



Blair Companies Electronic Price Unit Change (EPCU)

CERTIFICATION TRAINING LESSON

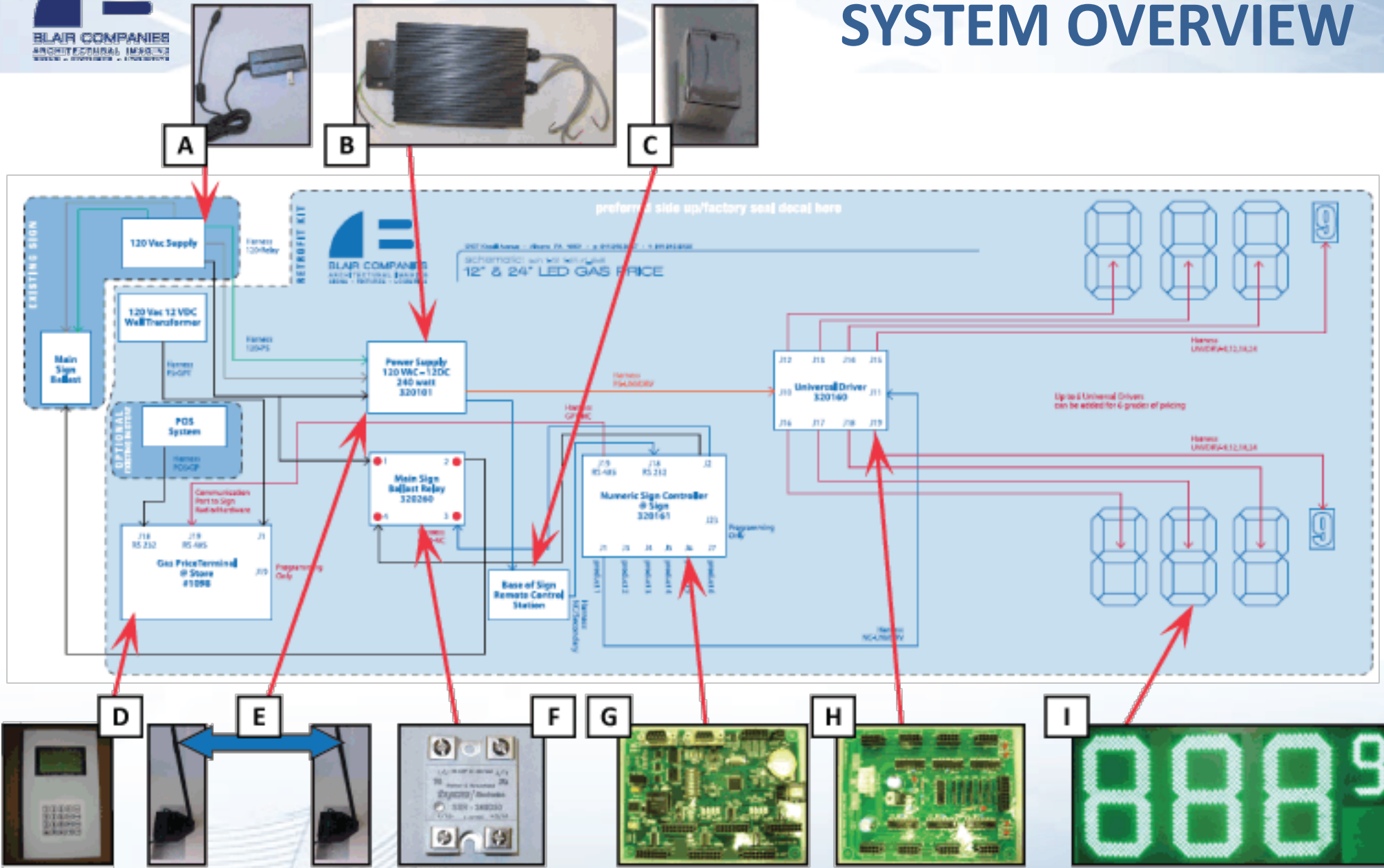
Revision 2

**Please refer to full installation instructions available at
www.blaircompanies.com/ledsupport**

SYSTEM OVERVIEW



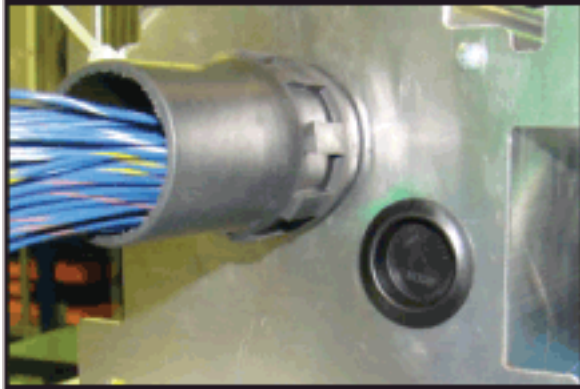
SYSTEM OVERVIEW



A—Operator Terminal Power Supply
 B—System Power Supply
 C—Secondary Com Box

D—Operator Terminal
 E—Communication Device (Standard Radio Shown)
 F—Relay

G—Control Board
 H—Driver Board (one per price grade)
 I—Set of LED Digits



- **Digit Cables Connect Driver Board To Each LED Digit**

Color coded:

