RC3KD TriKit
RC3000D to ANDREW Trifold® Interface Kit

Installation Manual

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RESEARCH CONCEPTS INC.

5420 Martindale
Shawnee, KS 66218
(913)422-0210

www.researchconcepts.com

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1.0 RC3KD TriKit Installation

The RC3KD TriKit provides all the hardware necessary to interface a RC3000D mobile antenna controller with an Andrew 3.7/4.5m.Trifold antenna system.

Chapter 1 of this document describes how to install the components of RC3K TriKit onto an Andrew Trifold antenna system. Chapter 2 details calibrating the RC3000D antenna controller with the Trifold system. Chapter 3 provides drawings and schematics associated with the interface kit.

1.1 Mount Requirements

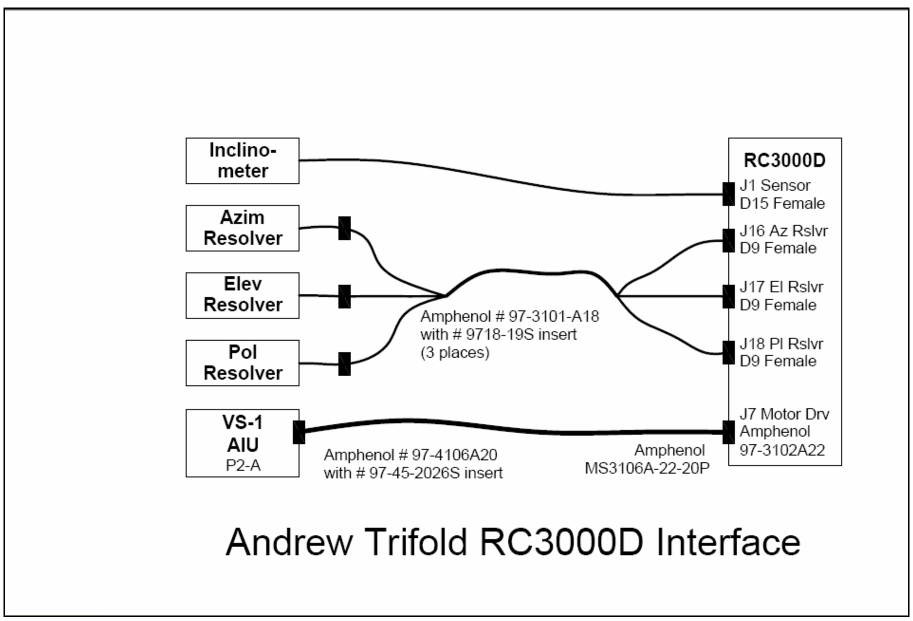
The RC3KD TriKit requires that the following Andrew antenna components are present:

1) Andrew positioner (mount) mechanism. Andrew supplies the combined reflector (3.7m. or 4.5m. Trifold) and mount as their model AP (Antenna and Positioner).
2) Andrew MKAPVS1 motorization kit. This option provides the azimuth, elevation and polarization motors along with the VS-1 antenna interface unit (AIU) and VS-2 handheld control.
3) Andrew REMKAP-VS1-100 2 pole resolver kit. This option provides the azimuth, elevation and polarization resolvers, brackets and cabling to the VS-1 AIU. **Note: Make sure to have the 2 pole vs. 4 pole resolver kit.**

Prior to installation of the kit, manual control of the mount via the Andrew VS-2 local controller should be established to ensure proper operation of the MKAPVS1 motorization kit. This manual assumes that a RC3000D antenna controller is present. The model RC3000D is specifically configured to interface to the Andrew VS-1 AIU.

1.2 Interface Kit Components

The following block diagram shows the four components of the interface kit.



The following provides a description of the RC3K TriKit components:

#1 Inclinometer Assembly. This assembly contains :

- electronic inclinometer used by the RC3000D for sensing true reflector elevation
- weatherproof housing for the inclinometer (the inclinometer will be mounted inside at the correct orientation)
- plates and bolts to attach the inclinometer housing to the appropriate place on the trifold mount
- cable to connect to the RC3000D

The inclinometer assembly is shown in the following picture attached to a 3”x3” metal tube.

#2 Drive Cable. This cable connects between the VS-1’s APC Command connector and the RC3000D’s Motor Drive connector.

#3 Resolver Cable. This cable connects between the VS-1’s APC Resolver connector and the RC3000D’s azimuth/elevation/polarization resolver connectors.

1.3 TriKit Installation

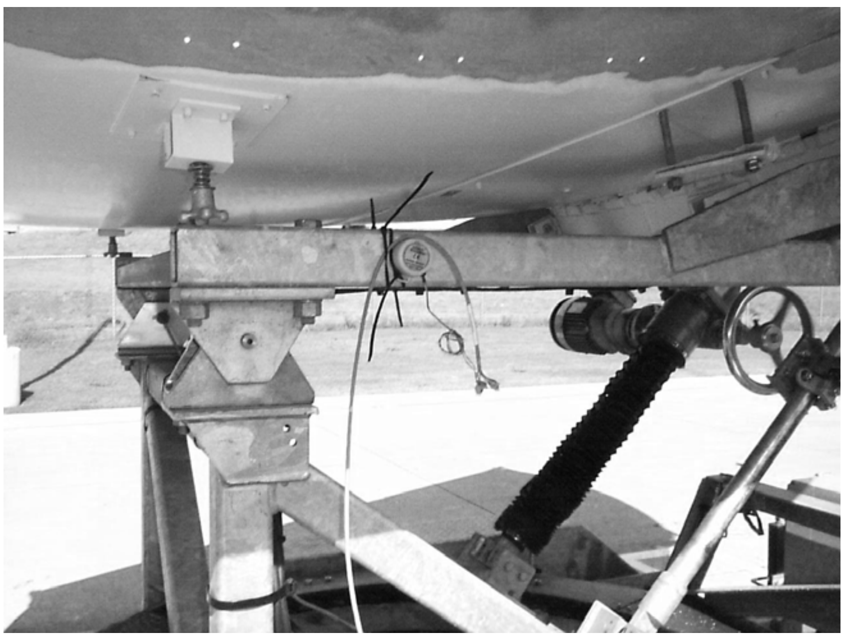
The following instructions require that the mount be initially placed in a specific position. It will be easiest to obtain this position by leveling the mount's platform as much as possible.

Place the mount in the following position using the VS-2 hand controller:

1) position the azimuth axis at its center of travel. This position may be recognized by noting if the mount is symmetrically seated when in the stowed position

2) position the polarization axis in its center of travel. This position should place the waveguide(s) in a horizontal or vertical orientation.

3) move the elevation axis to the position where the structural member attached to the elevation pivot point is horizontal. This position is shown in the following picture. Use a level to obtain an exact horizontal position of the member.

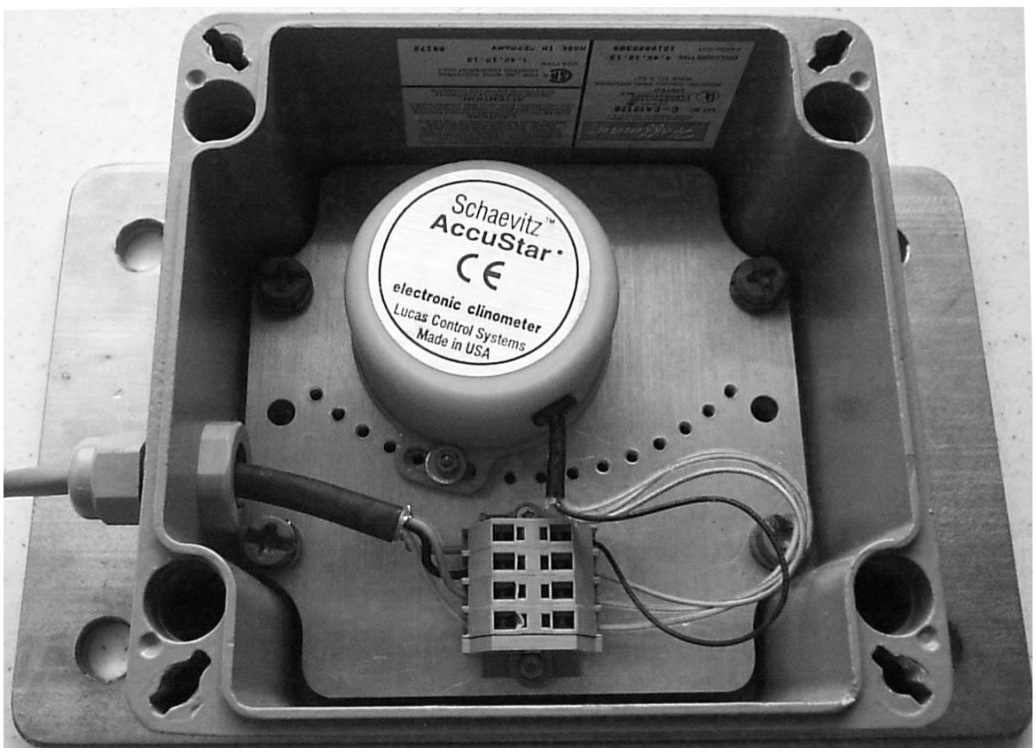


1.3.1 Mounting the Inclinometer Assembly

The inclinometer housing will be clamped to the mount so that it will rotate as the antenna rotates in elevation. The housing should be positioned on the 3 inch x 3 inch member of mount as shown in the picture in section 1.3. *The current picture in 1.3 shows an unhoused inclinometer but it is placed in the general location where the inclinometer assembly should be attached.*

NOTE: Be sure to place the housing with the side marked "UP" facing up. From this position the cable coming from the housing should point toward the elevation pivot point.

The inclinometer will be correctly oriented for the Trifold mount (15 degrees from vertical, shown below) when shipped. There should be no need to adjust the orientation of the inclinometer inside the housing.



Clamp the housing firmly (until the lock washers flatten) using the plates and bolts provided. The nuts may be tightened using 1/2" and 9/16" (or alternately 2 adjustable) wrenches.

The cable from the inclinometer housing should be routed along the mount structure to the area where the VS-1 AIU is attached to the mount. The inclinometer cable is 25 feet longer than the drive and resolver cables. This additional 25 feet should be plenty to safely route and attach the cable along the mount to the VS-1 area. Routing the inclinometer cable to the VS-1 area will allow it to be bundled together with the resolver and drive cables to the RC3000D antenna controller.

WARNING: Near the elevation pivot point, the cable should be provided enough slack to allow the elevation axis to completely rotate without straining the cable. Also confirm that the cable has been routed such that no azimuth movement will pinch the cable.

1.3.2 Resolver Cable

The 6-headed resolver cable will connect between the three antenna-mounted resolvers with Amphenol 97-series connectors and the RC3000D’s Back Panel-mounted J16 AZ, J17 EL, and J18 POL resolver connections. There will be no connection made to the resolver connectors on the VS-1.

1.3.3 Drive Cable

The drive cable will connect between the VS-1’s J2 (APC Command) connector and the RC3000D’s J7 (Motor Drive) connector.

2.0 RC3000D CALIBRATION

After installing the components of the RC3KD TriKit, the RC3000D controller may now be calibrated to optimize performance with the Trifold mount.

Note that the calibration steps described here parallel the steps contained in section 2 (INSTALLATION) of the RC3000 User’s Manual. The steps described here are condensed from that in the User’s Manual and are specific to this situation (Trifold mount with RC3KD TriKit). The installer should reference the RC3000’s User’s Manual and the RC3000D’s appendix to the User’s Manual for more details of specific calibration steps.

