



# Auxiliary Drive to ISBus Interface Board IS200ADIIH\_A\_ \_

## Safety Symbol Legend



### Warning

Indicates a procedure or condition that, if not strictly observed, could result in personal injury or death.

*These instructions do not purport to cover all details or variations in equipment, nor to provide every possible contingency to be met during installation, operation, and maintenance. If further information is desired or if particular problems arise that are not covered sufficiently for the purchaser's purpose, the matter should be referred to GE Industrial Systems.*

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### Caution

Indicates a procedure or condition that, if not strictly observed, could result in damage to or destruction of equipment.

**Note** Indicates an essential or important procedure or statement.

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# Functional Description

The IS200ADII Auxiliary ISBus (Innovation Series™ Bus) Interface board (ADII) interfaces an AcDc2000 drive to an ISBus Local Area Network (LAN). The ADII board resides on the backside of the first board carrier of the AcDc2000 drive.

The ADII board connects to the DS200LDCC Drive Control/LAN Communications board (LDCC) through the LNPL ribbon cable and COM1 wire. The ADII board receives power through the 2PL power cable from the AcDc2000 drive's power supply board. The ADII board includes a bypass relay to maintain ISBus electrical continuity if the drive is powered down (no external bypass module is required).

The interface signal map is derived from the Innovation Series drive system applications signal map. Many references and feedbacks are generic and AcDc2000 drive blockware must be created to imitate the Innovation Series drive functionality. The ADII board provides an integer variable map between the drive and controller. The integers must be scaled to the AcDc2000 units (given in the signal map definition). Configuration of the interface is done with either the local keypad on the LDCC board (see Figure 1) or the GE Control System Toolbox (toolbox). Refer to the section, *Data Mapping*.

The ADII board has no fuses or hardware jumpers. Refer to the section, *Application Data* for information on the LED indicators, testpoints, and connectors that are on the board.

**Note** The ADII board can only be used in AcDc2000 drives that have the LDCC board. It cannot be used with previous design drive control and LAN communication boards.

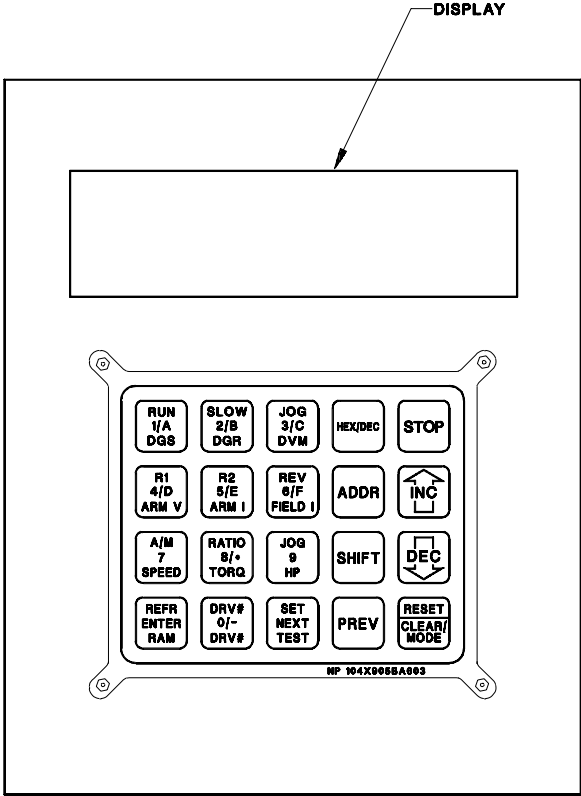


Figure 1. Keypad with Display

## ISBus

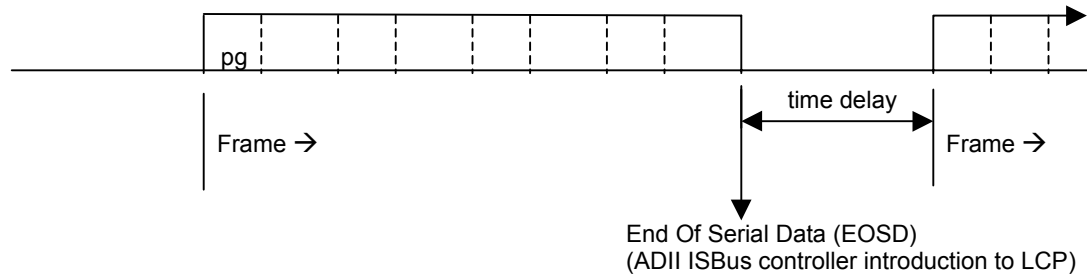
The ISBus has one controller (drop 0) and no more than 31 nodes (1-31). The master sends out a stream of bytes containing each ISBus node's references. As the nodes receive the stream of bytes, they pass the stream on to the next node substituting their own feedback data in place of their reference data in the stream. When the stream of bytes return to the master, it contains each nodes feedback data.

