Legacy RTU Retrofit Solutions

Using the Orion Automation Platform and Orion I/O

January 2021 Update
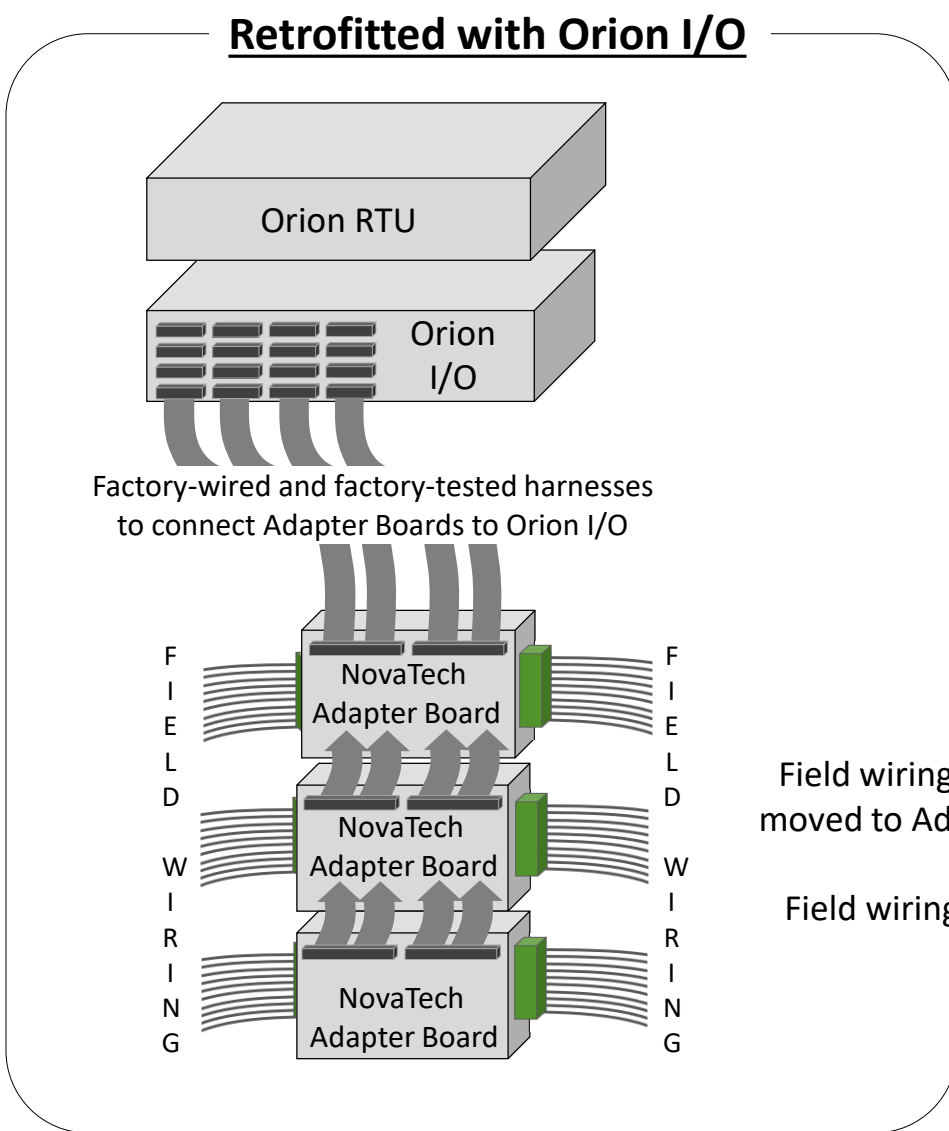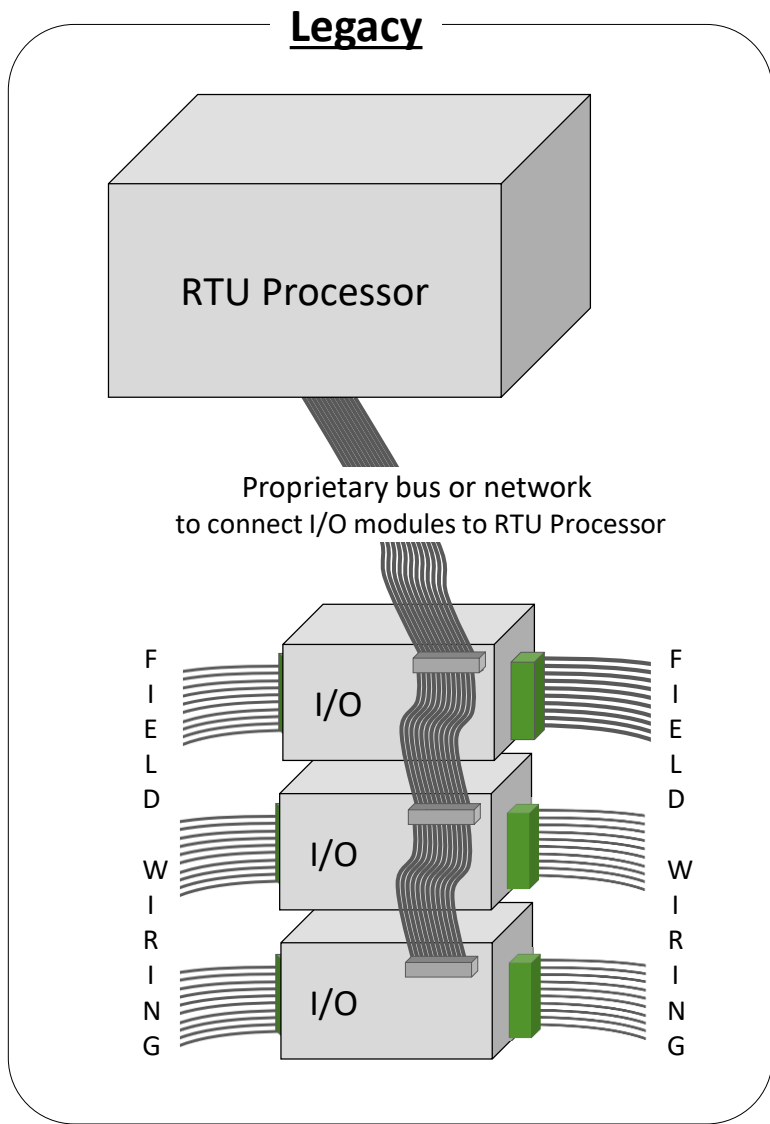
Legacy RTU Retrofits

- [Legacy Retrofit Concept](#)

- [Telvent Retrofits](#)

- [Siemen Telegyr TG5300/TG5700 Retrofits](#)

- [Systems Northwest (SNW) Retrofits](#)

- [ACS Retrofits](#)

- [D20/D200 Retrofits](#)

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Legacy RTU Retrofit Concept Using Adapter Boards

Legacy

RTU Processor

Proprietary bus or network
to connect I/O modules to RTU Processor

I/O

I/O

I/O

F I E L D   W I R I N G

F I E L D   W I R I N G

Retrofitted with Orion I/O

Orion RTU

Orion I/O

Factory-wired and factory-tested harnesses
to connect Adapter Boards to Orion I/O

NovaTech Adapter Board

NovaTech Adapter Board

NovaTech Adapter Board

F I E L D   W I R I N G

F I E L D   W I R I N G

Field wiring connectors
moved to Adapter Boards.

Field wiring untouched

NovaTech

Telvent Retrofits

Telvent Retrofit: C3232 Discrete Input Card

Legacy Telvent Input Card

NovaTech Adapter Board

Field Wiring Connectors

Field Wiring Connectors
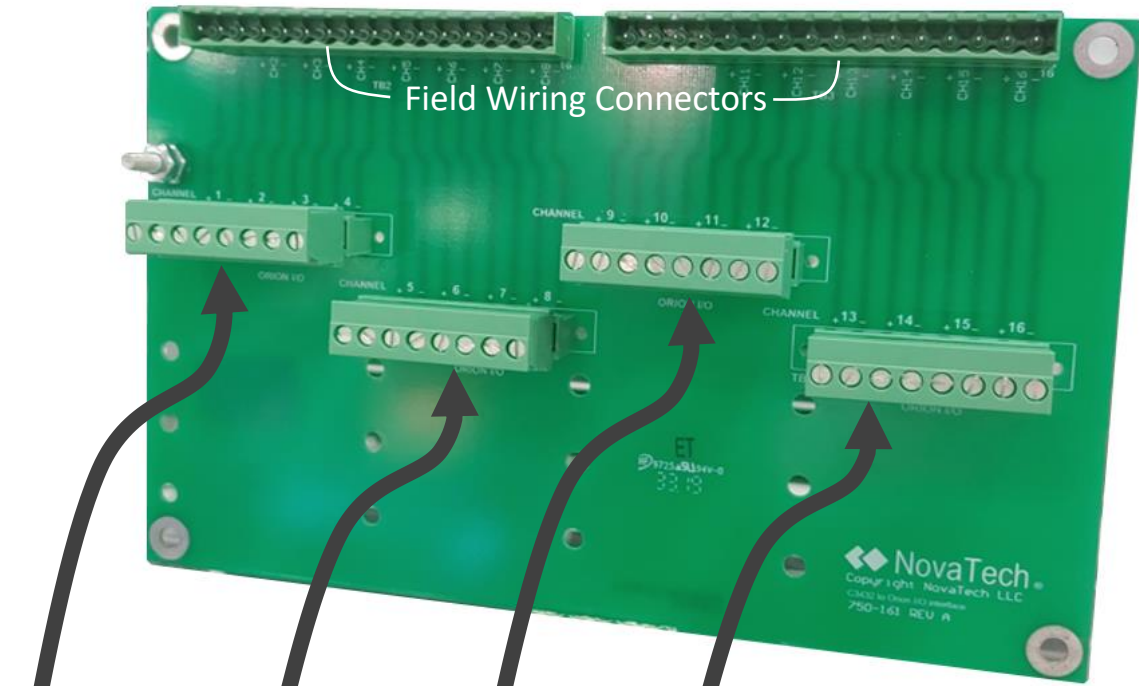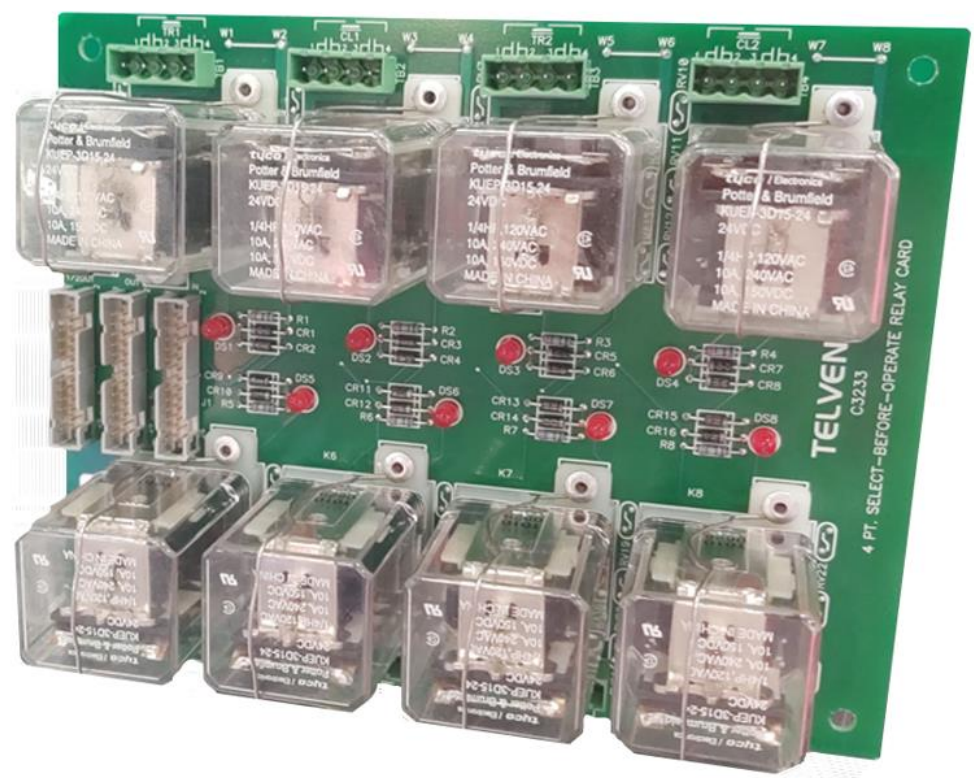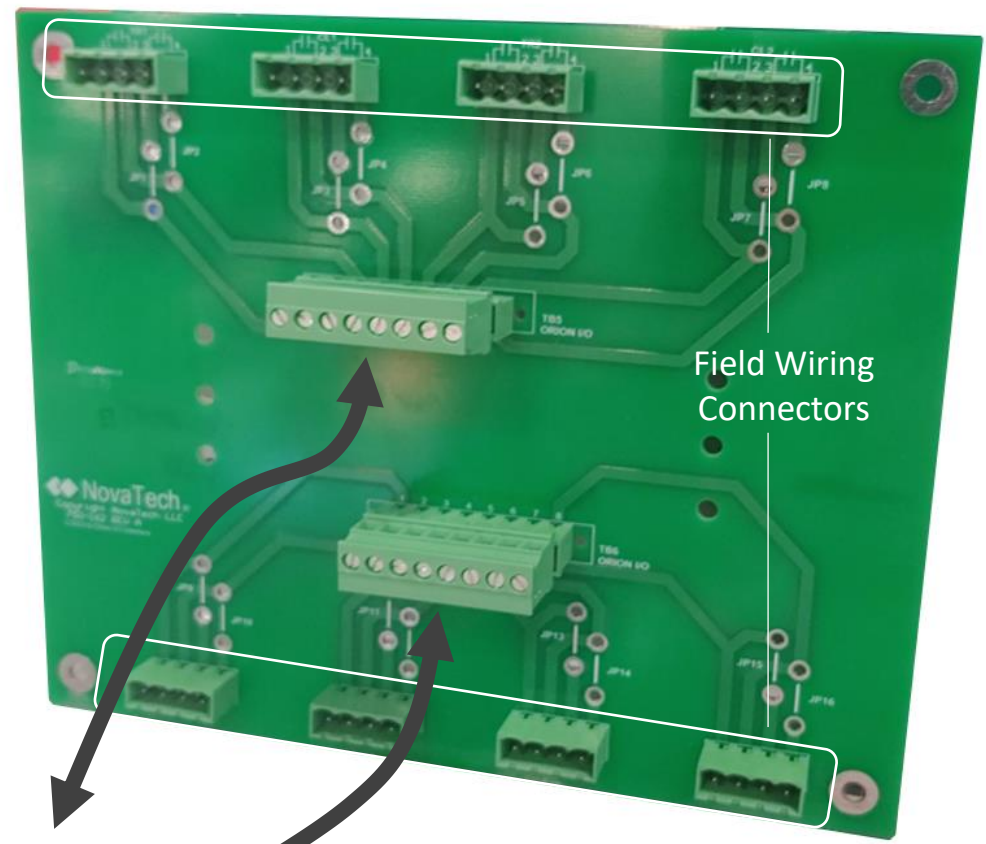
Wire harnesses to Orion I/O Input Card

