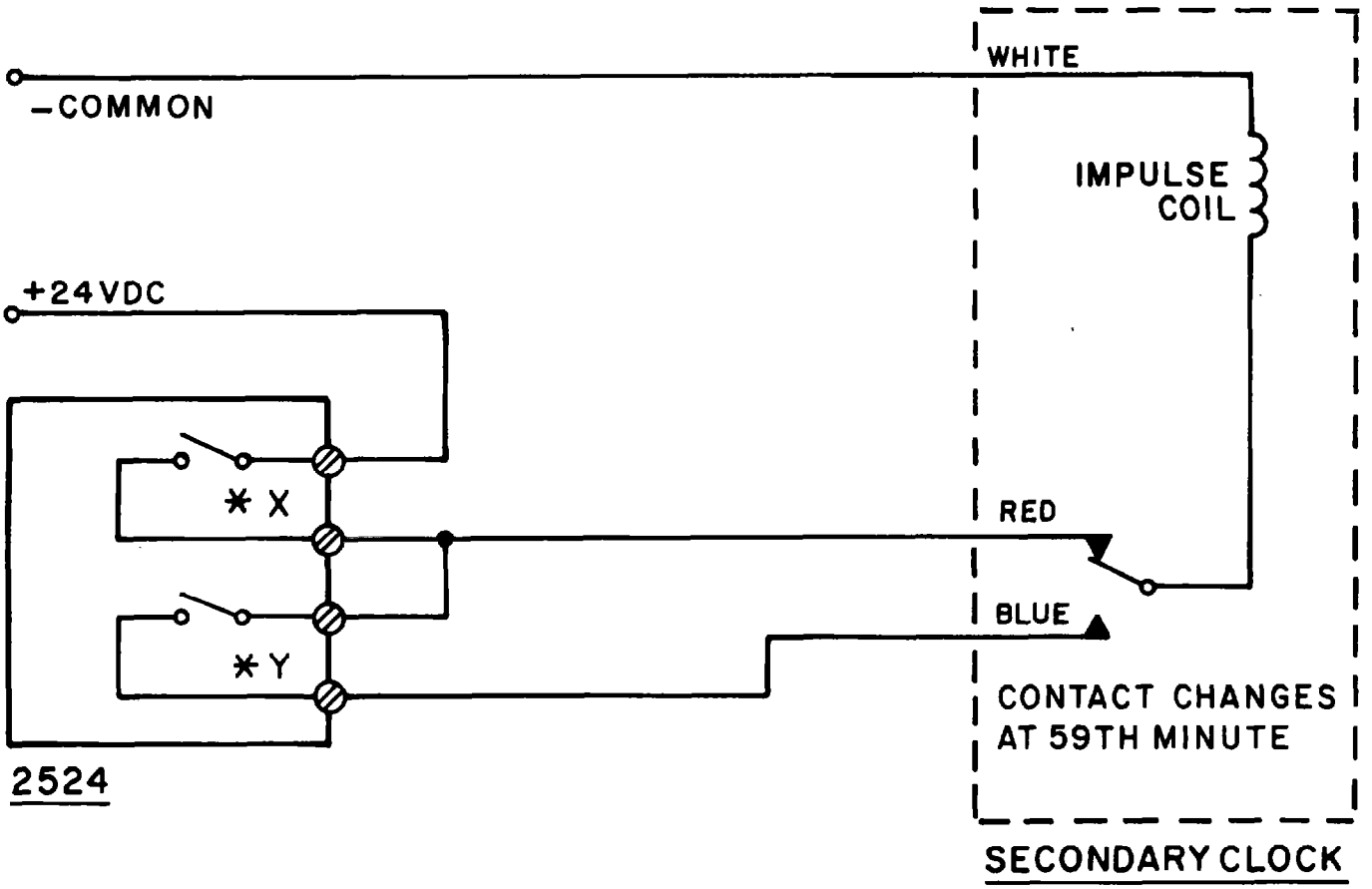
Correction Code (Mode A)	Impulse	Correction Timing	
	Minute	Hourly	12-Hour
#18	"Y" is activated for 2 seconds every minute for 52 minutes From X:59:58 To (X+1):51:00.	"X" is activated for 2 seconds every minute for 8 minutes From X:51:58 To X:59:00. then for 19 cycles (2 seconds on, 1 second off From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

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

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

Figure 20.

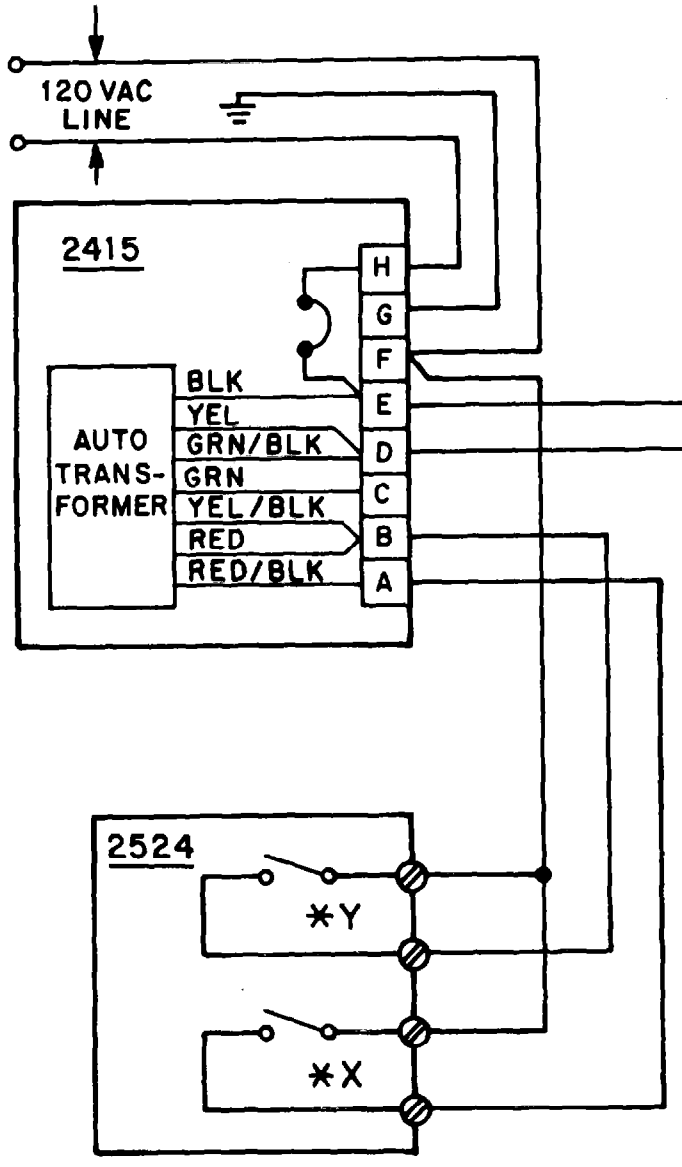
KM0972 A



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.