2.1 Equipment Mounting

2.1.1 RC3000D

Place the RC3000D in its rack as described in the User’s Manual.

2.1.2 GPS Receiver

Install the GPS receiver anywhere close to the mount as errors in latitude and longitude as large as a 100 meters will not significantly affect the calculated pointing angle to a satellite. The main criteria is that the GPS receiver have an unobstructed view of the sky. If additional cable length is needed to reach the RC3000D, a simple DB-9 to DB-9 extension cable may be used.

2.1.3 Fluxgate Compass

The fluxgate compass should be positioned so that is oriented in a direction parallel to the centerline of azimuth travel (the azimuth 0.0 degree position). If additional cable length is needed to reach the RC3000D, a simple DB-9 to DB-9 extension cable may be used.

2.1.4 Inclinometer

The inclinometer will be correctly oriented in the weatherproof housing when shipped. If the housing was installed correctly in step 1.3.1, the inclinometer will operate in its linear range throughout the range of mount elevation movement.

2.2 Electrical Connections

2.2.1 Power Entry

All RC3000D controllers after serial number 2000 is configured to accept 115 or 230 VAC. Ensure that the voltage selector in the power entry module is blank.

2.2.2 Motor Drive

The correct motor drive connections will be achieved via the drive cable installed in 1.3.3. The RC3000D will send drive control signals to the VS-1 AIU. Actual drive voltage will be generated by the VS-1.

2.2.3 Drive Sense

The inclinometer cable installed in step 1.3.1 satisfies the connections to J1 of the RC3000D.
Note: There is no azimuth or polarization potentiometers from the Trifold antenna.

2.2.4 Limit Switches

No limit switch signals come from the VS-1 AIU to the RC3000D. The RC3000D has been internally configured to ignore the J3 signals.

NOTE: When the Trifold mount encounters one of its limit switches, motor drive to the appropriate axis is disabled within the VS-1 AIU. The RC3000D allows for setting of "software limits" which are described in the azimuth, elevation and polarization calibration procedures later. The software limits should be set slightly "inside" of the hardware limits. If hardware limits are encountered, the VS-1 will stop physical movement, but the RC3000D will continue to send a drive command until it declares a jammed condition.

2.2.5 Signal Strength

Connections to J2 should be made as described in section 2.2.5 of the User's Manual.

2.2.6 Navigation Sensors

Connections to the fluxgate compass and the GPS receiver should be made using the supplied cables.
As noted in 2.1.2 and 2.1.3, additional length for these connections may be achieved via straight-through DB-9 to DB-9 extension cables.

2.2.7 Accessories

The HPA disable signal may be mechanized as described in 2.2.7 of the User's Manual.

2.2.8 RF Autopeak

The RF Autopeak signal may be mechanized as described in 2.2.8 of the User’s Manual.

2.2.9 Hand Held Remote

It is assumed that the optional RC3000 Hand Held Remote will not be required since the mount may be moved via the Andrew VS-2 local controller.

2.2.10 Pulse Sensors

There are no pulse sensors on the Trifold mount.

2.2.11 PC Remote Control

If the PC remote control option is purchased, J5 would be configured as described in 2.2.11 of the User’s Manual. All RC3000D’s normally include the PC Remote Control option.

2.2.12 Waveguide Switch

The waveguide switch option is not available with the RC3000D.

2.3 Initial Configuration

2.3.1 Initialization

All RC3000D controllers after serial number 2000 is configured to accept 115 or 230 VAC. Ensure that the voltage selector in the power entry module is blank.

2.3.2 Elevation Calibration

NOTE: When the trifold mount is moved in the UP direction (RF pointing angle increases), the mount itself looks like it is moving down (towards the stowed position). Keep this is mind to avoid confusion.

Before starting calibration of the elevation axis, make sure that the initial position of the mount referenced in section 1.3 is established. The level of the 3"x3" mount structure should be confirmed before proceeding.

1) Go to the VOLTS maintenance screen and record the elevation voltage. This voltage should be around 2.7 +/- 0.2 volts.

Recorded Elevation Reference Voltage_________________ V.

2) Go to the Elevation Calibration screen (UM 3.3.1.2.2) and enter the recorded voltage as the REF_V value. This establishes the reference voltage for the inclinometer. After entering the reference voltage, go to the MANUAL mode screen and verify that an elevation of 60.0 is shown.

3) Go back to the VOLTS maintenance screen and observe the value of the elevation resolver angle. The resolver angle should be about 180.0 degrees (center of resolver movement) to ensure that the elevation resolver will not "wrap around" when the elevation axis approaches its end of travel.

   If the elevation resolver angle (observed from the VOLTS screen) is not approximately 180.0, the resolver should be rotated until this is achieved.

Recorded Elevation Resolver Angle _____________________ Degrees

4) Go to the Elevation Calibration screen. Enter the required offset to make the resolver-based elevation angle equal 60.0.

   Example: If the recorded elevation resolver angle is 181.4, enter an elevation offset of –121.4 (60 – 181.4).

5) From the MANUAL mode screen, move the elevation axis down. The indicated angle should decrease. Press the SCROLL UP key to show elevation resolver counts. Again move the elevation axis down and verify that the resolver count decreases.

6) Move the elevation axis down until it reaches its limit of motion. Motion should stop via the VS-1.

   Move the elevation slightly up from the limit. Record the elevation resolver count and enter as the down_limit on the ELEVATION PULSE DRIVE configuration screen. This count will trigger the RC3000D's DOWN limit indication.

7) Move the elevation axis up until the angled piece of the structure almost touches the pivoting stops (shown below). Don't drive the elevation axis all the way onto the pivoting stops. From this position, when the elevation stow clamps are engaged they should pull the structure onto the pivoting stops and provide effective clamping action.

Record the elevation resolver count and enter as the up_limit on the ELEVATION PULSE DRIVE configuration screen. This count will trigger the RC3000D's STOW limit indication. This is the position the mount will stop at when the RC3000D STOW operation is performed.

8) Return the elevation axis to the reference position. Perform the Elevation Scale Factor Calibration step described in section 2.3.2 of the User's Manual to characterize the output signal of the inclinometer.

2.3.3 Azimuth Calibration

Before starting calibration of the azimuth axis, make sure that the initial position of the mount referenced in section 1.3 is established. The azimuth center position may be determined by verifying that the structure sits symmetrically on the pivoting elevation stops.

1) Go to the VOLTS maintenance screen and observe the value of the azimuth resolver angle. The resolver angle should be about 180.0 degrees (center of resolver movement) to ensure that the azimuth resolver will not "wrap around" when the azimuth axis approaches its end of travel.

   If the azimuth resolver angle (observed from the VOLTS screen) is not approximately 180.0, the resolver should be rotated until this is achieved.

Recorded Azimuth Resolver Angle ______________________ Degrees

2) Go to the Azimuth Calibration screen. Enter the required offset to make the resolver-based azimuth angle equal 0.0.

   Example: If the recorded azimuth resolver angle is 181.4, enter an elevation offset of –181.4 (0.0 – 181.4).

   Verify that the azimuth angle displayed in the MANUAL mode is 0.0.

   NOTE: When doing a STOW operation, the RC3000D will require the azimuth axis to at an angle of 0.0 +/- 1.0 degrees before allowing the elevation axis to go the stow position.

3) From the MANUAL mode, drive the azimuth axis clockwise. The indicated angle should increase.

   Drive the azimuth axis until it reaches its clockwise limit. Drive the azimuth axis slightly counter-clockwise and stop. Note the azimuth resolver count.

   Recorded Azimuth Clockwise Limit Resolver Count _______________________

4) Enter the clockwise limit resolver count as the cw_pulse_limit in the AZIMUTH PULSE DRIVE configuration screen. This value will trigger the RC3000D's CW limit indication.

5) From the MANUAL mode, drive the azimuth axis counter-clockwise. The indicated angle should decrease.

   Drive the azimuth axis until it reaches its counter-clockwise limit. Drive the azimuth axis slightly clockwise and stop. Note the azimuth resolver count.

   Recorded Azimuth Counter-Clockwise Limit Resolver Count _______________________

6) Enter the counter-clockwise limit resolver count as the ccw_pulse_limit in the AZIMUTH PULSE DRIVE configuration screen. This value will trigger the RC3000D's CCW limit indication.

2.3.4 Polarization Calibration

Before starting calibration of the polarization axis, make sure that the initial position of the mount referenced in section 1.3 is established. The polarization center position may be determined by verifying that the waveguides are oriented with the local horizontal and vertical.

1) Go to the VOLTS maintenance screen and observe the value of the polarization resolver angle. The resolver angle should be about 180.0 degrees (center of resolver movement) to ensure that the polarization resolver will not "wrap around" when the polarization axis approaches its end of travel.

   If the polarization resolver angle (observed from the VOLTS screen) is not approximately 180.0, the resolver should be rotated until this is achieved.

   Recorded Polarization Resolver Angle _____________________ Degrees

2) Go to the Polarization Calibration screen. Enter the required offset to make the resolver-based polarization angle equal 0.0.

   Example: If the recorded polarization resolver angle is 181.4, enter an polarization offset of –181.4 (0.0 – 181.4).

   Verify that the polarization angle displayed in the MANUAL mode is 0.0.

3) From the MANUAL mode, drive the polarization axis clockwise. The indicated angle should increase.

   Drive the polarization axis until it reaches its clockwise limit. Drive the polarization axis slightly counter-clockwise and stop. Note the polarization resolver angle.

   Recorded Polarization Clockwise Limit Resolver Angle_______________________

4) Enter the clockwise limit resolver angle as the cw_limit in the POLARIZATION CALIBRATION configuration screen. This value will trigger the RC3000D's CW limit indication.

5) From the MANUAL mode, drive the polarization axis counter-clockwise. The indicated angle should decrease.

   Drive the polarization axis until it reaches its counter-clockwise limit. Drive the polarization axis slightly clockwise and stop. Note the polarization resolver angle.

   Recorded Polarization Counter-Clockwise Limit Resolver Angle ________________________

6) Enter the counter-clockwise limit resolver angle as the ccw_limit in the POLARIZATION CALIBRATION configuration screen. This value will trigger the RC3000D's CCW limit indication.

2.3.5 Fast/Slow Motor Speed

The RC3000D only sends a Fast/Slow command to the VS-1 AIU. The actual setting of the Fast/Slow speeds is accomplished at the VS-1 AIU.

2.3.6 Pulse Sensor Checkout

No pulse sensors are used on the Trifold mount. The RC3000D's software uses resolver counts instead of pulse counts to perform several functions (such as inclined orbit tracking) that require very precise (high resolution) movements of the antenna.

Analogous steps to the ones described in 2.3.6 of the User's Manual have already been performed in the azimuth, elevation and polarization calibration steps above.

2.3.7 Drive System Checkout

Perform the checkout as described in the User's Manual.

2.3.8 Navigation Sensor Communication

Perform the checkout as described in the User's Manual.

2.4 Final Calibration

All steps in 2.4 may be performed as described in the User's Manual with the exception of 2.4.4 (Pulse Scale Factors). The calculation described in **2.4.4 is not required to be performed** since the correct value for the resolver interface (10,431 counts per radian) is included as the default value.

