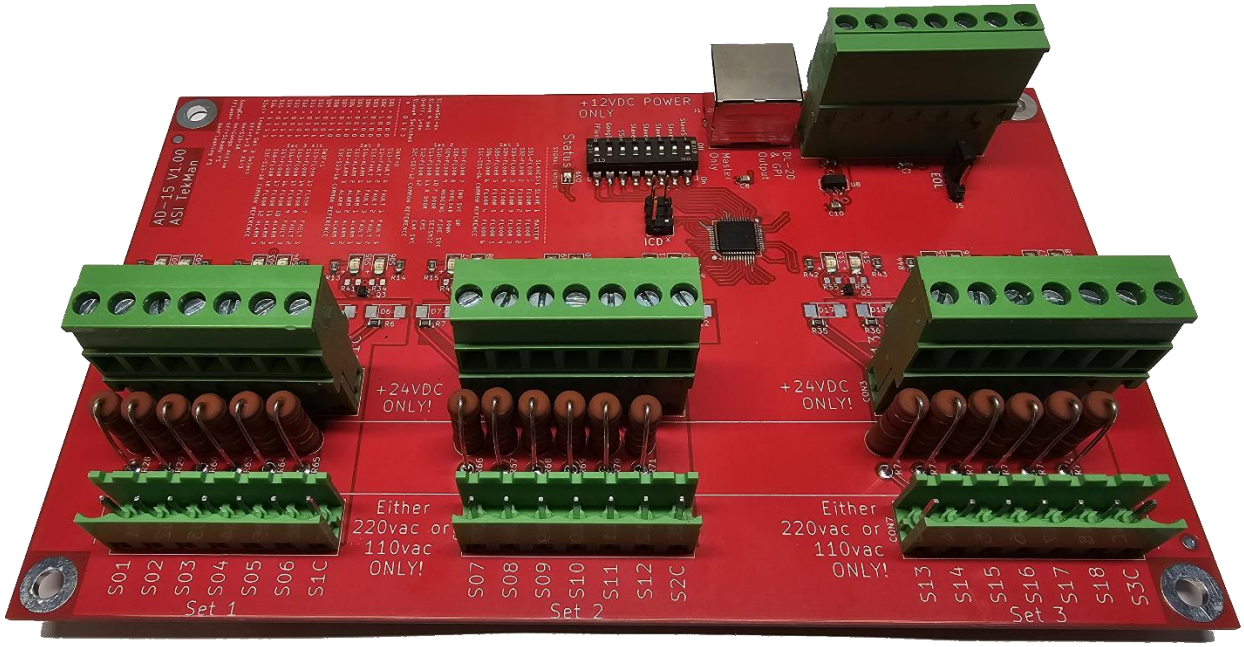

AD-15 Single Line Per Floor Interface

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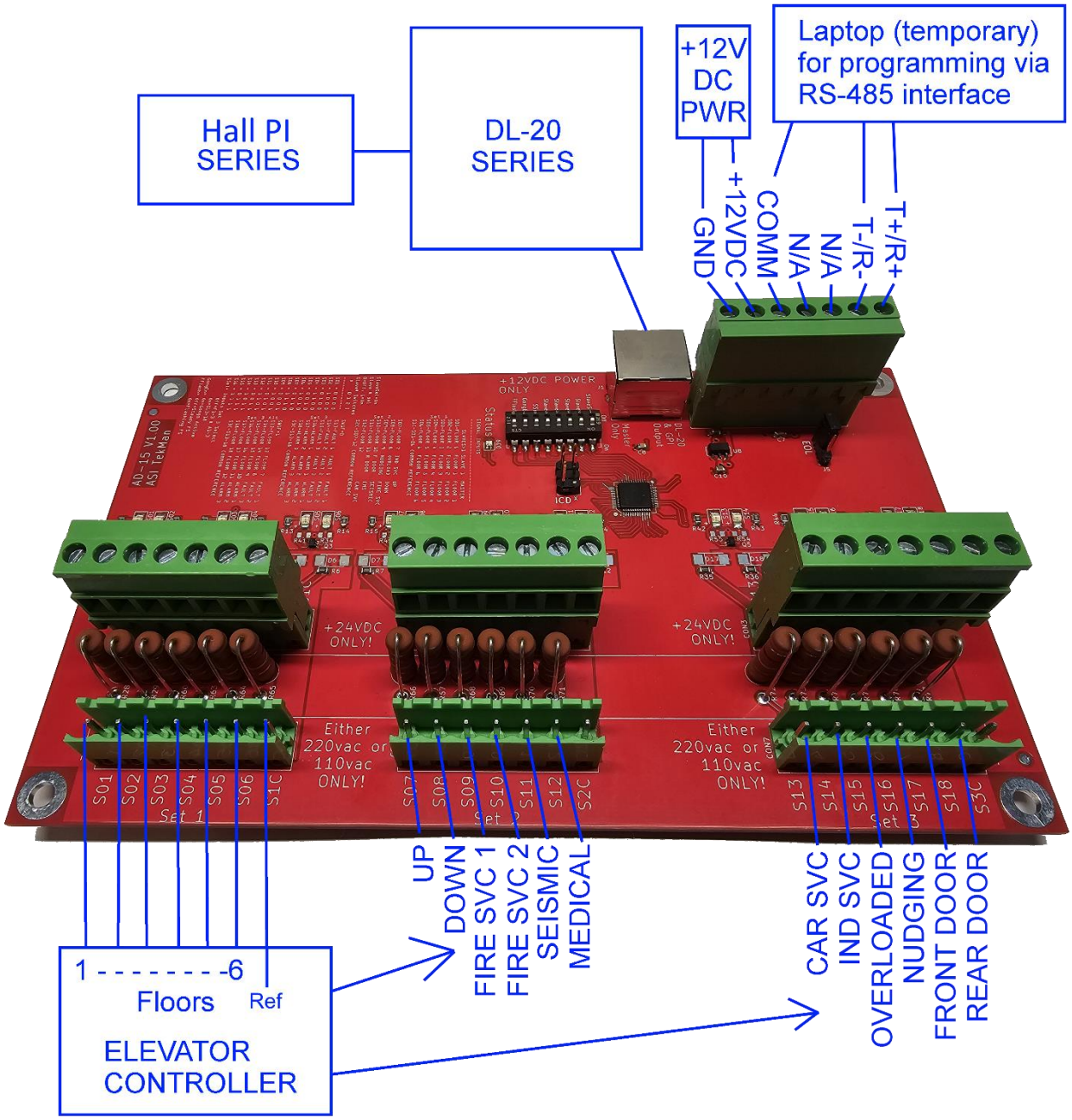
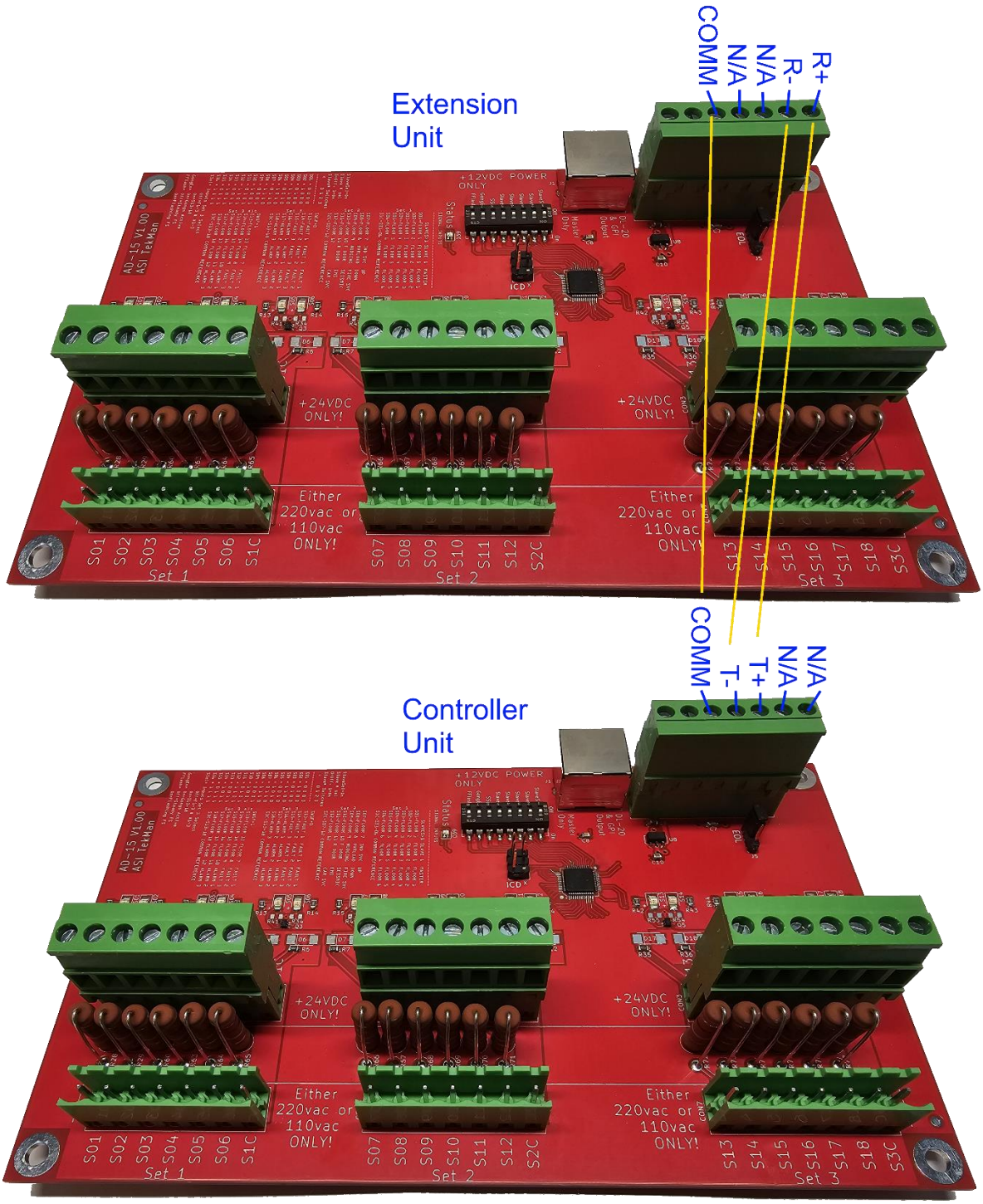
INTRODUCTION



The AD-15 is an interface board that lets Elevator Controllers using "Single Line Per Floor" outputs drive DL-20 line and Hall PI line units. A single AD-15 (as shown above) can handle up to 6 stops with all the available control inputs. You can add from one to sixteen AD-15 Extensions to a Controller, this adds 12 additional floors, along with either 6 more floors (for 18 total) or 3 Fault inputs with 3 Alarm inputs, per Extension unit. Each unit can handle +24VDC power for the input banks or either 110vac or 220vac per input bank. It can work as a single Controller or with up to four Extension units.