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Telvent Retrofit: C3233 Output Card

Legacy Telvent Output Card
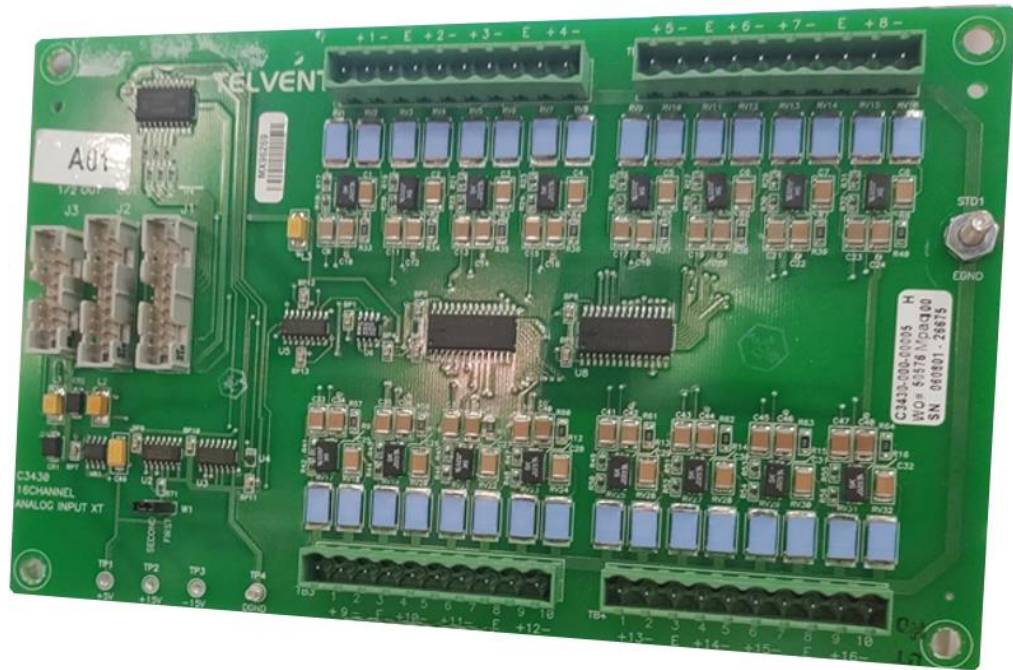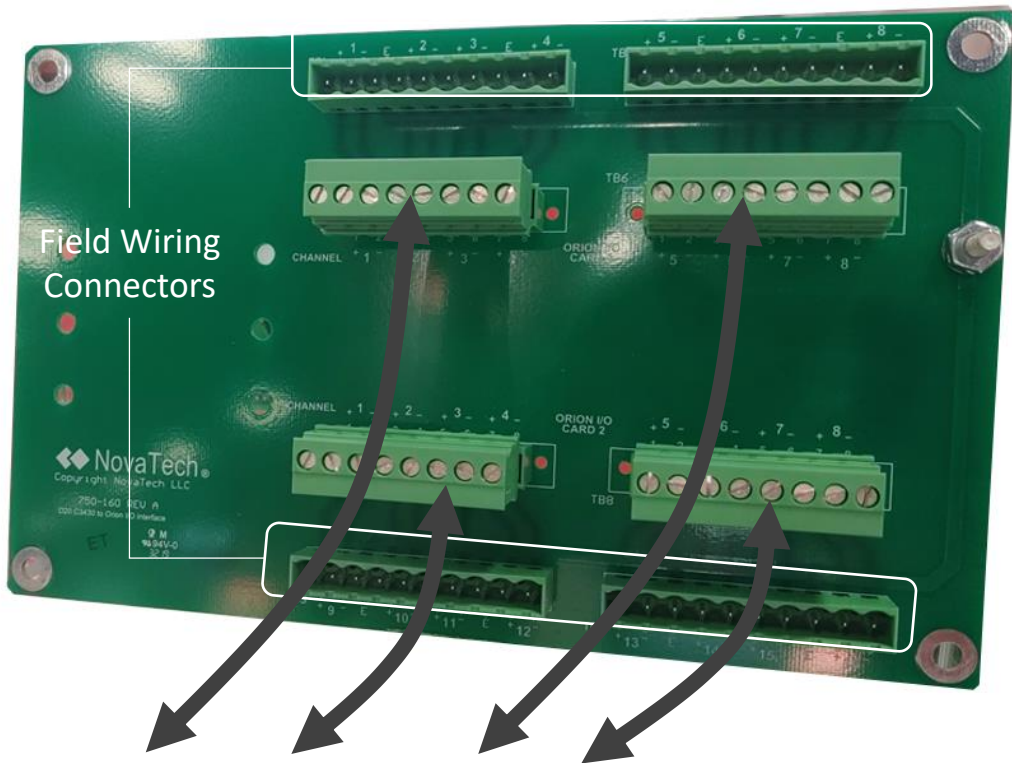
NovaTech Adapter Board

Field Wiring Connectors

Wire harnesses to Orion I/O
High Power Output Card (HPO)

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Telvent Retrofit: C3430 Analog Input Card

Legacy Telvent Analog Input Card

NovaTech Adapter Board

Field Wiring
Connectors

Wire harnesses to
Orion I/O Analog Input Card

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Siemens Telegyr TG5300/TG5700 Retrofits
(Landis & Gyr)

NovaTech Retrofit Solution for Siemens Telegyr TG5700

Outputs Retrofit Solution
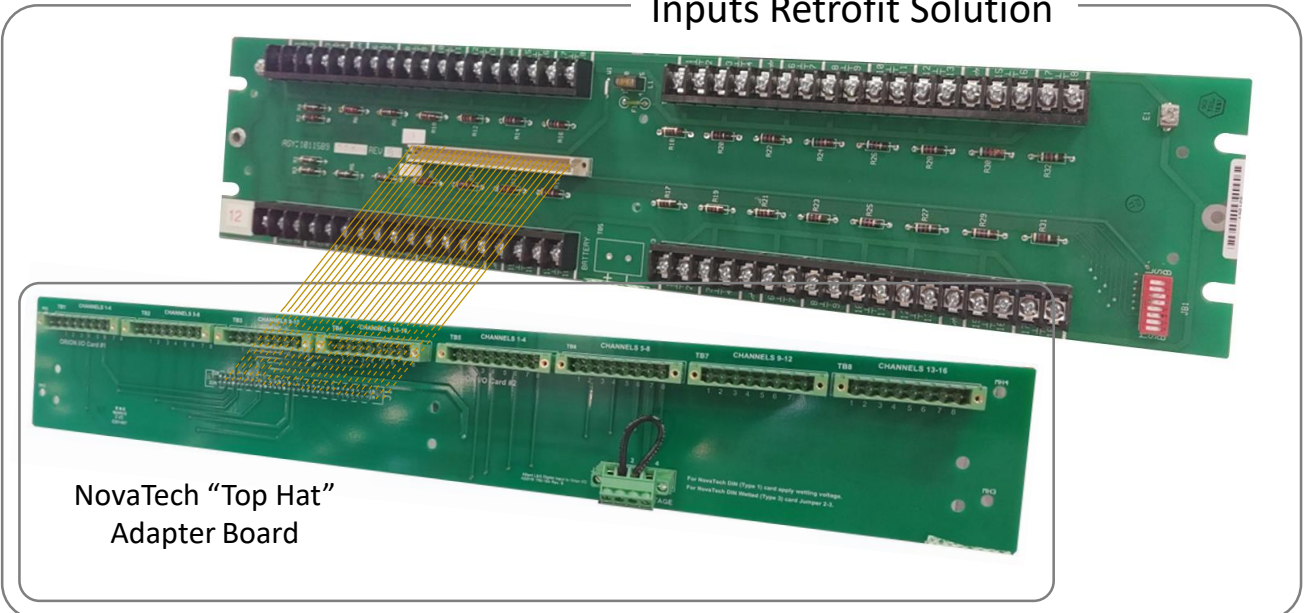
NovaTech Adapter Board

Telegyr 5700
Output Module
and
Input Module
installed in substation panel

Inputs Retrofit Solution

NovaTech "Top Hat"
Adapter Board
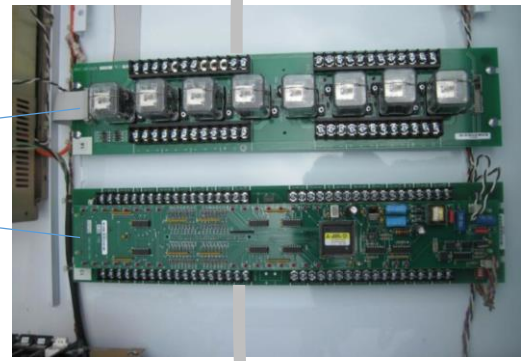
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NovaTech Adapter Board for Telegyr TG5700 8-point Output Module