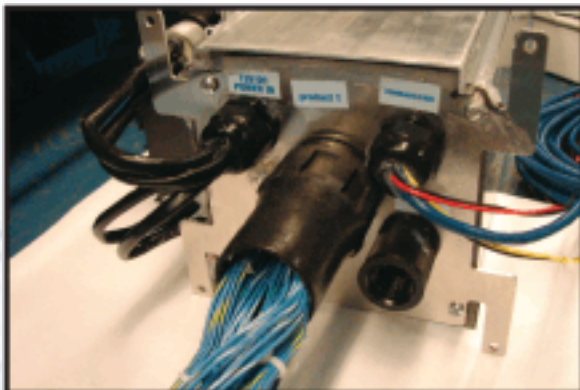
- Green strip - first (dollar) digit;
- Yellow stripe - second (tens) digit;
- Orange stripe - third (cents) digit;
- White stripe - 9/10 digit

Each bundle of cables is for one grade; will be labeled “Line 1”, etc.
Each bundle contains two of each cable (for a double face sign)



- **Sign Side Radio Will Connect To Radio Connect Fitting**

- Antenna should be oriented vertically
- Store side radio also oriented vertically
- Mount as close as possible to front of store, with line-of-sight to sign side radio
- Operator Terminal timers control LED dimming and fluorescent on/off
- Operator Terminal to remain plugged in with its Power Supply and connected to store side radio





SAFETY FIRST!

- Wear all appropriate personal protective gear
- Make appropriate arrangements with store owner/manager prior to visit
- Inform store personnel upon arrival
- Disconnect electrical power (Using Lock-out Tag-out) before opening sign
- Barricade area safely for bystanders and traffic

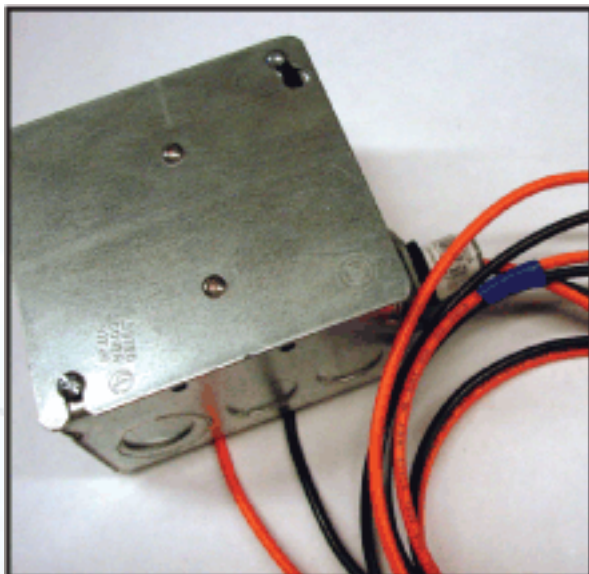
Any work done on BP/ARCO sites requires all workers to be API WorkSafe certified. Contact your Blair account manager for details

CHECK MATERIALS

- Ensure all components are received
- Have all necessary tools
- Have all barricades, cones, caution tape, and warning signs required to secure the work area

ELECTRICAL REQUIREMENTS

- Dedicated 20A circuit for EPCU system
- 100V-240VAC for Power Supply
- Timers and energy management systems must be disabled for this circuit
- Use UL listed conduit
- Recommended electrical grounding is a dedicated ½" x 8' copper grounding rod, and a #8 copper grounding electrode terminated to ground wire of AC supply line and sign base. This equipment is to be supplied by the installer.



ENERGY RELAY

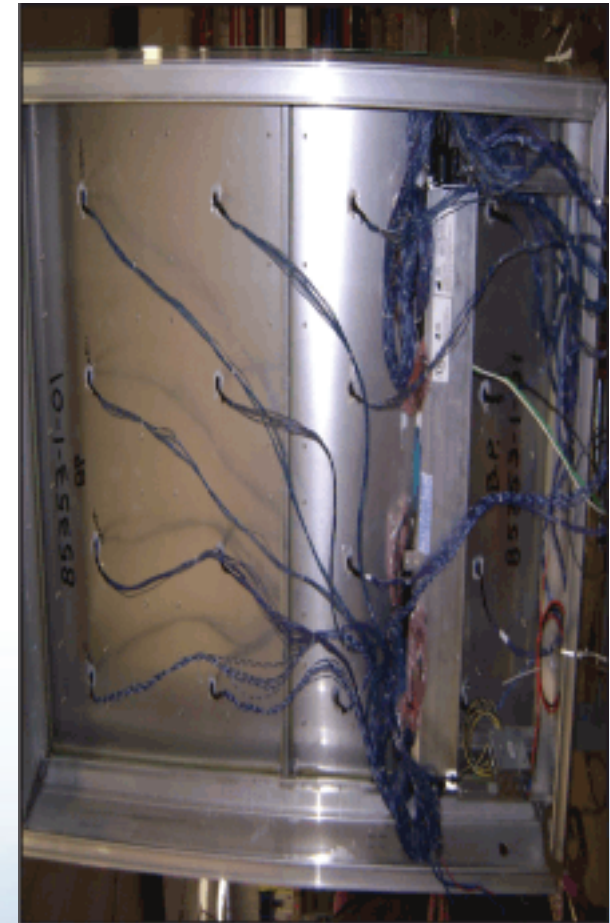
- Eliminates need for external timers to turn lamps on and off
- Route line side power to ballasts through orange and black relay wires (terminals 1 and 2)
- Yellow and black wire from control box go to terminals 3 and 4 respectively