FEATURES

- Only 1 unit needed for an installation of 1 to 6 floors
- Each input bank of 6 inputs can be triggered with either +24VDC, 110vac, or 220vac
- The DC inputs are non-polarized, but the COMMON for each individual bank (Set 1, Set 2, Set 3) MUST be the same
- Each input has a LED to indicate when the input is active

POWER SUPPLY REQUIREMENTS

- +5VDC to 12VDC at 0.5A Regulated Output
- Output voltage tolerance = +/- 3% (1V) MAX
- Output ripple = 1% (240mV p-p MAX
- The power supply should be UL listed

FEATURES SUPPLIED TO DL-20 LINE UNITS

- Position Indication (PI), only 50 floors are allowed so only Faults/Alarms available beyond that
- Direction Indication
- Passing Chime
- Floor Enunciation
- Phone Line Verification – requires current time/date to be programmed
- Display SLEEP Mode
- Clock Display Function – requires current time/date to be programmed
- Remote Monitoring of Elevator Controller Faults and Alarms
- FIRE SERVICE, SEISMIC, OVERLOAD, HOSPITAL, OUT OF SERVICE, NUDGING, and INSPECTION indication
- Fire Service Indication per code – Steady (FS phase 1) or Flashing (FS phase 2)
- Load Test DUE monitoring – requires current time/date to be programmed

FEATURES SUPPLIED TO HALL PI UNITS

- Position Indication (PI), only 50 floors are allowed so only Faults/Alarms available beyond that
- Traveling/Arrival Direction indication – Arrival requires external lanterns
- Arrival Gong/Passing Chime – passing chime is only for “in car” units
- Landing Floor Indication – green screen on Graphical Hall PIs on arrival and will travel afterward
- FIRE SERVICE, OUT OF SERVICE, HOSPITAL, and INDEPENDENT indication
- Fire Service Indication per code – Steady (FS phase 1) or Flashing (FS phase 2)
- Display SLEEP mode – requires current time/date to be programmed
- Display SLEEP DISABLE MODE – requires current time/date to be programmed

NOTIFICATION FEATURES

These messages repeat every 30 seconds.

- Fire Service – activates steady tone 1 with message
- Seismic Sensor
- Car Overloaded
- Hospital Emergency Service
- Out of Service
- Door Nudging – activates steady tone 2 with message
- Inspection Modes
- Independent Service

PROPER DATA CABLE FOR DL-20 AND HALL PI LINES

The DL-20/Hall PI units communicate via a high-speed RS-422 Serial Communications Port. To maintain signal integrity the proper cable be used between the AD-15 and DL-20/Hall PI units. The proper cable type will reduce communication problems between units and will save you a lot of potential headaches. For short length runs (under 10 feet), standard straight cable will work. Longer runs are more susceptible to noise so twisted pair cables (CAT5/CAT6) must be used. Only the cable output from the Controller unit is used to drive DL-20/Hall PI units; that single cable can be chained from unit to unit with an RJ-45 splitter (like the Akwor RJ45 Ethernet Splitter on Amazon).

The DATA cable should meet the following Specs:

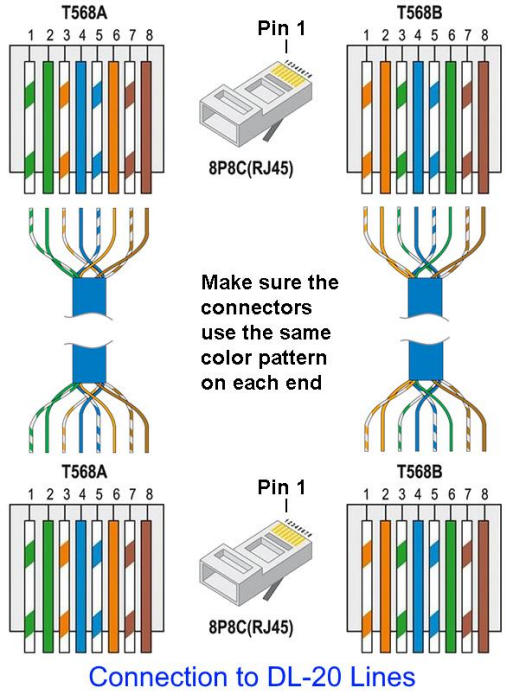
- Meets EIA RS-232/422 Specs
- Minimum of 1 Twisted pair (4.3 to 12 Twist/Ft)
- 24 AWG, stranded
- Shielded

Examples of approved wire are:

- Beldon 8102/9729, Alpha 66222C, Carol C0515A
- Allied 1030, Pronto 5402, Delco 30702
- AutomationDirect.com L1987/L19954

CONNECT TO A DL-20

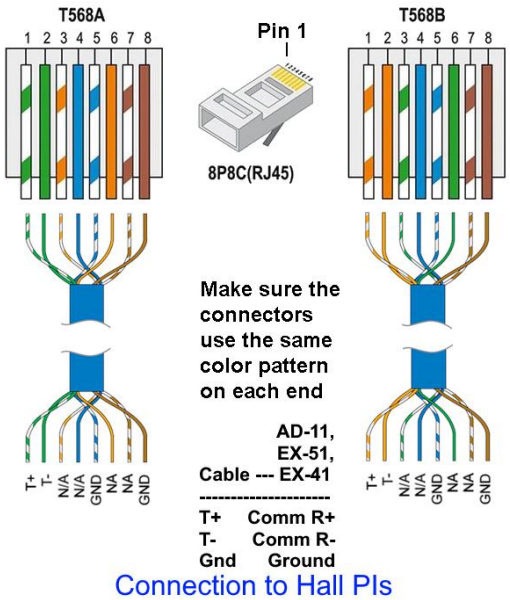
If the DL-20 is located within 10’ of the AD-15, use a standard CAT5 or better cable as shown on the top-right.



Connection to DL-20 Lines

CONNECT TO A HALL PI

The Hall PI requires a standard CAT5/5e/6 cable connected to the D+/R+, D-/R-, and data ground lines of these units. The Data cable is Daisy Chained between units.