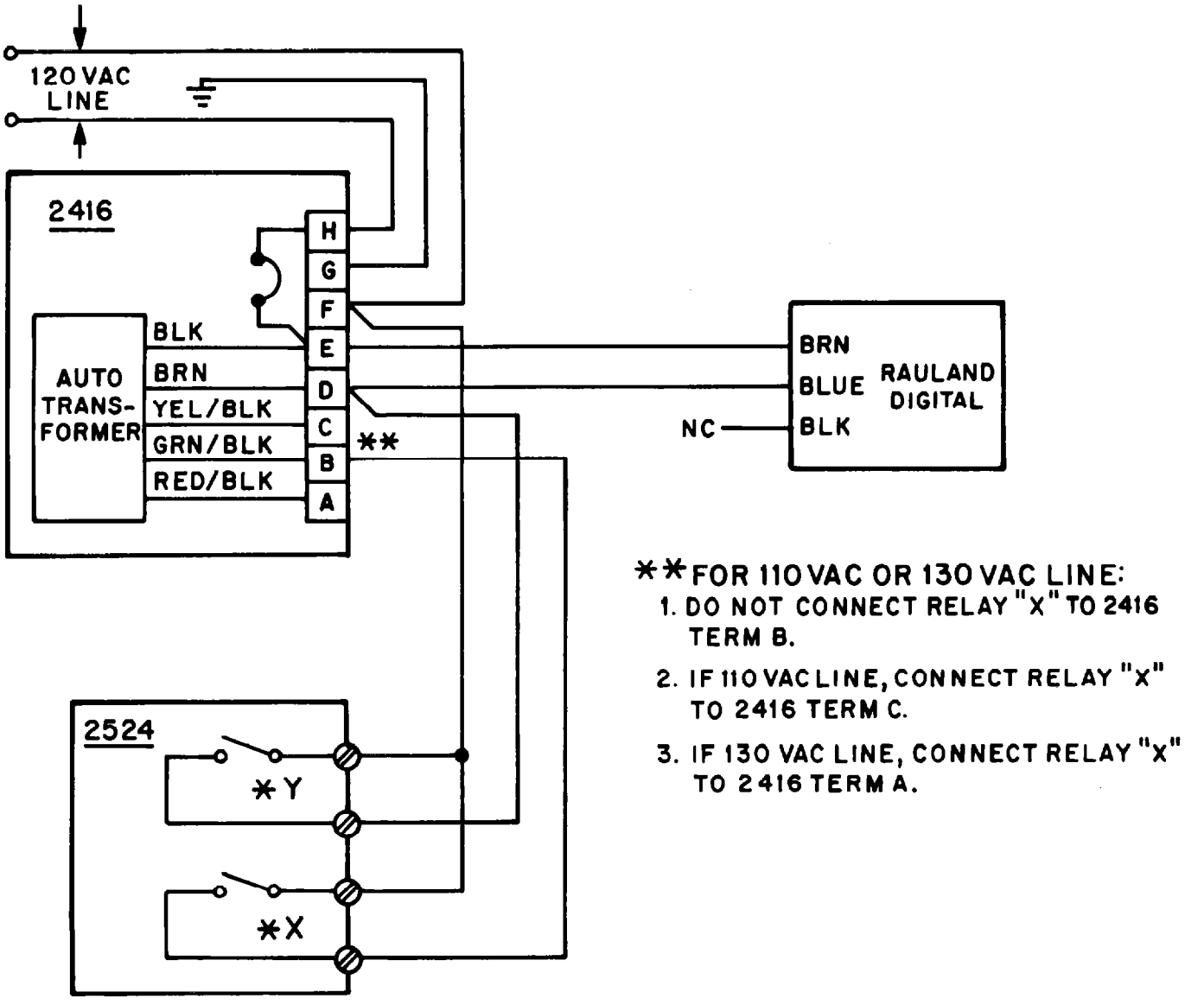


LINE VOLT	TRANSFORMER LEADS	TERMINAL
110 VAC	RED & GREEN	B
	GREEN/BLACK & YELLOW/BLACK	C
130 VAC	RED & GREEN/BLACK	B
	GREEN & YELLOW/BLACK	C

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.

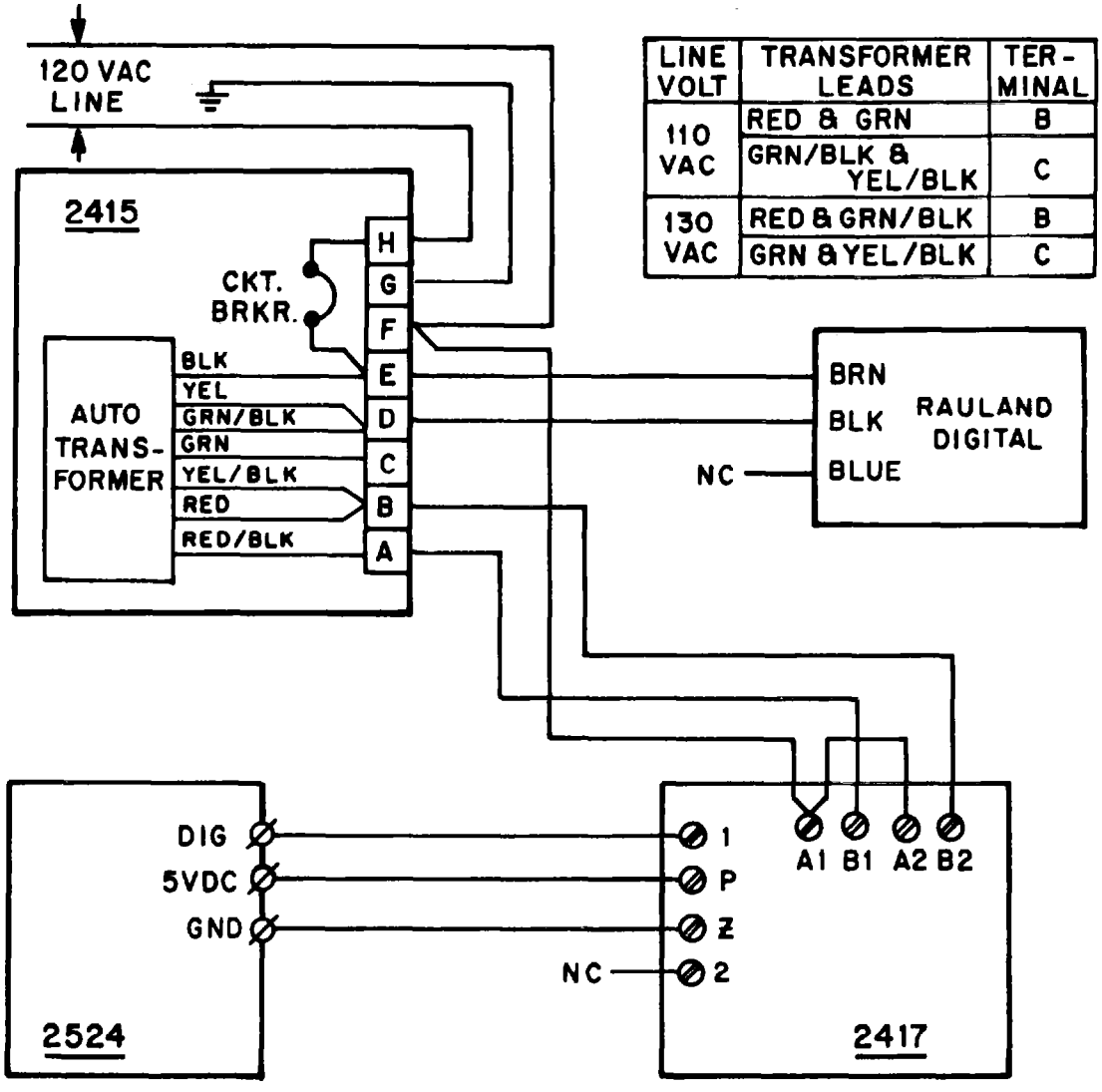
Figure 22.