The ISBus frame rate is programmable and can be 1, 2, 4, or 8 milliseconds (ms). The ADII board requires a time delay of 200  $\mu$ sec. This allows the LAN Control Processor (LCP on the LDCC board) to write the drive's feedbacks into the ISBus controller prior to the start of the next frame. The delay time at the end of a frame is shown in Table 1. This time is valid as long as the number of pages per the frame rate is not exceeded.

Table 1. Frame End Delay Time

Frame Rate (ms)	Number of AcDc2000 drives*	End of Frame Delay Time ( $\mu$ s)
1	4	200
2	8	400
4	16	800
8	32	1600

\*AcDc2000 drives use a double page (refer to the following timing diagram).



2  $\mu$ s per byte (5 Mbits/s baud rate)

64  $\mu$ s per page

1 page = 1 cell = 8 variables (variable = 4 bytes in length)

1 double page = 2 cells = 16 variables

## Connections

The ADII board interfaces to the ISBus through two RJ45 connectors, P2 (TX/OUT) and P3 (RX/IN). The user's cables are run into the drive package and directly to the ADII board.

The TX/OUT connector (P2) ties to the RX/IN connector (P3) of the next device on the ISBus. The RX/IN connector (P3) ties to the TX/OUT connector (P2) of the previous device on the ISBus.

## Performance

On the ISBus, the controller sends control bits and references for each drive in a single stream of bytes. The first drive wired to the controller receives the stream of bytes, retrieves its command bits and references, and passes the stream of bytes onto the next drive substituting its feedback bits and variables for the command bits and references. When the controller receives the stream of bytes from the bus, it is receiving the feedback bits and feedback variables from the drives.

The ISBus scan time can be selected to be 1, 2, 4, or 8 ms. These times are limited to the number of devices on the bus. See Table 2 for performance factor descriptions.

Table 2. Performance Factors

Performance Factor	Description
Control logic sweep rate	Time required for a sweep of the control logic being executed in the controller (typically measured in ms).
Configured frame time of the ISBus	1, 2, 4, or 8 milliseconds (Set by the master).
Types of devices on the bus	The contribution of each device to the bus sweep rate varies with the quantity of I/O data being exchanged with the controller. Each AcDc2000 drive contributes about 0.20 ms (200 $\mu$ s). This data is used in calculating what the frame time should be.
Quantity of devices on the bus	As the number of devices on the bus grows, so does the bus sweep rate. This data is used in calculating what the frame time should be.
AC/DC2000 LCP to DCP	LCP will pass the reference bits and references to the drive control processor (DCP) in one ms time with an average of 500 $\mu$ s.
AD/DC2000 DCP Algorithms	Many of the references are passed to the DCP in generic setpoint variables. These variables are read by the DCP at different update times (11, 22, or 44 ms).
AD/DC2000 DCP Algorithms	Many of the feedbacks are passed from the DCP in generic feedback variables. These variables are written by the DCP at different update times (11 ms, 22 ms, 44 ms).
LCP to ISBus	LCP obtains drive feedbacks from the LCP/DCP dual-port RAM at the end of a frame and loads these feedbacks into the controller. These feedbacks are sent to the master in the next ISBus frame.

## Data Mapping

The drive is configured through its keypad or by the toolbox. Once configured, the drive exchanges a fixed set of integer variables with the controller during each ISBus scan.

- Variables sent to the drive are defined as references
- Variables retrieved from the drive are defined as feedbacks.

The integer variable interface map consists of 17 words of reference and 17 words of feedback. The first two words of reference and feedback contain 32 bits. The remaining 15 words of reference and feedback contain signed integer variables. Tables 3 and 4 define the system application signal map and Boolean signals. Table 5 contains AcDc2000 reference and feedback values.

Table 3. Signal Map

Page 1 References Innovation Series	Innovation Series Mnemonic	AcDc2000	Feedbacks AcDc2000	Innovation Series Mnemonic	Innovation Series
1 Request Bits	—	Request Bits	1 Feedback Bits	—	Feedback Bits
2 Auto Speed Ref	LAN_SPD_REF	MMSSETP (V.204)	2 FAULT (V.500)	LAN_FLT_CODE	Fault Number
3 Spd Ref Aux RPM	LAN_AUX_RPM	SPDSETP (V.205)	3 LCPSFB (V.558)	LAN_SPD_FBK	Speed Feedback
4 Torque Ref	LAN_TRQ_REF	LOADADJ (V.225)	4 (EE.5627) LFBVAR7 (V.593)	LAN_TRQ_FBK	Motor Torque
5 Spd Ref Aux Appl	LAN_AUX_SPD	GS1 (V.218,219) DW	5 LCPCFB (V.559)	LAN_I_MAG	Motor Current
6 Ramp Time Ref	LAN_RAMP_TM	GS3DWA (V.1438)	6 Undefined	—	—
7 GP LAN Ref 1	LAN_R01_REF	LANV0SP (V.206)	7 (EE.769) LFBVAR1 (V.566)	LAN_R01_ADR	GP LAN Fbk Reg 1
8 GP LAN Ref 2	LAN_R02_REF	LANV1SP (V.207)	8 (EE.770) LFBVAR2 (V.567)	LAN_R02_ADR	GP LAN Fbk Reg 2