CONTROL BOX

- Will be mounted inside sign cabinet
- Use mounting tabs provided
- Tabs can be bent as necessary for mounting
- Have some aluminum angle or tube on hand to fabricate mounting braces
- **DO NOT** drill into Control Box enclosure!!!
- Control box is sealed with anti-tamper label
- Opening control box will only be necessary for servicing the system; a Blair service person will instruct you to open the box
- Observe labels indicating preferred up or down when mounting
- Control box can be mounted vertically; if so have the digit cable bundles pointing upward in the sign
- Conduit to and wires from the Control Box should be routed and properly tied to not create shadows on illuminated portions of sign, and to allow opening hinged faces
- Keep in mind that digit cables must be able to reach all digits; locate control box centrally in the area of LED digits
- In an on-canopy application, Control Box can be mounted on the top of canopy, but a small cover/roof above it is necessary

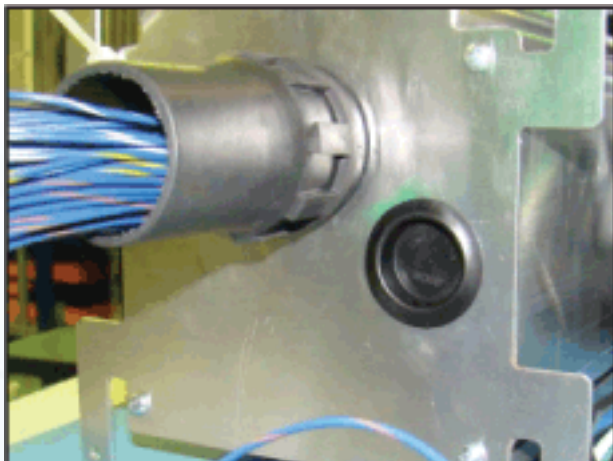
SPECIAL NOTE: Mounting the control box is the most difficult and most important step when retrofitting the EPCU system into a sign. Keep in mind that future serviceability and not interfering with lamps is important when selecting a location for the Control Box.

CONTROL BOX



LED DIGITS

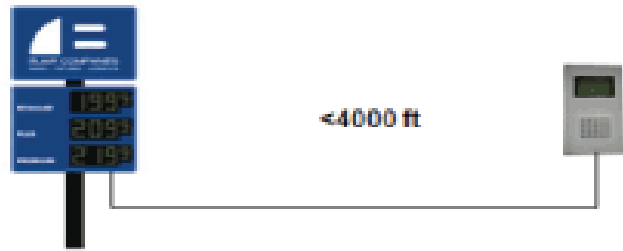
- Blair will supply pounce pattern for mounting digits for retrofit signs
- For retrofit, black vinyl background will also be provided
- Drill holes to mount 6-32 Nutserts (provided)
- Drill holes for digit cable plug as shown on pattern
- Installer must have nutsert tool
- Attach digits with supplied 6-32 Screws
- Handle digits carefully to avoid damaging LEDs



DIGIT CONNECTIONS

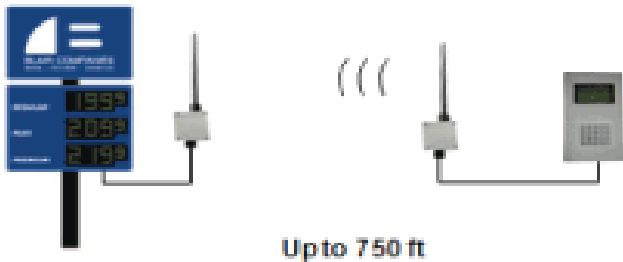
- Color coded to digits
(G, Y, O, W = \$8, 8, 8, 9/10)
- Knockout provided for any future digit cable replacement