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.

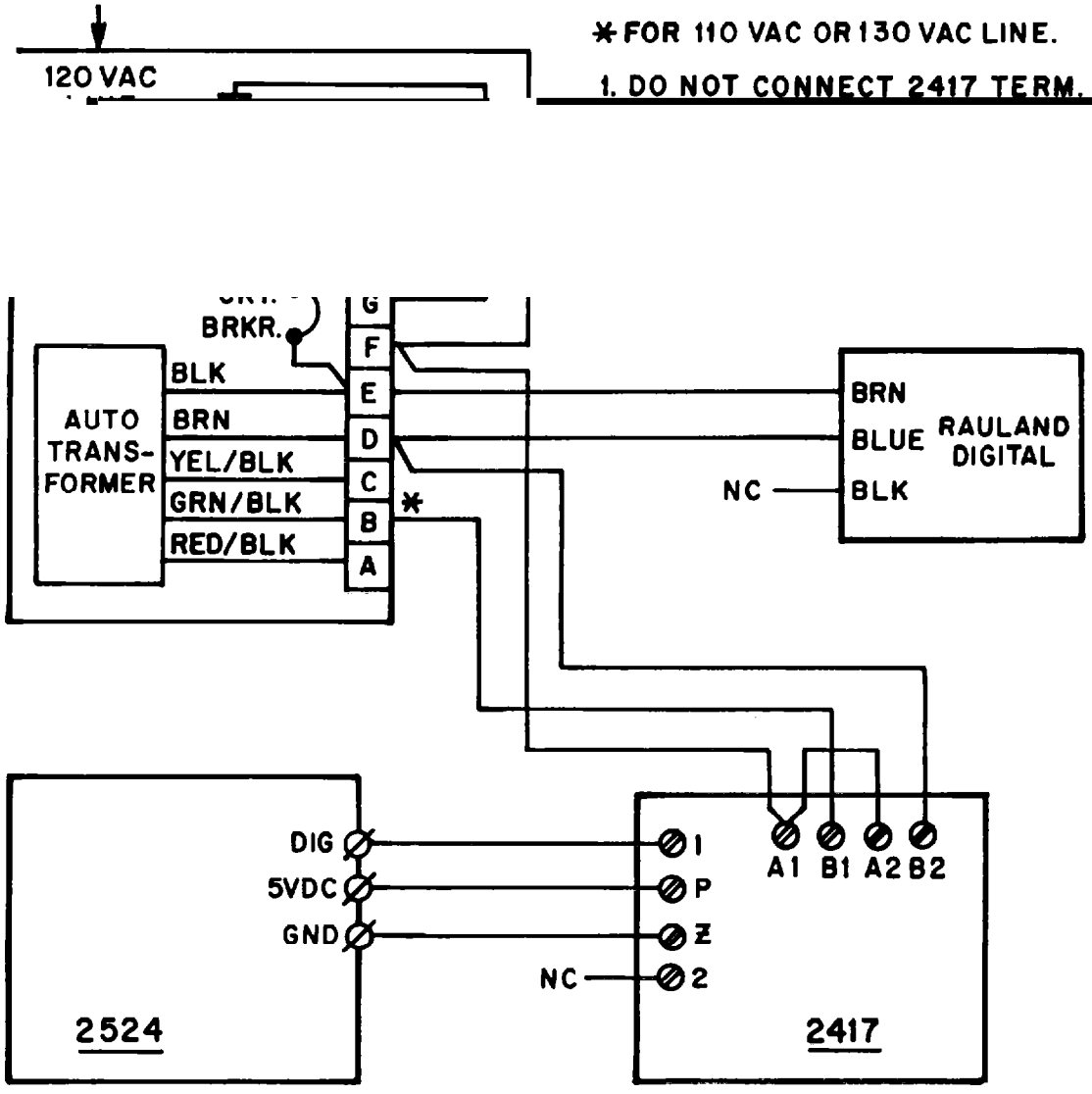
Figure 23.



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.

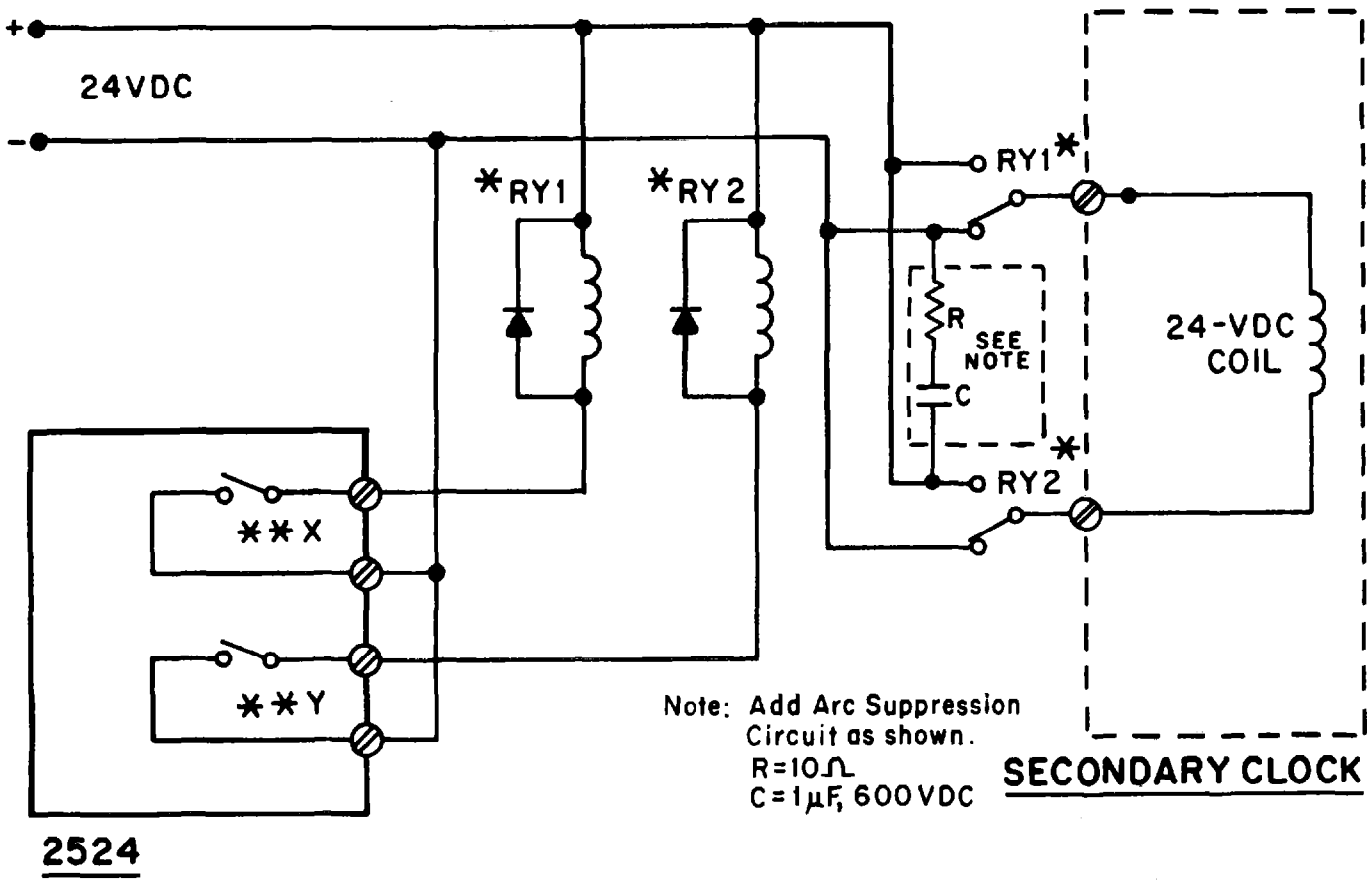
Figure 24.