Page 2 References Innovation Series	Innovation Series Mnemonic	AcDc2000	Feedbacks AcDc2000	Innovation Series Mnemonic	Innovation Series
1 Torque Ref Aux	LAN_TRQ_AUX	GS3DWB (V.1439)	1 (EE.771) LFBVAR5 (V.588)	LAN_R05_ADR	GPLAN Fbk Reg 5
2 Speed Ratio	LAN_SPD_ADJ	DRAWSETP (V.209)	2 (EE.772) LFBVAR6 (V.589)	LAN_R06_ADR	GPLAN Fbk Reg 6
3 Diameter Ratio	LAN_DIAM_ADJ	DIAMSETP (V.224)	3 SPEEDREF (V.560)	LAN_SREF_FBK	Net Spd Ref Fbk
4 Inertia Ref	LAN_J_REF	GS2 (V.220,221) DW	4 Undefined	—	—
5 Undefined	—	—	5 Undefined	—	—
6 Undefined	—	—	6 Undefined	—	—
7 GP LAN Ref 3	LAN_R03_REF	LANV2SP (V.208)	7 (EE.743) LFBVAR3 (V.568)	LAN_R03_ADR	GP LAN Fbk Reg 3
8 GP LAN Ref 4	LAN_R04_REF	LANV3SP (V.210)	8 (EE.744) LFBVAR4 (V.569)	LAN_R04_ADR	GP LAN Fbk Reg 4

Table 4. Boolean Signals

Request Bits Innovation Series bit #	Innovation Series Mnemonic	AcDc2000	Feedback Bits AcDc2000 bit #	Innovation Series Mnemonic	Innovation Series		
0	Heartbeat ref, lan	LAN_HTBT_REF	AUXCMD00	0	AUXFB00	LAN_HTBT_FBK	Heartbeat fbk, lan
1	Fault reset req, lan	LAN_FLT_RST	SOFTRES	1	NOFAULT	NO_FLT	No faults active
2	Trip request, lan	LAN_TRP_REQ	CFGCMD32 (V.1422)	2	TRIPFLT	TRIP_FLT	Trip fault active
3	Alarm request, lan	LAN_ALM_REQ	CFGCMD33 (V.1423)	3	AUXFBW32.0	LOC_FLT	Local Fault string
4	Undefined	—	—	4	AUXFBW32.1	SYS_FLT	System fault string
5	Undefined	—	—	5	AUXFBW32.2	RUN_RDY	Ready to Run
6	Undefined	—	—	6	MPWRENAB	BRG_PWR_ENB	Bridge is on
7	Undefined	—	—	7	RUNNING	RUNNING	Running
8	Run request, lan	LAN_RUN_REQ	RUNRQ (V.650)	8	RUNACT	RUN_ACT	Run Active
9	Jog request, lan	LAN_JOG_REQ	JOGRQ (V.651)	9	JOGACT	JOG_ACT	Jog Active
10	X stop request, lan	LAN_XSTP_REQ	CFGCMD34 (V.1424)	10	AUXFBW32.3	X_STP_CMD	X stop active
11	Full flux req, lan	LAN_FFLX_REQ	CFGCMD35 (V.1425)	11	AUXFBW32.4	FLX_ENB_STAT	Flux enable status
12	Rev mode req, lan	LAN_REV_REQ	REVCMD (V.675)	12	AUXFBW32.5	REVERSE	Reverse mode active
13	Torque mode req, lan	LAN_TREF_ENB	CURFOLRQ (V.684)	13	AUXFBW32.6	TRQ_MODE_ACT	Torque mode active
14	Droop disab req, lan	LAN_DRP_INH	BIASDINH (V.724)	14	AUXFBW32.7	SPD_MODE_ACT	Speed mode active
15	Trq lim 2 sel, lan	LAN_TLIM_SEL	RCLILIM (V.695)	15	AUXFBW32.8	TRQ_LIM_ACT	In cur or trq limit
16	Ramp rate 2 sel, lan	LAN_RMP_SEL	ALTRAJSU (V.643)	16	AUXFBW32.9	LOCAL_MODE	Local mode active
17	Ramp hold req, lan	LAN_RMP_HOLD	HOLDSPD (V.699)	17	AUXFBW32.10	MA_ENB_STAT	MA cont enable stat
18	Auto mode req, lan	LAN_AUTO_REQ	AUTOCMD (V.683)	18	Undefined	—	—
19	Undefined	—	—	19	ZEROSPD	ZERO_SPD	Zero speed active
20	Undefined	—	—	20	Undefined	—	—
21	Undefined	—	—	21	Undefined	—	—
22	Undefined	—	—	22	Undefined	—	—
23	Undefined	—	—	23	Undefined	—	—
24	GP lan req bit 1	LAN_B01_REQ	AUXCMD01 (V.661)	24	(EE.781) AUXFB01	LAN_B01_ADR	LAN_B01_ADR
25	GP lan req bit 2	LAN_B02_REQ	AUXCMD02 (V.662)	25	(EE.782) AUXFB02	LAN_B02_ADR	LAN_B02_ADR
26	GP lan req bit 3	LAN_B03_REQ	AUXCMD03 (V.663)	26	(EE.783) AUXFB03	LAN_B03_ADR	LAN_B03_ADR
27	GP lan req bit 4	LAN_B04_REQ	AUXCMD04 (V.664)	27	(EE.784) AUXFB04	LAN_B04_ADR	LAN_B04_ADR
28	GP lan req bit 5	LAN_B05_REQ	AUXCMD05 (V.665)	28	(EE.785) AUXFB05	LAN_B05_ADR	LAN_B05_ADR
29	GP lan req bit 6	LAN_B06_REQ	AUXCMD06 (V.666)	29	(EE.786) AUXFB06	LAN_B06_ADR	LAN_B06_ADR
30	GP lan req bit 7	LAN_B07_REQ	AUXCMD07 (V.667)	30	(EE.787) AUXFB07	LAN_B07_ADR	LAN_B07_ADR
31	GP lan req bit 8	LAN_B08_REQ	AUXCMD08 (V.738)	31	(EE.788) AUXFB08	LAN_B08_ADR	LAN_B08_ADR