COMMUNICATION METHODS



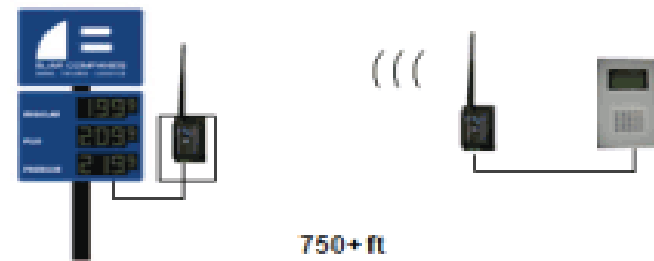
Direct Cable Communication

- Communicate from operator terminal inside store
- Kit includes terminal with display and all cables to connect to site-supplied CAT5 cable
- Most reliable, guaranteed connection
- Range up to 4000 ft



Standard Radio Communication

- Communicate from operator terminal inside store
- Kit includes terminal with display, cables, radio components, and enclosures
- Range up to 750 ft line-of-sight



Long-range Radio Communication

- Communicate from operator terminal inside store
- Kit includes terminal with display, cables, radio components, and enclosures
- Range up to 750+ ft line-of-sight
- Allows communication with multiple signs from single terminal



Economy Operator Terminal

- Simple 4-button handheld remote
- Kit includes remote and receiver components at sign
- Price change and settings displayed at sign
- Range up to 300 ft line-of-sight

Communication (Sign Side)

- Antenna to be mounted outside sign, with line-of-sight to store
- Antenna to be vertical
- Route CAT5 cable to Radio Connect Fitting
- Mounting will depend on design of sign
- Mounting plate tab provided for each radio type
- Standard radio module is same potted unit for sign side as store side
- Long range radio for sign side in waterproof box
- Long range radio in near future will utilize same Radio Connect Fitting

**For a multiple-sign site, each sign will have a long range radio, with one store side long range radio*

Communication (Store Side)

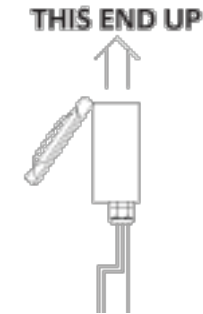
- Store radio should be mounted as near front of store as possible, with clearest line-of-sight to sign
- 12VDC transformer for Operator Terminal must be plugged in; use supplied transformer or contact Blair for a replacement
- Radio will be connected to Operator Terminal



**If POS system is to be utilized, the system must be indicated when ordering. Operator Terminal will be clearly labeled with the POS it works with. The supplied 7' CAT5 cable will connect to register. Place Operator Terminal near register.*

SECONDARY COMMUNICATION BOX

- Mount weathertight box to column leg 4-5' above ground
- Hinge facing upward
- Power (Red/Black) and NC Secondary (CAT5) are routed to the box. Drill into cladding or pole to drop the wires down to box.
- Seal around back of box and all fittings with silicone to prevent water ingress into box
- Allows operation with Terminal at sign in the event of radio failure



TESTING SYSTEM

- Check all connections
- Apply power to sign
- Test operation of Terminal with radio in store and at Secondary Comm Box
- Set to 8.88 and check all LEDs light on each face



PRICE CHANGE

- Changing prices is the primary function of the Operator Terminal
- Press “Price” on the keypad to scroll through the different grades (Line1, Line2,Line6)
- At the desired grade, enter the 3 digit price, then press “Valid”
- After a few seconds, the system will update the price for that Line
- Continue stepping through the grades and updating prices
- Not all signs will have all grades

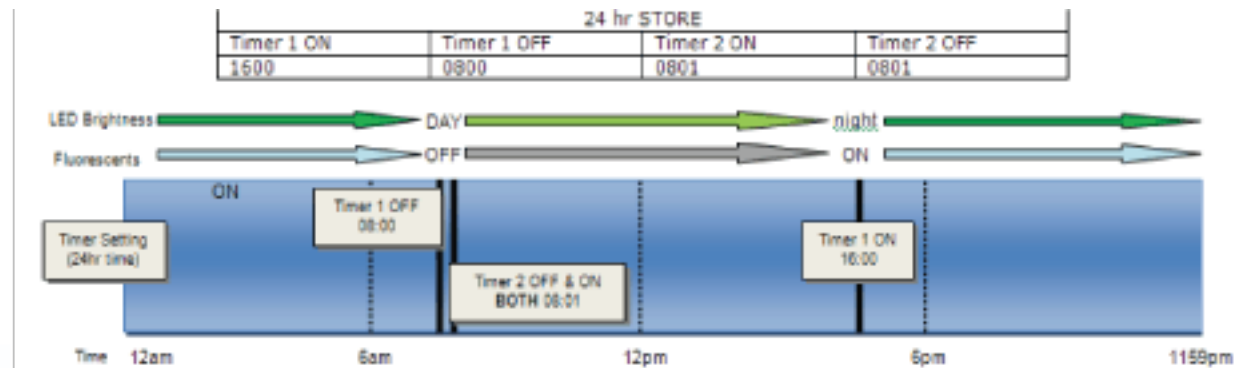
SETTING DATE AND TIME

- Press “Config” to reach the “Set Time” screen
- Enter the current time (24hr/military format)
- Press “Valid”
- Press “Config” to reach the “Set Date” screen
- Enter the numeric date including year
- Press “Valid”