Connection to Hall PIs

INPUTS S01 – S18 SPECS

The AD-15 uses three sets of six inputs; each set has its own Common. You can connect each set to a common power format; i.e. S01-S06 (set 1) could be +24VDC, S07-S12 (set 2) could be 110vac, and S13-S18 (set 3) could be 220vac, providing each set has only one common point. The +24VDC inputs are NOT polarity sensitive, so you could connect the ground to the Common (with +24VDC to the inputs), or you could connect the +24VDC to the Common (with ground to the inputs). NOTE: The 110vac/220vac input banks are separate from the +24VDC input banks, so don’t connect the wrong levels to incorrect input banks.

INPUT LEDS

Each input has a LED that turns Green when the input is activated. If an input is not detected, make sure that you have NOT tightened down on the wire's insulation in the screw terminal!

S01-S18 INPUT ASSIGNMENTS

CONTROLLER

- S01-S06 – One Floor Indication for each STOP
- **S1C – Common for S01-S06**
- S07 – UP – travel/arrival direction - required
- S08 – DOWN – travel/arrival direction - required
- S09 – FIRE SVC 1 – Steady fire hat
- S10 – FIRE SVC 2 – Flash fire hat – Connect to FIRE SVC 1 if only 1 trigger available
- S11 – SEISMIC – seismic condition active
- S12 – EMS – medical emergency active
- **S2C – Common for S07-S12**
- S13 – CAR SVC – all inspection modes active
- S14 – IND SVC – car is in private service mode – optional, used for HALL PI
- S15 – OVERLOADED, car is overloaded
- S16 – NUDGING, door nudging active –plays Stand Clear every 30 seconds & buzzer 2
- S17 – FRONT DOOR – indicates front (or only) door is open – required
- S18 – REAR DOOR – indicates rear door is open
- **S3C – Common for S13-S18**

EXTENSIONS – ALTFSEL OFF

- S01-S06 – One Floor Indication for each STOP
- **S1C – Common for S01-S06**
- S07-S12 – One Floor Indication for each STOP
- **S2C – Common for S07-S12**
- S13 – Fault 1 – Highest priority for this Extension
- S14 – Fault 2
- S15 – Fault 3 – Lowest priority for this Extension
- S16 – Alarm 1 – Highest priority for this Extension
- S17 – Alarm 2
- S18 – Alarm 3 – Lowest priority for this Extension
- **S3C – Common for S13-S18**

EXTENSIONS – ALTFSEL ON

- S01-S06 – One Floor Indication for each STOP
- **S1C – Common for S01-S06**
- S07-S12 – One Floor Indication for each STOP
- **S2C – Common for S07-S12**
- S13-S18 – One Floor Indication for each STOP
- **S3C – Common for S13-S18**

PRIORITY OF INPUTS

The AD-15 gives the highest priority from the lowest to the highest number; i.e. S01 is the highest priority input while S18 is the lowest on a single unit. As you chain Extension units to the Controller, the Extensions add their inputs in a similar fashion with each higher numbered Extension having lower priority to the previous unit. The same format applies to the Fault/Alarm inputs; the first Extension to supply Faults/Alarms has the highest priority and subsequent Extensions have lower priority Faults/Alarms.

FAULT/ALARM INPUTS

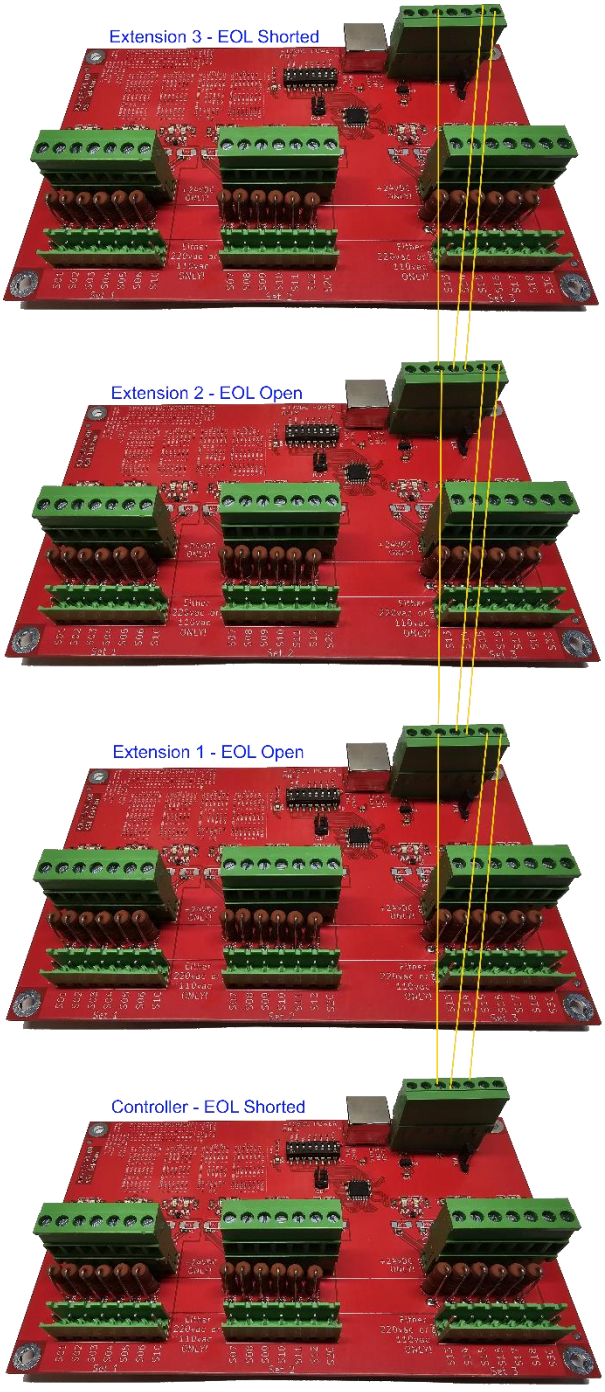
Each Extension unit can supply 12 Inputs and 3 Fault/3Alarm inputs, or 18 Inputs. Extension units will provide 12 Inputs, 3 Faults, and 3 Alarms by default. Set the **AltFSel** switch to the **ON** position to make that Extension instead provide 18 Inputs. By default, the AD-15 will trigger immediately when a Fault/Alarm input is activated. The unit can be changed (by individual inputs) to require multiple trigger events, from 1 to 127, before the unit will officially send the trigger notification (see Programming the AD-15). Once triggered, Faults/Alarms will remain triggered and only clear when the Input is released for 60 minutes.

