INSTALLATION FIELD MANUAL

Design, Start-Up, Check-Out, and Trouble-shooting

AKCESS 25 Rack Controller NC25-4

(with notes pertaining to the NC25-3)

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July 23, 1993

This Field Manual contains Installation, Start-Up, and Trouble-shooting information for the NC25-4 AKCESS 25 Rack Controller, and includes reference material for the NC25-3. For detailed operating instructions, an NC25-4 User Manual is shipped by Danfoss with each controller.

This publication is a collection of explanations and procedures to which many people contributed. Use the Table of Contents to find the section you need right now. You may well find it useful later to browse through the entire manual.

To Danfoss, continued improvement to documentation goes hand-in-hand with the product refinement and quality for which Danfoss is world famous. We welcome your suggestions for additions or improvements to any of our manuals or other literature. Please address your comments to:

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For Additional Information -- Other Relevant Danfoss Automatic Controls Publications:

NC25-4 Rack Controller User Manual
Database Preparation Manual (BUILD) (for those who have taken Course 301)
AKC16 User Manual (available printed and on disk)
AKC16 Technical Brochure
AKC16 Sales Brochure

1.0 SYSTEM DESIGN

This section provides guidelines and reference material for OEM's and re-sellers. It is not intended as a replacement for formal Danfoss training (Course) on the equipment. Understanding both of the NC25 and of the equipment to be controlled, is assumed.

1.1 Hardware Overview

A Danfoss control system consists of a CPU board (Central Processing Unit -- the main computer), peripheral boards, a power transformer, and a number of input sensors and output devices. These components, in various enclosures, are interconnected to form a control network. Normally, an OEM or re-seller configures the system to suit the particular requirements of their customer, and develops a standard configuration for a particular application.

1.2 First Step in Design.. The Population Form

The first step in system design is to prepare an NC25 Population Form, which will list all the inputs and outputs and allow you to select the boards needed for the application. A set of Hardware Quick Reference Guides (QRG's) is found in Appendix A to this manual, and QRG pages 7 and 7a are blank NC25 Population Forms. Copies of this form can be used as worksheets in tuning your design. When the design is finalized, send a copy of the form to the person who will prepare the database for the unit.

First, make a list of all the analog devices you will be using, including pressure transducers, temperature sensors, humidity sensor, etc. Make a list, too, of the devices you need to control: compressors, condenser fans, valves, etc. Finally, make a list of the devices for which you want digital inputs -- those you want to monitor for actual run time and function. Each of these lists should be organized in an order dictated by the end user's criteria; or, in the absence of formal criteria, put the lists in logical order for ease of use with the controlled equipment.

Rearrange the items on your lists, if necessary, to present the logical order you want. Then transfer each list to the NC25 population form.

1.3 Systems with AKC Smart Case Controllers

For systems with AKC Smart Case Controllers, complete an AKC Master-Slave Schedule. A blank Master-Slave schedule will be found in the Standard Drawings appendix to this Field Manual.

1.4 Control Monitor Data Sheet

In addition, or as an alternative, you may wish to complete an NC25 Control Monitor Data Sheet, particularly if the system is extensive. A blank NC25 Control Monitor Data Sheet will be found in the Standard Drawings section of this Field Manual.

1.5 Selecting Analog Boards And Sensors

Two types of analog input boards are available, the DDAI8-T1 and the DDAI8-TP. There is one analog output board, the DDAO4. These all connect to the system in the same manner, but differ in the types of sensors and method of analog-to-digital conversion used. Before selecting the boards for your system, you need to select the sensors you will be using.

Almost any linear sensor that provides a 0-5 vdc output signal, most 0-50 mv differential pressure transducers, and most 4-20 ma sensors can be effectively used with NC systems. Still, it's best where possible to use Danfoss sensors. Each Danfoss sensor type has been thoroughly tested with NC25 components; each sensor is of consistent high quality; and Danfoss technical support personnel are fully-informed about Danfoss sensors.