To Orion I/O
16 DO Card

NovaTech
Adapter
Board

To Orion I/O
16 DO Card

Field Wiring Connectors
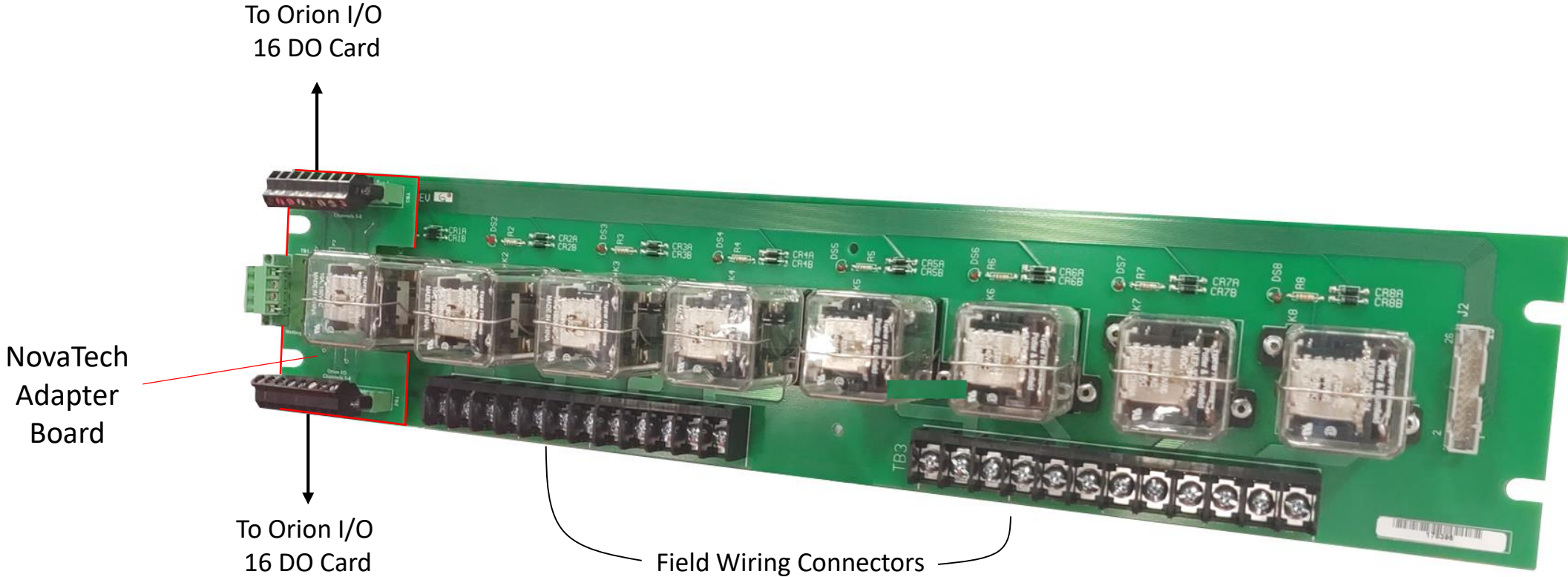
NovaTech "Top Hat" Adapter Board for Telegyr TG5700 32-point Input Module
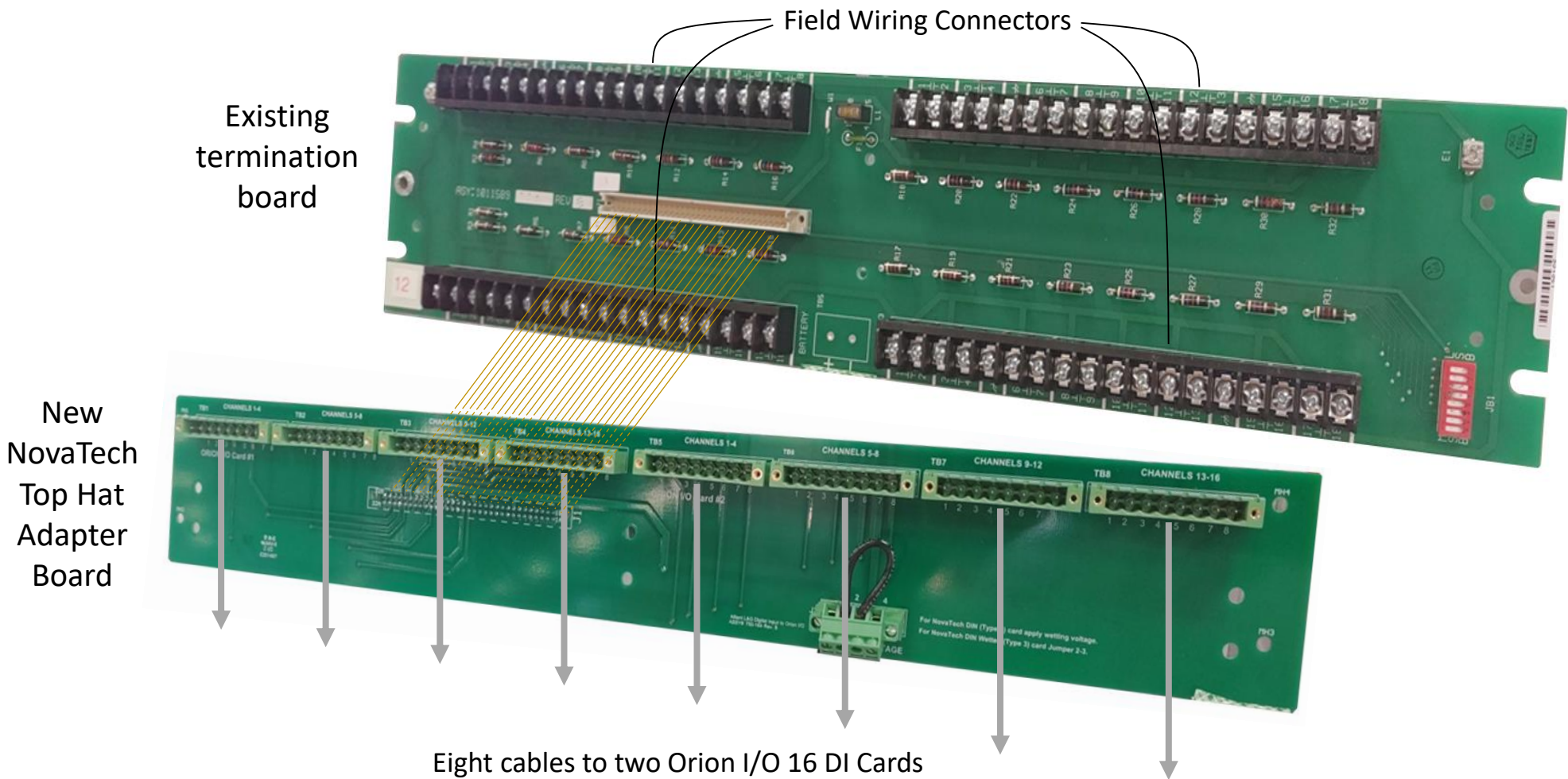
Field Wiring Connectors

Existing termination board

New NovaTech Top Hat Adapter Board

Eight cables to two Orion I/O 16 DI Cards

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NovaTech "Top Hat" Adapter Board for Telegyr TG5300 32-point Input Module

Eight cables to two Orion I/O 16 DI Cards

Top Hat Adapter Board

Telegyr TG5300
32-point Input Module

Field Wiring Connectors

Assembled
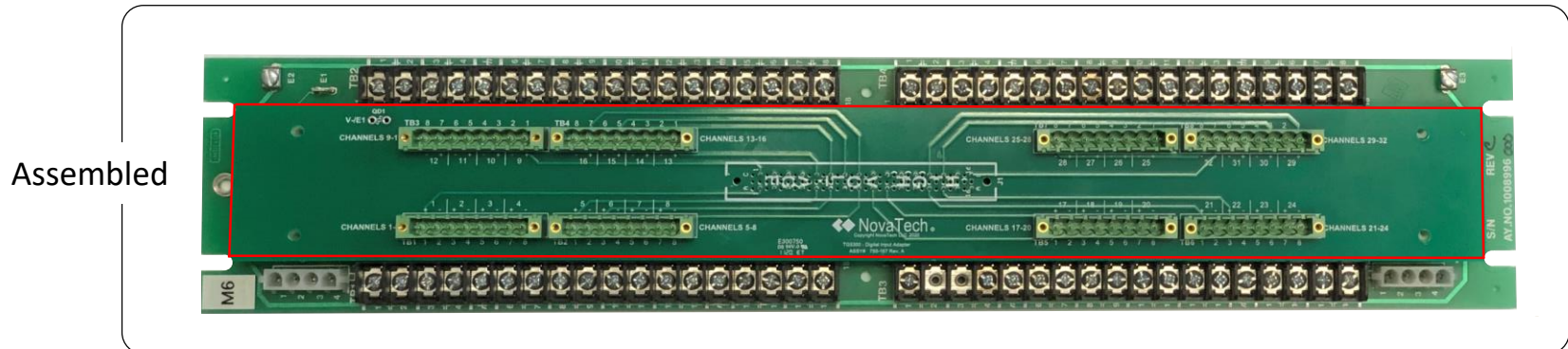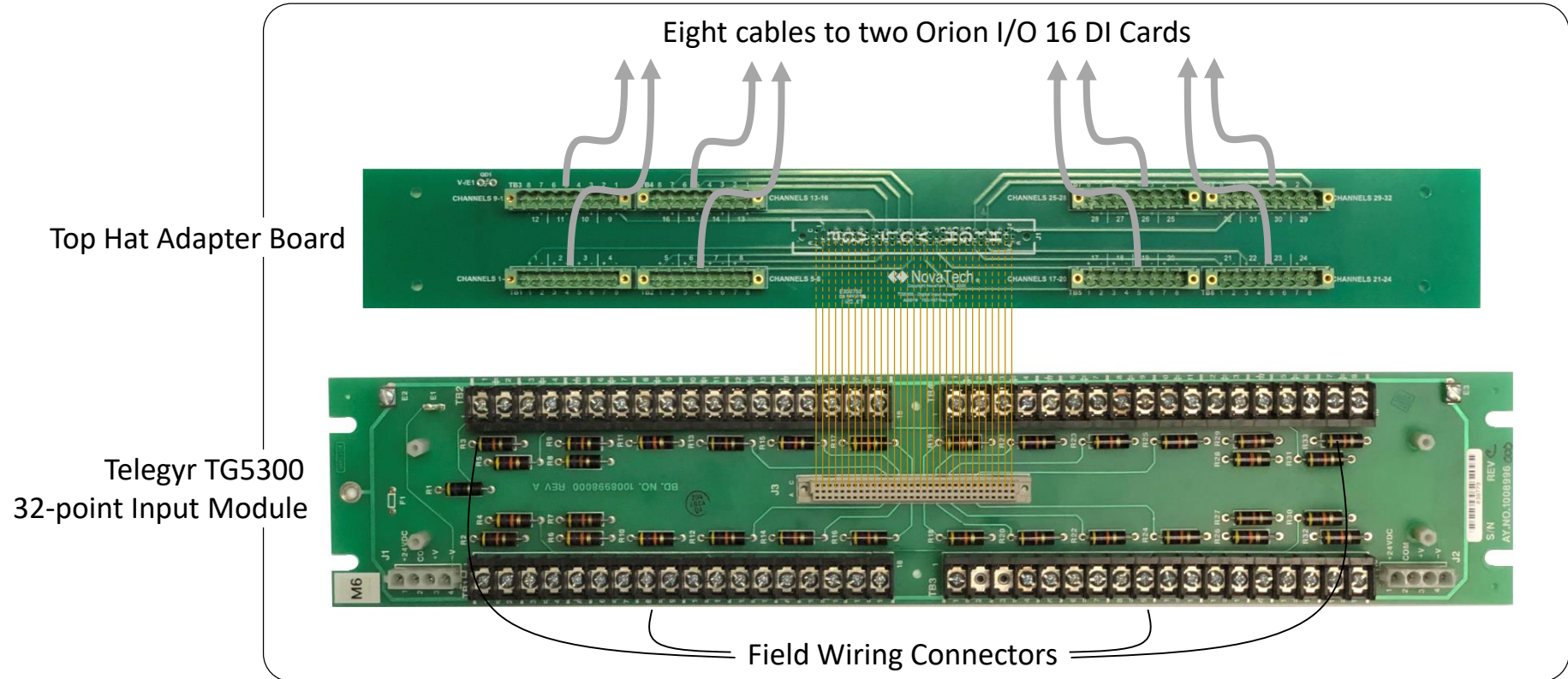
NovaTech Adapter Board for Telegyr TG5300 8-point Output Module