EOL JUMPER

The EOL (End Of Line) Jumper MUST be **EOL Shorted**, as shown on the right, for the Controller and the **last** Extension units **ONLY**. The EOL jumper MUST be **EOL Open**, as shown on the right, for all other Extensions. In both scenarios, the **last** Extension refers to the last unit physically connected in the chain, where that unit's T+/T- connections are open.

EOL Shorted

EOL Open



EXPLANATION OF SWITCH OPTIONS

SET AS CONTROLLER OR EXTENSION

Up to 4 Extension units can be chain-connected to a Controller unit. Move the **ExtSel** switch to the **OFF** position to make it the Controller (default). A unit is switched to an Extension by moving the **ExtSel** switch to the **ON** position.

ASSIGNING AN EXTENSION NUMBER

Extension 1 has the highest Inputs priority while Extension 4 has the lowest. Extensions can be connected anywhere within the chain and will still respond to their assigned Extension Number; so Extension 1 could be the end of the chain, yet its inputs will still be the highest priority after the Controller. The Extension Number can be changed at any time. The Extension Number is selected by setting **Ext0** and **Ext1** according to this table.

Extension Number	Ext0	Ext1
1	OFF	OFF
2	ON	OFF
3	OFF	ON
4	ON	ON

ALTFSEL

AltFSel selects whether an Extension unit will use S13-S18 as 3 Fault and 3Alarm inputs **OFF**, or as 6 additional Floor Position Inputs **ON**.

GONG ENABLE

Setting **ON** makes Graphical PI (AD-11/EX-51) units chime for the next traveling direction (once for UP and twice for DOWN). With an “in car” Graphical PI unit, this makes the Gong chime as it passes each floor (once for traveling UP and twice for traveling DOWN). The default for the Gong Enable is **OFF**.

DL-20

This selects whether the DL-20s receive the Fire Service 1 input, **OFF**, or Fire Service 2 input, **ON**. Fire Service 1 provides a steady fire hat while Fire Service 2 provides a flashing fire hat. Both Fire Service inputs activate the Buzzer 1 signal and the fire service message (repeats every 30 seconds).

HALLPI

This selects whether the Hall PIs receive the Fire Service 1 input, **OFF**, or Fire Service 2 input, **ON**. Fire Service 1 provides a steady fire hat. Fire Service 2 provides a flashing fire hat.

LOST PI

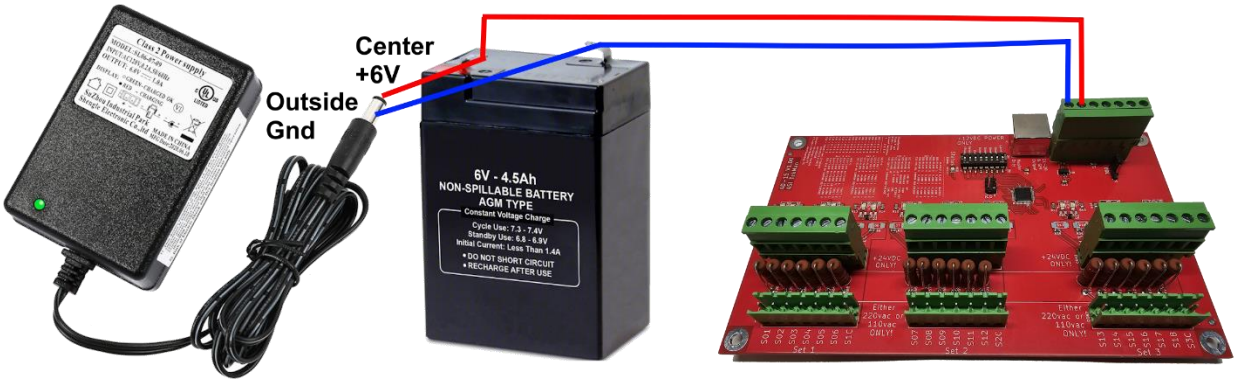
The unit normally keeps displaying the current floor number, even when all the floor inputs are off, until a floor change occurs. By setting this switch **ON**, the unit will signal “lost position” whenever all the floor inputs are off over half a second.