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.

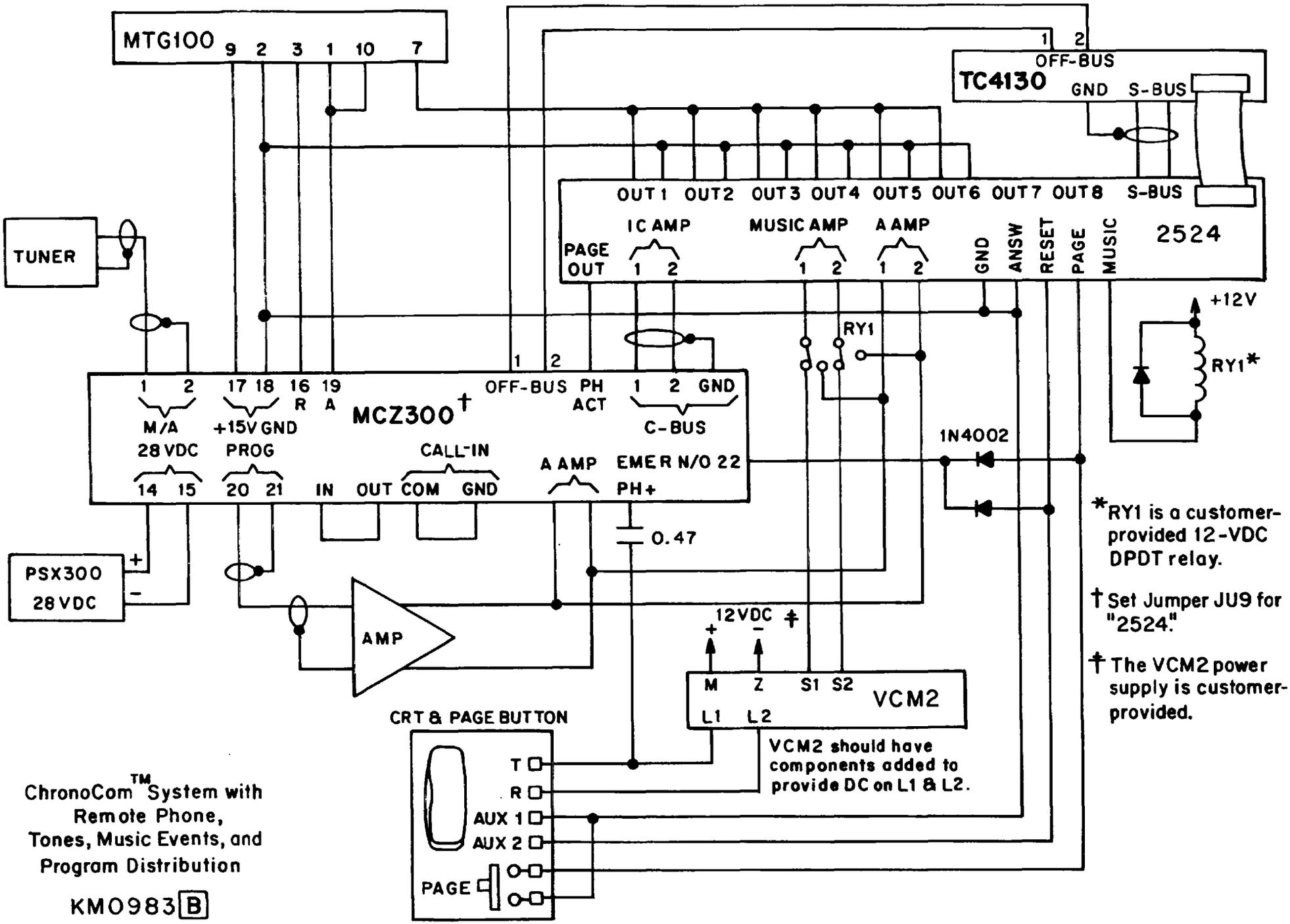
Figure 25.



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.



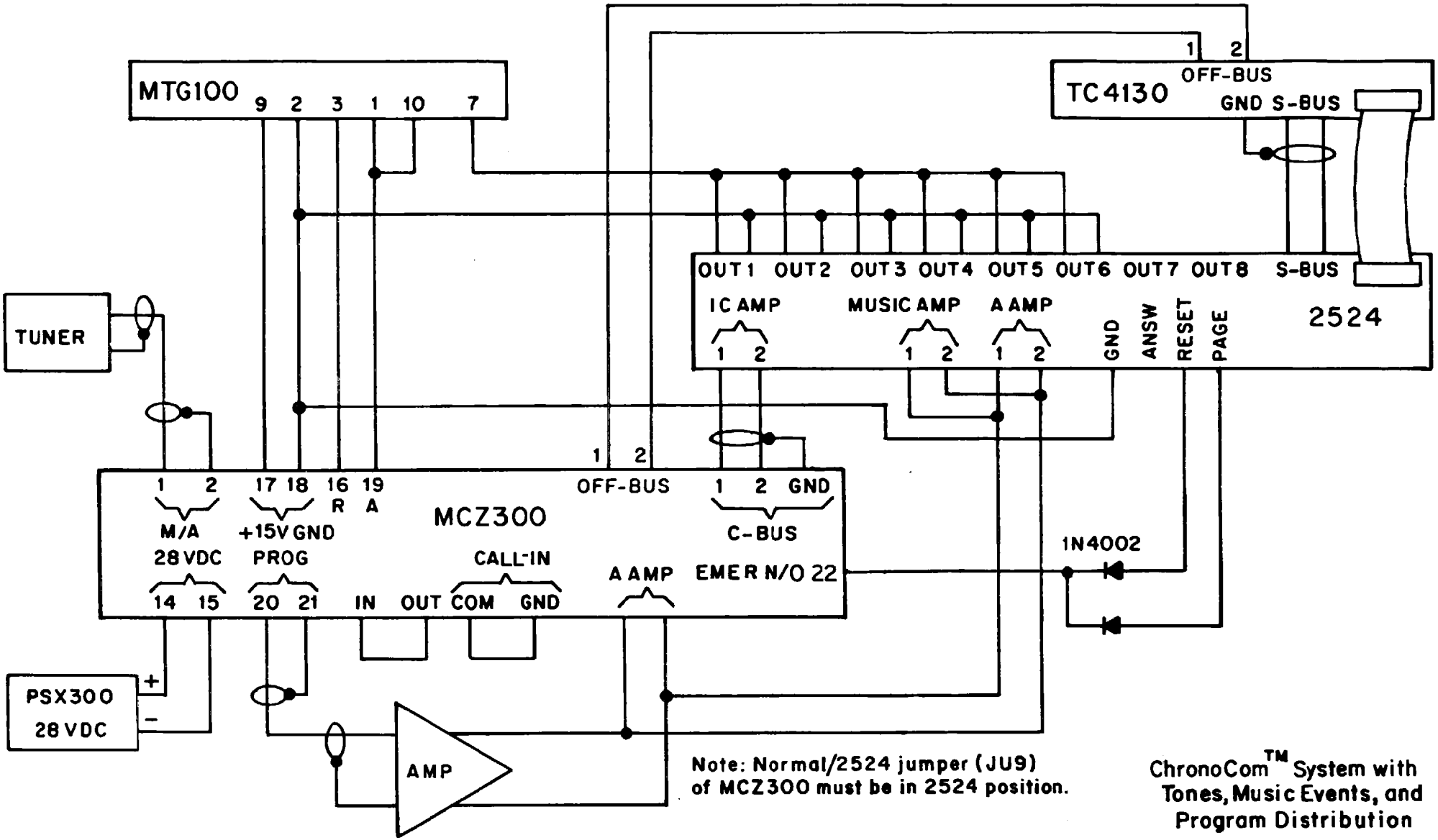
*RY1 is a customer-provided 12-VDC DPDT relay.