To Orion I/O 16 DO Card

NovaTech Adapter Board

Field Wiring Connectors
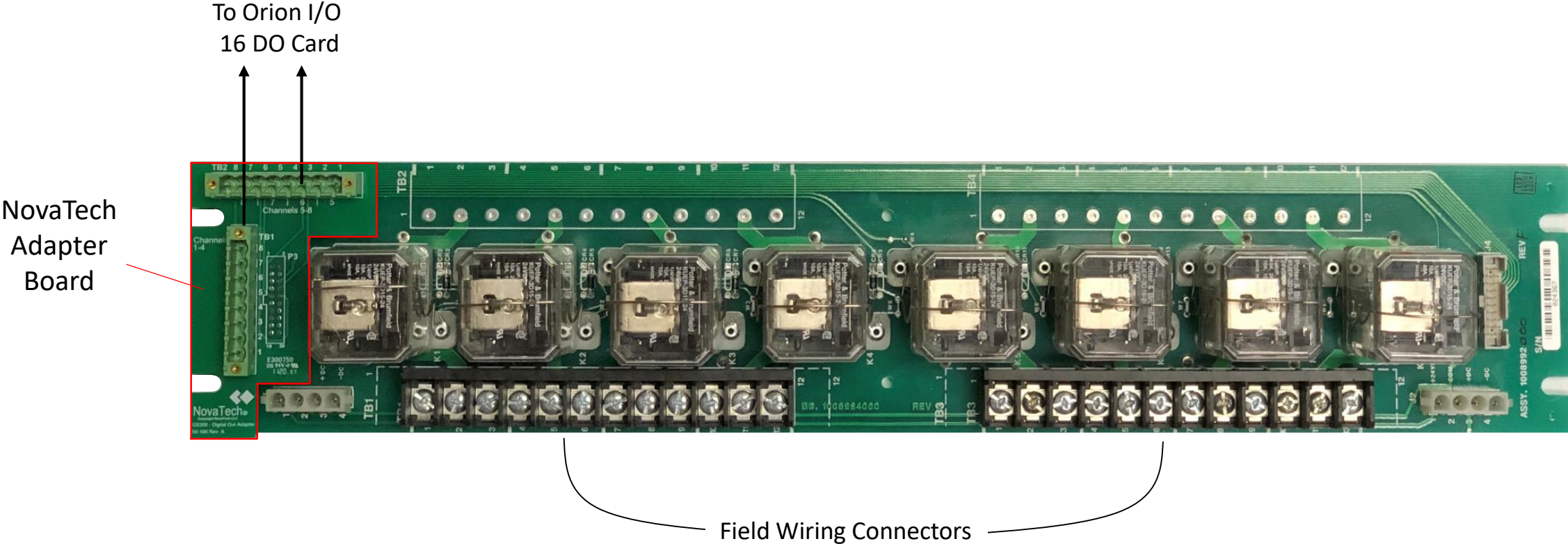
For Telegyr TG5300/TG5700 24-point Analog Input Module

Field Wiring Connectors

New baseboard Adapter Board

Six cables to three Orion I/O 8 AI Cards
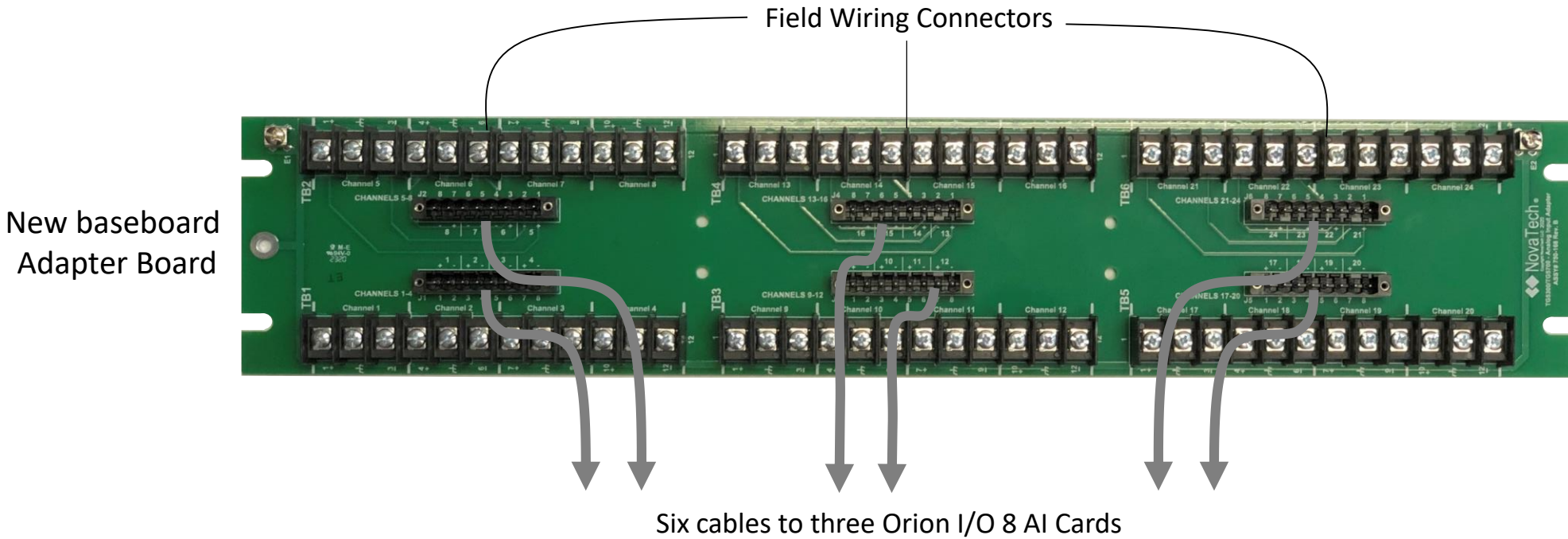
NovaTech®

Example Telegyr 5700 Configurations: 96 DI, 32 DO
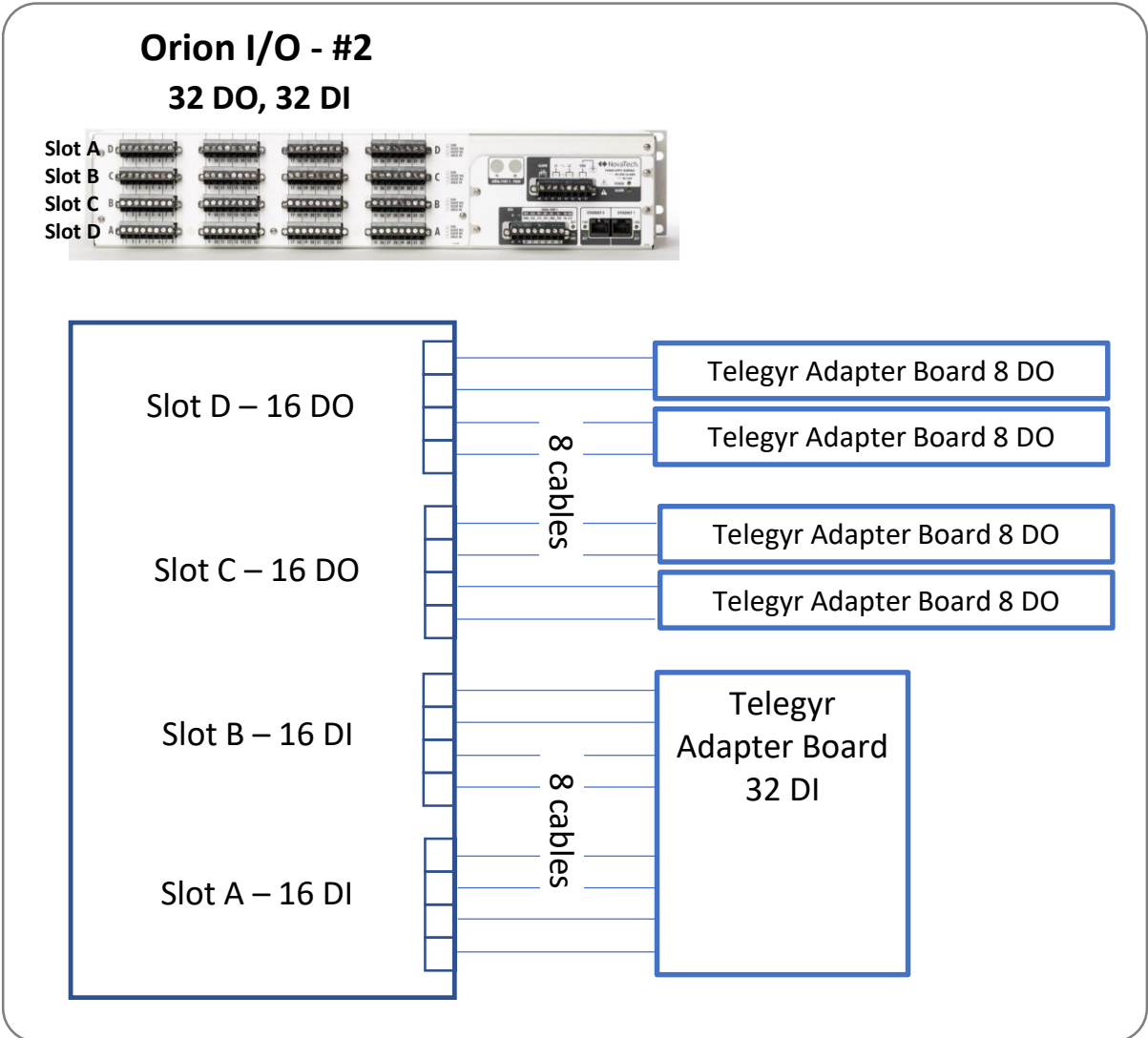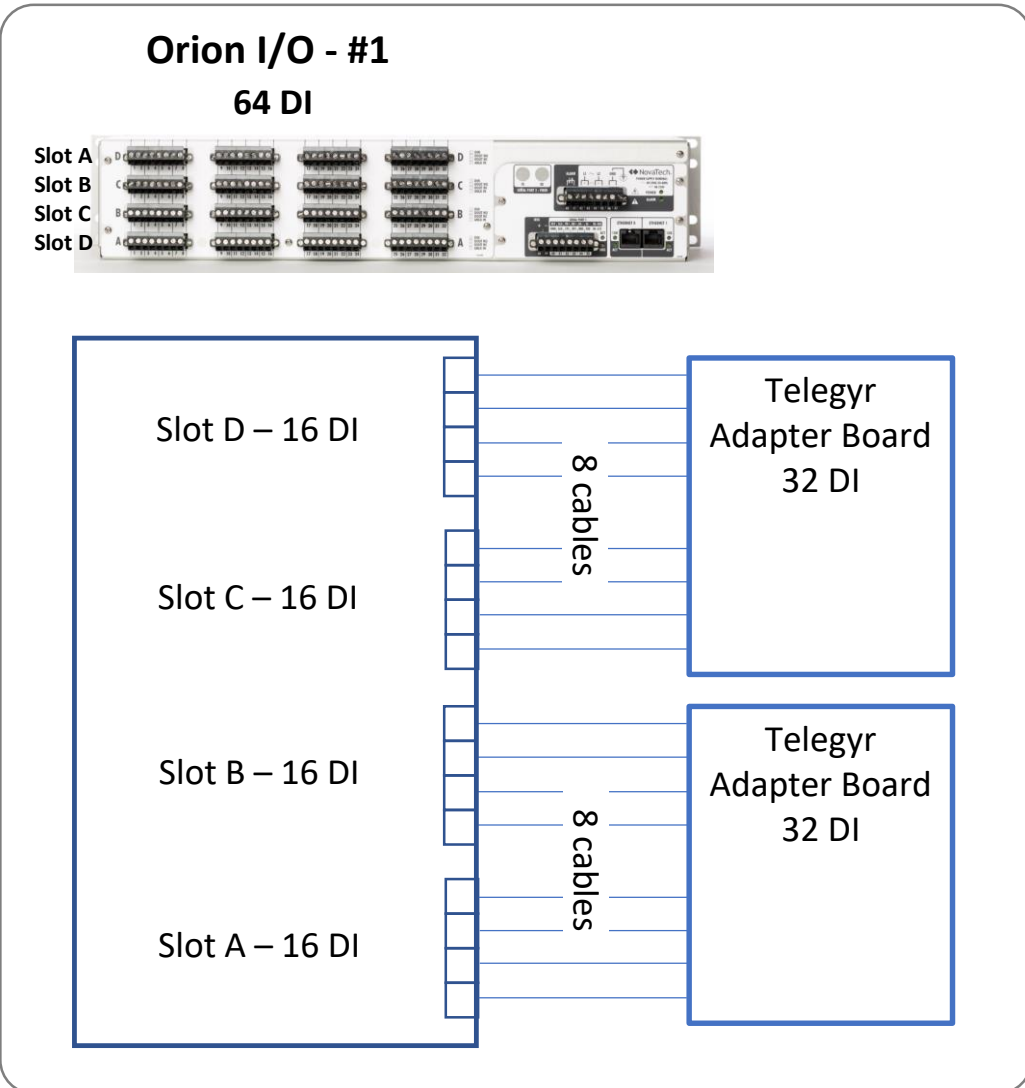
Orion I/O - #1

64 DI

Slot A
Slot B
Slot C
Slot D

Slot D – 16 DI

Slot C – 16 DI

8 cables

Telegyr
Adapter Board
32 DI

Slot B – 16 DI

Slot A – 16 DI

8 cables

Telegyr
Adapter Board
32 DI

Orion I/O - #2

32 DO, 32 DI

Slot A
Slot B
Slot C
Slot D

Slot D – 16 DO

Slot C – 16 DO

8 cables

Telegyr Adapter Board 8 DO

Telegyr Adapter Board 8 DO

Telegyr Adapter Board 8 DO

Telegyr Adapter Board 8 DO

Slot B – 16 DI

Slot A – 16 DI

8 cables

Telegyr
Adapter Board
32 DI

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Systems Northwest (SNW) Retrofits