Take care in selecting sensors so that conditions will not exceed the upper limit of the sensor range. See the "Caution" following section 1.62 of this Field Manual.

1.51 Danfoss Sensors

Sensors available from Danfoss Automatic Controls include:

- Temperature probes
- Pressure transducers
- Humidity sensors
- Photocells
- Refrigerant leak detectors

1.511 Pressure Transducers

AKS32

0-200 psig (part #060G0040) or 0-500 psig (part #060G0041)
Requires DDAI8-T1 or DDAI8-TP analog input board

AKS31R

0-200 psig (part #060G2030) or 0-500 psig (part #060G2031)
Ratiometric -- requires DDAI8-TP analog input board

References:
Specification sheet
Hardware Quick Reference Guides 2, 4, and 6.

1.512 Thermistor Temperature Probes

THERM3	-30 °F to 125 °F	
THERM3B-1	-30 °F to 125 °F (with outdoor enclosure)	
THERM3-LO	-60 °F to -10 °F	
THERM3-HI	32 °F to 250 °F	
BTP	high temp sensor with stainless sleeve for boiler insertion	
CP3	case probe assembly with 22′ cable	-30 °F to 125 °F
CP3-LT	case probe assembly with 22′ cable	-60 °F to -10 °F
CP3-HT	case probe assembly with 22′ cable	-32 °F to 250 °F
ASTP3	air duct probe assembly	
ZTP3	wall-mount zone temperature assembly	

Require DDAI8-T1 or DDAI8-TP analog input board

References:
Specification sheets
Hardware Quick Reference Guides 2, 4, and 6

1.513 Humidity/ Temperature Sensor

EMHS-1 combination assembly in wall-mount enclosure

Requires DDAI8-T1 or DDAI8--TP analog input board
References:
Specification sheet
Hardware Quick Reference Guides 2, 4, and 6

1.514 Photocell/ Temperature Sensor

PHOTOZX3-1 Photocell output in foot-candles
Temperature range -30 °F to 125 °F
combination assembly in wall-mount enclosure

Requires DDAI8-T1 or DDAI8-TP analog input board
References:
Specification sheet
Hardware Quick Reference Guides 2, 4, and 6

1.515 Refrigerant Leak Sensors

LD1011	R11-specific
LD1012	R12-specific
LD1022	R22-specific
LD1113	R113-specific
LD1114	R114-specific
LD1124	R124-specific
LD1134a	R134a-specific
LD1502	R502-specific

All require DDAI8-T1 or DDAI8-TP analog input board
References:
Specification sheets
Hardware Quick Reference Guides 2, 4, and 6

1.52 4-20 ma Sensors

If use of 4-20 ma sensors is essential, place a 280 Ω resistor across the input terminals, effectively converting the signal to a 1-5 vdc input. (280 Ω is used rather than 250 Ω, which would be the theoretical solution using Ohm's Law because of the danger of input current in excess of 20 ma flooding the analog-to-digital conversion circuitry).

1.53 Conversion Factors

Software conversion to a reading in customary units (degrees, psi, etc.) requires a ***conversion factor***, which is introduced

when the NC25's database is written. If sensors of a different type are substituted after the database is written, a change to the conversion factor in the database may be required.

1.54 Two kinds of Sensors: *Ratiometric* and *Absolute*

A *ratiometric* sensor's resistance changes as its temperature changes, but the sensed value is computed from the ratio of voltage supplied to that returned, and the value is independent of supply voltage.

An absolute sensor's resistance changes as its temperature changes, too, but its output voltage is compared not against the supply voltage, but against a fixed number to which the supply voltage must be adjusted in order to calibrate the sensor.