**Notes:**

For CFGCMDx reference bits to be active, drive EE.762.8 (LDRVJP.8) must be set.

For AUXFBW32.x feedback bits to be active, drive EE.5626 (AUXFBJP) must be set to 3 (bits .1 & .0 must be set).

Table 5. AcDc2000 References and Feedback Values (1pu)

Variable	AcDc2000 Signal	(1pu)
Armature Current Refr	LOADADJ	5000
Speed Refr	MMSETP	20000
Ramp Refr	—	20000
Droop Gain R	—	10000
Field Flux Refr	—	5000
Speed Rate Reg Output	—	5000
Voltage Fdbk	—	20000
Field Current Fdbk	—	5000
Armature Current Fdbk	LCPCFB	5000
Speed Fdbk	LCPSFB	20000

## Drive Parameters

All of the ADII board configuration parameters are stored in the drive and loaded into the ADII board when the drive is powered up or reset. The parameters can be modified using the drive's keypad or the toolbox, either through the ISBus LAN or through the drive's RS-232C port.

The following parameters configure the application interface:

- ADII Jumper 1 (ADIIJP1)

ADIIJP1.0 = Enables the ADII interface

When ADII is enabled, all other LAN interfaces must be disabled.

ADIIJP1.14 = Disables the ISBus controller ASIC watchdog.

This is a special diagnostic bit that is normally not set. Setting this bit disables the ISBus controller watchdog detection.

ADIIJP1.15 = Enables Loop Back Mode

This is a special diagnostic mode that loops the references received back into the feedbacks. The references do not go to the drive's regulator processor but are short circuited to the feedback area of the ISBus controller.

- ADII Node Number (ADINID)

ADINID = The drive's ISBus node ID (1–31).

The controller is drop number 0 and the drives may be drops 1–31.

Drive blockware patterns should be set up to accept the references and perform the required functions. Drive blockware patterns must also be set up to load the feedback data appropriately.

## LAN Validation

The drive has two levels of validation, the LAN watchdog and the LAN heartbeat functions.

*A Programmable Logic Controller (PLC) used as a master controller can generate a heartbeat to the drive by inverting the heartbeat from the drive and sending that value back to the drive.*

The **LAN watchdog** function is made up of three parts:

- First, the LAN Control Processor (LCP) monitors the ISBus controller's fault bits and displays an ADII fault, if the ISBus controller is in a fault state.
- Second, the LCP monitors its own communication with the ISBus controller and if for any reason the ISBus controller is not communicating to LCP, then a drive fault FLT.xxx ADIIRTM displays.
- If the LCP and the Drive Control Processor (DCP, on the LDCC board) fail to communicate with each other, then a drive fault is triggered and displays.

The **LAN heartbeat** function can loop back a signal between the drive and any level in the LAN hierarchy, such that a higher-level controller can validate the entire connection pathway, including the drive.

The first bit in the drive's feedback map is used as a heartbeat from the drive to the master controller. The drive LCP always writes the heartbeat feedback to the same state as the heartbeat reference. Thus, the master controller can monitor the status of the communication with the drive by continually toggling the heartbeat to the drive and monitoring the heartbeat from the drive.

The LCP sets AUXCMD0 if references are being received from the LAN and clears AUXCMD0 if references are not being received from the LAN. The drive blockware may be set up to monitor AUXCMD0 and cause a fault FLT.359 LINKLOSS if AUXCMD0 is cleared.

### **LAN Faults**

The following signals determine LAN health and declare faults:

- AUXCMD0 (master link presence)
- Heartbeat ref, LAN (Lan\_Htbt\_Ref)
- Heartbeat fbk, LAN (Lan\_Htbt\_Fbk)

The following faults are associated with the LAN interface: (See Table 6 for descriptions.)