Systems Northwest Retrofit (SNW) Solution

Retrofitted SNW RTU with Orion Adapter Boards
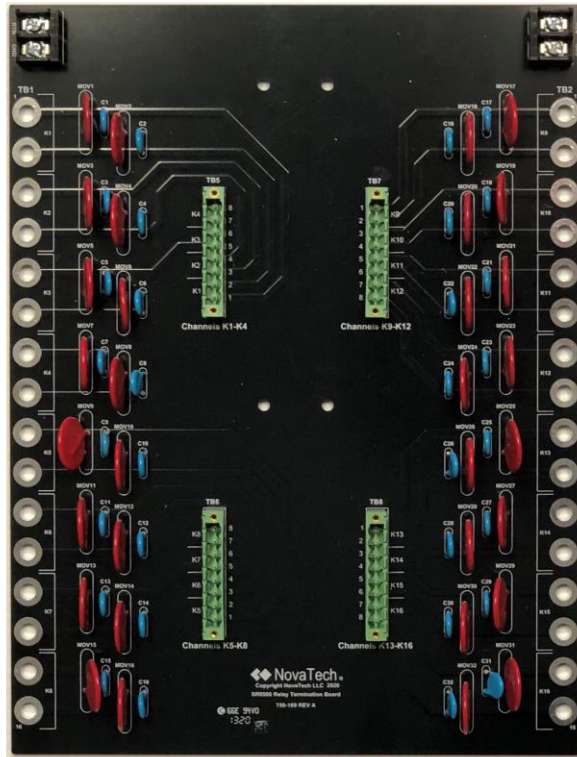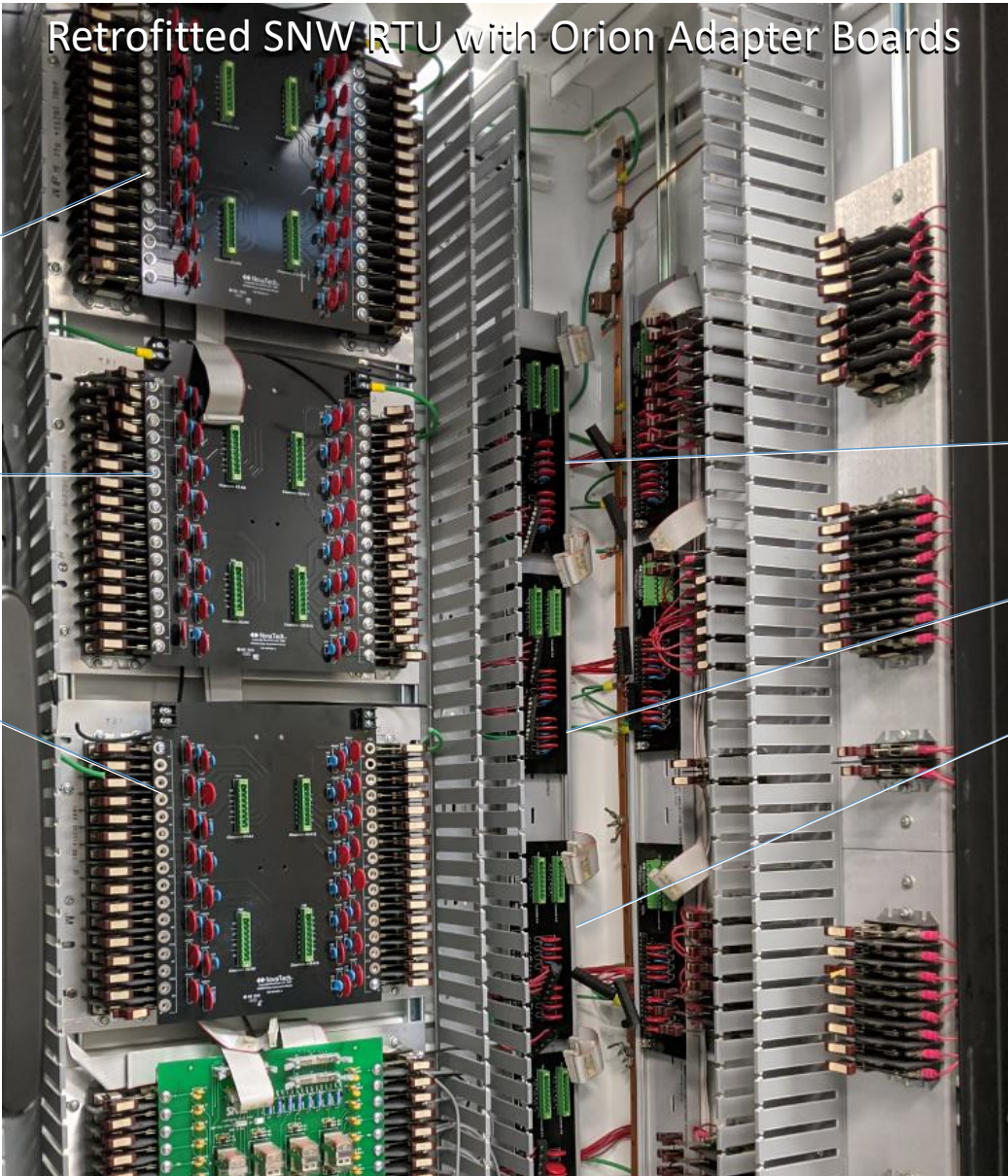
Output Adapter Board
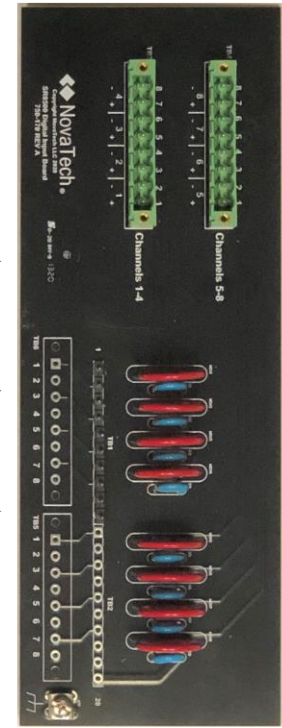
Input Adapter Board

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NovaTech SNW Adapter Board to Replace Interposing Relays

Adapter Board

Legacy
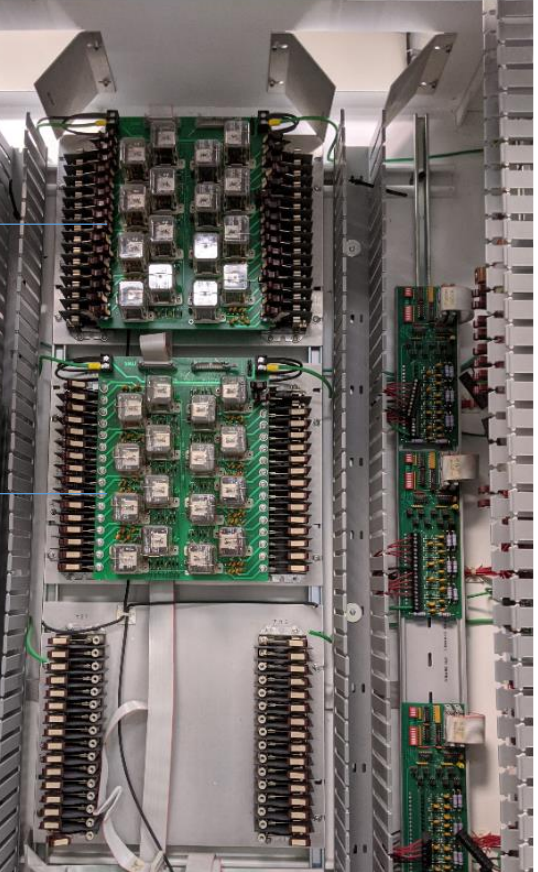
Retrofitted

Legacy 16-point interposing relay output cards

Interface Board

Interface Board

Interface Board
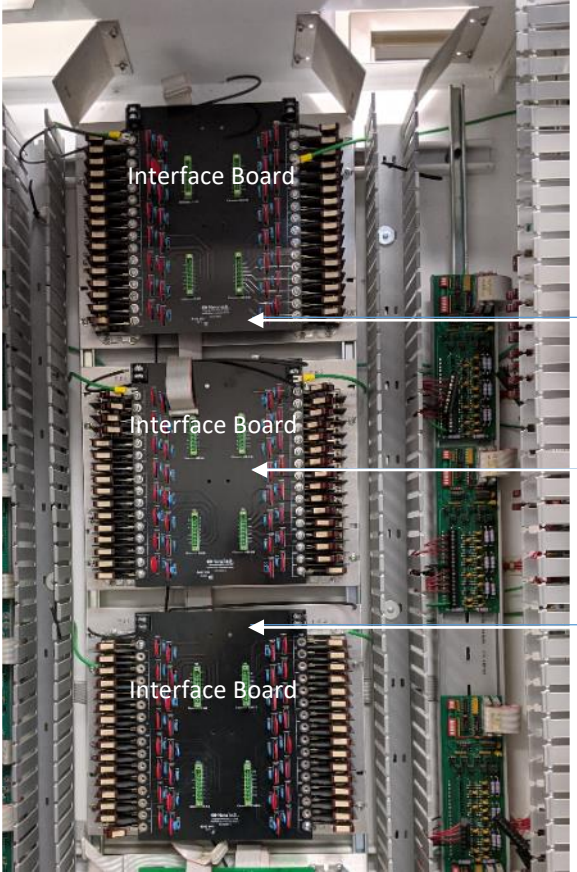
New NovaTech Adapter Boards screwed into place.

Pre-wired cables
to Orion I/O Output HPO Card
(on Combination 8 DI / 8 HPO Card)

- Field wiring (behind card) remains untouched

- Isolation knife switches remain

- Orion HPO (High Power Output) replaces interposing output relays
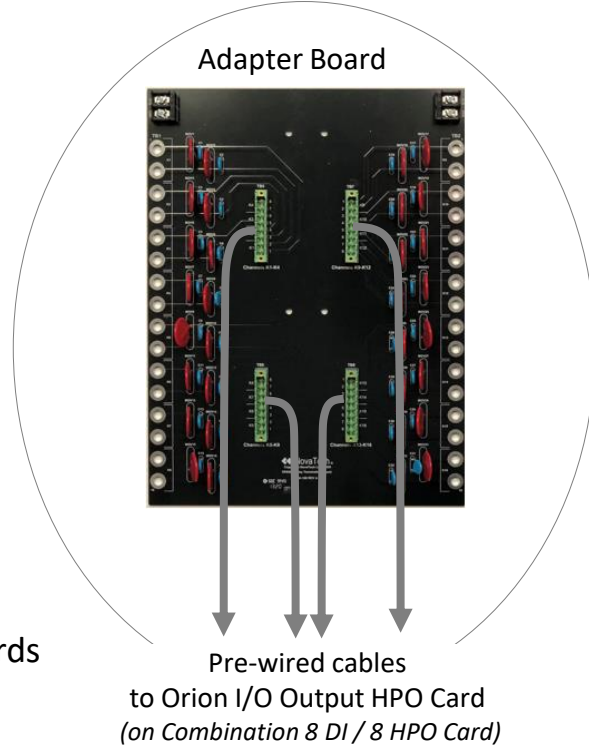
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NovaTech SNW Adapter Board to Replace Discrete Input Cards

New NovaTech Adapter Board

Field wiring

Legacy Discrete Input Card

Adapter Board

Field wiring

Pre-wired cables
to Orion I/O Input Card
(on Combination 8 DI / 8 HPO Card)

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ACS Retrofits

Panel Concept with Adapter Boards for ACS 7530 Retrofit

Top Adapter Board

Top Adapter Board matches ACS I/O connectors and connects to field wiring

Orion RTU

Wire trough

Wire trough

Wire trough

Wire trough

Wire trough

Panel Front

Orion RTU

Panel Rear

Factory pre-wired wire harnesses between Orion I/O and Bottom Adapter Board

Bottom Adapter Board

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Vin(+)
Vin(−)
GND

ANALOG IN D | Term. Block #13 | Term. Block #14 | Term. Block #15 | Term. Block #16 | D
DIGITAL OUT C | Term. Block #9 | Term. Block #10 | Term. Block #11 | Term. Block #12 | C
DIGITAL IN B | Term. Block #5 | Term. Block #6 | Term. Block #7 | Term. Block #8 | B
DIGITAL IN A | Term. Block #1 | Term. Block #2 | Term. Block #3 | Term. Block #4 | A

Orion I/O

D
ANALOG INPUTS

1 2 3 4 5 6 7 8 | 9 10 11 12 13 14 15 16 | 17 18 19 20 21 22 23 24 | 25 26 27 28 29 30 31 32

Wire harness to Terminal Block #13 | Wire harness to Terminal Block #14 | Wire harness to Terminal Block #15 | Wire harness to Terminal Block #16