† Set Jumper JU9 for "2524."

‡ The VCM2 power supply is customer-provided.

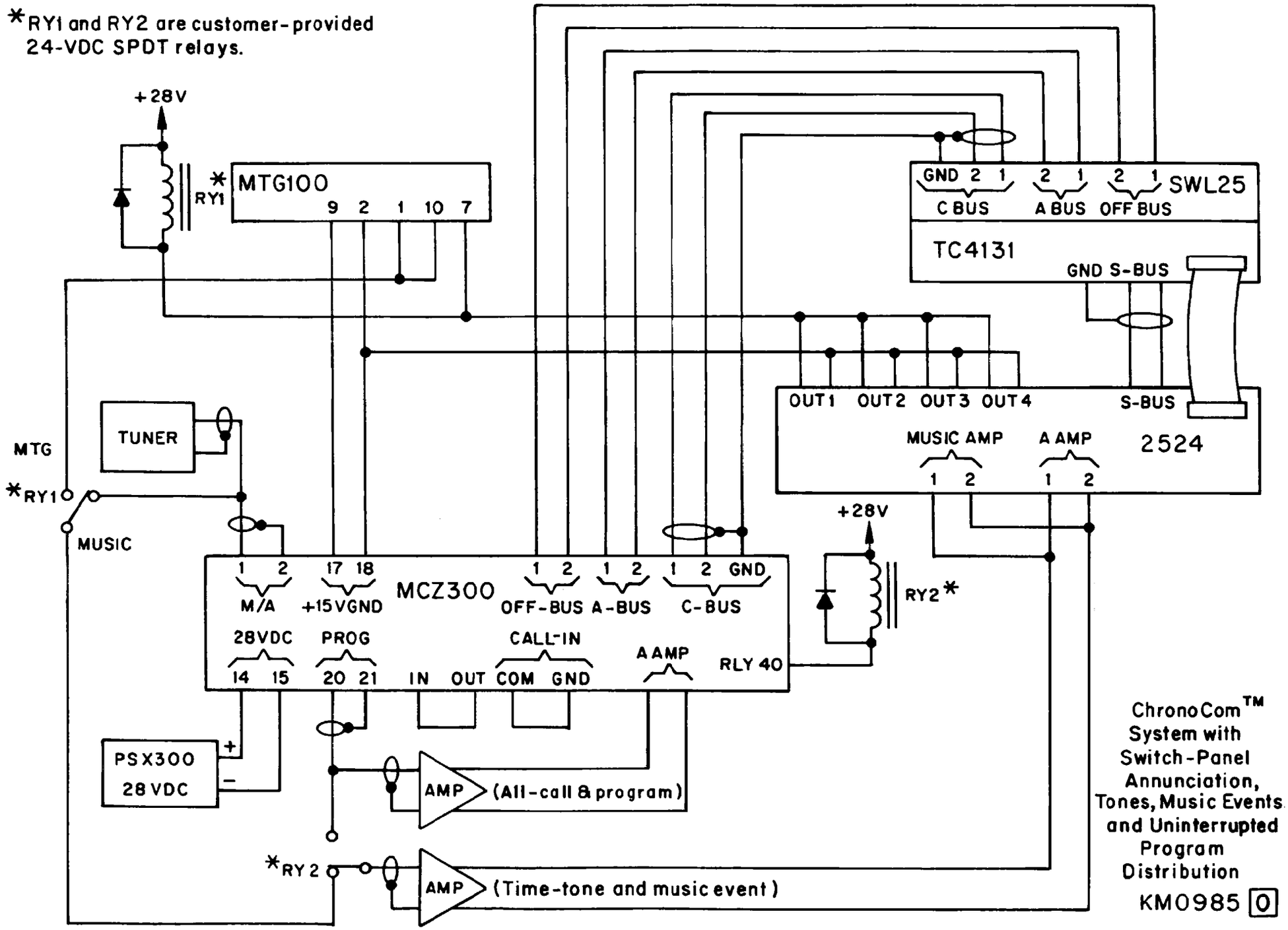
ChronoCom™ System with Remote Phone, Tones, Music Events, and Program Distribution