- FLT.359 LINKLOSS
- FLT.446 LADIINIT
- FLT.447LADIWDG
- FLT.448 LADIIRTM
- FLT.449 LADIISEL



Table 6. Fault Codes for ADII Board and ISBus Interface

Fault No.	Fault Name	Description	Corrective Action to Take
359	FLT_LINK_LOS (May be set up to monitor AUXCMD.00 bit. If AUXCMD.00 = 0, the cause fault FL359.) *	The ISBus controller is not receiving data from the ISBus LAN. (LCP ADII interrupt is not being triggered)	Check to make sure there is a master controller on the ISBus and that it is communicating. Check ADII board JP1 for a 1-2 connection. Check/replace LNPL and 2PL connections and cables. Check the ISBus connections (RJ45 – P2 & P3) Replace ADII board
446	FLT_LADIINIT	ADII board failed initialization	Check/replace LNPL and 2PL connections and cables. Replace ADII board
447	FLT_LADIWDG	ISBus controller and/or LCP has failed the watchdog	Check/replace LNPL and 2PL connections and cables. Check the ISBus connections (RJ45 – P2 & P3) Replace ADII board
448	FLT_LADIIRTM	ADII board run time fault The ISBus controller has a fault or LCP has detected a problem with the ADII board or ISBus controller interface.	Check/replace LNPL and 2PL connections and cables. Check the ISBus connections (RJ45 – P2 & P3) Replace ADII board
449	FLT_LADIISEL	Another drive LAN is enabled besides ISBus.	Modify the drive's parameters (EEROM) to disable the other LANs DLAN – LCPJP1.0 (EE615.0) = 1 DLAN + – ARCJP1.0 (EE706.0) = 0 GENIUS – GENJPR.0 (EE725.0) = 0 ADCI – LCPJP3.0 (EE617.0) = 0 (CPL/CBUS/FBUS)

\* = AUXCMD.00 will be set if the LCP is interrupted by the ADII board's interrupt line (the ISBus controller received data from the master), AUXCMD.00 will be cleared if the interrupt does not happen for 80 ms.

## Application Data

The ADII board has no fuses or hardware jumpers. The ADII board has LED indicators and testpoints for diagnostic and setup purposes. Any ISBus or ADII board faults will be displayed on the drive's display. The testpoints on the ADII board are for manufacturing, diagnostic, and setup purposes. See Figure 2 for the locations of these devices.