From P2
Adapter Board

C
DIGITAL OUTPUTS

1 2 3 4 5 6 7 8 | 9 10 11 12 13 14 15 16 | 17 18 19 20 21 22 23 24 | 25 26 27 28 29 30 31 32

Wire harness to Terminal Block #9 | Wire harness to Terminal Block #10 | Wire harness to Terminal Block #11 | Wire harness to Terminal Block #12

From P3
Adapter Board
(from eight terminals into four terminals)

Pre-wired harnesses from Adapter Boards to Orion I/O
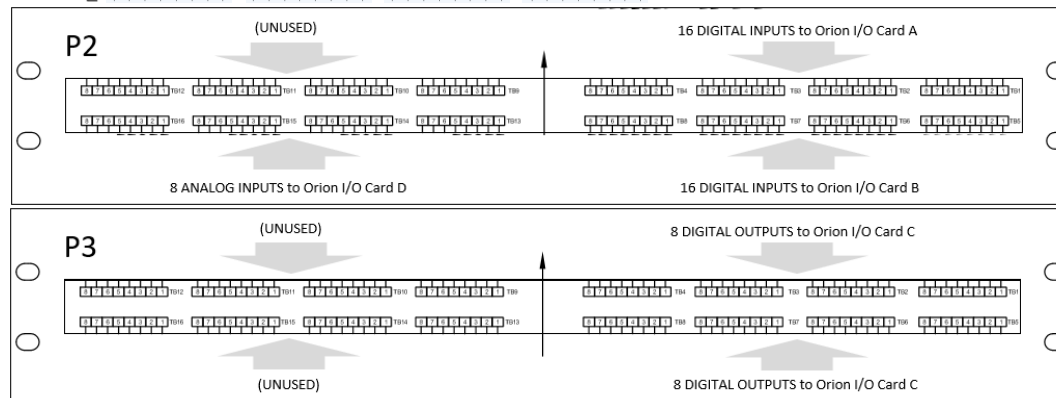
B
DIGITAL INPUTS

1 2 3 4 5 6 7 8 | 9 10 11 12 13 14 15 16 | 17 18 19 20 21 22 23 24 | 25 26 27 28 29 30 31 32

Wire harness to Terminal Block #5 | Wire harness to Terminal Block #7 | Wire harness to Terminal Block #8 | Wire harness to Terminal Block #9

From P2
Adapter Board

A
DIGITAL INPUTS

1 2 3 4 5 6 7 8 | 9 10 11 12 13 14 15 16 | 17 18 19 20 21 22 23 24 | 25 26 27 28 29 30 31 32

Wire harness to Terminal Block #1 | Wire harness to Terminal Block #2 | Wire harness to Terminal Block #3 | Wire harness to Terminal Block #4

From P2
Adapter Board

P2
(UNUSED)
16 DIGITAL INPUTS to Orion I/O Card A
8 ANALOG INPUTS to Orion I/O Card D
16 DIGITAL INPUTS to Orion I/O Card B

Adapter Boards

P3
(UNUSED)
8 DIGITAL OUTPUTS to Orion I/O Card C
(UNUSED)
8 DIGITAL OUTPUTS to Orion I/O Card C

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D20/D200 Retrofits

D20 I/O Retrofit

- Uses the high-density Orion I/O modules factory wired with D20-Style connectors

- Available for:
  - D20A   32 AI
  - D20S   64 DI
  - D20K   32 DO TRIP/CLOSE
  - D20C   Combination: 16 DI, 16 DO (8 TRIP/CLOSE) and 16 AI

- The Orion I/O retrofit solution uses the same 3RU panel space as the D20 modules.

- For both 19" rack mount applications and surface mount applications.
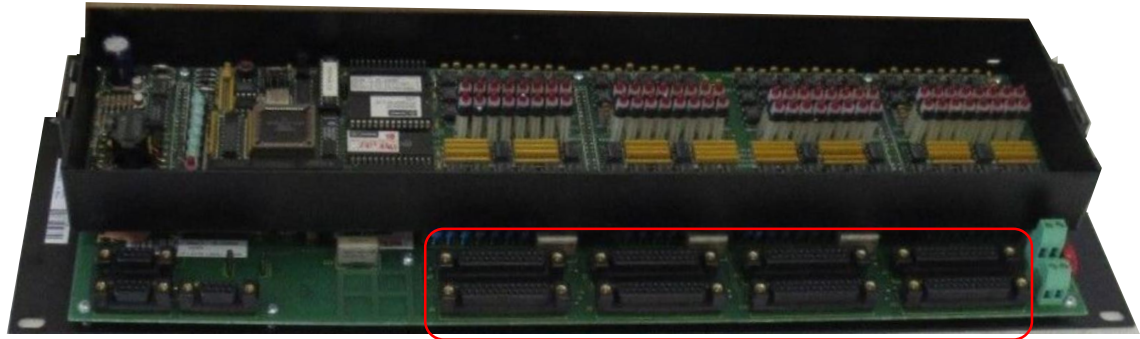
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Example: D20 Modules with DB25 Connectors

D20AD 32 AI
with (4) DB25F connectors
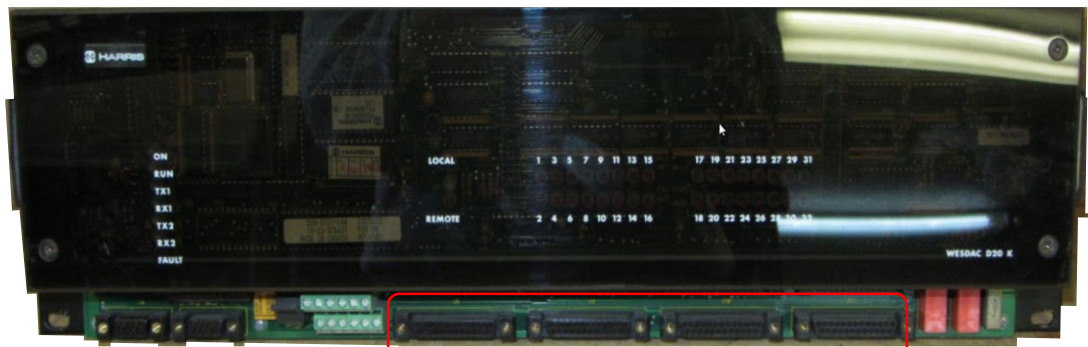
D20KR 32 DO
with (4) DB25F connectors

D20SD 64 DI
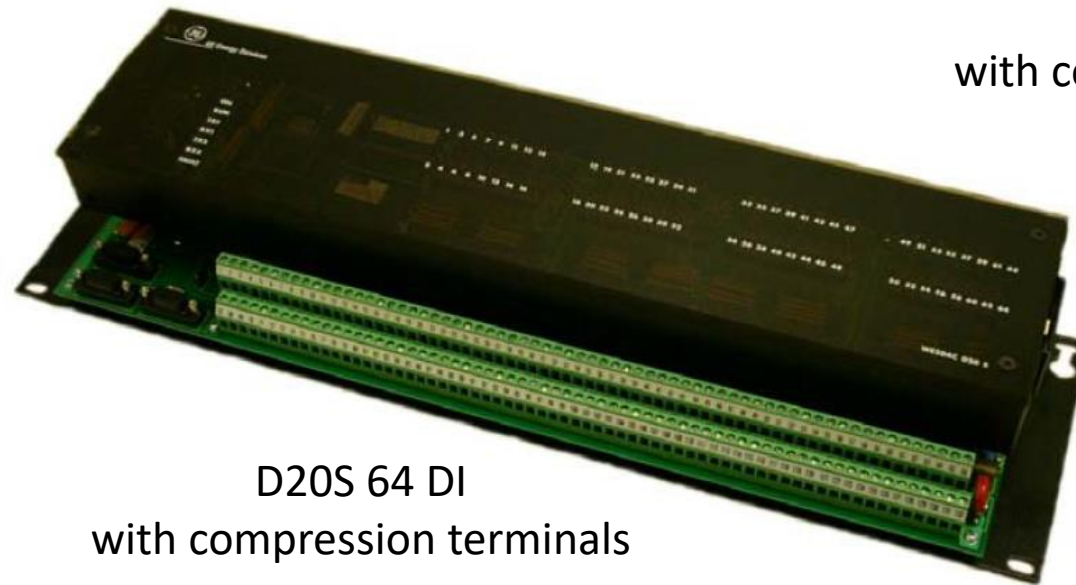with (8) DB25F connectors

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Example: D20 Modules with Compression Terminals (removable or non-removable)
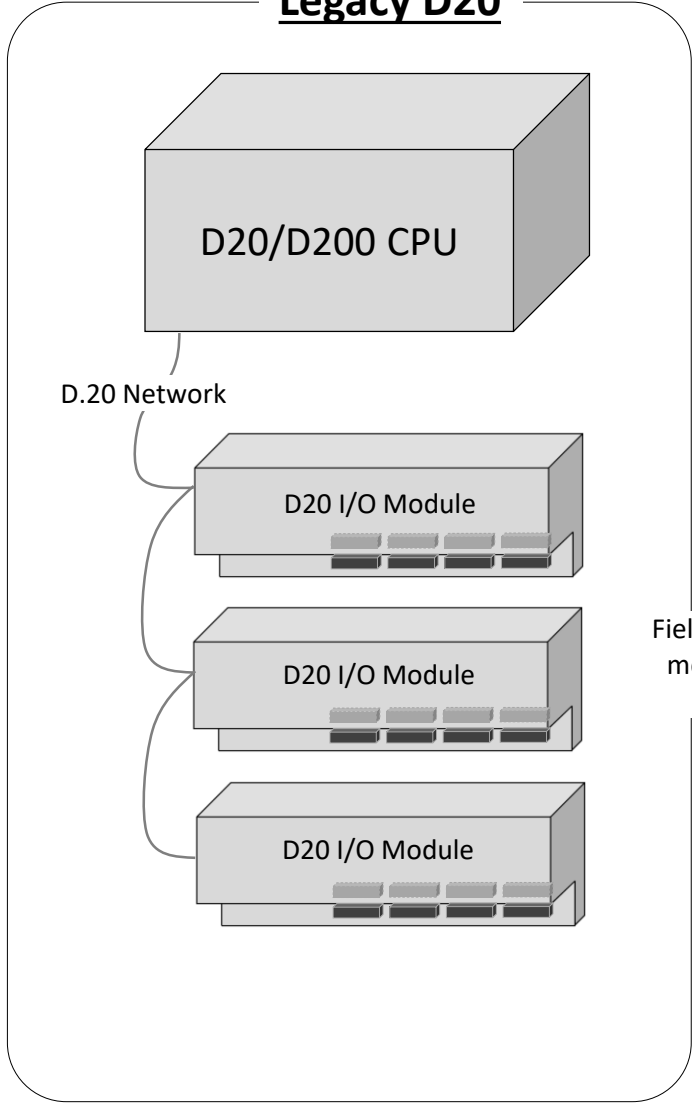