2.5 Operational Presets

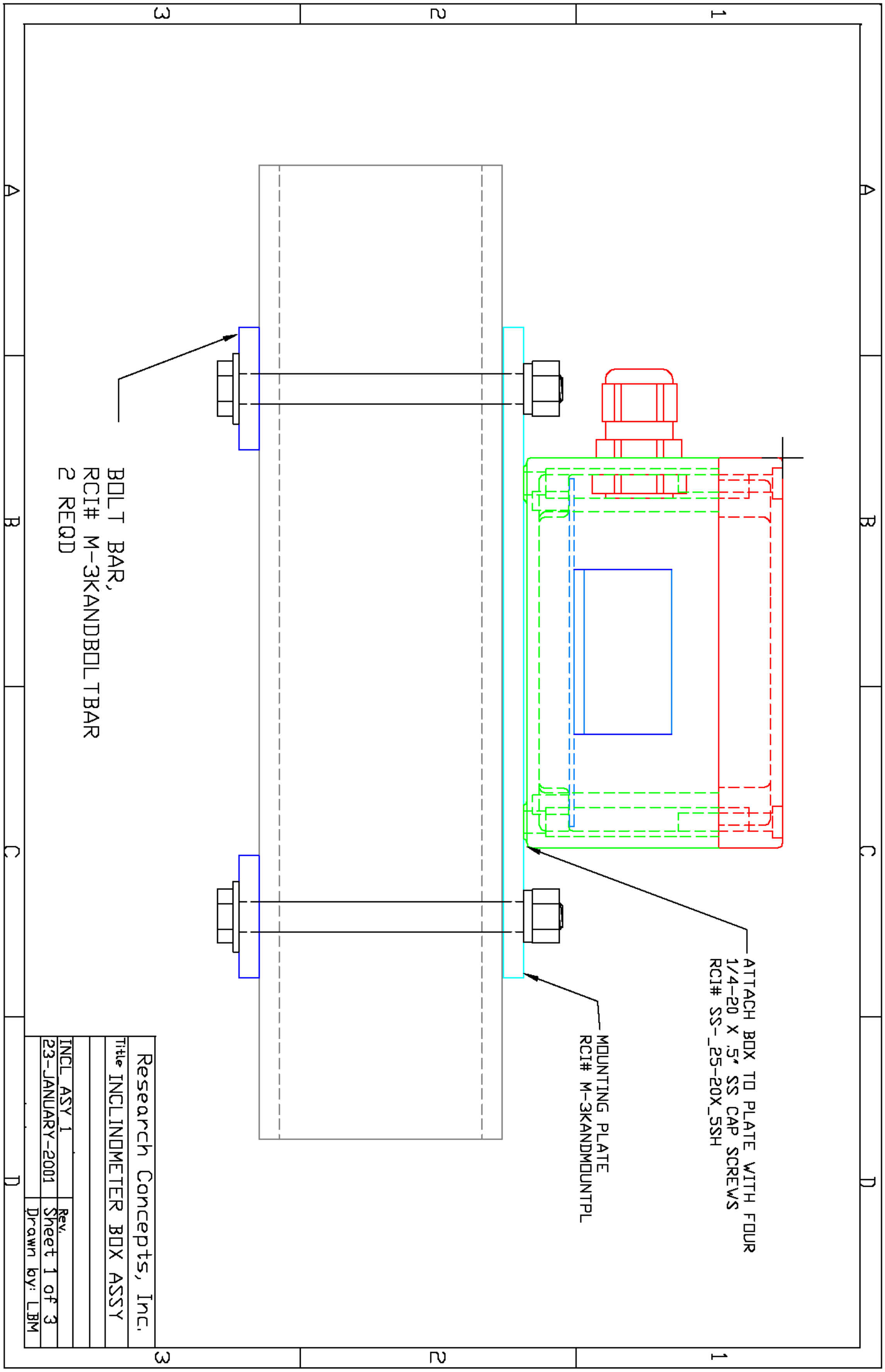
Perform as described in the User's Manual.

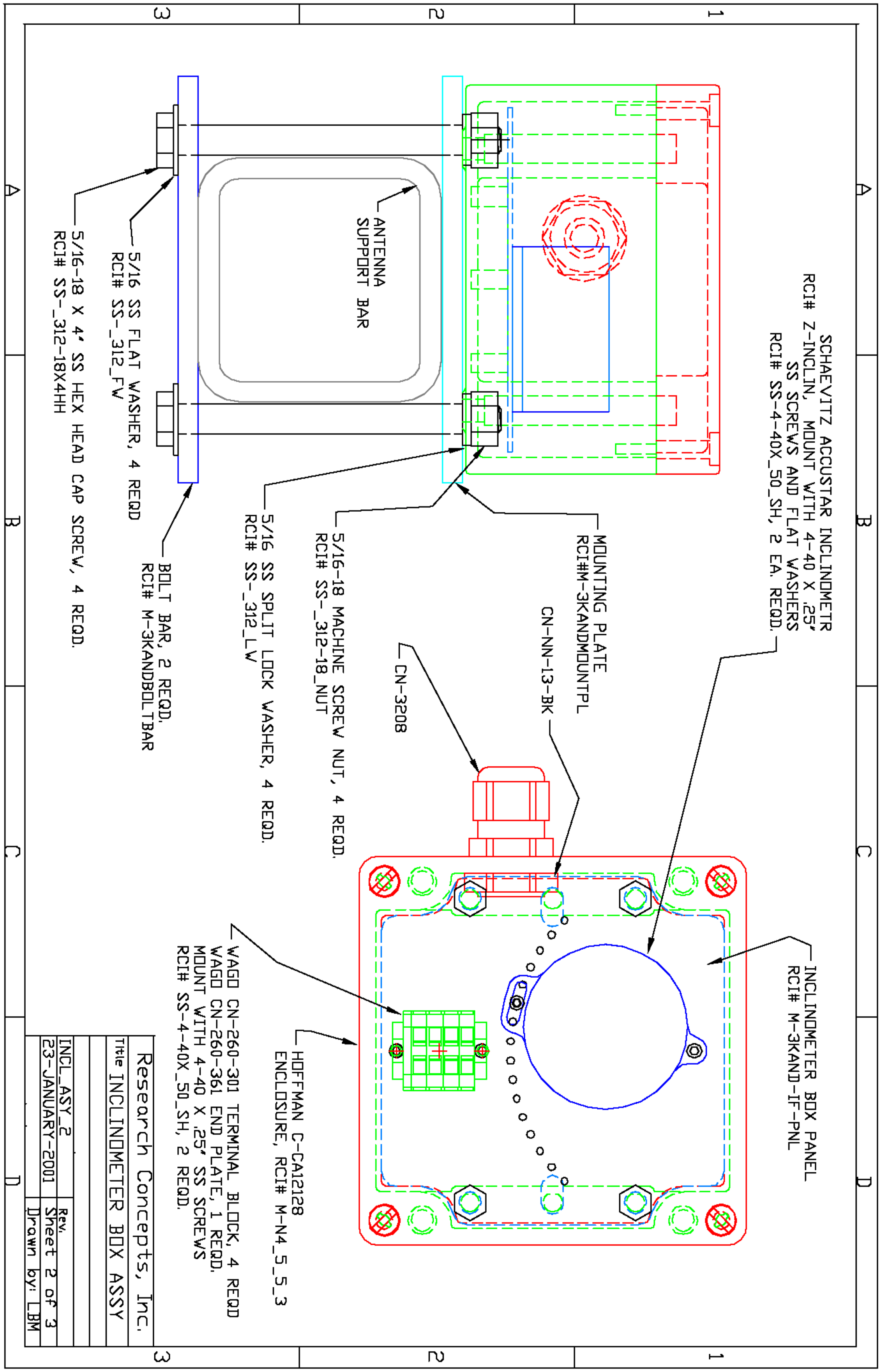
2.6 Miscellaneous Adjustments

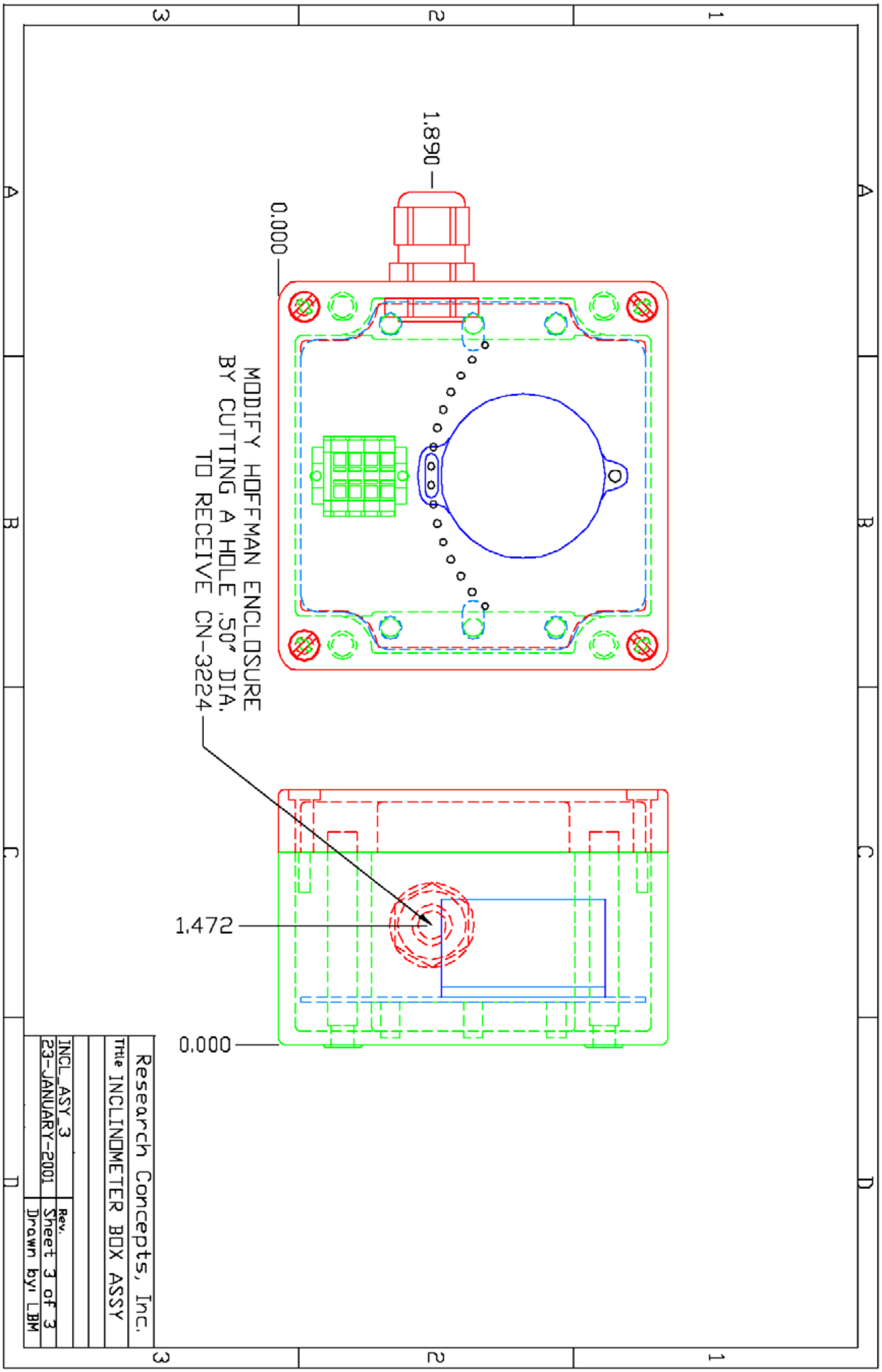
Perform as described in the User's Manual.