1.6 ANALOG INPUT BOARDS

1.61 DDAI8-T1 Analog Input Board

The DDAI8-T1 is the most common analog input board used in Danfoss NC systems; it reads up to eight three-wire analog sensors, and will serve all Danfoss sensors except the AKS31R pressure transducer, which is a four-wire ratiometric device. The name DDAI8-T1 is derived from the words Direct Digital Analog Input (8-channel) - Temperature (revision 1). The DDAI8-T1 mounts in 3-inch snap track.

1.62 DDAI8-TP Analog Input Board

The DDAI8-TP is used with four-wire sensors such as the Danfoss AKS31R pressure transducer; it reads up to eight four- or three-wire analog sensors. The name is derived from Direct Digital Analog Input (8-channel) - Temperature Pressure. The DDAI8-TP mounts in 3-inch snap track.

Either four-wire or 3-wire ("single-ended") sensors can be used with a DDAI8-TP. There is a Berg jumper (JP1-1 to JP1-8) for each analog input. If the jumper is in place, the corresponding analog input channel hardware is set up for a four-wire sensor. The jumper is removed for use with a three-wire sensor.

Caution

Take care to select sensors so that they are only infrequently subject to conditions at the top of their range. The DDAI8 boards will not read signals above 5 vdc or 40 mV, and if signals too far outside the normal range are applied to the inputs, the A-to-D conversion circuit may become "flooded" so that all channels read erratically. This can result in erratic functioning of equipment whose control strategy is dependent upon analog measurements.

1.7 DDAO4 ANALOG OUTPUT BOARD

The DDA04 provides 4 analog outputs in two ranges, 0-5 vdc

and 0-10 vdc. The name is derived from Direct Digital Analog Output (4-channel). Up to 8 DDAO4's can be used with an NC25, but regardless of the number of DDAO4's used, each one's 4 outputs must occupy four consecutive control points within the first 32; and each group of four must begin at control point number 1, 5, 9, 13, 17, 21, 25, or 29. The DDAO4 mounts in 3-inch snap track.

1.8 DIGITAL I / O BOARDS

Digital I/O boards for NC systems include two input/output boards, the DDIO8 and the DDIO16; two output boards, the DDOUT and the DDATC; and two input boards, the DDIN-DC and the DDIN-AC; all connect to the DD bus in the same manner.

1.801 About Digital Outputs

Digital outputs are provided by dry contact relays with normally open, normally closed, and common terminals. The common terminal is fused at 5 A (resistive), and the normally open and normally closed contacts are bypassed to the common terminal with a .22 µF capacitor. The capacitor, while minimizing electrical noise generation from contact bouncing and arcing, will pass sufficient leakage current to power a neon lamp or other high impedance device.

1.802 About Digital Inputs

Digital inputs are optically isolated and jumper-selectable for either a high range (150-250 VAC), a low range (12-150 VAC), or 15 vdc. Each digital input has an LED to indicate when power is applied to the input terminals. Under some circumstances, it is necessary or advisable to bypass the digital input with a capacitor or resistor when the digital inputs are high impedance or if the monitored device produces enough leakage current to activate the input and give a false ON signal when the monitored device is actually off.

1.81 DDOUT Digital Output Board

(Primarily NC10)

The DDOUT (Direct Digital Output) board, developed for use with the NC10, has 6 dry contact digital outputs, and is connected to the DD bus to an NC10. It mounts in 3-inch snap track.

Although the DDOUT was developed for connection on the DD bus of an NC10, it may be used on an NC25 I/O bus with outputs 7 and 8 of its address space "wasted," since the DDOUT has only 6 channels.

1.82 DDATC Digital Output Board (Discrete Parallel Control)

(Primarily NC10)

The DDATC (Direct Digital Automatic Temperature Control) board, developed for use with the NC10, has 6 dry contact digital outputs and an ATC relay that enables it to be used with another, parallel control pathway. It mounts in 3-inch snap track.

Although the DDATC was developed for connection on the DD bus of an NC10, it may be used on an NC25 I/O bus with outputs 7 and 8 of its address space "wasted," since the DDATC has only 6 channels.