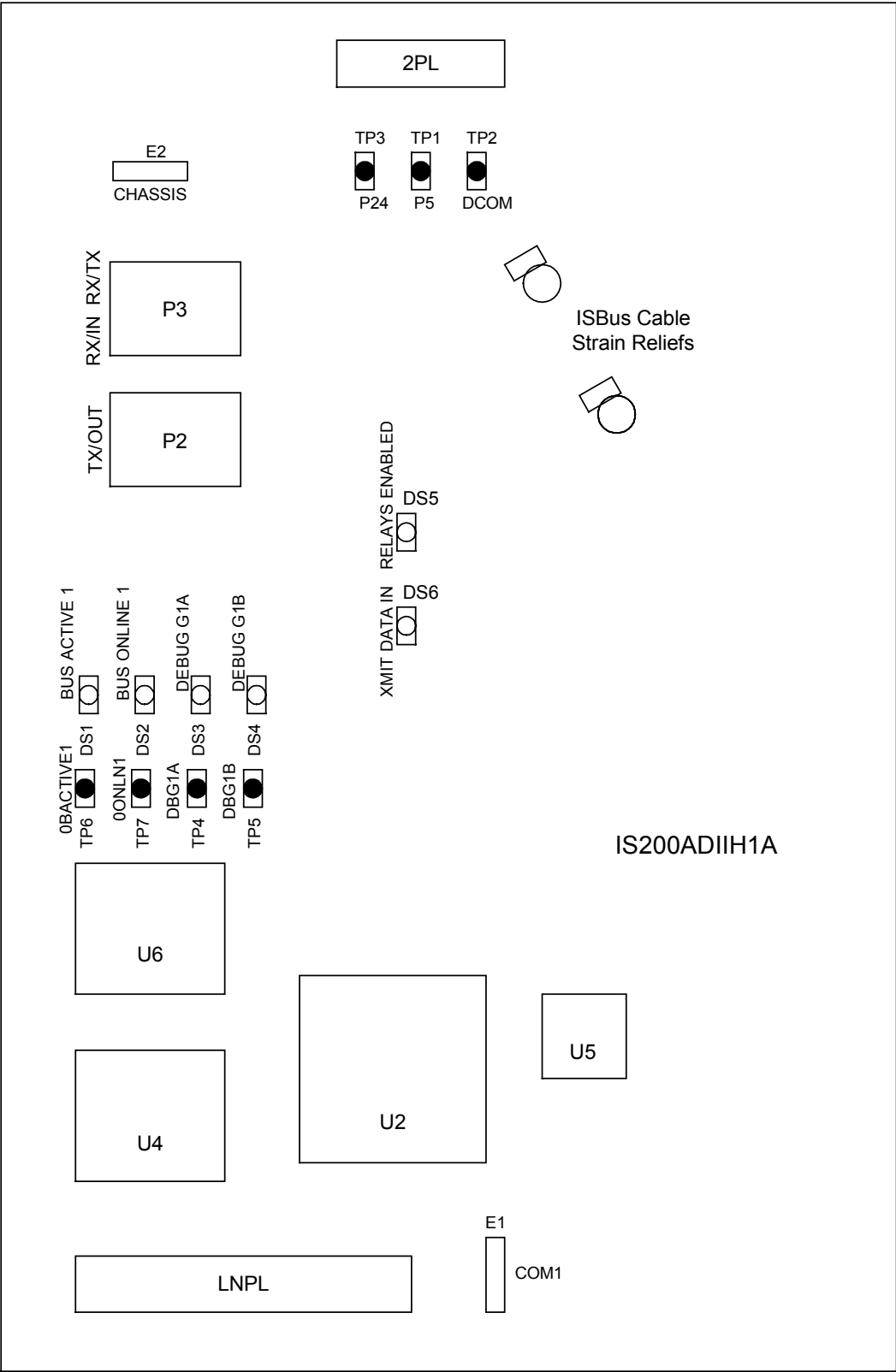


Figure 2. ADII Board Layout Diagram

## LED Indicators

The LEDs on the ADII board are only intended for diagnostic purposes. See Table 7 for a description of the LED indications. The drive's display will show any ISBus faults or ADII board interface faults.

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**Note** Debug LEDs DBG1A (DS3) and DBG1B (DS4) are for manufacturing test only.

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Table 7. ADII Board LED Indicator Descriptions

LED	Mnemonic	Description
DS1	Bus Active	On if LAN pulses are detected and in an active state. If this LED is not on, then the ISBus Controller has not detected any LAN pulses and is not in an active state.
DS2	Bus Online	On or flashing if modulation on the LAN is detected. If this LED is not on, then the ISBus Controller is not online. See Table 8 for a description of flashing indications.
DS3	Debug1A	Manufacturing use only
DS4	Debug1B	Manufacturing use only
DS5	Bypass Relays Enabled	On if these relays are being driven (meaning the drive's P5 is OK). If this LED is not on, then P5 (+5 V) is below 4.6 V or P24 (+24 V) is too low to drive these relays.
DS6	Xmit Data	On if there is data being transmitted. If this relay is not lit (dimly), then there is no transmitted data.  (because this LED is directly across the differential transmit lines, it is being pulsed and will appear to be very dim)

Table 8. DS2 LED Indicator Flashing Indications

Modulation Present	ISBus Controller Core State	DS2 Flashes/Second
No	x	Off Solid
Yes	RESET	1
Yes	OFF LINE	2
Yes	STANDBY	3
Yes	ONLINE	On Solid

## Testpoints

There are seven testpoints on the ADII board as follows:

Table 9. Testpoint Descriptions

Testpoint	Nomenclature	Description
TP1	P5	Positive 5 V dc
TP2	DCOM	Digital common
TP3	P24	Positive 24 V dc
TP4	DBG1A	Manufacturing use only
TP5	DBG1B	Manufacturing use only
TP6	0BACTIVE1	Manufacturing use only
TP7	0ONLN1	Manufacturing use only

## Connectors

There are four plug connectors and two stab-on connectors on the ADII board. Refer to the following tables for complete descriptions of these connectors:

Table	Description
10	Stab-on Connectors
11	2PL Power Connector
12	LNPL Connector to LDCC Board
13	P3 ISBus Connector
14	P2 ISBus Connector

Table 10. Stab-on Connector Descriptions

Connector	Nomenclature	Description
E1	COM1	Common (to LDCC board)
E2	CHASSIS	Chassis ground

Table 11. Connector 2PL, Power Supply to ADII Board

Pin No.	Nomenclature	Description
1	P24	+24 V dc
2	N24	Not connected
3	DCOM	Digital common
4	P5	+5 V dc
5	P5	+5 V dc
6	DCOM	Digital common

Table 12. Connector LNPL, I/O Between the LDCC Board and ADII Board

Pin No.	Nomenclature	Description
1, 2	DCOM	Digital common ground
3 – 10	LND0 – LND7	ADII board data signals (D0 – D7)
11	DCOM	Digital common ground
12	LNRST	Reset signal going to ADII board
13	LNINT	ADII board interrupt
14	DCOM	Digital common ground
15	LNRDY	Ready/busy signal from ADII board DPRAM
16	DCOM	Digital common ground
17	LNALE	NC
18	DCOM	Digital common ground
19	LNRD	ADII board read control signal
20	LNWR	ADII board write control signal
21	DCOM	Digital common ground
22 – 34	LNA0 – LNA12	ADII board address signals (A0 – A12)
35	P5	+5 V dc
36	LNACS	Not connected
37	LNCS1	ADII board DPRAM select
38	LNCS2	ADII board ISBus controller select
39, 40	DCOM	Digital common ground