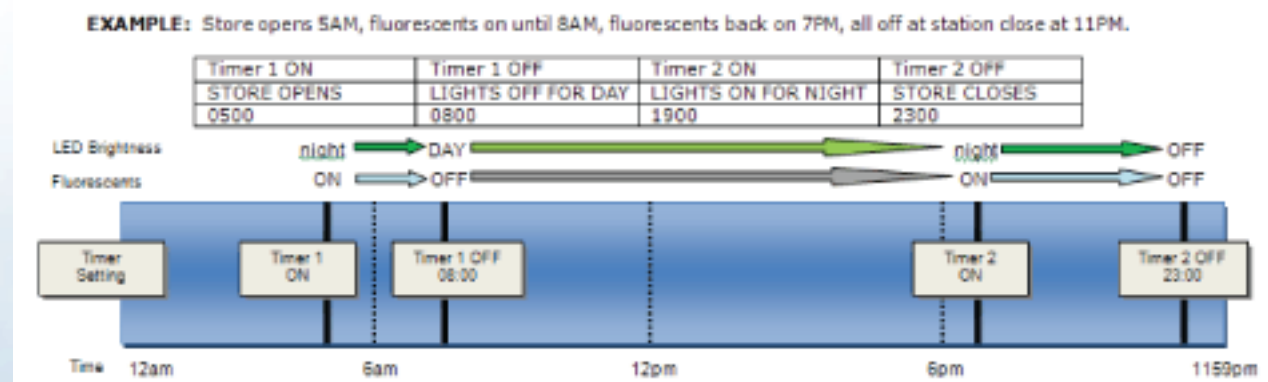


DIMMING AND FLUORESCENT CONTROL

- Operator Terminal uses timers to control dimming of LEDs and lights on/off with the Energy Relay
- There are 2 timers to control lighting and LED brightness
- For a 24 hour store, only Timer1 will be needed; Timer2 ON and OFF will be set to same time to deactivate (0801 as default)
- In this scenario, Timer1 ON controls time fluorescents turn on and LEDs dim
- Timer 1 OFF controls time fluorescents turn off and LEDs brighten to daytime use
- Example: Lights on at 4PM
Lights off at 8AM



- If the store closes at night, Timer 1 ON/OFF controls morning lights/dimming, and Timer 2 ON/OFF controls evening lights/dimming



DIMMING AND FLUORESCENT CONTROL

- Press “Config” until screen shows “Set Timer 1 On”
- Enter time in 24hr format
- Press “Valid”
- Continue pressing “Config” and set Timer 1 Off, Timer 2 On, and Timer 2 Off in the same manner

To manually control fluorescent lamps in the sign

- Simply press the “Light” key on the Operator Terminal
- This will provide a temporary override to the other state
- Timer function will keep this light state correct at next timer change
- This allows lights to be on in event of early darkness due to weather, or to test the function of radio without changing price

To set brightness of LEDs in both Day and Night settings

- Press “Config” until “Day*Night Light Level” is displayed
- Enter daytime and nighttime light levels, as a percentage of full brightness, where 000 is no light and 999 is full brightness
- Press “Valid”
- Default settings are 999 and 500 (99.9% and 50%)

CUSTOMER TRAINING

- Spend 20 minutes to train customer on operation: changing price, using Secondary Comm Box, Timers for lights and dimming, Breaker location.
- Instruct store personnel to leave Operator Terminal plugged in all the time. If not, the timers will not work, and the sign will not work properly.
- Leave the supplied Operation Manual with the Terminal at the store
- Answer any and all of their questions and concerns
- Show them Blair contacts for service issues in back of Operation Manual

SITE WRAP UP

- Take completion photos of each major part of installation: Faces in operation (close up and 5x height away from sign), Radio mounting at sign, Radio mounting in store, top of sign (showing sealed) taken from inside, back of each face showing silicone on plugs, Secondary Comm Box mounting, Control Box mounting
- Complete Warranty Checklist and send to LEDWarranty@blaircompanies.com along with completion photos

ACCESSORIES

- Other Blair products include: an Economy Operator Terminal (handheld remote with 4 function buttons), POS interfaces, Modular Digits for large sizes up to 120" tall, and an EMCmini--small message display that can show multiple grades, CASH/CREDIT
- Contact Blair for further information on these products

REPAIR KIT

- All certified installers are required to purchase and carry a Repair Kit.