1.83 DDIN-DC Digital Input Board

The DDIN-DC Direct Digital INput - Direct Current board, developed for use with the NC10, has 7 optically-isolated inputs; each input is also fused. The DDIN-DC mounts in 3-inch snap track.

Although the DDIN-DC was developed for connection on the DD bus of an NC10, it may be used on an NC25 I/O bus with input 8 of the board address space "wasted," since the DDIN-DC has only 7 channels.

1.84 DDIN-AC Digital Input Board

The DDIN-AC Direct Digital INput - Alternating Current board, developed for use with the NC10, has 7 optically-isolated digital inputs; each input is also fused. The DDIN-AC mounts in 3-inch snap track.

Although the DDIN-AC was developed for connection on the DD bus of an NC10, it may be used on an NC25 I/O bus with input 8 of the board address space "wasted," since the DDIN-AC has only 7 channels.

1.841 DC Inputs to a DDIN-AC

When using dc input signals with a DDIN-AC, the inputs are polarity-sensitive, and the inputs will not be readable unless polarity is observed.

1.85 DDIO8 Digital Input-Output Board

The DDIO8 Direct Digital Input -Output (8-channel) board is the smaller of two available combination input-output boards for use on the DD bus of an NC25. It has 8 dry contact digital outputs and 8 optically-isolated digital inputs. The DDIO8 mounts in 5-inch snap track.

1.851 Switched and Un-switched +12 vdc

In addition to the DD bus connection, the DDIO8 has two +12 vdc (nominal; may range from 8.5-16 vdc) terminals for use with external relay logic and to provide sensor power. One of the two +12 vdc terminals (1 Amp) is labelled "switched," and the other (0.5 Amp) "un-switched." The un-switched should be used to power sensors like three-wire pressure transducers, and the switched should be used to power external control relays. Using the +12 vdc supplies in this manner, when the system is first given power (or after a reset) the external control relays and logic will not be activated until software turns on the external relay power, but analog data from sensors will be available so that the NC25 can make

decisions based on accurate data.

1.852 Fusing

Switched 12 vdc is fused at 1 A because it also powers the on-board output relays; un-switched 12 vdc is fused at 0.5 A.

On-board relays are fed by switched power so that they will fail to a known state when control is lost or power is interrupted or low.

Although the DDIO8 was developed for connection on the DD I/O bus of an NC25, it may be used on an NC10 DD bus with two outputs and one input non-functional.

1.86 DDIO16 Digital Input-Output Board

The DDIO16 Direct Digital Input -Output (16-channel) board is the larger of two available combination input-output boards for use on the DD bus of an NC25. It has 16 dry contact digital outputs and 16 optically-isolated digital inputs. The DDIO8 mounts in 5-inch snap track.

1.861 Expansion I / O

Systems with more than 32 points must use the optional NC25 expander board, to which one DDIO16 board can be connected; that board must be addressed as board 1. (There can thus be both a board 1 on the main NC25 DD I/O bus and a board 1 on the expander board bus.)

1.862 Switched and Unswitched +12 vdc

In addition to the DD bus connection, the DDIO16 has two 0.5A+12 vdc (nominal; may range from 8.5-16 vdc) terminals for use with external relay logic and to provide sensor power. One of the two +12 vdc terminals (1 Amp) is labelled "switched," and the other (0.5 Amp) "unswitched." The unswitched should be used to power sensors like three-wire pressure transducers, and the switched should be used to power external control relays. Using the +12 vdc supplies in this manner, when the system is first given power (or after a reset) the external control relays and logic will not be activated until software turns on the external relay power, but analog data from sensors will be available so that the NC25 can make decisions based on accurate data.

Although the DDIO16 was developed for connection on the DD I/O bus of an NC25, it may be used on an NC10 DD bus, but only 12 of its outputs and only 14 of its inputs will be functional.