POWER LED OPERATION

- Fast Red/Green Flash for 2 seconds on Power Up and after each Programming Reset
- Steady Green as the Controller unit
- Steady Red as an Extension unit

POWER BACKUP OPERATION

One method to provide backup power is by using a UPS to supply the power to all the AD-15s. Optionally, the AD-15 can easily be connected for power loss operation by using a 6V SLA battery charger and a 6V 4.5AH SLA battery. A standard 6V SLA battery charger for children's riding toys generally works well. We've tested the SL06-07-09, readily available through Amazon. Any standard 6V 4.5AH SLA battery like the Expert Power EXP-645 or Power Sonic PS-640 will work well to keep the AD-15 running for well over 8 hours. The typical connection shown below will both keep the battery charged and the unit running for normal operation:



AD-15 CONTROLLER COMMUNICATION PROTOCOL (V8.02)

Specifications:

1. Port Type: Standard RS-422 Port using separate Transmit and Receive pairs (**NOT an RS-485 port**).
2. Serial Format: 1 Start Bit, 8 data bits, 1 stop Bit, No Parity
3. Baud Rate: 19.2K
4. Transmitted Data from Controller:
   a. DL-20 line, a 26 byte string, no more than 1.04ms between bytes, **ONLY the Header and Checksum can be over a value of 127**, at **75ms** per transmission with the Checksum as a sum of ALL the Data Bytes (02-25) masked to the last 8 bits (Byte) of the result (i.e. a value of 3048 would be 3048 [0xBE8] AND 255 = 232 [0xE8])
   b. Hall PI line, a 10 byte string, no more than 1.04ms between bytes, **ONLY the Header and Checksum can be over a value of 127**, at **75ms** per transmission with the Checksum is a sum of ALL the Data Bytes (02-09) and just use the last 8 bits (Byte) of the result (i.e. a value of 3048 would be 3048 [0xBE8] AND 255 = 232 [0xE8])

DL-20 LINE DATA TRANSMITTED

Byte 01	Byte 02	Byte 03	Byte 04	Byte 05	Byte 06	Byte 07	Byte 08	Byte 09	Byte 10	Byte 11	Byte 12	Byte 13
Header	FlrPos	Direction	StatusA	StatusB	Voice	Alarm1	Alarm2	Alarm3	Alarm4	Fault1	Fault2	Fault3
0xAA	0-99	1-3	0-127	0-127	0-13	0-100	0-100	0-100	0-100	0-127	0-127	0-127
Byte 14	**Byte 15**	**Byte 16**	**Byte 17**	**Byte 18**	**Byte 19**	**Byte 20**	**Byte 21**	**Byte 22**	**Byte 23**	**Byte 24**	**Byte 25**	**Byte 26**
Fault4	ClkMon	ClkDay	ClkYear	ClkHour	ClkMin	Res1	Res2	Res3	Res4	Res5	Res6	ChkSum
0-127	1-12	1-31	0-99	0-23	0-59	0	0	0	0	0	0	0-255

Byte Number **Byte Variable** **Acceptable Value Range**

HALL PI LINE DATA TRANSMITTED

Byte 01	Byte 02	Byte 03	Byte 04	Byte 05	Byte 06	Byte 07	Byte 08	Byte 09	Byte 10
Header	CurFlr	StatusA	StatusB	ClockD	ClockH	ClockM	ArrFlr	Future	ChkSum
0xAA	0-99	0-127	0-127	1-7	0-23	0-59	0-99	0	0-255

Byte Number **Byte Variable** **Acceptable Value Range**

5. DL-20 line received Data to Controller: two unique command chains continually repeated (Chain A, Chain B, Chain A, etc.), 3 bytes per Chain, no more than 1.04ms between bytes, **ONLY the Header will be over a value of 127**, at **75ms** per reception for a total chain sequence (A then B) of **150ms**.

DL-20 LINE DATA RECEIVED

Chain A

Byte 01	Byte 02	Byte 03
Header	ELState	Disabled
0xAA	20	0-1

75ms gap

Byte Number **Byte Variable**

Chain B

Byte 01	Byte 02	Byte 03
Header	PLState	Present
0xAA	21	0-1

75ms gap

Acceptable Value Range

DL-20 LINE TRANSMIT PACKET - DETAILED

Description	Byte Number	Value/Range
Header	01	**170**
FlrPos	02	**0-99, Current floor to display, 0=Lost PI**
Direction	03	**1-3, 1=Up, 2=Down, 3=End Of Call**
Status A	04	**Bits:** **0. 1=In Car Inspection Active** **1. 1=Car Top Inspection Active** **2. 1=Machine Room Inspection Active** **3. 1=Hoistway Inspection Active** **4. 1=Medical Icon Active** **5. 1=Fire Service Active** **6. 1=Seismic Icon Active** **7. Bit 7 – Always 0**
Status B	05	**Bits:** **0. 1=Buzzer 1 Active** **1. 1=Buzzer 2 Active** **2. 1=Door Open/Opening** **3. 1=Overload Icon Active** **4. 1=Fire Service Icon Flashing** **5. Reserved** **6. Reserved** **7. Bit 7 – Always 0**
Voice	06	**0 – 13** **A Voice command should be output a minimum of 4 times before changing to a No Voice command.** **0 = No Voice** **1 = Announce Floor Number** **2 = Going Up.** **3 = Going Down.** **4 = Please stand clear of doors.** **5 = Fire alarm active. Please exit when the doors open.** **6 = Seismic sensor activated. Please exit when the doors open.** **7 = Medical emergency. Please exit when the doors open.** **8 = Car is overloaded.** **9 = Car is on emergency power.** **10 = Elevator is on emergency power. Please exit when the doors open.** **11 = Inspection service.** **12 = Independent service.** **13 = Floor Chime**

Description	Byte Number	Value/Range
Alarm 1	07	0-127,
Alarm 2	08	0-127,
Alarm 3	09	0-127,
Alarm 4	10	0-127,
Fault 1	11	0-127,
Fault 2	12	0-127,
Fault 3	13	0-127,
Fault 4	14	0-127,
Clock Month	15	1-12, January=1, February=2, etc.
Clock Day	16	1-31,
Clock Year	17	0-99, This is the Century year number and MUST NOT be over 99, i.e. for 2019 it is 19, for 2102 it is 2
Clock Hour	18	0-23, 24 hour format; 0=12am, 1=1am, 12=12pm, 23=11pm, etc.
Clock Minute	19	0-59,
Reserved 1	20	0, N/A
Reserved 2	21	0, N/A
Reserved 3	22	0, N/A
Reserved 4	23	0, N/A
Reserved 5	24	0, N/A
Reserved 6	25	0, N/A
Checksum	26	Add all the data bytes, 02-25, and just use the last 8 bits of the result, i.e. for 0xBE8 it is 0xE8