3.0 DRAWINGS & SCHEMATICS

Inclinometer Box Assembly
Inclinometer Data Sheet, P/N Z-INCLIN, MEASUREMENT SPECIALITIES # 02111002-000
Inclinometer Cable
Resolver cable
Drive cable


BOLT BAR,
RCI# M-3KANDBOLTBAR
2 REQD
ATTACH BOX TO PLATE WITH FOUR
1/4-20 X .5" SS CAP SCREWS
RCI# SS-_25-20X_5SH
MOUNTING PLATE
RCI# M-3KANDMOUNTPL
Research Concepts, Inc.
Title INCLINOMETER BOX ASSY
INCL_ASY_1
23-JANUARY-2001
Rev.
Sheet 1 of 3
Drawn by: LBM


SCHAEVITZ ACCUSTAR INCLINOMETR
RCI# Z-INCLIN. MOUNT WITH 4-40 X .25"
SS SCREWS AND FLAT WASHERS
RCI# SS-4-40X_50_SH, 2 EA. REQD.
ANTENNA SUPPORT BAR
MOUNTING PLATE
RCI#M-3KANDMOUNTPL
CN-NN-13-BK
CN-3208
5/16-18 MACHINE SCREW NUT, 4 REQD.
RCI# SS-_312-18_NUT
5/16 SS SPLIT LOCK WASHER, 4 REQD.
RCI# SS-_312_LW
BOLT BAR, 2 REQD.
RCI# M-3KANDBOLTBAR
5/16 SS FLAT WASHER, 4 REQD
RCI# SS-_312_FW
5/16-18 X 4" SS HEX HEAD CAP SCREW, 4 REQD.
RCI# SS-_312-18X4HH
INCLINOMETER BOX PANEL
RCI# M-3KAND-IF-PNL
HOFFMAN C-CA12128
ENCLOSURE, RCI# M-N4_5_5_3
WAGO CN-260-301 TERMINAL BLOCK, 4 REQD
WAGO CN-260-361 END PLATE, 1 REQD.
MOUNT WITH 4-40 X .25" SS SCREWS
RCI# SS-4-40X_50_SH, 2 REQD.
Research Concepts, Inc.
Title INCLINOMETER BOX ASSY
INCL_ASY_2
Rev.
23-JANUARY-2001
Sheet 2 of 3
Drawn by: LBM


1.890
0.000
MODIFY HOFFMAN ENCLOSURE
BY CUTTING A HOLE .50" DIA.
TO RECEIVE CN-3224
1.472
0.000
Research Concepts, Inc.
Title INCLINOMETER BOX ASSY
INCL_ASY_3
23-JANUARY-2001
Rev.
Sheet 3 of 3
Drawn by: LBM

Inclinometer Data Sheet, RCI P/N Z-INCLIN, Measurement Specialties p/n 0211 1002-000

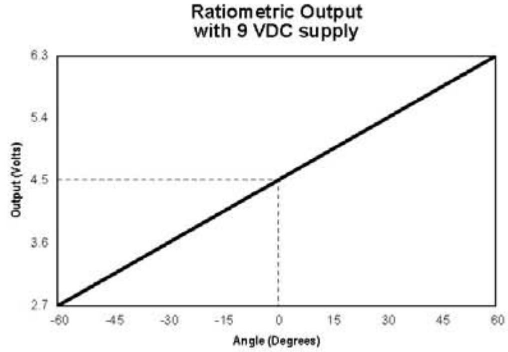
AccuStar® Electronic Clinometer

Ratiometric Output

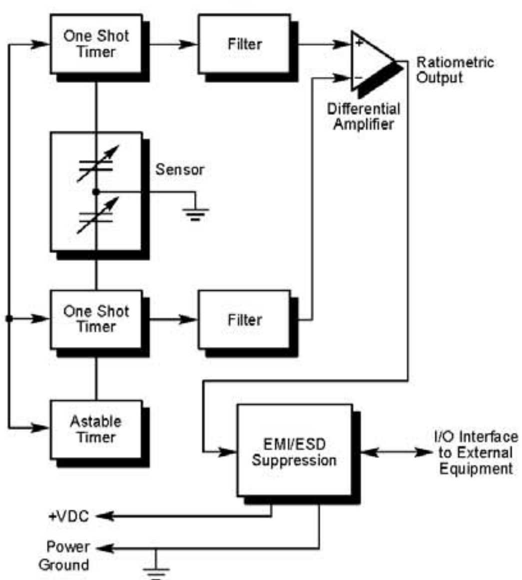
Features

- ***Low power consumption***
- ***3 wire operation***

The Ratiometric clinometer is a signal conditioned sensor that has been designed to operate like a potentiometer. This is a three wire device: power; power ground; and signal. The signal is referenced to power ground. A regulated power supply is required since the output is supply dependent. The midscale output, zero degrees, is 1/2 the supply voltage while the scale factor is also supply dependent. With its low power consumption, 0.5 mA, this device is ideal for battery supplied applications. The Ratiometric clinometer was designed with EMI and ESD suppression circuitry on every line.