2.0 HARDWARE LAYOUT AND WIRING CONSIDERATIONS

2.01 Control Panel Layout

If the NC25 is not going to be used in the standard box enclosure, but is being integrated into an OEM control panel, there are some important considerations about component location to take into account now.

2.02 Separation of Wiring Classes

High voltage (class 1, >30 v) must be separated from low voltage (class 2, <30 v). Locations of peripheral boards (DDIO, DDAI, DDAO) should be planned for best separation. Then plan to run each class in its own set of wireways. Where classes are not well separated, there will be fluctuation in analog readings, relay chattering, and other problems, including, in extreme cases, sporadic and system resets.

2.03 Class 2 in NC25 Systems

In an NC25 system, the analog inputs, analog outputs, and ribbon cables are class 2 wiring. Both can have their signals severely disrupted by noise engendered by nearby high voltage wiring.

2.1 RIBBON CABLES

2.101 The DD Bus

A 26-line ribbon cable connects the peripheral boards to the CPU, and carries digital data between them, hence its name, DD Bus. In an NC25, the DD Bus has two cable designations; there is an analog I/O cable and a digital I/O cable. At an NC10, both analog and digital functions are combined and are served by a single ribbon cable. We will discuss NC10 and NC25 cabling separately in this manual.

2.102 About Ribbon Cables

Caution ...
Three foot limit !

DD bus ribbon cable is available from Danfoss Automatic Controls in a standard configurations. OEM's may fabricate ribbon cables for special applications, but remember that the maximum length must be no more than 3 feet. Board locations need to be planned with this limitation in mind. Longer cables may seem to function properly, but consistent results cannot be guaranteed.

Caution ...
Keep away from high voltage !

Remember that all DD bus ribbon cables must be separated from class 1 wiring. Failure to do so can result in erratic functioning of or damage to the NC25, the I/O boards, or both, due to electrical noise.

2.11 NC25 ANALOG I / O RIBBON CABLE

An NC25 can have one or two analog I /O ribbon cables: one connected to the NC25 CPU board, and one connected to the optional expander board. Analog I /O ribbon cables connect analog input (DDAI-) boards and analog output boards (DDAO-) to the NC25.

2.111 NC25 Analog Capacities

The CPU ANALOG I / O CABLE can connect:
up to 4 analog input boards, and
up to 8 analog output boards to the NC25.

An EXPANDER BOARD ANALOG I / O CABLE can connect:
up to 2 analog input boards to the NC25.
No analog output boards can be connected to an expander board analog I /O ribbon cable.

2.12 NC25 DIGITAL I / O RIBBON CABLE

An NC25 can have one or two digital I/O ribbon cables: one connected to the NC25 CPU board, and one connected to the optional expander board. Digital I/O ribbon cables connect digital input boards (DDI-) and digital output boards (DDO-) to the NC25.

2.121 NC25 Digital Capacities

The CPU DIGITAL I / O CABLE can connect:
up to 4 digital input boards, and
up to 4 digital output boards to the NC25.

An EXPANDER BOARD DIGITAL I / O CABLE can connect:
up to 2 digital input boards, and
up to 2 digital output boards to the NC25.

Note, however, that combination digital boards, which offer both inputs and outputs, count as more than one board -- one input and one output. As an example, the DDIO8 board counts as one digital input board and one digital output board; the DDIO16 board counts as 2 digital input boards and 2 digital output boards. Management of the "board count" is covered in more detail in the section on Board Addressing.

2.13 NC10 Ribbon Cable

Like the NC25 ribbon cables, the NC10 ribbon cable is used to connect I/O boards to an NC10, but both analog and digital I/O boards are connected to the NC10 on a single ribbon cable.

2.131 NC10 I / O Capacities

An NC10 processor has 4 input and 3 output channels. These can be used for analog input, digital input, and digital output boards; analog output boards can not be connected to NC10's.

Each digital input board requires one input channel. Each digital output board requires one output channel. Each analog input board requires one input channel; *the use of analog any number of analog input boards, from 1 to 4, requires one*

output channel as well as the required input channels.