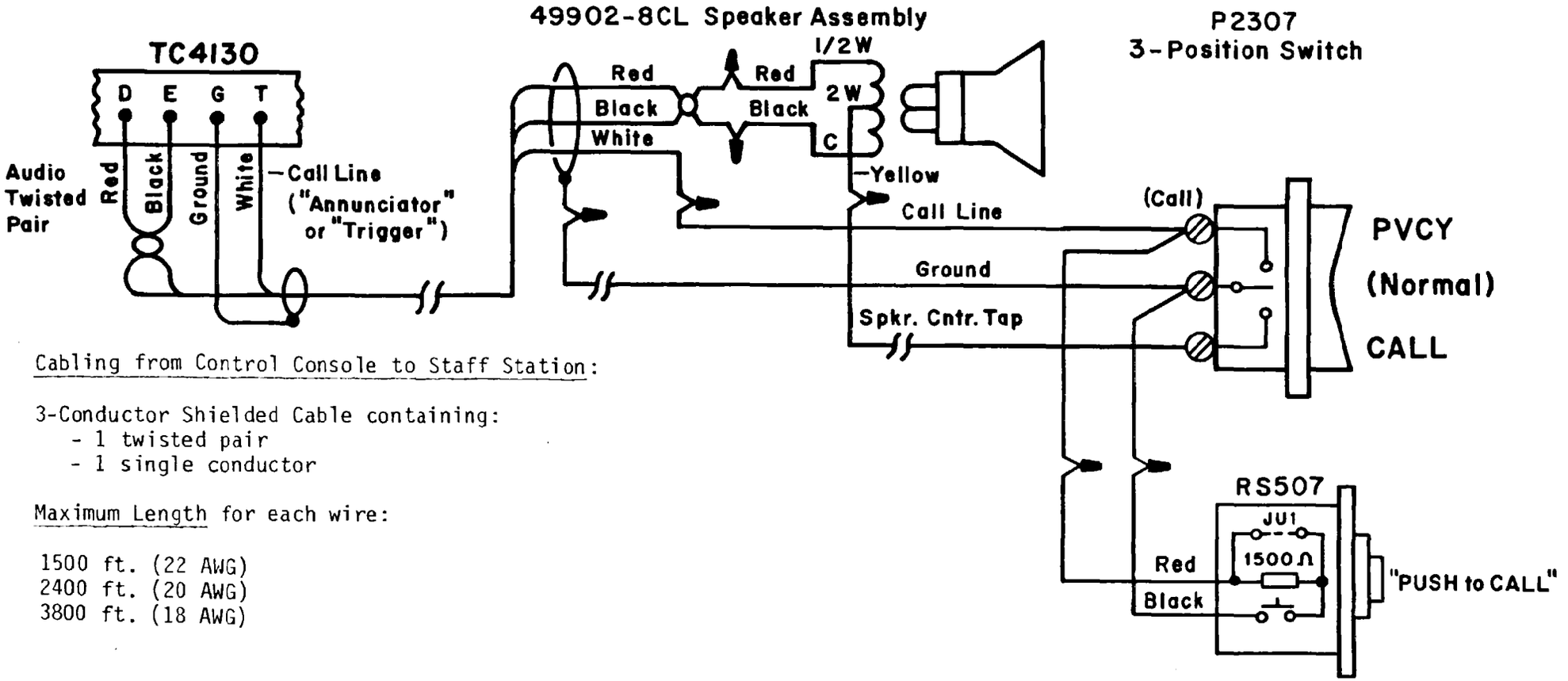
KM0983B



ChronoCom™ System with Tones, Music Events, and Program Distribution

KM0984 B


*RY1 and RY2 are customer-provided 24-VDC SPDT relays.
+28V
*RY1
MTG100
9 2 1 10 7
GND 2 1
C BUS
2 1
A BUS
2 1
OFF BUS
SWL25
TC4131
GND S-BUS
S-BUS
OUT1 OUT2 OUT3 OUT4
MUSIC AMP
A AMP
2524
1 2
1 2
MTG
TUNER
*RY1
MUSIC
1 2
M/A
17 18
+15VGND
MCZ300
1 2
OFF-BUS
1 2
A-BUS
1 2 GND
C-BUS
+28V
*RY2
28VDC
14 15
PROG
20 21
IN OUT
CALL-IN
COM GND
A AMP
RLY 40
PSX300
28 VDC
+
−
AMP
(All-call & program)
*RY2
AMP
(Time-tone and music event)
ChronoCom™ System with Switch-Panel Annunciation, Tones, Music Events and Uninterrupted Program Distribution
KM0985 0



Cabling from Control Console to Staff Station:

3-Conductor Shielded Cable containing:
- 1 twisted pair
- 1 single conductor

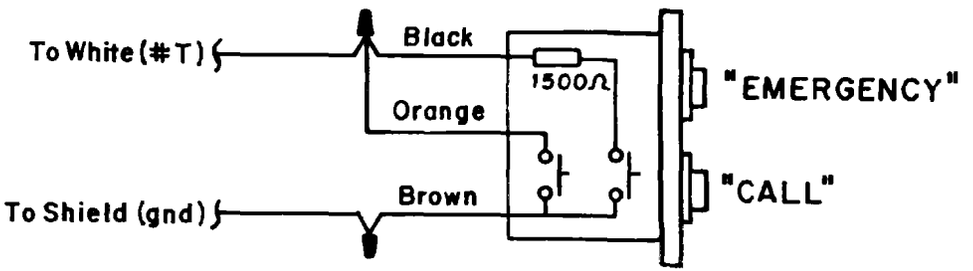
Maximum Length for each wire:

1500 ft. (22 AWG)
2400 ft. (20 AWG)
3800 ft. (18 AWG)

1. Cut JU1 for "EMER" call.
2. Tape up unused yellow wire.

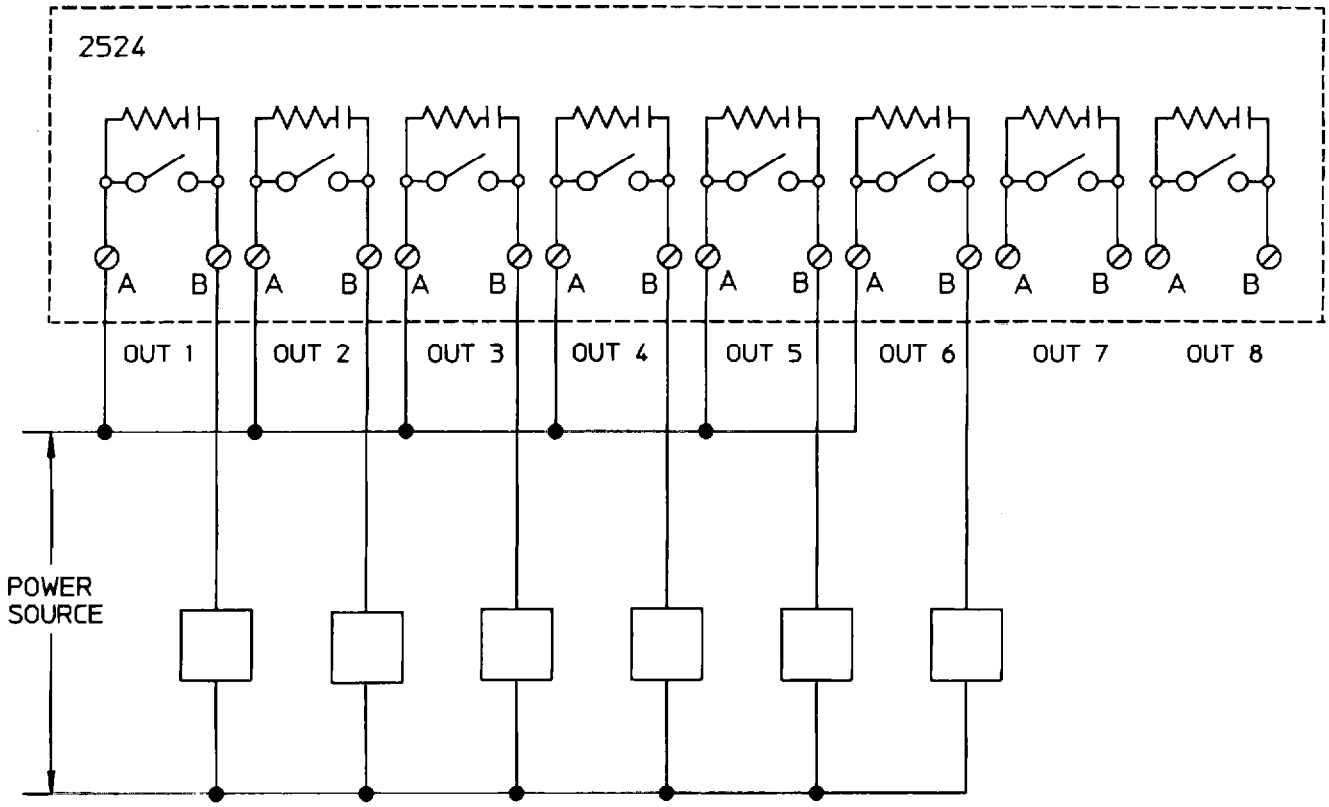
ALTERNATE

RS508
(FOR NORM & EMER CALL W/O PRIVACY)



Tape off red & yellow wires.