Ratiometric I/O Block Diagram



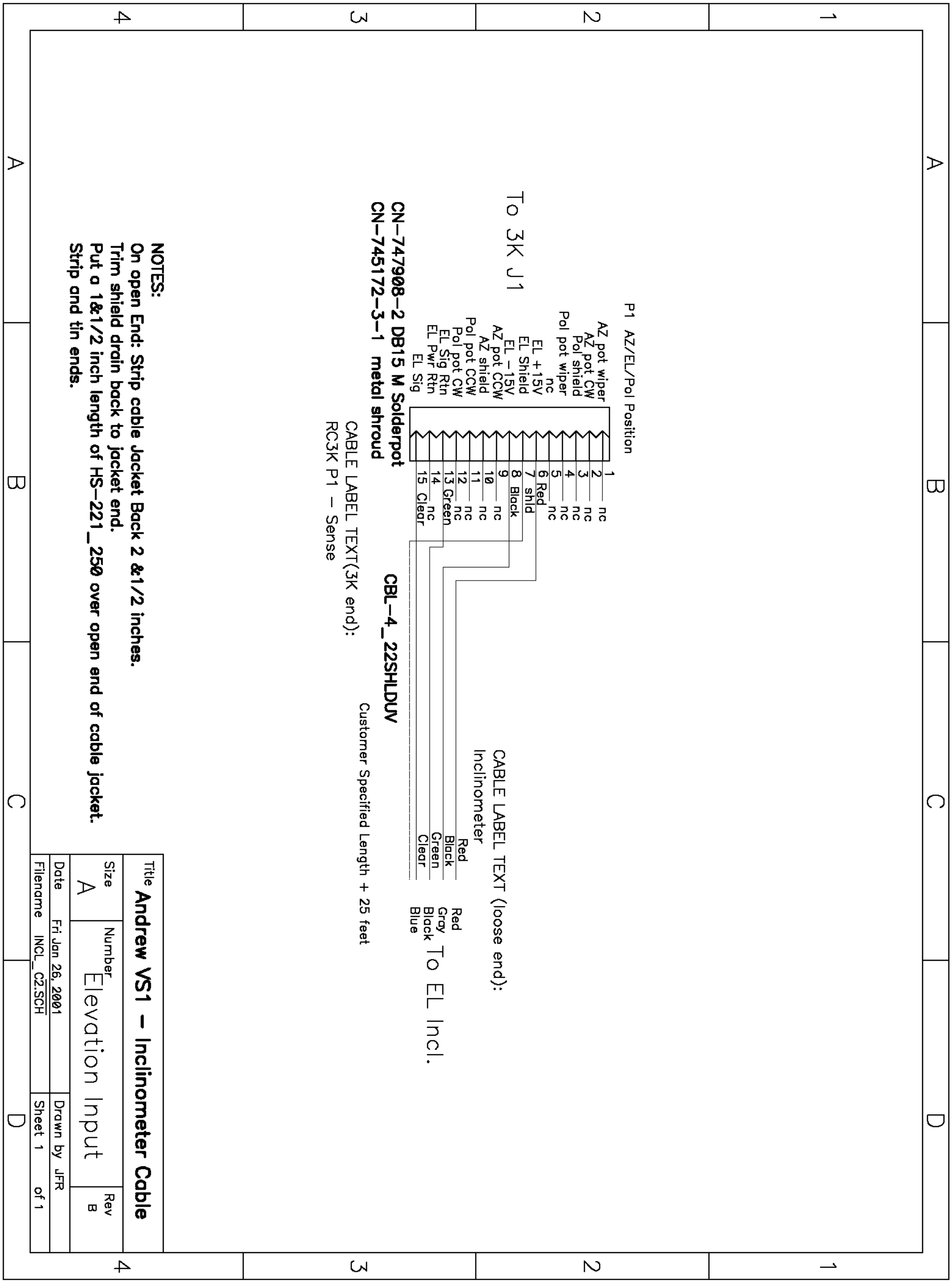
Ratiometric Electrical Specifications

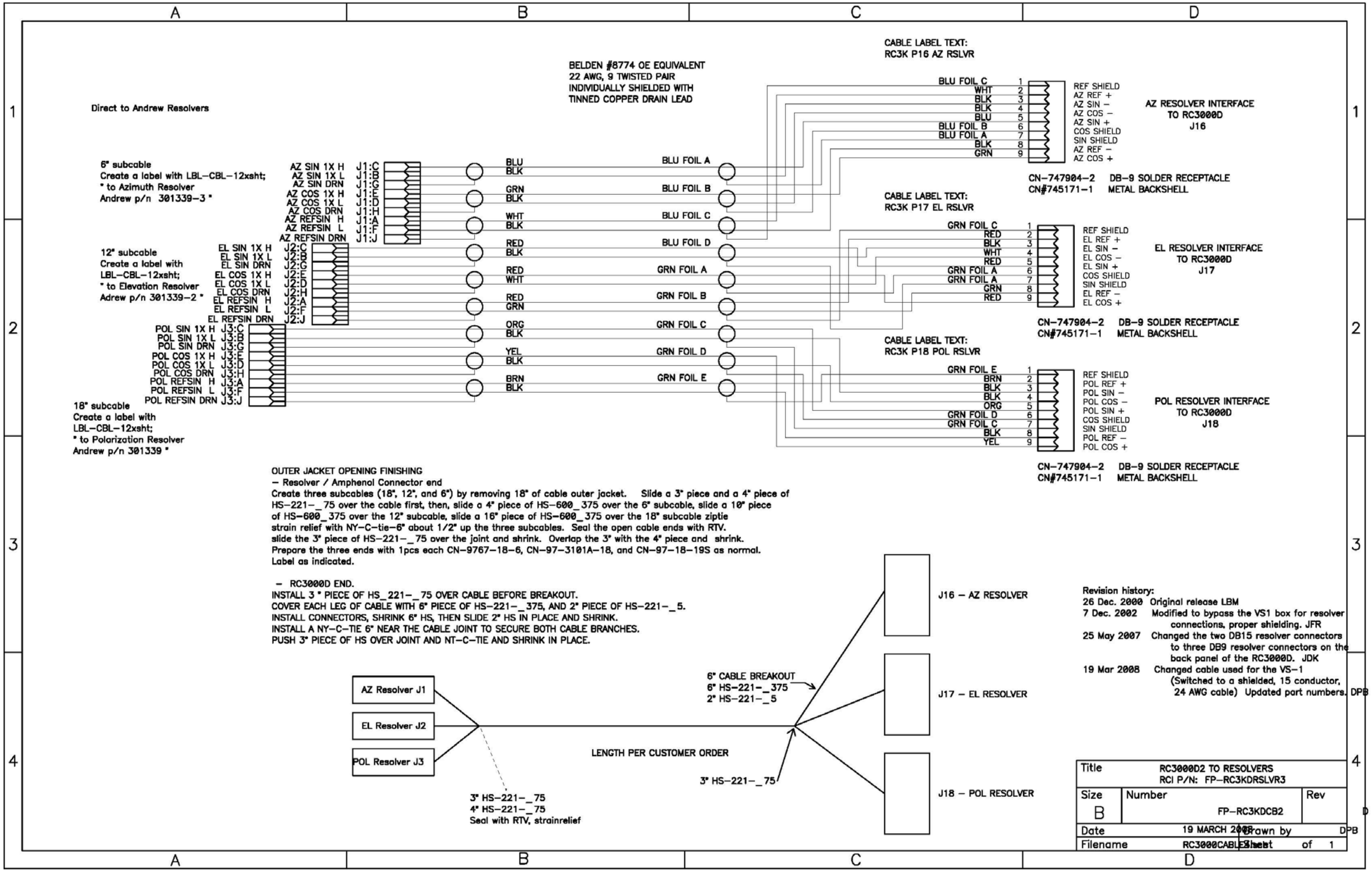
Voltage

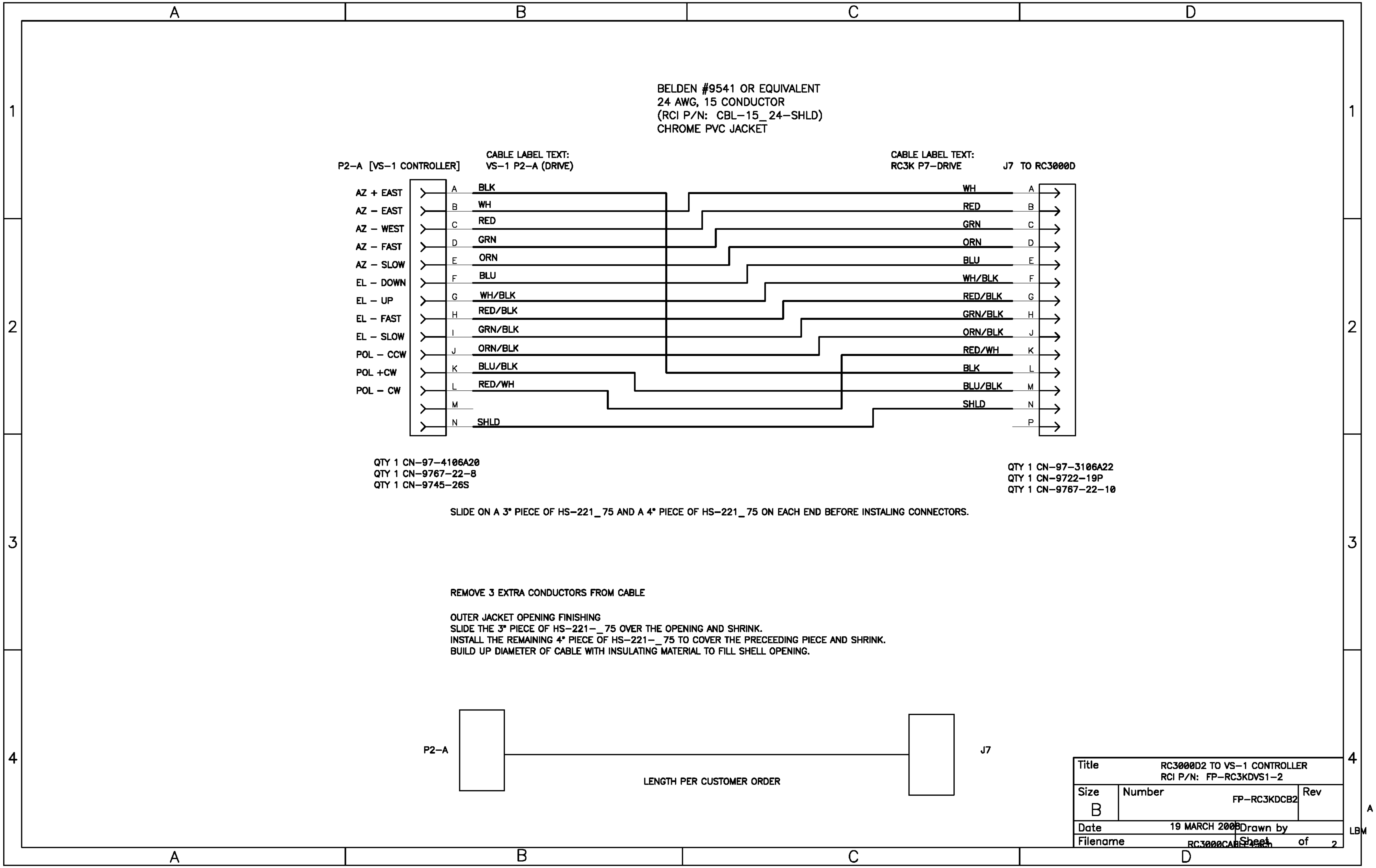
Voltage Supply	
Nominal	+9 VDC
Range (regulated)	+5 to +15 VDC
Current	0.5mA
Scale Factor	
Nominal (@9VDC)	30mV/degree ±10%
Load Resistance (min.)	10 k0hms
Level Output (0°)	1/2Vcc

Electrical Connections

Wire	Source
Black	Power ground
Red	Reg. +5 to +15 VDC
Yellow	Signal output (reference to power ground)


P1 AZ/EL/Pol Position
To 3K J1
AZ pot wiper 1 nc
AZ pot CW 2 nc
Pol shield 3 nc
Pol pot wiper 4 nc
nc 5 nc
EL +15V 6 Red
EL Shield 7 shld
EL -15V 8 Black
AZ pot CCW 9
AZ shield 10 nc
Pol pot CCW 11 nc
Pol pot CW 12 nc
EL Sig Rtn 13 Green
EL Pwr Rtn 14 nc
EL Sig 15 Clear
CN-747908-2 DB15 M Solderpot
CN-745172-3-1 metal shroud
CABLE LABEL TEXT(3K end):
RC3K P1 - Sense
CBL-4_22SHLDUV
Customer Specified Length + 25 feet
CABLE LABEL TEXT (loose end):
Inclinometer
Red Red
Black Gray
Green Black
Clear Blue
To EL Incl.
NOTES:
On open End: Strip cable Jacket Back 2 &1/2 inches.
Trim shield drain back to jacket end.
Put a 1&1/2 inch length of HS-221_250 over open end of cable jacket.
Strip and tin ends.
Title Andrew VS1 - Inclinometer Cable
Size A
Number Elevation Input
Rev B
Date Fri Jan 26, 2001
Drawn by JFR
Filename INCL_C2.SCH
Sheet 1 of 1


Direct to Andrew Resolvers
BELDEN #8774 OE EQUIVALENT
22 AWG, 9 TWISTED PAIR
INDIVIDUALLY SHIELDED WITH
TINNED COPPER DRAIN LEAD
CABLE LABEL TEXT:
RC3K P16 AZ RSLVR
BLU FOIL C
WHT
BLK
BLK
BLU
BLU FOIL B
BLU FOIL A
BLK
GRN
REF SHIELD
AZ REF +
AZ SIN −
AZ COS −
AZ SIN +
COS SHIELD
SIN SHIELD
AZ REF −
AZ COS +
AZ RESOLVER INTERFACE
TO RC3000D
J16
CN−747904−2 DB−9 SOLDER RECEPTACLE
CN#745171−1 METAL BACKSHELL
6" subcable
Create a label with LBL−CBL−12xsht;
" to Azimuth Resolver
Andrew p/n 301339−3 "
AZ SIN 1X H J1:C
AZ SIN 1X L J1:B
AZ SIN DRN J1:G
AZ COS 1X H J1:E
AZ COS 1X L J1:D
AZ COS DRN J1:H
AZ REFSIN H J1:A
AZ REFSIN L J1:F
AZ REFSIN DRN J1:J
BLU
BLK
BLU FOIL A
GRN
BLK
BLU FOIL B
WHT
BLK
BLU FOIL C
RED
BLK
BLU FOID D
RED
WHT
GRN FOIL A
RED
GRN
GRN FOIL B
ORG
BLK
GRN FOIL C
YEL
BLK
GRN FOIL D
BRN
BLK
GRN FOIL E
CABLE LABEL TEXT:
RC3K P17 EL RSLVR
GRN FOIL C
RED
BLK
WHT
RED
GRN FOIL A
GRN FOIL A
GRN
RED
REF SHIELD
EL REF +
EL SIN −
EL COS −
EL SIN +
COS SHIELD
SIN SHIELD
EL REF −
EL COS +
EL RESOLVER INTERFACE
TO RC3000D
J17
12" subcable
Create a label with
LBL−CBL−12xsht;
" to Elevation Resolver
Adrew p/n 301339−2 "
EL SIN 1X H J2:C
EL SIN 1X L J2:B
EL SIN DRN J2:G
EL COS 1X H J2:E
EL COS 1X L J2:D
EL COS DRN J2:H
EL REFSIN H J2:A
EL REFSIN L J2:F
EL REFSIN DRN J2:J
CN−747904−2 DB−9 SOLDER RECEPTACLE
CN#745171−1 METAL BACKSHELL
CABLE LABEL TEXT:
RC3K P18 POL RSLVR
POL SIN 1X H J3:C
POL SIN 1X L J3:B
POL SIN DRN J3:G
POL COS 1X H J3:E
POL COS 1X L J3:D
POL COS DRN J3:H
POL REFSIN H J3:A
POL REFSIN L J3:F
POL REFSIN DRN J3:J
GRN FOIL E
BRN
BLK
BLK
ORG
GRN FOIL D
GRN FOIL C
BLK
YEL
REF SHIELD
POL REF +
POL SIN −
POL COS −
POL SIN +
COS SHIELD
SIN SHIELD
POL REF −
POL COS +
POL RESOLVER INTERFACE
TO RC3000D
J18
18" subcable
Create a label with
LBL−CBL−12xsht;
" to Polarization Resolver
Andrew p/n 301339 "
CN−747904−2 DB−9 SOLDER RECEPTACLE
CN#745171−1 METAL BACKSHELL
OUTER JACKET OPENING FINISHING
− Resolver / Amphenol Connector end
Create three subcables (18", 12", and 6") by removing 18" of cable outer jacket. Slide a 3" piece and a 4" piece of
HS−221−_75 over the cable first, then, slide a 4" piece of HS−600_375 over the 6" subcable, slide a 10" piece
of HS−600_375 over the 12" subcable, slide a 16" piece of HS−600_375 over the 18" subcable ziptie
strain relief with NY−C−tie−6" about 1/2" up the three subcables. Seal the open cable ends with RTV.
slide the 3" piece of HS−221−_75 over the joint and shrink. Overlap the 3" with the 4" piece and shrink.
Prepare the three ends with 1pcs each CN−9767−18−6, CN−97−3101A−18, and CN−97−18−19S as normal.
Label as indicated.
− RC3000D END.
INSTALL 3 " PIECE OF HS_221−_75 OVER CABLE BEFORE BREAKOUT.
COVER EACH LEG OF CABLE WITH 6" PIECE OF HS−221−_375, AND 2" PIECE OF HS−221−_5.
INSTALL CONNECTORS, SHRINK 6" HS, THEN SLIDE 2" HS IN PLACE AND SHRINK.
INSTALL A NY−C−TIE 6" NEAR THE CABLE JOINT TO SECURE BOTH CABLE BRANCHES.
PUSH 3" PIECE OF HS OVER JOINT AND NT−C−TIE AND SHRINK IN PLACE.
J16 − AZ RESOLVER
J17 − EL RESOLVER
J18 − POL RESOLVER
AZ Resolver J1
EL Resolver J2
POL Resolver J3
6" CABLE BREAKOUT
6" HS−221−_375
2" HS−221−_5
LENGTH PER CUSTOMER ORDER
3" HS−221−_75
3" HS−221−_75
4" HS−221−_75
Seal with RTV, strainrelief
Revision history:
26 Dec. 2000 Original release LBM
7 Dec. 2002 Modified to bypass the VS1 box for resolver connections, proper shielding. JFR
25 May 2007 Changed the two DB15 resolver connectors to three DB9 resolver connectors on the back panel of the RC3000D. JDK
19 Mar 2008 Changed cable used for the VS−1 (Switched to a shielded, 15 conductor, 24 AWG cable) Updated part numbers. DPB
Title RC3000D2 TO RESOLVERS
RCI P/N: FP−RC3KDRSLVR3
Size B
Number FP−RC3KDCB2
Rev
Date 19 MARCH 2008
Drawn by DPB
Filename RC3000CABLE
Sheet 1 of 1