Table 13. P3 Connector, RJ45 ISBus RX/IN RX/TX

Pin No.	Nomenclature	Description
1, 2	NC	Not connected
3	ISBRXP	ISBus receive positive
4	4 – 5	Pin 4 is tied to pin 5
5	4 – 5	Pin 5 is tied to pin 4
6	ISBRXN	ISBus receive negative
7, 8	NC	Not connected
9, 10	Shield	Shield connection

Table 14. P2 Connector, RJ45 ISBus TX/OUT

Pin No.	Nomenclature	Description
1, 2	NC	Not connected
3	ISBTXP	ISBus transmit positive
4, 5	NC	Not connected
6	ISBTXN	ISBus transmit negative
7, 8	NC	Not connected
9, 10	Shield	Shield connection

## Installation and Renewal/Warranty Replacement

### How to Order a Board

When ordering a replacement board for a GE drive, you need to know:

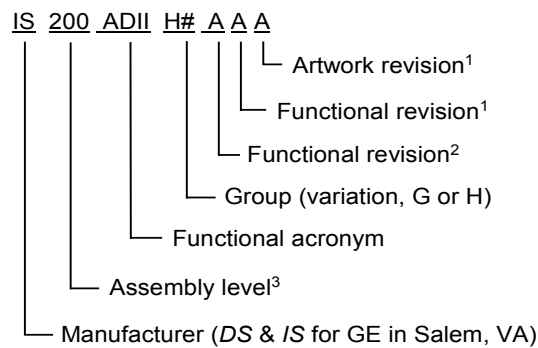
- How to accurately identify the part
- If the part is under warranty
- How to place the order

This information helps ensure that GE can process the order accurately and as soon as possible.

### Board Identification

A printed wiring board is identified by an alphanumeric **part (catalog) number** located near its edge. Figure 3 explains the structure of the part number.

The board's functional acronym, shown in Figure 3, is normally based on the **board description**, or name. For example, the ADII board is described as the Auxiliary Drive to ISBus Interface board.



<sup>1</sup>Backward compatible

<sup>2</sup>Not backward compatible

<sup>3</sup>200 indicates a base-level board; 215 indicates a higher-level assembly or added components (such as PROM)

Figure 3. Board Part Number Conventions

## Warranty Terms

The GE *Terms and Conditions* brochure details product warranty information, including **warranty period** and **parts and service coverage**. The brochure is included with customer documentation. It may be obtained separately from the nearest GE Sales Office or authorized GE Sales Representative.

## Placing the Order

Parts still under **warranty** may be obtained directly from the factory:

GE Industrial Systems  
Product Service Engineering  
1501 Roanoke Blvd.  
Salem, VA 24153-6492 USA

Phone: + 1 800 533 5885 (United States, Canada, Mexico)  
+ 1 540 378 3280 (International)

Fax: + 1 540 387 8606 (All)

(“+” indicates the international access code required when calling from outside of the USA.)

**Renewals** (spares or those not under warranty) should be ordered by contacting the nearest GE Sales or Service Office.

Be sure to **include the following** when ordering any warranty or renewal parts:

- Complete part number and description
- Drive serial number
- Drive Material List (ML) number

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**Note** All digits are important when ordering or replacing any board. The factory may substitute later versions of replacement boards based on availability and design enhancements. However, GE Industrial Systems ensures backward compatibility of replacement boards.

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## Handling Precautions



### Caution

**To prevent component damage caused by static electricity, treat all boards with static sensitive handling techniques. Wear a wrist grounding strap when handling boards or components, but only after boards or components have been removed from potentially energized equipment and are at a normally grounded workstation.**

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Printed wiring boards may contain static-sensitive components. Therefore, GE ships all replacement boards in antistatic bags.

Use the following guidelines when handling boards:

- Store boards in antistatic bags or boxes.
- Use a grounding strap when handling boards or board components (per previous *Caution* criteria).

## ***New Installations***

### ***ADII Required Parts***

When installing an ADII board in a drive that has not had this board in it previously, GE kit number 277A8496G01 is required. This kit includes the ADII board, LNPL cable, DCOM wire, and chassis wire (see Table 15 for individual part numbers).

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**Note** When adding the ADII board in the field, a new 2PL cable assembly will also be needed. The part number for the 2PL cable assembly differs for different drives. Refer to Table 16 for the 2PL part number of the applicable drive/frame size.

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*Table 15. ADII Board New Installation Part Numbers*

<b>Part</b>	<b>Description</b>	<b>Part Number</b>
ADII board	Auxiliary drive to ISBus interface board	IS200ADIIH_A_ _
2PL	Power cable from the power supply board to the LDCC board and ADII board	See Table 16
LNPL	40-pin ribbon cable to the LDCC board	336A3493AA G01
DCOM wire	Common wire from the LDCC board to the ADII board (runs parallel to the LNPL cable)	336A3438AT G15
CHASSIS wire	Ground wire from the ADII board to the drive's chassis	277A8495G01

*Table 16. AcDc2000 Frame Size/Drive 2PL Part Numbers*

<b>Frame/Drive</b>	<b>Part Number</b>
BM	36B605787ACG06
C	36B605787ACG01
G	36B605787ACG01
M	36B605787ACG06
J	36B605787ACG06
AA	36B605787ACG03
AP	36B605787ACG03
AQ	36B605787ACG06
AT	36B605787ACG06
AS/AW	36B605787ACG08
SilcoMatic 2000	246B235JLG01
IM2000	36B605787ACG03
CV2000	36B605787ACG06



## Installation Procedures

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To prevent electric shock, turn off power to the drive, then test to verify that no power exists in the drive before touching it or any connected circuits.