DL-20 LINE RECEIVE PACKET – DETAILED

CHAIN A

Description	Byte Number	Value/Range
Header	01	170
ELState	02	20 – Elevator Disabled Status
Disabled	03	0-1, 0 = Elevator Enabled 1 = Elevator Disabled

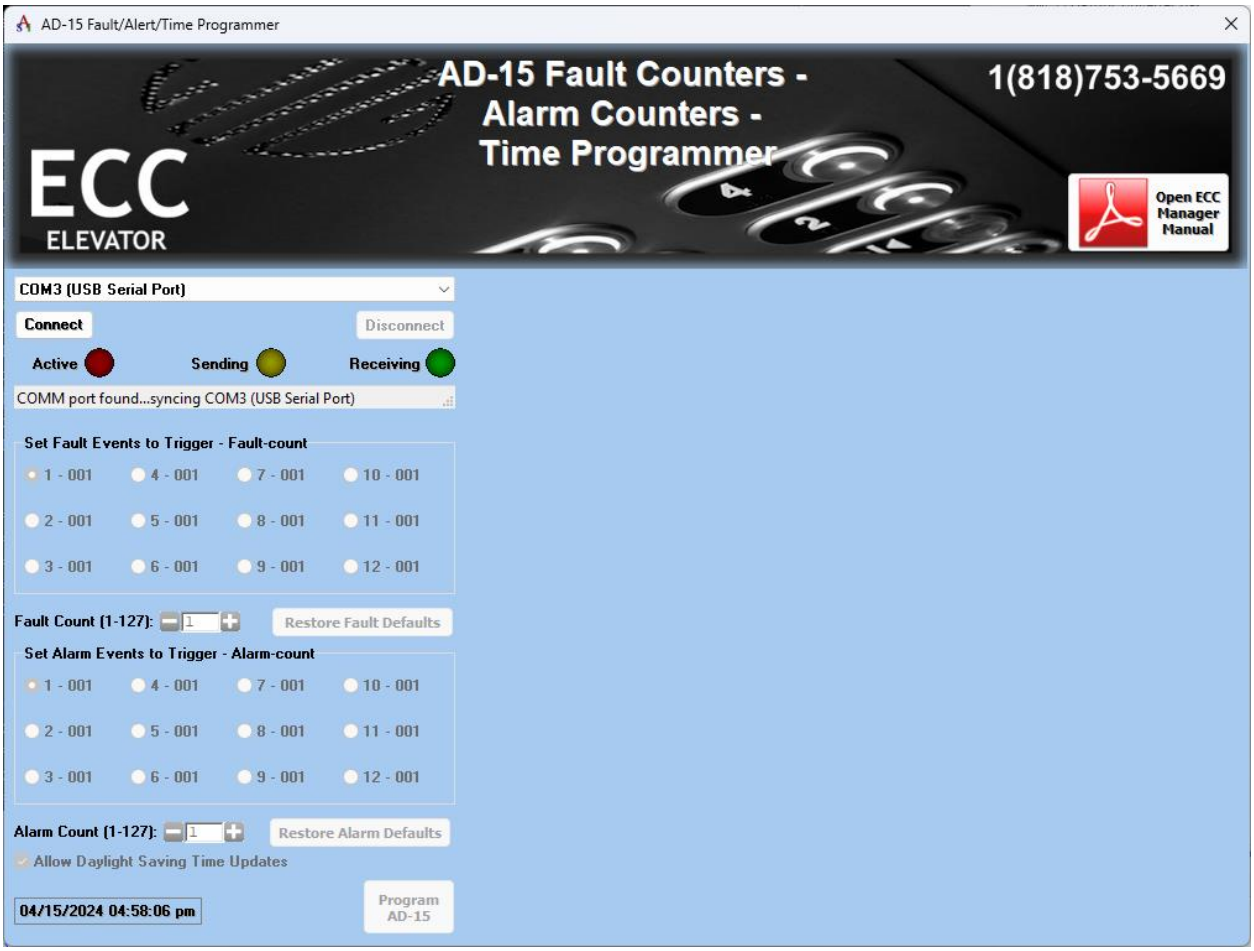
CHAIN B

Description	Byte Number	Value/Range
Header	01	170
PLState	02	21 – Daily Phone Line Verified Status
Present	03	0-1, 0 = Phone Line Present 1 = Phone Line Missing

HALL PI LINE TRANSMIT PACKET - DETAILED

Description	Byte Number	Value/Range
Header	01	**170**
CurFlr	02	**0-99, Current floor to display, 0=Lost PI**
StatusA	03	**Bits:** **8. 1=UP Travel Direction** **9. 1=DOWN Travel Direction** **10. 1=UP Arrival Direction** **11. 1=DOWN Arrival Direction** **12. 1=Gong Enabled** **13. 1=Future_B1** **14. 1=Future_B2** **15. Bit 7 – Always 0**
StatusB	04	**Bits:** **8. 1=Front Door is OPEN** **9. 1=Rear Door is OPEN** **10. 1=Fire Service Icon Active** **11. 1=Out of Service Icon Active** **12. 1=Hospital Icon Active** **13. Independent Service Icon Active** **14. Fire Service Icon Flashing** **15. Bit 7 – Always 0**
ClockD	05	**1-7, Day of the week, 1=Monday, 2=Tuesday, 3=Wednesday, 4=Thursday, 5=Friday, 6=Saturday, 7=Sunday**
ClockH	06	**0-23, 24 hour format; 0=12am, 1=1am, 12=12pm, 23=11pm, etc.**
ClockM	07	**0-59**
ArvFlr	08	**0-99, 0=Off, 1-99=Floor Arriving At, (Not Displayed), Controls Arrival Lantern/Gong**
Reserved 1	09	**0, N/A**
ChkSum	10	**Add all the data bytes, 02-09, and just use the last 8 bits of the result, i.e. for 0xBE8 it is 0xE8**