BELDEN #9541 OR EQUIVALENT
24 AWG, 15 CONDUCTOR
(RCI P/N: CBL-15_24-SHLD)
CHROME PVC JACKET
P2-A [VS-1 CONTROLLER]
CABLE LABEL TEXT:
VS-1 P2-A (DRIVE)
CABLE LABEL TEXT:
RC3K P7-DRIVE
J7 TO RC3000D
AZ + EAST
AZ - EAST
AZ - WEST
AZ - FAST
AZ - SLOW
EL - DOWN
EL - UP
EL - FAST
EL - SLOW
POL - CCW
POL +CW
POL - CW
A BLK
B WH
C RED
D GRN
E ORN
F BLU
G WH/BLK
H RED/BLK
I GRN/BLK
J ORN/BLK
K BLU/BLK
L RED/WH
M
N SHLD
WH A
RED B
GRN C
ORN D
BLU E
WH/BLK F
RED/BLK G
GRN/BLK H
ORN/BLK J
RED/WH K
BLK L
BLU/BLK M
SHLD N
P
QTY 1 CN-97-4106A20
QTY 1 CN-9767-22-8
QTY 1 CN-9745-26S
QTY 1 CN-97-3106A22
QTY 1 CN-9722-19P
QTY 1 CN-9767-22-10
SLIDE ON A 3" PIECE OF HS-221_75 AND A 4" PIECE OF HS-221_75 ON EACH END BEFORE INSTALING CONNECTORS.
REMOVE 3 EXTRA CONDUCTORS FROM CABLE
OUTER JACKET OPENING FINISHING
SLIDE THE 3" PIECE OF HS-221-_75 OVER THE OPENING AND SHRINK.
INSTALL THE REMAINING 4" PIECE OF HS-221-_75 TO COVER THE PRECEEDING PIECE AND SHRINK.
BUILD UP DIAMETER OF CABLE WITH INSULATING MATERIAL TO FILL SHELL OPENING.
P2-A
J7
LENGTH PER CUSTOMER ORDER
Title RC3000D2 TO VS-1 CONTROLLER
RCI P/N: FP-RC3KDVS1-2
Size B
Number FP-RC3KDCB2
Rev A
Date 19 MARCH 2008
Drawn by LBM
Filename RC3000CABLE.sch
Sheet of 2

4.0 RC3KD TriKit DATA SHEET

Customer ____________________ PO#____________________________

Cable Length _________________

INCLINOMETER ASSEMBLY

Inclinometer S/N__________________ Scale Factor______________________

Date Assembled___________________ Initials___________________________

Date Tested_______________________ Initials___________________________

RESOLVER CABLE

Date Assembled___________________ Initials___________________________

Date Tested_______________________ Initials___________________________

DRIVE CABLE

Date Assembled___________________ Initials___________________________

Date Tested_______________________ Initials___________________________

VS-1 MODIFICATION

Date Assembled___________________ Initials___________________________

Date Tested_______________________ Initials___________________________

Date Assembled___________________ Initials__________________________

5.0 TriFold Installation Kit RCI Part Numbers and Cable Revision History

The RCI part number for the Andrew TriFold Installation kit is FP-RC3KDTRIKIT

Unfortunately, RCI p/n FP-RC3KDTRIKIT is not a unique part number. The components associated with this part number have changed over time. Because of this, order replacement cables based on the information presented in the following section …
RC3000D – Andrew TriFold Interface Cable Revision History

RCI p/n FP-RC3KDTRIKIT currently consists of the following …

RCI p/n FP-RC3KINCLAND – an inclinometer kit with attached interface cable, **the inclinometer kit has not changed over time**.
RCI p/n FP-RC3KDVS1-2 – RC3000D shielded VS-1 interface cable depicted on the RC3000CABLE4.PDF drawing.
RCI p/n FP-RC3KDRSLVR3 – RC3000D Resolver Interface Cable (depicted in RC3000CABLE3.PDF and RC3000CABLE4.PDF).

The following table describes previous revisions of RCI p/n FP-RC3KDTRIKIT.

Description	Inclinometer P/N	VS-1 and Resolver Interface Cabling P/N
Original configuration	RC3KINCLAND	FP-RC3KVS1CBL1 – consists of the components required to make FP-RC3KDVS1-1 and FP-RC3KDRSLVR1
Resolver cable modified to interface directly to each resolver rather than the resolver connectors on the VS-1.	RC3KINCLAND	FP-RC3KVS1CBL2 – consists of the components to make FP-RC3KDVS1-1 and FP-RC3KDRSLVR2
Resolver cable modified to work with late model RC3000D, s/n 2000 and up	RC3KINCLAND	FP-RC3KDCB2 – consists of the components to make .FP-RC3KDVS1-1 and FP-RC3KDRSLVR3