D20A 32 AI
with compression terminals

D20K 32 DO
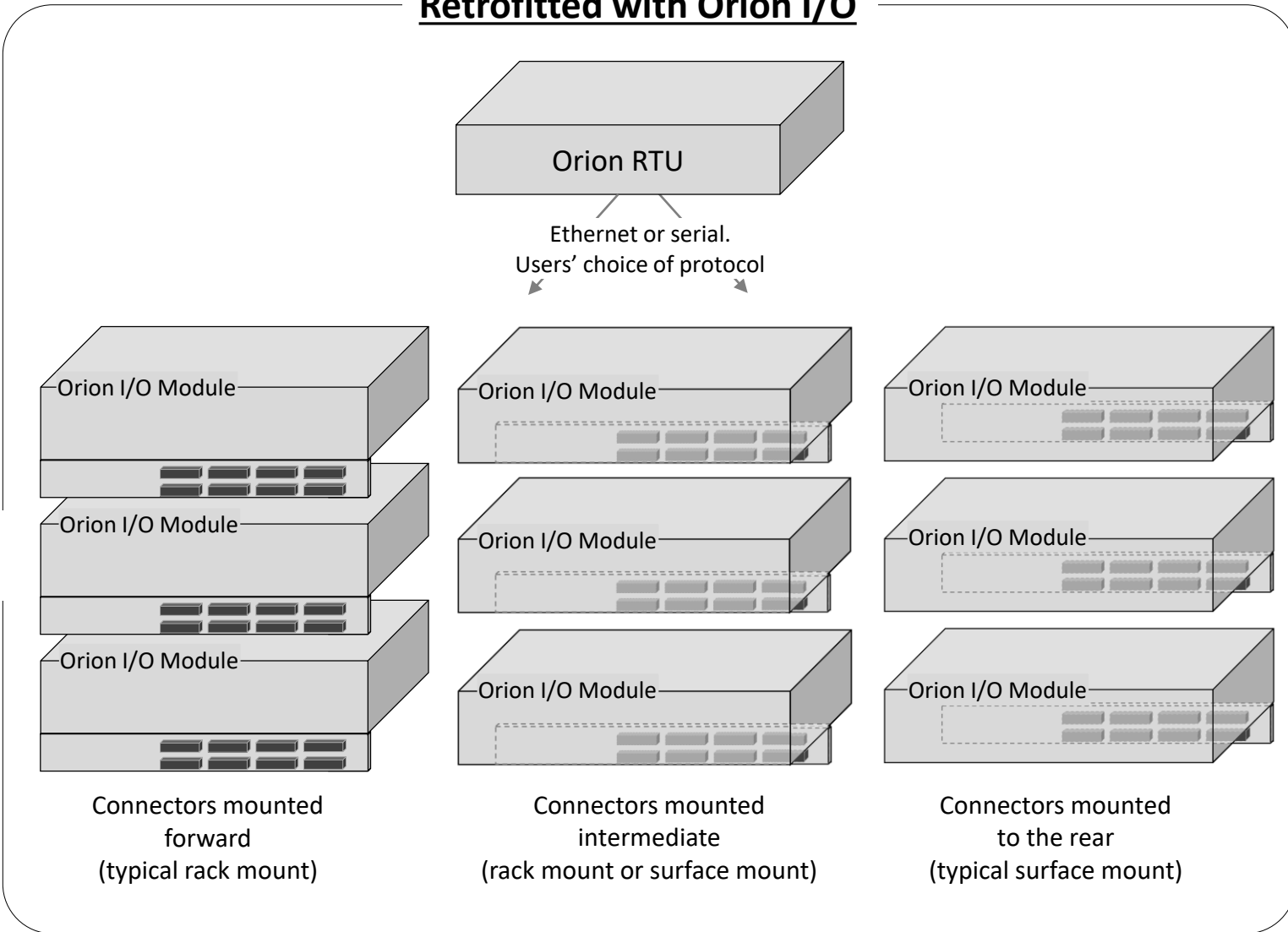with compression terminals

D20S 64 DI
with compression terminals

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D20 RTU Retrofit Concept

Legacy D20

D20/D200 CPU

D.20 Network

D20 I/O Module

D20 I/O Module

D20 I/O Module

Field wiring connectors moved from D20 I/O to Orion I/O

Retrofitted with Orion I/O

Orion RTU

Ethernet or serial.
Users' choice of protocol

Orion I/O Module

Orion I/O Module

Orion I/O Module

Orion I/O Module

Orion I/O Module

Orion I/O Module

Orion I/O Module

Orion I/O Module

Orion I/O Module

Connectors mounted
forward
(typical rack mount)

Connectors mounted
intermediate
(rack mount or surface mount)

Connectors mounted
to the rear
(typical surface mount)

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D20 Retrofit Assemblies in 19" Rack

Replaces D20CD "Combination" card
Orion I/O shown with Advanced User Interface.

Replaces D20SD "Status" Input card.
Orion I/O shown with Advanced User Interface.

Replaces D20KR "Output" card
Orion I/O shown with Standard Faceplate.
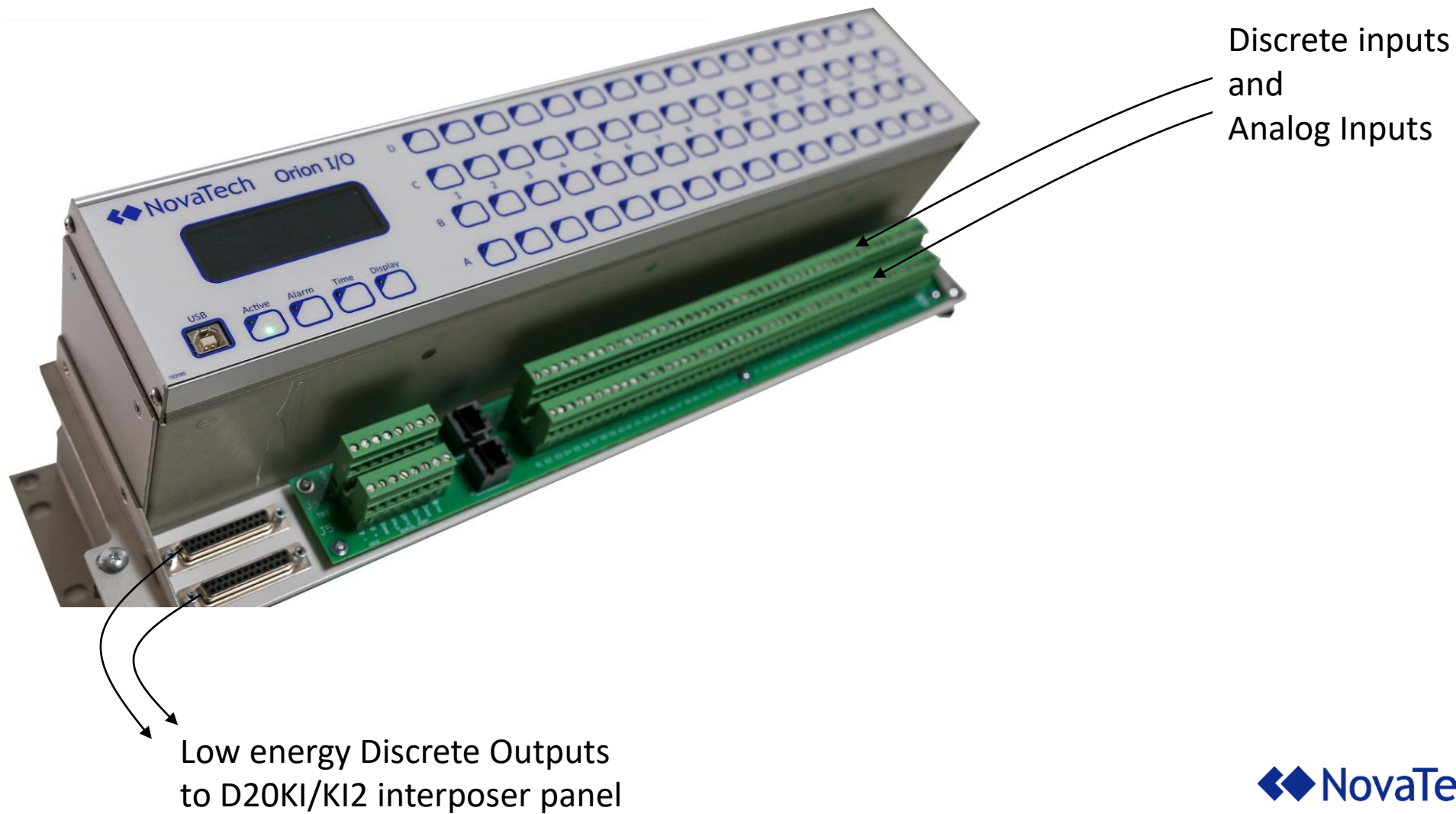
D20SD Status Input Card

Advanced Point Status and Diagnostics

Retrofit Assembly for:

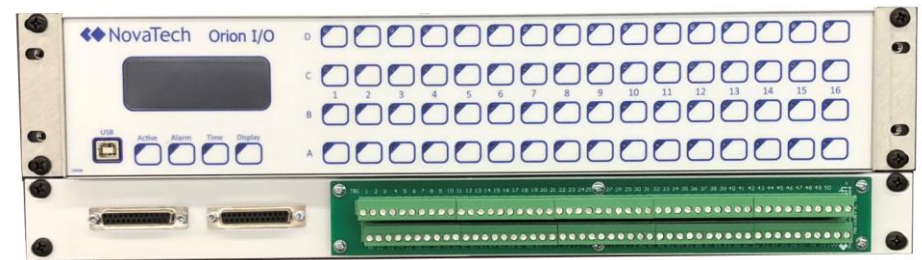| Model	Connector(s)	Mounting
D20C	Compression to Inputs DB25 to outputs thru interposer panel	Surface

Discrete inputs and Analog Inputs

Low energy Discrete Outputs to D20KI/KI2 interposer panel

Retrofit Assembly for:

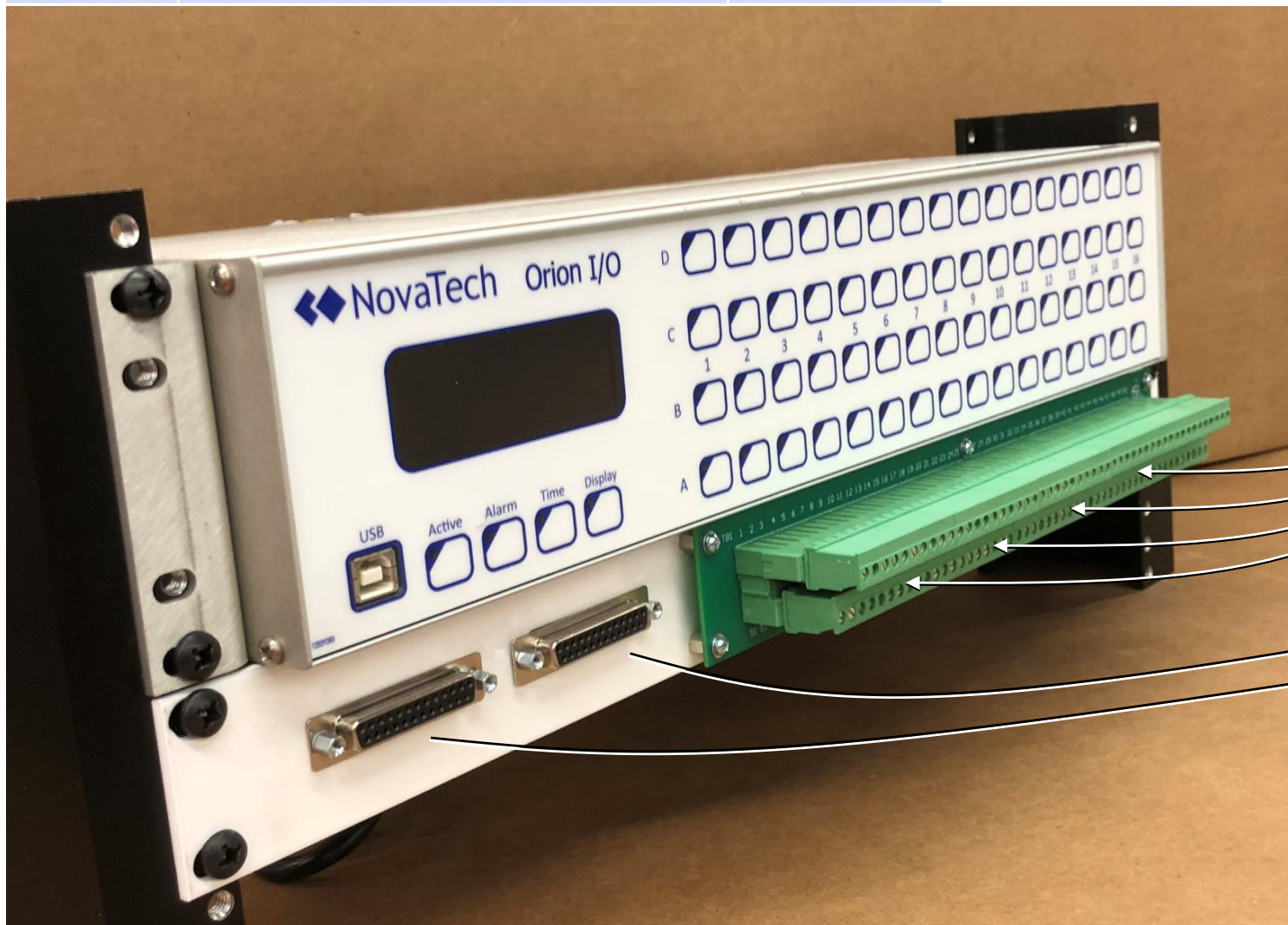| Model	Connector(s)	Mounting
D20C	Compression to Inputs DB25 to outputs thru interposer panel	19" Rack