ROOM STATION with Speaker, Call-Privacy Switch, and Emergency Switch
KM1014 [0]

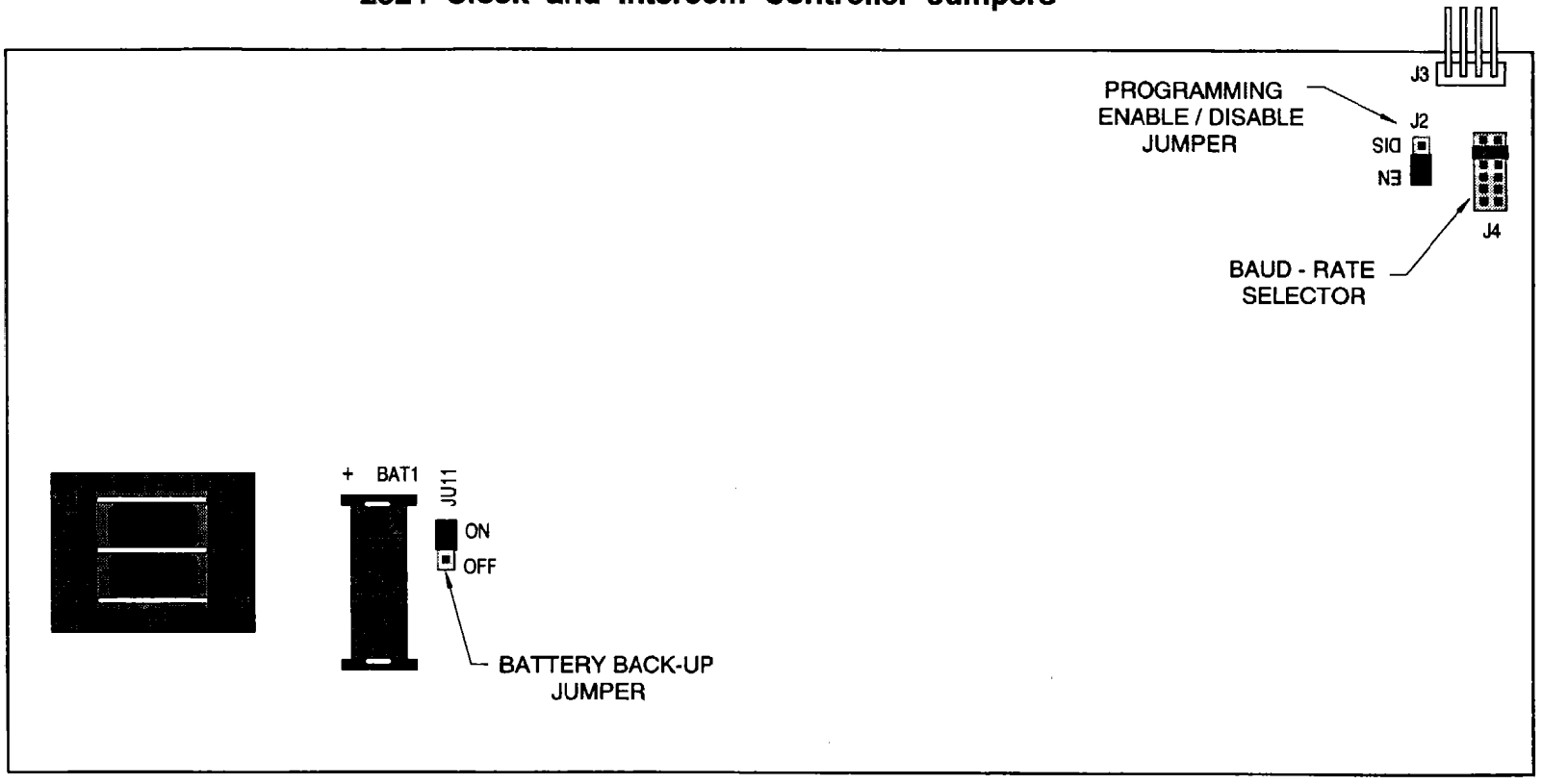


NOTES:
1. "Mode A" programming determines how many outputs are available as clock zones.
2. Each box (□) represents a load (signaling device or equipment). Each load's current should be limited to 5 amperes (resistive) at 30 VDC or 125 VAC.
3. "Out 7" and "Out 8" are normally used for clock correction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

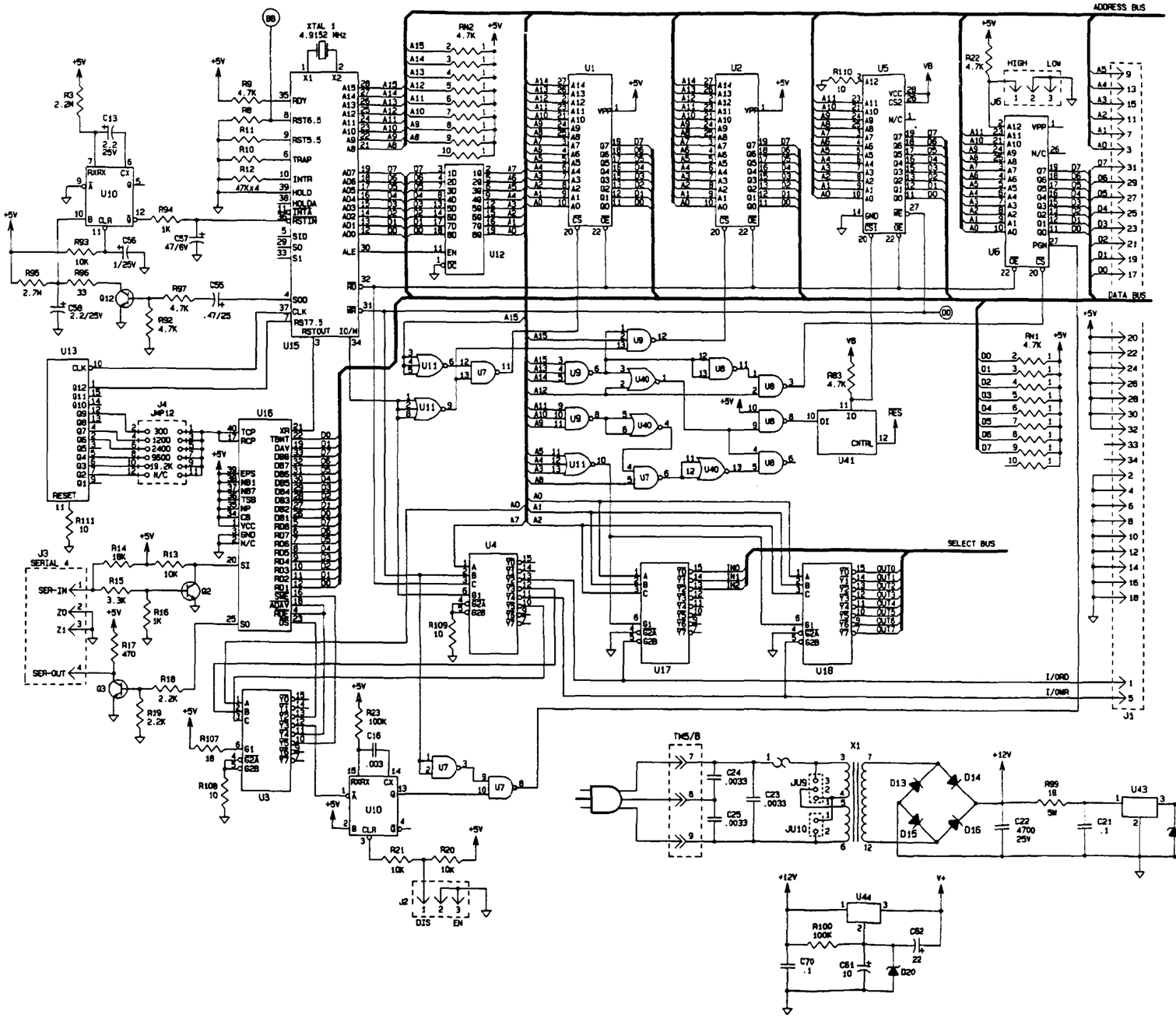
2524 Master Clock
Connecting Signaling Devices and Equipment