2.132 Maximum Configurations per NC10 Processor

The following maximum NC10 configurations are allowable:

Analog Input Boards:	Digital Input Boards:	Digital Output Boards:
4	0	2
3	1	2
2	2	2
1	3	2
0	4	3
0	0	3

Note: the NC10 ribbon cable connector for the NC10 is reversed from the connectors for the other boards, and *must* be used only for the NC10.

3.0 BOARD MOUNTING

Caution

Peripheral boards (input and output boards) are designed to be mounted in 3-inch or 5-inch snap track. When mounting the snap track to an enclosure, be sure not to use screws with heads large enough to short traces on the underside of the circuit board. Remember that there is only about 1/4 inch of clearance between the back of the board and the snap track. Nylon cap nuts should be used in close situations. Shorting a board to the enclosure will almost without exception cause a failure.

3.1 SYSTEM GROUNDING

NC25 and NC10 systems must have a solid **earth ground** (grounding rod or cold water pipe -- if the latter, insure that the pipe is conductive metal all the way to ground, with no intermediate PVC or other non-conductive segments).

Conduit grounds are not adequate.

Taking care to observe these grounding requirements will prevent voltage potential differences from developing during equipment failures or lightning strikes.

A separate ground lug should be mounted in each enclosure, where the system ground is connected to both earth ground and chassis ground.

When connecting system grounds, be sure to interconnect all ground terminals on the I/O boards (except DDAO4 analog output boards), and then connect the resulting ground bus to chassis or earth ground (remember, chassis ground and earth ground must be connected).

When networking several NC25's on an RS485 bus, it is

important to physically connect metallic ground conductors between each and every control component in the system. This ground wire is in addition to cable shields, which*must* be grounded *only* at the master controller.

These grounding measures will improve communication by reducing noise and provide protection during lightning.

4.0 BOARD ADDRESSING

After configuration of the system, each board must be physically given its system address, so that commands to it and data from it will be correctly received and sent.

4.1 INPUT-OUTPUT BOARDS

4.11 DDIO8

The DDIO8 is addressed as one 8-channel output board and one 8-channel input board. Berg-type board select jumpers are provided for selecting the board's input and output addresses.

4.12 DDIO16

The DDIO16 is addressed as two 8-channel output boards and two 8-channel input boards. Berg-type board select jumpers are provided, but unlike the DDIO8, DDIO16's can be set as either board 1 or board 2. If two DDIO16's are used, they are set as boards 1 (points 1-16) and 2 (points 17-32). If a single DDIO16 and a DDIO8 are used for up to 24 points, then the DDIO16 must have its Berg selector jumper set as board 1 and the DDIO8 must be set as board 3. This system could be later expanded to 32 points by adding a DDIO8 as board 4.

4.2 ANALOG INPUT BOARDS

4.21 DDAI8-T1
4.22 DDAI8-TP

Addresses are set with Berg jumpers on each card.
On the CPU BOARD ANALOG I /O CABLE,

Board Address 1	Analogs 1-8
Board Address 2	Analogs 9-16
Board Address 3	Analogs 17-24
Board Address 4	Analogs 25-32

On the EXPANDER BOARD ANALOG I /O CABLE,

Board Address 1	Analogs 33-40
Board Address 2	Analogs 41-48

4.3 DIGITAL INPUT AND OUTPUT BOARDS

4.31 DDOUT
DDIN-AC
DDATC

Addresses are set with Berg jumpers on each card.
On the CPU BOARD DIGITAL I /O CABLE,

Board Address 1	Digitals 1-8
Board Address 2	Digitals 9-16

Board Address 3 Digitals 17-24
Board Address 4 Digitals 25-32
On the EXPANDER BOARD DIGITAL I /O CABLE,
Board Address 1 Digitals 33-40
Board Address 2 Digitals 41-48

We work with groups of 8 channels, even though boards can have 2, 4, 8, or 16 I/O channels. A DDIO16 board, for example, has 16 digital outputs and 16 digital inputs. To the system software, however, the board has 4 addresses, and there are 4 Berg jumpers, one for each set of 8 outputs, and one for each set of 8 inputs.