Discrete inputs
and
Analog Inputs

Low energy Discrete Outputs
to D20KI/KI2 interposer panel
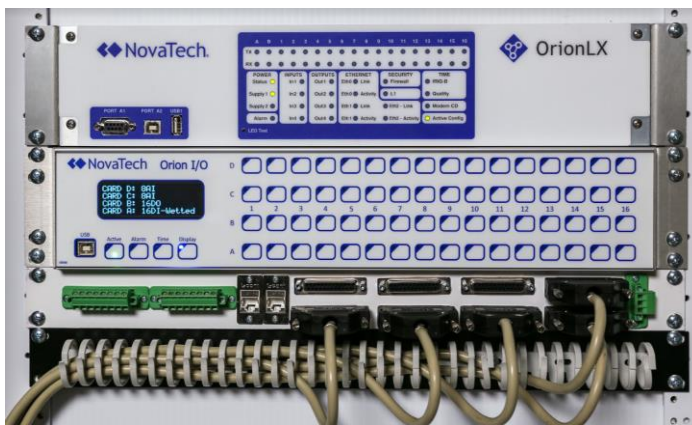
Retrofit Assembly for:

Model	Connector	Mounting
D20S	DB25	Surface

All wiring connections, power connections, serial connections and Ethernet connections made from the front

Retrofit Assembly for:

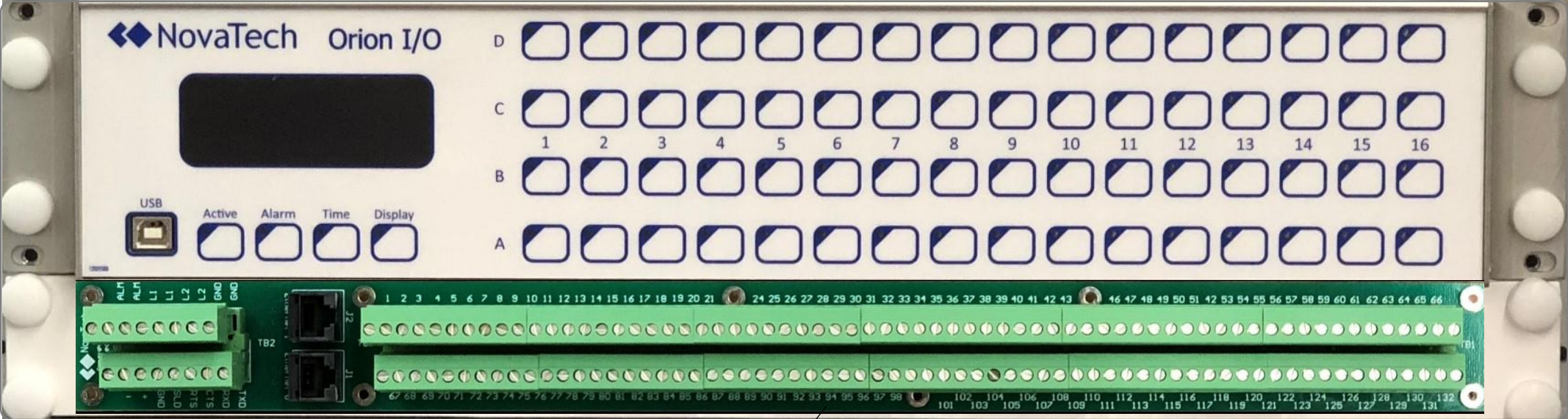| Model	Connector	Mounting
D20S	DB25	19" Rack

In 19" rack

Note that these connectors are built in but not populated on this 19" rack design.
These connectors are populated in the surface mount model

Retrofit Assembly for:
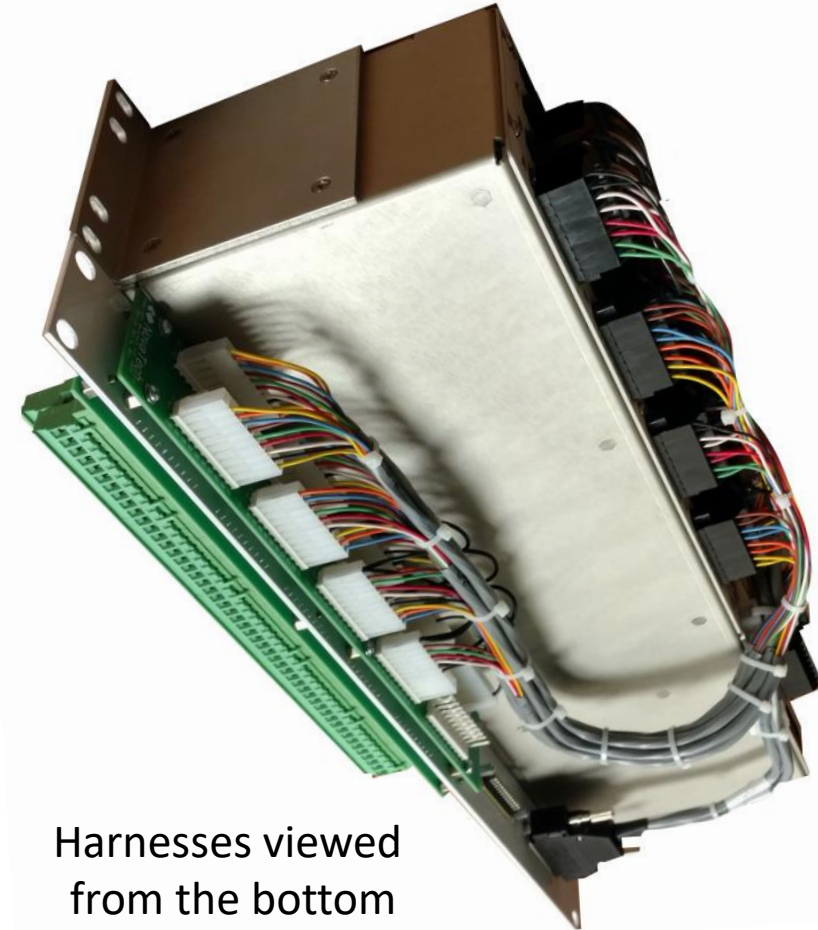
Model	Connector	Mounting
D20S	Compression	19" Rack

Standard-sized connectors for I/O wiring (5.08mm pitch)

Typical Factory-Built Wire Harnesses

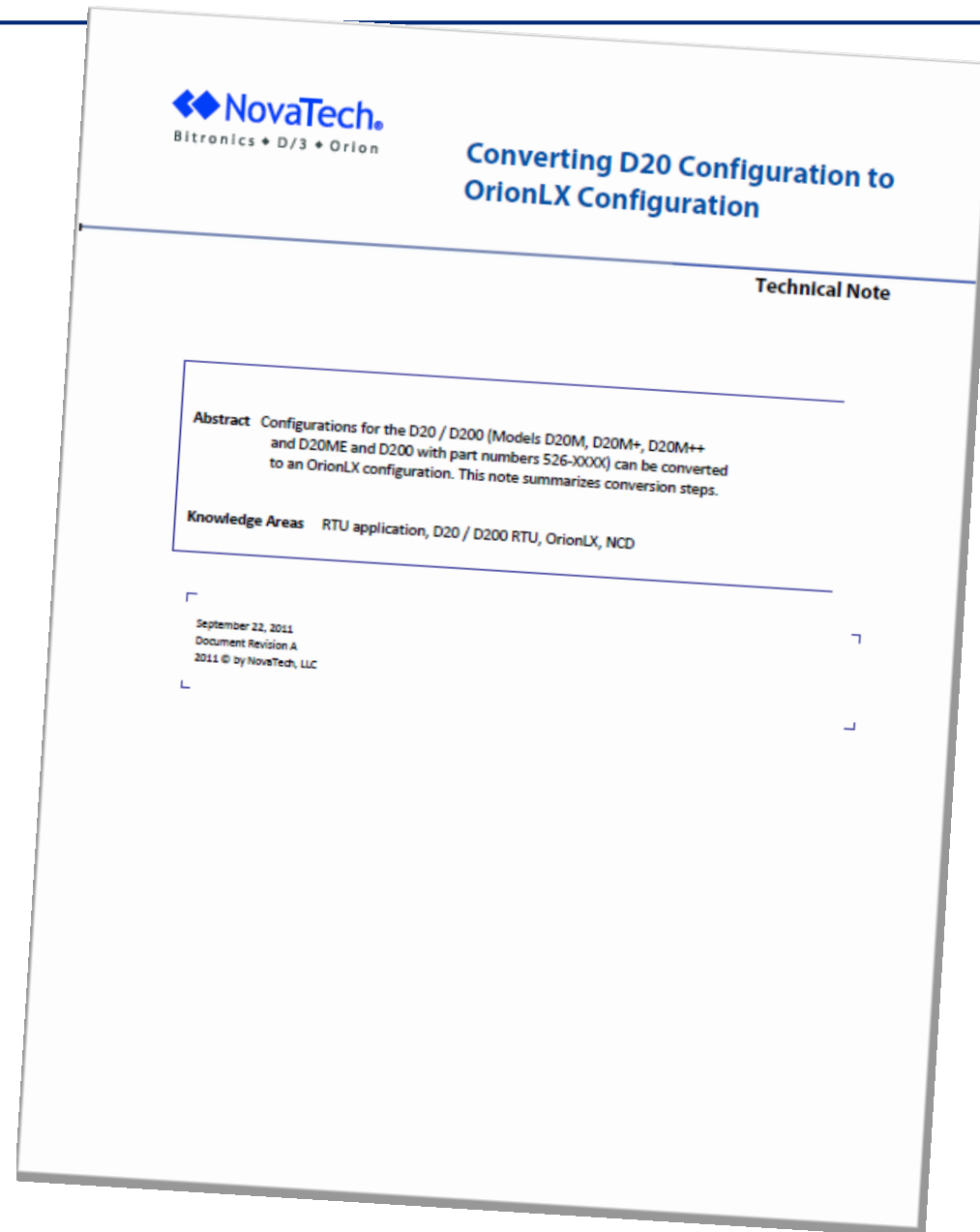Harnesses viewed
from the top
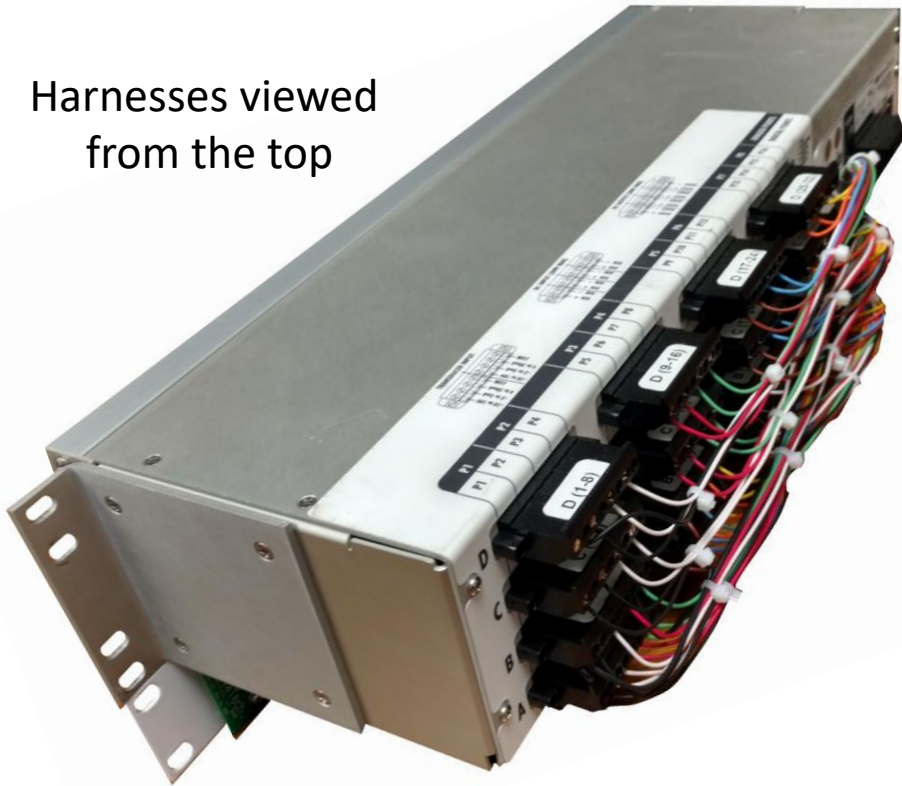
Harnesses viewed
from the bottom

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Hinge-mounting Surface Mount Option

Orion I/O with standard faceplate on hinged mount.
Engineering prototype in testing (September 2020)

Configuration Conversion Services

- The NovaTech Systems and Services group can convert D20 configurations to OrionLX NCD configurations

- A Technical Note is available for users who will convert configurations

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Bitronics ● D/3 ● Orion

Converting D20 Configuration to OrionLX Configuration

Technical Note

Abstract Configurations for the D20 / D200 (Models D20M, D20M+, D20M++ and D20ME and D200 with part numbers 526-XXXX) can be converted to an OrionLX configuration. This note summarizes conversion steps.

Knowledge Areas RTU application, D20 / D200 RTU, OrionLX, NCD

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Thank You

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