KM0987 [A]

2524 Clock and Intercom Controller Jumpers



IL0341

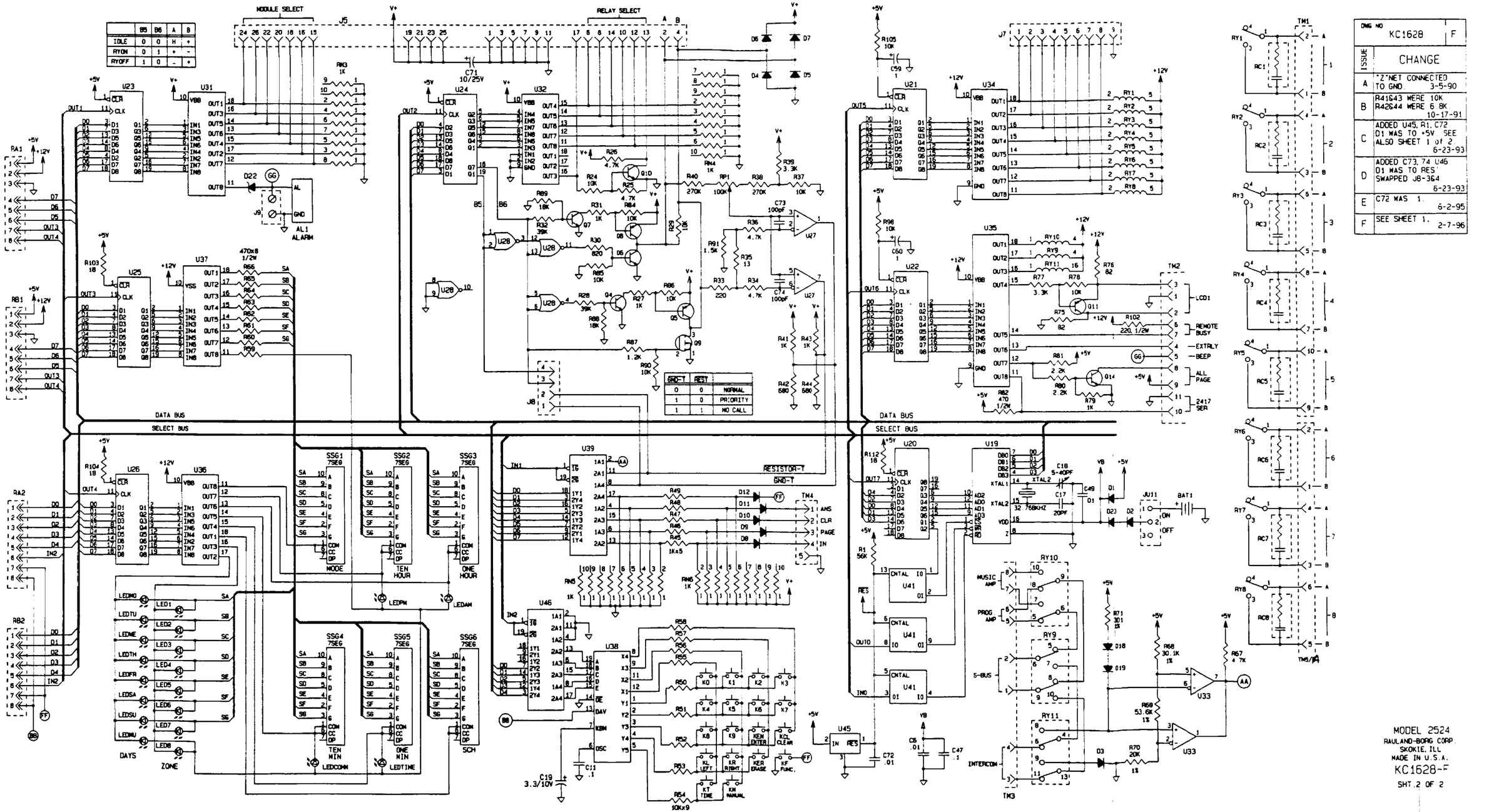


SYMBOL	RAULAND PART NO
U1, U2	EC0278
U3, 4, 17, 18	EC0179
U5	EC0262
U6	EC0279
U7, 8	EC0170
U9	EC0221
U10	EC0274
U11	EC0035
U12	EC0181
U13	EC0193
U15	EC0241
U16	EC0105
U19	EC0272
U20-U26	EC0195
U27	EC0196
U28	EC0111
U31, 32	EC0197
U33	EC0196
U34, 35, 36	EC0189
U37	EC0076
U38	EC0166
U39, 45	EC0192
U41	EC0284
U40	EC0205
U43	EC0112
U44	EC0290
U45	EC0301

SYMBOL	RAULAND PART NO.
Q2, 3, 10, 12, 14	ETMPS8515
Q4, 5	ETMPSA18
Q6, 8, 11	ETMPSA56
Q7	ETMPSA05
Q9	ETS9041
D1, 2, 23	1N5817
D3-D7, 18, 19	1N914
D8-D12	1N4002
D13-D16	1N5401
D20	JR0090-13
D22	JR0090-11
D24	JR0090-12

DWG NO.	KC1628	F
ISSUE	CHANGE	
A	DELETED C69, 013. R101 & D21. "Z" NET CONNECTED TO GND. 3-5-90	
B	SEE SHEET 2 of 2. 10-17-91	
C	U41 PIN 12 WAS TO +5. SEE SHEET 2 of 2. 6-22-93	
D	SEE SHEET 2 of 2. 7-27-94	
E	U15 WAS 8085 (EC0115) 6-5-95	
F	REPLACED D17 WITH D24. TM1 WAS 16 POSITION, TM5 WAS 3 POSITION. 2-7-96	

MODEL 2524
RAULAND-BORG CORP.
SKOKIE, ILL
MADE IN U.S.A.
KC1628-F
SHT.1 OF 2



	B5	B6	A	B
IDLE	0	0	H	+
RYON	0	1	+	-
RYOFF	1	0	-	+

GND-T	REST	
0	0	NORMAL
1	0	PRIORITY
1	1	NO CALL

DWG NO	KC1628	F
ISSUE	CHANGE	
A	"Z"NET CONNECTED TO GND. 3-5-90	
B	R41&43 WERE 10K R42&44 WERE 6.8K 10-17-91	
C	ADDED U45, R1, C72 D1 WAS TO +5V SEE ALSO SHEET 1 of 2. 6-23-93	
D	ADDED C73, 74 U46 D1 WAS TO RES SWAPPED J8-3&4 6-23-93	
E	C72 WAS 1. 6-2-95	
F	SEE SHEET 1. 2-7-96	