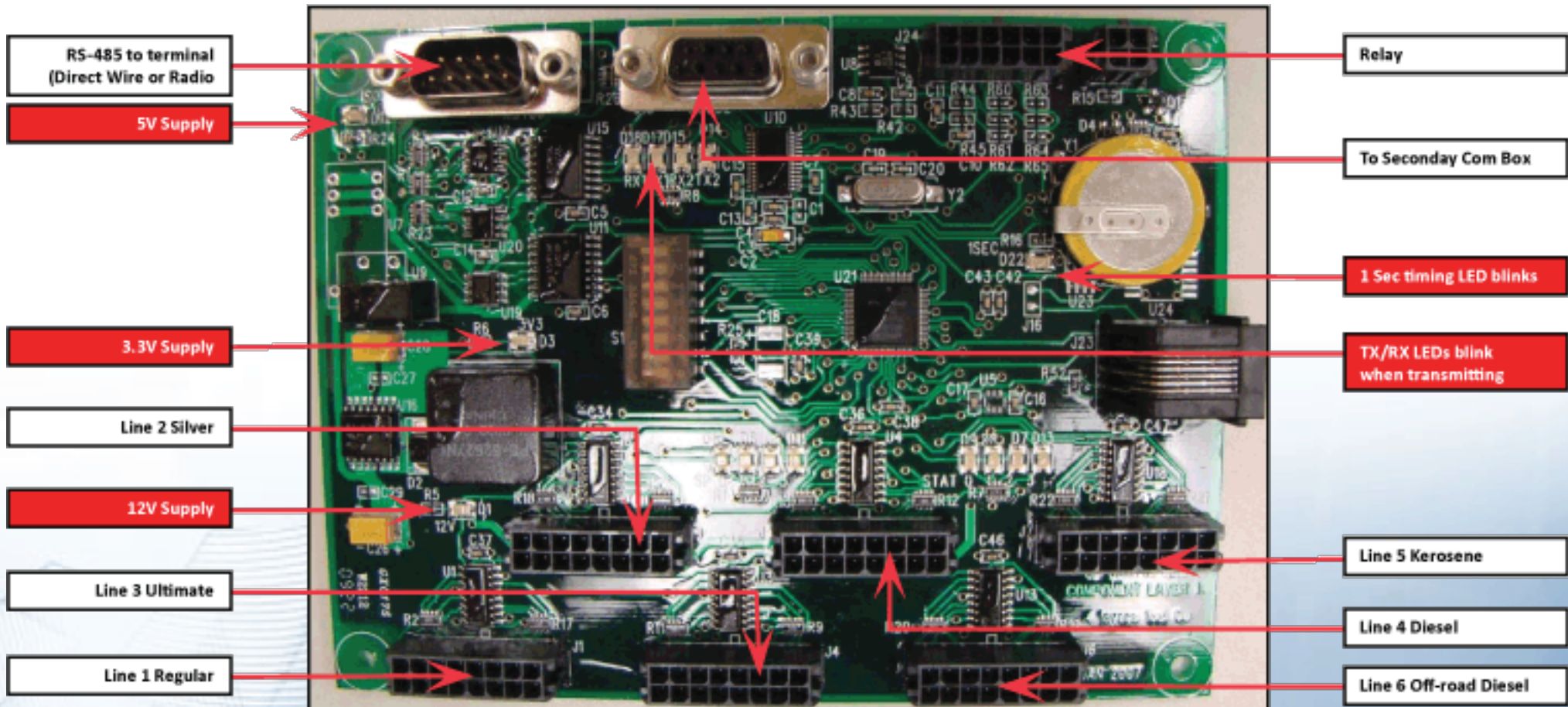
****Installers must bring Repair Kit along to new Installations****

- Kit includes a complete working system with one of each size digit
- Any parts from the repair kit used to repair a sign under warranty will be replaced by Blair.
- Control box has a display window to show components inside, including an incandescent bulb to represent fluorescent function
- Includes a set of Standard Radios
- Demo kits are also available to show potential customers