Digital boards with less than 8 channels

There are some boards which have less than 8 channels. The DDIN-AC, used to monitor high voltage AC, has only 7 digital inputs. A DDOUT board has only 6 digital outputs. Nevertheless, each of these boards occupies a block of 8 NC25 inputs or points.

4.4 THE DDAO4 ANALOG OUTPUT BOARD

A DDAO4 analog output board's four control points are Berg jumper selectable as NC25 control points 1-4, 5-8, 9-12, 13-16, 17-20, 21-24, 25-28, or 29-32. The Berg jumper positions on the board are marked with the control point numbers.

5.0 START-UP AND CHECK-OUT PROCEDURES

You can avoid or isolate and correct initial problems by following this procedure.

To perform these procedures, you will need:

A multimeter

A portable computer with Danfoss COMM or terminal-emulation program, or a terminal. Set your terminal communication parameters as follows:

9600 bps, 8 data bits, 1 stop bit, no parity.
Handshaking protocol: X-ON
Mode: full duplex
Terminal emulation: WYSE 50

5.1 Before applying power

21-1. disconnect all ribbon cables going to DO, DI, AO, and AI boards
21-2. disconnect any RS485 cables (J5, J10).
21-3. set the unit's address to 0 using the dip switches (SW1)
21-4. be sure the RS232 port is active by setting the Berg jumper (JP6)
21-5. now connect your terminal or laptop to the RS232 port (J6).
21-6. Confirm that the power jumpers [see fig] are in place for the power source being used (120/240 VAC).
21-7. Connect the 12 VAC power cable to the NC25 (J7).
21-8. APPLY POWER TO THE TRANSFORMER.

Something should appear on the display, which could be 1 x 24 LED, 2 x 40 non-backlit LCD, or 4 x 40 backlit LCD. After touching RETURN or ENTER on your terminal or laptop, you should see one or more "AUTH" prompts on the screen. If not, check that all the earlier steps have been correctly performed and try again.

5.2 Analog Check-Out

22-1. Turn off power to the NC25 and connect the analog ribbon cable to one DDAI8. Set your digital multimeter to a scale that will read 5 vdc and hold the leads to the 5 vdc and ground terminals of the DDAI8.

22-2. Apply power to the NC25 and read your meter. The voltage should be at least 4.95 vdc.

22-2t1. If the reading is less than 4.95 vdc, immediately turn off NC25 power and disconnect all wires going to the 5 vdc terminals of the DDAI8. It is probable that a sensor is shorted.

22-2t2. Turn NC25 power on.

22-2t3. Checking your meter for each wire, touch one

wire at a time to the 5 vdc terminal until you find which sensor is shorted.

22-2t4. After shorts are cleared, view each analog readings for approximate accuracy on either the display or your terminal. For trouble-shooting tips, see NC25 Quick Reference Guide #8.

22-3. Repeat this procedure for each DDAI8.

5.3 Digital Check-Out

23-1 Turn off NC25 power

23-2 Connect the DO/DI ribbon cable to one DDIO8/16

23-3 Restore power. Using software ON and OFF commands (for a discussion of software commands, see the NC25-4 User Manual), exercise each output and confirm any associated inputs. For troubleshooting tips, see NC25 Quick Reference Guides #9 and #10.

23-4. Repeat this procedure for each DDIO8/16.

5.4 Fine Adjustment of Analogs

Fine tuning requires two people with walkie-talkies, one at the sensor and one at the NC25. The objective is to verify identification of each sensor and to put in any necessary adjustments. You should have instruments as needed for the types of analogs you will be checking: (refrigeration thermometers [it is helpful to have several], pressure gauges, a psychrometer (for checking humidity), etc.

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