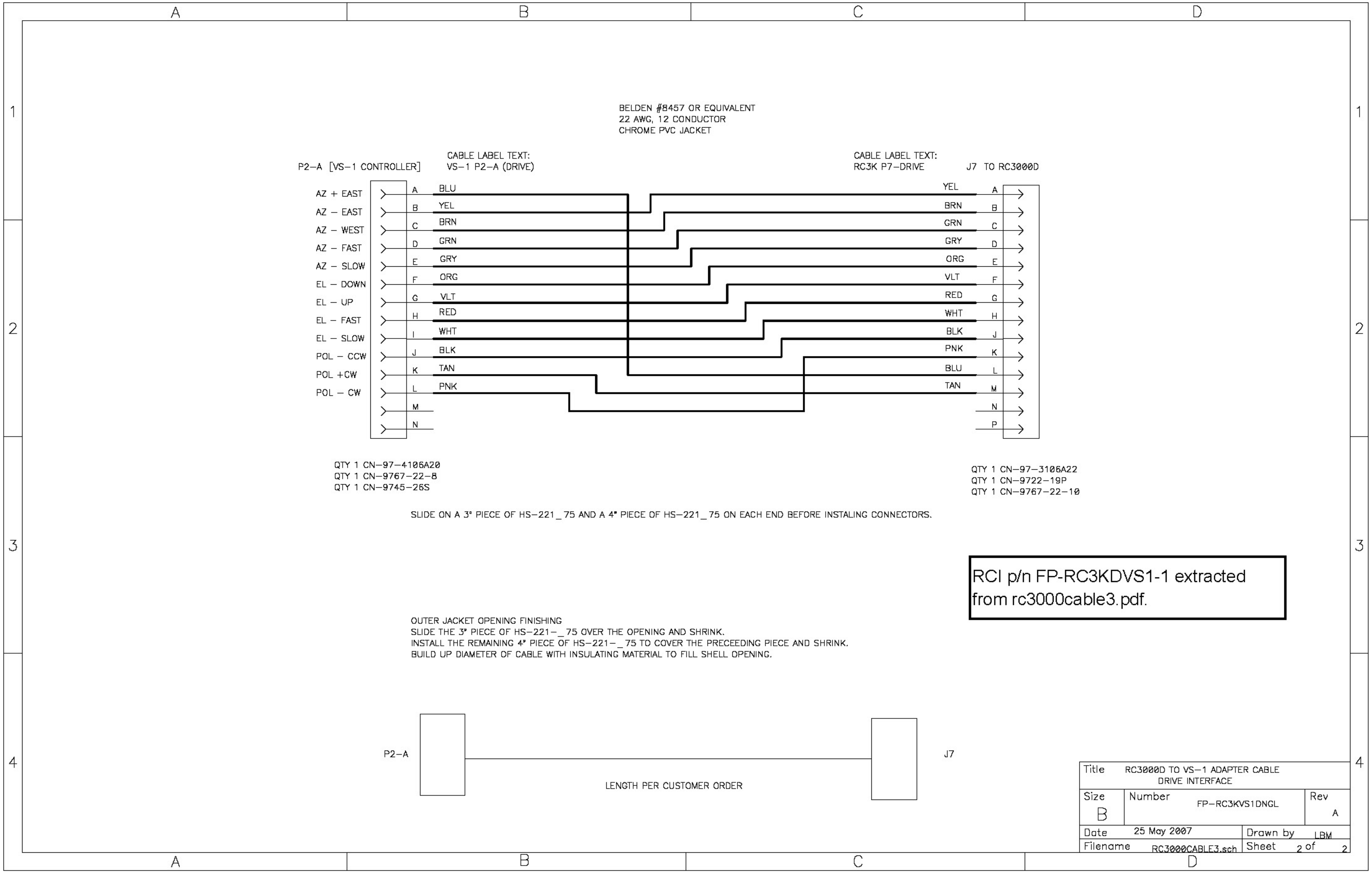
Extension Cables

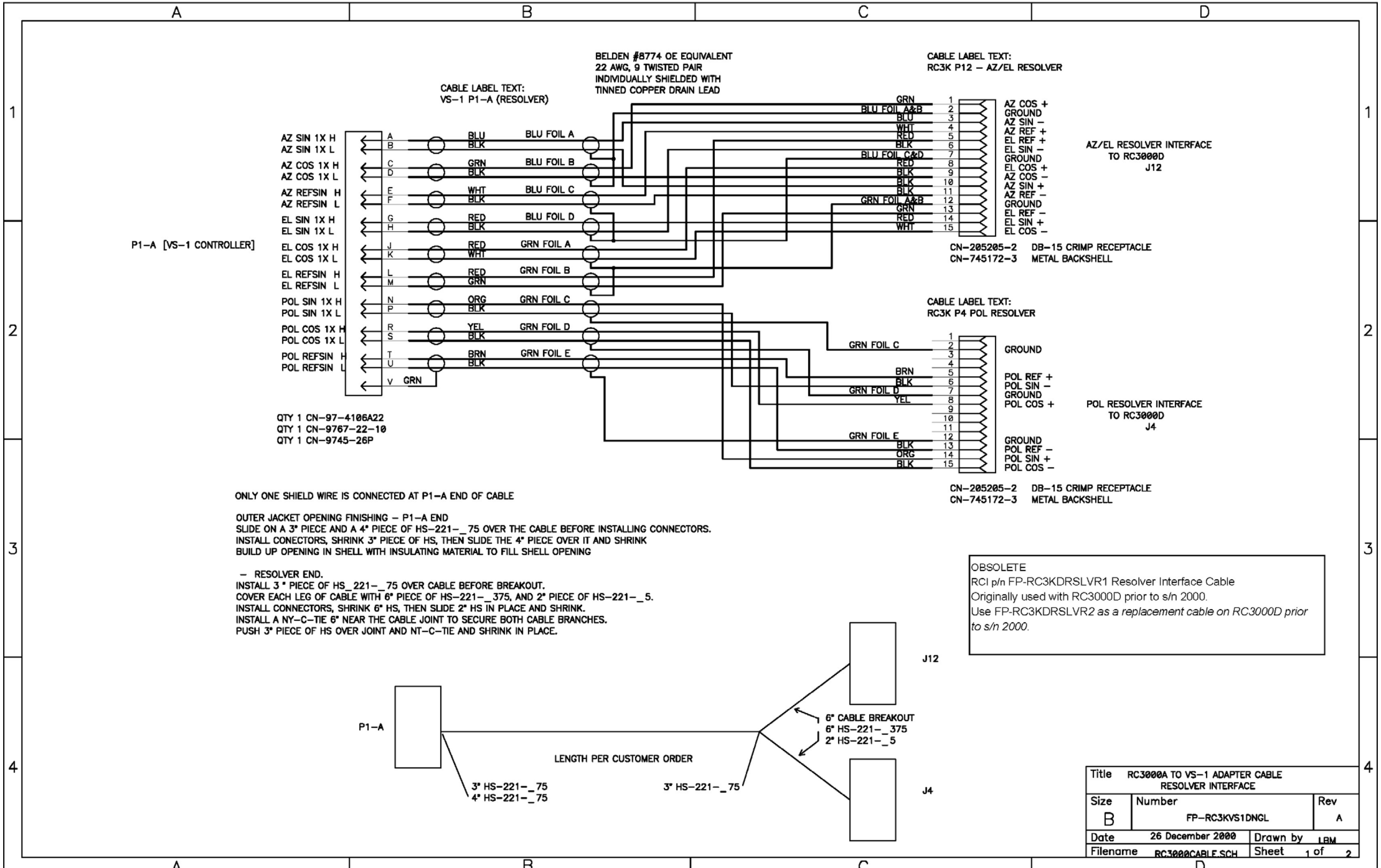
The standard cable length is 30 feet. Several p/n have been defined to support longer interface cables.

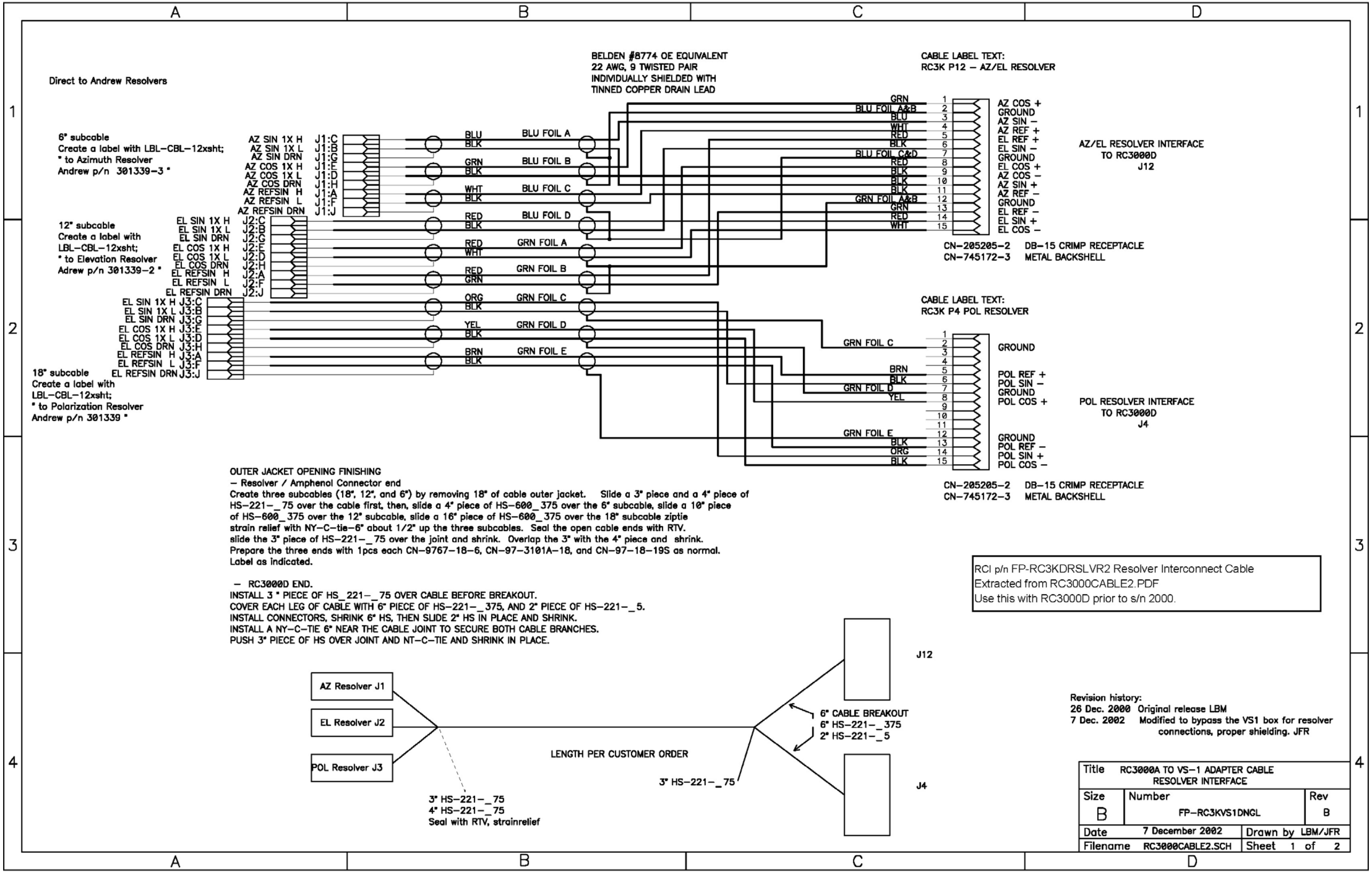
RCI p/n FP-RC3KDTRIXXX, contains FP-RC3KDCB2XXX and FP-RC3KINCLAND
RCI p/n FP-RC3KDCB2XXX, contains … RCI p/n FP-RC3KDCB2 with longer interface cables.

RC3000D – Andrew TriFold Interface Cable Revision History

Cable Function	**RCI p/n**	**Drawing Name**	**Description**	**RC3000 S/N**
VS-1 Command	FP-RC3KDVS1-1	RC3000CABLE.pdf (pg 2) or RC3000CABLE2.pdf (pg 2) or rc3000cable3.pdf (pg 2)	RC3000 to VS-1 command interface cable. Cable connectors … RC3000: Amphenol 97 series 3101A18, 19P insert VS-1: Amphenol 97 series 4106A20 Unshielded cable. This cable is usable with all RC3000D's. Length: 30 feet.	Before S/N 3090
VS-1 Command	FP-RC3KDVS1-2	rc3000cable4.pdf (pg 2)	RC3000 to VS-1 command interface cable. Cable connectors … RC3000: Amphenol 97 series 3101A18, 19P insert VS-1: Amphenol 97 series 4106A20 Shielded version of FP-RC3KDVS1-1. This cable is usable with all RC3000D's. To get the benefits of shielding with RC3000D's prior to S/N 3091, inside the controller, tie J7 terminal N to chassis ground. Length: 30 feet.	S/N 3091 and later
VS-1 Resolver	FP-RC3KDRSLVR1	RC3000CABLE.pdf (pg 1)	Original resolver interface cable. Used with early model RC3000D ACU's. Cable connectors … RC3000: (2x) D15 VS-1: Amphenol 97 series 4106A22 This cable was discontinued and replaced by FP-RC3KDRSLVR2. *This cable should not be used as a spare, instead use the RC3KDRSLVR2 cable.* Length: 30 feet.	Less than 2000
Resolver Interface	FP-RC3KDRSLVR2	RC3000CABLE2.pdf (pg 1)	Improved resolver interface cable. Used with early model RC3000D ACU's. Cable connectors … RC3000: (2x) D15 Antenna: Amphenol 97 series 3101A18, 19S insert This cable interfaces directly to each resolver cable bypassing the VS-1. This cable was adopted to provide more noise immunity. *Use this cable with RC3000D's with S/N < 2000.* Length: 30 feet.	Less than 2000
Resolver Interface	FP-RC3KDRSLVR3	RC3000CABLE3.pdf (pg 1) or RC3000CABLE4.pdf (pg 1)	Resolver interface cable for use with late mode RC3000D's (s/n >= 2000) Cable connectors … RC3000: (3x) D9 Antenna: Amphenol 97 series 3101A18, 19S insert This is FP-RC3KDRSLVR2 adapted for use with S/N 2000 and greater. *Use this cable with RC3000D's with S/N >= 2000.* Length: 30 feet.	Greater than or equal to 2000


BELDEN #8457 OR EQUIVALENT
22 AWG, 12 CONDUCTOR
CHROME PVC JACKET
P2-A [VS-1 CONTROLLER]
CABLE LABEL TEXT:
VS-1 P2-A (DRIVE)
CABLE LABEL TEXT:
RC3K P7-DRIVE
J7 TO RC3000D
AZ + EAST
AZ - EAST
AZ - WEST
AZ - FAST
AZ - SLOW
EL - DOWN
EL - UP
EL - FAST
EL - SLOW
POL - CCW
POL +CW
POL - CW
A BLU
B YEL
C BRN
D GRN
E GRY
F ORG
G VLT
H RED
I WHT
J BLK
K TAN
L PNK
M
N
YEL A
BRN B
GRN C
GRY D
ORG E
VLT F
RED G
WHT H
BLK J
PNK K
BLU L
TAN M
N
P
QTY 1 CN-97-4106A20
QTY 1 CN-9767-22-8
QTY 1 CN-9745-26S
QTY 1 CN-97-3106A22
QTY 1 CN-9722-19P
QTY 1 CN-9767-22-10
SLIDE ON A 3" PIECE OF HS-221_75 AND A 4" PIECE OF HS-221_75 ON EACH END BEFORE INSTALING CONNECTORS.
RCI p/n FP-RC3KDVS1-1 extracted from rc3000cable3.pdf.
OUTER JACKET OPENING FINISHING
SLIDE THE 3" PIECE OF HS-221-_75 OVER THE OPENING AND SHRINK.
INSTALL THE REMAINING 4" PIECE OF HS-221-_75 TO COVER THE PRECEEDING PIECE AND SHRINK.
BUILD UP DIAMETER OF CABLE WITH INSULATING MATERIAL TO FILL SHELL OPENING.
P2-A
J7
LENGTH PER CUSTOMER ORDER
Title RC3000D TO VS-1 ADAPTER CABLE
DRIVE INTERFACE
Size B
Number FP-RC3KVS1DNGL
Rev A
Date 25 May 2007
Drawn by LBM
Filename RC3000CABLE3.sch
Sheet 2 of 2