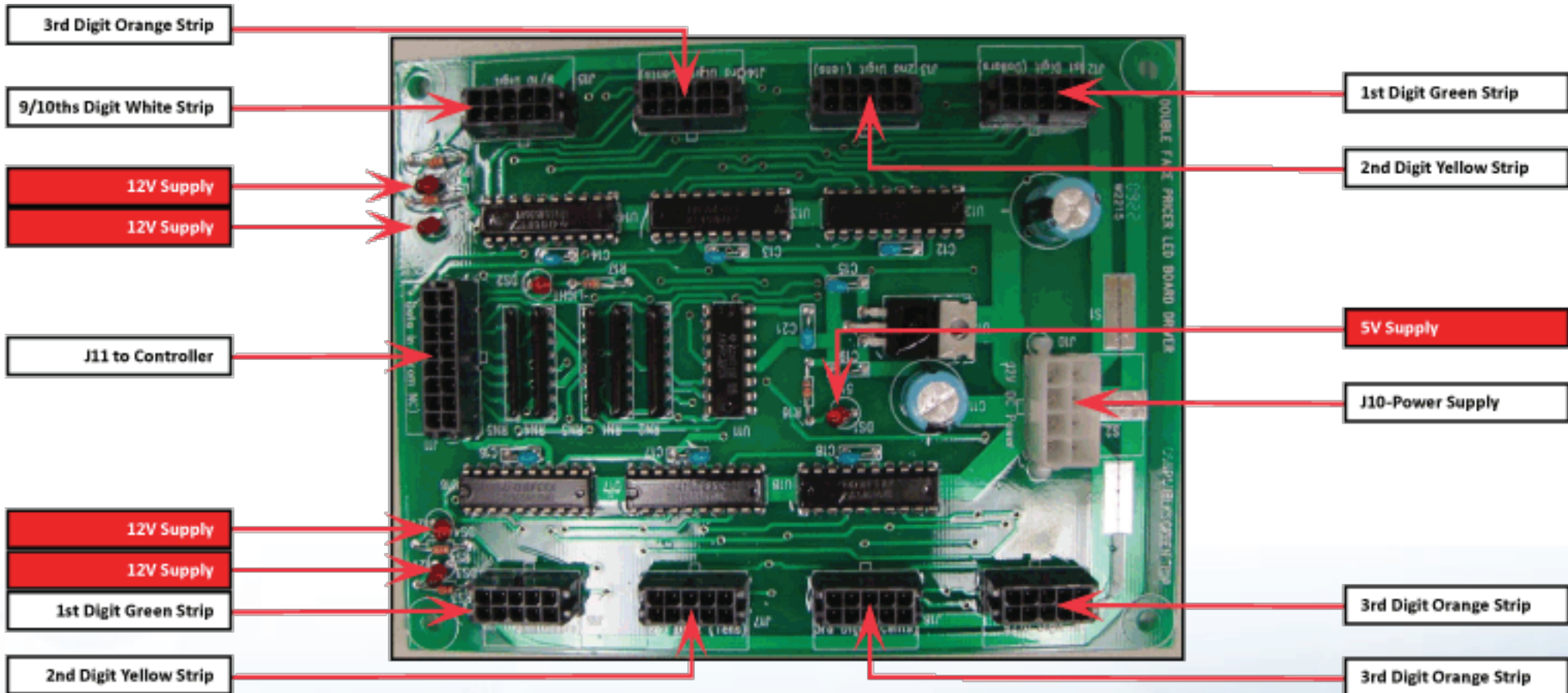


CONTROLLER BOARD

Installation does not require opening sealed Control Box. The following details connections inside the box in the event of servicing control board, power supplies, or driver boards. It will also be helpful in setup of the sample Control Box in the Repair Kit. White arrows indicate connections, red arrows indicate LED indicators.