PROGRAMMING THE AD-15



The AD-15 can be programmed by connecting a PC (Windows 10 or higher) with an RS-485 cable. A USB to RS-422/485 cable (recommended DTech DT-5119) can be purchased to connect the AD-15 to the PC. Using the AD-15 Fault/Alarm/Time Programmer in **E.C.C. Manager HRZ**, available at www.ecc-man.com, lets you adjust how many instances of individual Fault/Alarm Input triggers are required to activate a specific Fault/Alarm (the defaults are 1). The programming interface is also used to program the unit with the current time and whether to adjust for Daylight Saving Time. The AD-15 will continue running with the programmed Fault Counts/Alarm Counts/Time until it loses power; the unit will need to be reprogrammed if it loses power.

TROUBLESHOOTING

NO POWER AFTER PROLONGED OUTAGE

When using the 6V SLA backup option, the battery may have been drained beyond usability. Try replacing the battery before calling service. When using the UPS option, some UPS systems will also let the internal batteries drain beyond the usable point; try replacing the internal batteries or the UPS altogether.

THE AD-15 PROGRAMMER FUNCTION SEEMS TO STICK

First click the Disconnect button to abort the program operation. Close the programmer screen, then the DL-20 Manager HRZ program. Shorten the connecting wires between the RS-485 cable output to the AD-15 input; typically about 4" length should work fine. Make sure you are using twisted wire cable to reduce potential noise.

AN INPUT DOESN'T SHOW ACTIVE

Make sure bare wire is in the opening and not the insulation around the wire. Make sure the input in connected to the correct input back; i.e. +24VDC only to the +24VDC input banks and 110vac/220vac only to the 110vac/220vac input banks. Make sure all the inputs to a bank are the same type; either all +24DC inputs, 110vac inputs, or 220vac inputs (DON'T mix types). Verify the input signal is active when it should be using a volt meter.

FIRE SERVICE DOESN'T TRIGGER OR TRIGGERS WRONG

If you only have one Fire Service trigger, connect it to both the FIRE SVC 1 and FIRE SVC 2 inputs. Make sure you have the DL20 and HallPI switches on the Controller DIP switch block set to the correct position; each switch is independent of the other with OFF connecting to FIRE SVC 1 and ON connecting to FIRE SVC 2.

THE DL-20 KEEPS SAYING LOST POSITION

Check the LostPI switch on the Controller DIP switch block; the default of OFF makes the AD-15 keep the last PI until a new PI is signaled, while ON send the Lost Position signal if there is more than half a second delay between new floor indications.

INCORRECT SIGNALING OF EXTENSION INPUTS

Make sure that each Extension unit has a "unique" extension number on the individual Extension units; i.e. you can't have two units set as extension 1, etc. Make sure ONLY the Controller unit and the last Extension unit in the physical chain have the EOL jumper set to the EOL position.

THE EXTENSION INPUTS WORK, BUT NOT SHOWN

Make sure the ExtSel switch on ALL Extension units is set to the ON position.

EVERYTHING SEEMS TO BE WORKING, BUT NO COMMUNICATIONS

Make sure the DL-20/Hall PI cable is connected ONLY to the AD-15 Controller unit RJ-45 Output; this single output can be chained to a DL-20 and multiple Hall PI units using an RJ-45 splitter.

THE HALL PIS WON'T GONG

Make sure the GongEn switch on the Controller DIP switch block is set to ON. Make sure the Hall PI units have the correct programming in their setup.

CUSTOMER SUPPORT

All operation or technical questions should be directed to the Customer Support Center at **(818) 753-5669**, between 8:00 a.m. and 5:00 p.m. Pacific time. **Before calling the Customer Support Center**, we request that you have your AD-15 PCB serial number and site serial number.

If trouble is experienced with the AD-15, for repairs or warranty information, please contact E.C.C., located at: **16521 SATICOY ST, Van Nuys, CA 91406, (818) 753-5669 in the U.S.A.**

No repairs to the AD-15 should be made by the customer (user). All repairs MUST be made by the manufacturer or authorized repair facility. Call E.C.C. for repair information at **(818) 753-5669**.

LIMITED ONE YEAR PARTS & LABOR WARRANTY

This E.C.C. PRODUCT is warranted against defects for a period of one (1) year from the date of the original invoice. Within this period, we will repair it without charge for parts and labor. To obtain warranty service the product must be returned, at the customer's expense, to E.C.C. along with a copy of the original invoice. After the unit has been repaired, E.C.C. will ship the PRODUCT back via UPS GROUND service at our expense. If any other form of return shipment is requested, the customer will pay for 100% of the shipping cost.

This Warranty does not apply if in the sole opinion of E.C.C., the PRODUCT has been damaged by lightning, or any other Acts of God, or by accident, misuse, neglect, improper location (high dust or tobacco smoke prone areas), improper packing, shipping, modification, or servicing by other than an authorized E.C.C. Service Center.

Except as specifically provided in this agreement, there are no other warranties, expressed or implied, including, but not limited to, any implied warranties or merchantabilities or fitness for a particular purpose and in no event shall E.C.C be liable for loss of profits or benefits, indirect, special, consequential, or other similar damages arising out of any breach of this warranty or otherwise.