BELDEN #8774 OE EQUIVALENT
22 AWG, 9 TWISTED PAIR
INDIVIDUALLY SHIELDED WITH
TINNED COPPER DRAIN LEAD
CABLE LABEL TEXT:
VS-1 P1-A (RESOLVER)
CABLE LABEL TEXT:
RC3K P12 – AZ/EL RESOLVER
P1-A [VS-1 CONTROLLER]
AZ SIN 1X H
AZ SIN 1X L
AZ COS 1X H
AZ COS 1X L
AZ REFSIN H
AZ REFSIN L
EL SIN 1X H
EL SIN 1X L
EL COS 1X H
EL COS 1X L
EL REFSIN H
EL REFSIN L
POL SIN 1X H
POL SIN 1X L
POL COS 1X H
POL COS 1X L
POL REFSIN H
POL REFSIN L
BLU FOIL A
BLU FOIL B
BLU FOIL C
BLU FOIL D
GRN FOIL A
GRN FOIL B
GRN FOIL C
GRN FOIL D
GRN FOIL E
AZ COS +
GROUND
AZ SIN –
AZ REF +
EL REF +
EL SIN –
GROUND
EL COS +
AZ COS –
AZ SIN +
AZ REF –
GROUND
EL REF –
EL SIN +
EL COS –
AZ/EL RESOLVER INTERFACE
TO RC3000D
J12
CN-205205-2 DB-15 CRIMP RECEPTACLE
CN-745172-3 METAL BACKSHELL
CABLE LABEL TEXT:
RC3K P4 POL RESOLVER
GROUND
POL REF +
POL SIN –
GROUND
POL COS +
POL RESOLVER INTERFACE
TO RC3000D
J4
GROUND
POL REF –
POL SIN +
POL COS –
CN-205205-2 DB-15 CRIMP RECEPTACLE
CN-745172-3 METAL BACKSHELL
QTY 1 CN-97-4106A22
QTY 1 CN-9767-22-10
QTY 1 CN-9745-26P
ONLY ONE SHIELD WIRE IS CONNECTED AT P1-A END OF CABLE
OUTER JACKET OPENING FINISHING – P1-A END
SLIDE ON A 3" PIECE AND A 4" PIECE OF HS-221-_75 OVER THE CABLE BEFORE INSTALLING CONNECTORS.
INSTALL CONECTORS, SHRINK 3" PIECE OF HS, THEN SLIDE THE 4" PIECE OVER IT AND SHRINK
BUILD UP OPENING IN SHELL WITH INSULATING MATERIAL TO FILL SHELL OPENING
– RESOLVER END.
INSTALL 3 " PIECE OF HS_221-_75 OVER CABLE BEFORE BREAKOUT.
COVER EACH LEG OF CABLE WITH 6" PIECE OF HS-221-_375, AND 2" PIECE OF HS-221-_5.
INSTALL CONNECTORS, SHRINK 6" HS, THEN SLIDE 2" HS IN PLACE AND SHRINK.
INSTALL A NY-C-TIE 6" NEAR THE CABLE JOINT TO SECURE BOTH CABLE BRANCHES.
PUSH 3" PIECE OF HS OVER JOINT AND NT-C-TIE AND SHRINK IN PLACE.
OBSOLETE
RCI p/n FP-RC3KDRSLVR1 Resolver Interface Cable
Originally used with RC3000D prior to s/n 2000.
Use FP-RC3KDRSLVR2 as a replacement cable on RC3000D prior to s/n 2000.
J12
P1-A
6" CABLE BREAKOUT
6" HS-221-_375
2" HS-221-_5
LENGTH PER CUSTOMER ORDER
3" HS-221-_75
4" HS-221-_75
3" HS-221-_75
J4
Title RC3000A TO VS-1 ADAPTER CABLE
RESOLVER INTERFACE
Size B
Number FP-RC3KVS1DNGL
Rev A
Date 26 December 2000
Drawn by LBM
Filename RC3000CABLE.SCH
Sheet 1 of 2


Direct to Andrew Resolvers
BELDEN #8774 OE EQUIVALENT
22 AWG, 9 TWISTED PAIR
INDIVIDUALLY SHIELDED WITH
TINNED COPPER DRAIN LEAD
CABLE LABEL TEXT:
RC3K P12 – AZ/EL RESOLVER
6" subcable
Create a label with LBL–CBL–12xsht;
" to Azimuth Resolver
Andrew p/n 301339–3 "
AZ SIN 1X H J1:C
AZ SIN 1X L J1:B
AZ SIN DRN J1:G
AZ COS 1X H J1:E
AZ COS 1X L J1:D
AZ COS DRN J1:H
AZ REFSIN H J1:A
AZ REFSIN L J1:F
AZ REFSIN DRN J1:J
12" subcable
Create a label with
LBL–CBL–12xsht;
" to Elevation Resolver
Adrew p/n 301339–2 "
EL SIN 1X H J2:C
EL SIN 1X L J2:B
EL SIN DRN J2:G
EL COS 1X H J2:E
EL COS 1X L J2:D
EL COS DRN J2:H
EL REFSIN H J2:A
EL REFSIN L J2:F
EL REFSIN DRN J2:J
EL SIN 1X H J3:C
EL SIN 1X L J3:B
EL SIN DRN J3:G
EL COS 1X H J3:E
EL COS 1X L J3:D
EL COS DRN J3:H
EL REFSIN H J3:A
EL REFSIN L J3:F
EL REFSIN DRN J3:J
18" subcable
Create a label with
LBL–CBL–12xsht;
" to Polarization Resolver
Andrew p/n 301339 "
BLU BLK BLU FOIL A
GRN BLK BLU FOIL B
WHT BLK BLU FOIL C
RED BLK BLU FOIL D
RED WHT GRN FOIL A
RED GRN GRN FOIL B
ORG BLK GRN FOIL C
YEL BLK GRN FOIL D
BRN BLK GRN FOIL E
1 GRN AZ COS +
2 BLU FOIL A&B GROUND
3 BLU AZ SIN –
4 WHT AZ REF +
5 RED EL REF +
6 BLK EL SIN –
7 BLU FOIL C&D GROUND
8 RED EL COS +
9 BLK AZ COS –
10 BLK AZ SIN +
11 BLK AZ REF –
12 GRN FOIL A&B GROUND
13 GRN EL REF –
14 RED EL SIN +
15 WHT EL COS –
AZ/EL RESOLVER INTERFACE
TO RC3000D
J12
CN–205205–2 DB–15 CRIMP RECEPTACLE
CN–745172–3 METAL BACKSHELL
CABLE LABEL TEXT:
RC3K P4 POL RESOLVER
1
2 GRN FOIL C GROUND
3
4
5 BRN POL REF +
6 BLK POL SIN –
7 GRN FOIL D GROUND
8 YEL POL COS +
9
10
11
12 GRN FOIL E GROUND
13 BLK POL REF –
14 ORG POL SIN +
15 BLK POL COS –
POL RESOLVER INTERFACE
TO RC3000D
J4
CN–205205–2 DB–15 CRIMP RECEPTACLE
CN–745172–3 METAL BACKSHELL
OUTER JACKET OPENING FINISHING
– Resolver / Amphenol Connector end
Create three subcables (18", 12", and 6") by removing 18" of cable outer jacket. Slide a 3" piece and a 4" piece of HS–221–_75 over the cable first, then, slide a 4" piece of HS–600_375 over the 6" subcable, slide a 10" piece of HS–600_375 over the 12" subcable, slide a 16" piece of HS–600_375 over the 18" subcable ziptie strain relief with NY–C–tie–6" about 1/2" up the three subcables. Seal the open cable ends with RTV. slide the 3" piece of HS–221–_75 over the joint and shrink. Overlap the 3" with the 4" piece and shrink. Prepare the three ends with 1pcs each CN–9767–18–6, CN–97–3101A–18, and CN–97–18–19S as normal. Label as indicated.
– RC3000D END.
INSTALL 3 " PIECE OF HS_221–_75 OVER CABLE BEFORE BREAKOUT.
COVER EACH LEG OF CABLE WITH 6" PIECE OF HS–221–_375, AND 2" PIECE OF HS–221–_5.
INSTALL CONNECTORS, SHRINK 6" HS, THEN SLIDE 2" HS IN PLACE AND SHRINK.
INSTALL A NY–C–TIE 6" NEAR THE CABLE JOINT TO SECURE BOTH CABLE BRANCHES.
PUSH 3" PIECE OF HS OVER JOINT AND NT–C–TIE AND SHRINK IN PLACE.
RCI p/n FP-RC3KDRSLVR2 Resolver Interconnect Cable
Extracted from RC3000CABLE2.PDF
Use this with RC3000D prior to s/n 2000.
AZ Resolver J1
EL Resolver J2
POL Resolver J3
3" HS–221–_75
4" HS–221–_75
Seal with RTV, strainrelief
LENGTH PER CUSTOMER ORDER
3" HS–221–_75
6" CABLE BREAKOUT
6" HS–221–_375
2" HS–221–_5
J12
J4
Revision history:
26 Dec. 2000 Original release LBM
7 Dec. 2002 Modified to bypass the VS1 box for resolver connections, proper shielding. JFR
Title RC3000A TO VS–1 ADAPTER CABLE RESOLVER INTERFACE
Size B
Number FP–RC3KVS1DNGL
Rev B
Date 7 December 2002
Drawn by LBM/JFR
Filename RC3000CABLE2.SCH
Sheet 1 of 2

6.0 Revision History

20 March, 2008 – Add Revision History section, S Mikinski
The text of the RC3000D TriKit Installation Manual has not changed since the original version of the RC3000D. There have been 4 different cable Resolver and VS1 Cable drawings. When each rev occurred the interconnect cable drawings in the installation manual were replaced via Acrobat page insertion/deletion.

Cable used for VS-1 Drive cable was changed to a shielded cable. Wire colors changed as well. The cable drawing is RC3000CABLE4.pdf.

Here are the revisions to the TriKit_Install_050305ckj.doc document …

The block diagram of section 1.2 was revised to properly depict the resolver connections.
In section 1.2, item 4 was eliminated.
Section 1.3.2 was removed. Sections 1.3.3 and 1.3.4 in the original document were renamed 1.3.2 and 1.3.3 respectively.
Modify section 2.2.11 to note that all RC3000D's normally include support for the PC Remote Control option.
Modify section 2.2.12 to remove the reference to the Pol Resolver connection.
Modify section 2.3.1 to state that all RC3000D's after S/N 2000 can accept either 115 or 230 VAC.
Section 3, include the inclinometer sensor p/n and data sheet.
Add a section on the RCI p/n for the TriFold Installation Kit and on the Interconnect Cable revision history.

25 May 2007 – Revision - Interconnect cables changed (RC3000CABLE3.SCH replaced RC3000CABLE2.SCH). TriKit_Install_061407dpb.pdf – created via PDF page deletion/substitution

3 Amphenol connectors (Andrew AZ/EL/POL resolvers) to 3 DB9 connectors (RC3000—J16 AZ resolver, J17 EL resolver, and J18 POL resolver).

7 December 2002 – Revision - TriKit_Install_050305ckj.doc, drawings added to word document, Interconnect cables changed (RC3000CABLE2.SCH replaced RC3000CABLE.SCH)

3 Amphenol connectors (Andrew AZ/EL/POL resolvers) to 2 DB15 connectors (RC3000—J12 AZ/EL resolvers and J4 POL resolver).

26 December 2000 – Initial Drawing: Source Document:RC3K TriKit.doc, date 2.6.01, written by C. Jones, drawings not included, just references to PDF's
PDF (with drawings): TriKit_Install.PDF, date 2.6.01
Antenna Interconnect Cabling: RC3000CABLE.SCH 1 single Amphenol connector (VS-1 P1-A [Resolver] to 2 DB15 connectors (RC3000—J12 AZ/EL resolvers and J4 POL resolver).