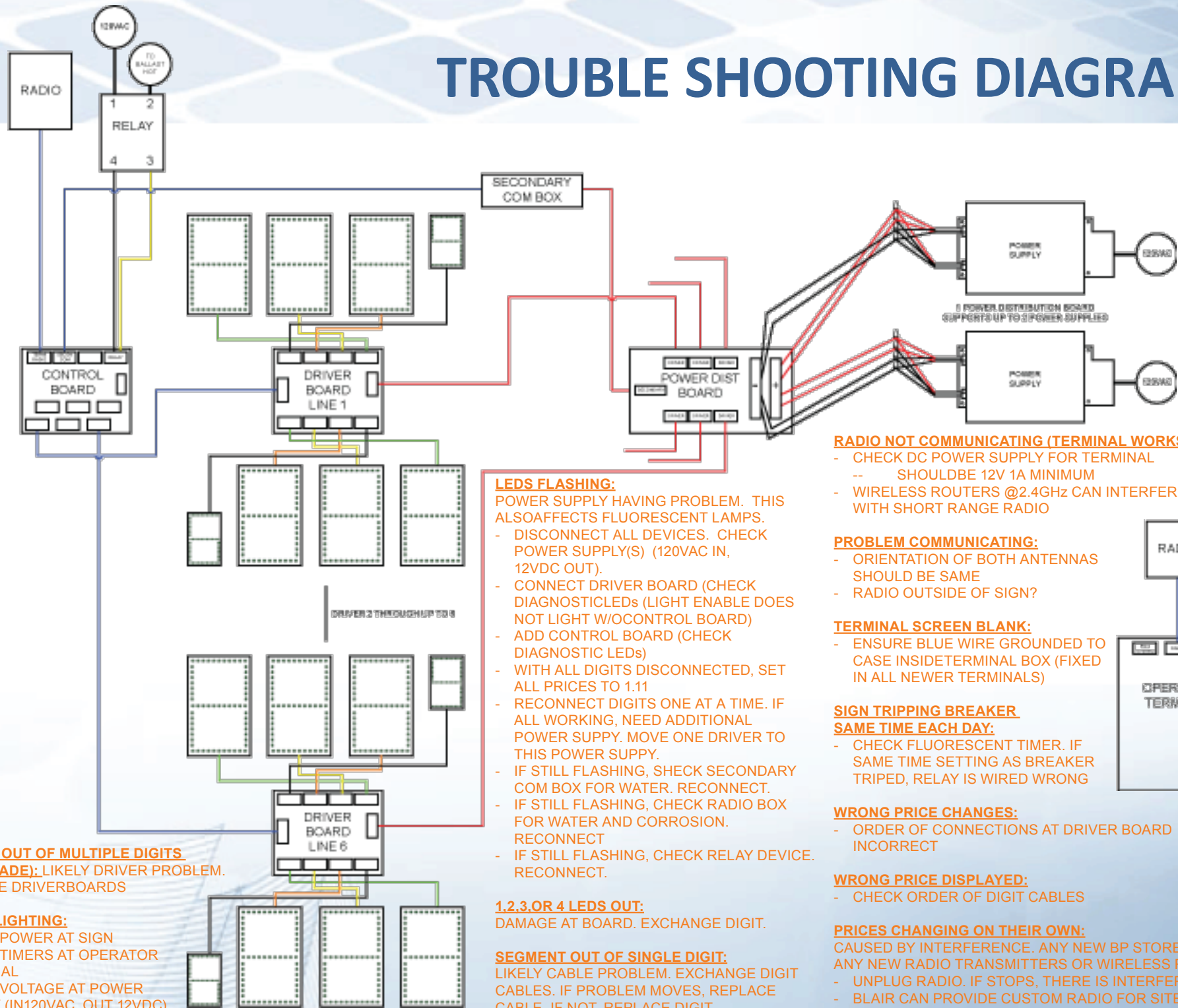


DRIVER BOARD



- With modular digits, each digit has its own driver board, and each segment is connected to one driver port
- The control board receives power from its connection to Driver1. If Driver1 is not properly connected to 12V supply, the control board will not power up.

TROUBLE SHOOTING DIAGRAM



SEGMENT OUT OF MULTIPLE DIGITS (SAME GRADE): LIKELY DRIVER PROBLEM. EXCHANGE DRIVERBOARDS

NO LEDS LIGHTING:

- CHECK POWER AT SIGN
- CHECK TIMERS AT OPERATOR TERMINAL
- CHECK VOLTAGE AT POWER SUPPLY (IN 120VAC, OUT 12VDC)

LEDS FLASHING:
POWER SUPPLY HAVING PROBLEM. THIS ALSO AFFECTS FLUORESCENT LAMPS.

- DISCONNECT ALL DEVICES. CHECK POWER SUPPLY(S) (120VAC IN, 12VDC OUT).
- CONNECT DRIVER BOARD (CHECK DIAGNOSTIC LEDS (LIGHT ENABLE DOES NOT LIGHT W/O CONTROL BOARD)
- ADD CONTROL BOARD (CHECK DIAGNOSTIC LEDs)
- WITH ALL DIGITS DISCONNECTED, SET ALL PRICES TO 1.11
- RECONNECT DIGITS ONE AT A TIME. IF ALL WORKING, NEED ADDITIONAL POWER SUPPLY. MOVE ONE DRIVER TO THIS POWER SUPPLY.
- IF STILL FLASHING, CHECK SECONDARY COM BOX FOR WATER. RECONNECT.
- IF STILL FLASHING, CHECK RADIO BOX FOR WATER AND CORROSION. RECONNECT
- IF STILL FLASHING, CHECK RELAY DEVICE. RECONNECT.

1,2,3,OR 4 LEDS OUT:
DAMAGE AT BOARD. EXCHANGE DIGIT.

SEGMENT OUT OF SINGLE DIGIT:
LIKELY CABLE PROBLEM. EXCHANGE DIGIT CABLES. IF PROBLEM MOVES, REPLACE CABLE. IF NOT, REPLACE DIGIT

RADIO NOT COMMUNICATING (TERMINAL WORKS):

- CHECK DC POWER SUPPLY FOR TERMINAL -- SHOULD BE 12V 1A MINIMUM
- WIRELESS ROUTERS @2.4GHz CAN INTERFERE WITH SHORT RANGE RADIO

PROBLEM COMMUNICATING:

- ORIENTATION OF BOTH ANTENNAS SHOULD BE SAME
- RADIO OUTSIDE OF SIGN?

TERMINAL SCREEN BLANK:

- ENSURE BLUE WIRE GROUNDED TO CASE INSIDE TERMINAL BOX (FIXED IN ALL NEWER TERMINALS)

SIGN TRIPPING BREAKER

- SAME TIME EACH DAY:**
- CHECK FLUORESCENT TIMER. IF SAME TIME SETTING AS BREAKER TRIPPED, RELAY IS WIRED WRONG

WRONG PRICE CHANGES:

- ORDER OF CONNECTIONS AT DRIVER BOARD INCORRECT

WRONG PRICE DISPLAYED:

- CHECK ORDER OF DIGIT CABLES

PRICES CHANGING ON THEIR OWN:

- CAUSED BY INTERFERENCE. ANY NEW BP STORES IN AREA? ANY NEW RADIO TRANSMITTERS OR WIRELESS ROUTERS?
- UNPLUG RADIO. IF STOPS, THERE IS INTERFERENCE.
 - BLAIR CAN PROVIDE CUSTOM RADIO FOR SITE TO AVOID THE INTERFERENCE.





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