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To prevent equipment damage, do not remove, insert, or adjust board connections while power is applied to the equipment.

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### ➤ To install a new ADII Board in a drive

1. Make sure that the drive in which the board is to be installed has been deenergized. (Refer to the appropriate *User's Guide* for complete de-energizing procedures and follow all local practices of lock out/tag out.)
  2. Open the drive's cabinet door, and using equipment designed for high voltages, test any electrical circuits **before touching them** to ensure that power is off.
  3. Install the ADII board in the drive as follows:
    - a. Release the two board carrier retainers by pulling them forward.
    - b. Lift up and rotate the front board carrier out and down until it is resting on its stops.
    - c. Place the board in position on the four tabs (on left side) of the back of this board carrier and press it firmly into position on these tabs.
  4. Install the LNPL ribbon cable into the LNPL connector on the ADII board and the LNPL connector on the LDCC board.
  5. Install the COM1 wire onto the E1 (COM1) stab-on terminal on the ADII board and the E1 (COM1) terminal on the LDCC board.
  6. Install the CHASSIS wire onto the E2 stab-on terminal on the ADII board and secure the other end to an accessible screw on the drive chassis.
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The chassis wire must be securely mounted to the drive's chassis to shunt the ISBus shield to ground.

Care must be taken to keep the chassis wire tight to the ADII board and away from the power supply board at all times. Use a wire tie down strap connected to the bottom of the board carrier to keep it away from the power supply board.

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7. Plug the 2PL cable connector into the 2PL receptacle on the ADII board.
8. Install an ISBus cable into the RX/IN RJ45 jack (P3) on the ADII board and the TX/OUT jack (P2) of the previous device on the ISBus.
9. Install an ISBus cable into the TX/OUT RJ45 jack (P2) on the ADII board and the RX/IN jack (P3) of the next device on the ISBus.



**Caution**

Care must be taken to keep the ISBus cables away from any high voltage wires and any electrically noisy wires. Keep the cables tight to the ADII board carrier and use the tie down strap holders to hold the cables close to the ADII board and away from the power supply board.

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10. Install cable ties to the ISBus cables on the ADII board strain reliefs and on the other cables/locations as necessary to keep the cables tight to the board and board carrier, and away from the power supply board.
11. Raise the board carrier back up into its normal position, slide the board carrier retainers in to secure it in this position, and close the drive cabinet door.

## ***Replacement Procedures***

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**Warning**

To prevent electric shock, turn off power to the board, then test to verify that no power exists in the board before touching it or any connected circuits.

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**Caution**

To prevent equipment damage, do not remove, insert, or adjust board connections while power is applied to the equipment.

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➤ **To remove the ADII Board from the drive**

1. Make sure that the drive in which the board is to be removed has been deenergized. (Refer to the appropriate *User's Guide* for complete de-energizing procedures and follow all local practices of lock out/tag out.)
2. Open the drive's cabinet doors, and using equipment designed for high voltages, test any electrical circuits **before touching them** to ensure that power is off.
3. Carefully remove the board from the drive as follows:
  - a. Release board carrier retainers by pulling them forward.
  - b. Lift up and rotate the front board carrier out and down until it is resting on its stops.
  - c. Disconnect all cables and wires from the ADII board (2PL, TX and RX ISBus, CHASSIS ground wire, LNPL, and COM1 wire). (The COM1 wire runs parallel to the LNPL cable.)
  - d. Pull back on the four locking tabs and lift board up and off of the board carrier.

➤ **To install the new (replacement) board on the board carrier**

1. Orient the new board in the same position as the one removed, and seat the board by firmly pressing the board onto the four tabs (on left side) of the back of the front board carrier. (LDCC board is on front of this carrier.)
2. Reinstall all cables that were removed from the old ADII board (COM1 wire, CHASSIS ground wire, LNPL, 2PL, TX and RX ISBus).



**Caution**

**The chassis wire must be securely mounted to the drive's chassis to shunt the ISBus shield to ground.**

**Care must be taken to keep the chassis wire tight to the ADII board and away from the power supply board at all times. Use a wire tie down strap connected to the bottom of the board carrier to keep it away from the power supply board.**

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**Caution**

**Care must be taken to keep the ISBus cables away from any high voltage wires and any electrically noisy wires. Keep the cables tight to the ADII board carrier and use the tie down strap holders to hold the cables close to the ADII board and away from the power supply board.**

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3. Reinstall cable ties to the ISBus cables on the ADII board strain reliefs and on the other cables/locations as necessary to keep the cables tight to the board and board carrier, and away from the power supply board.

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**Note** If the ADII board must be configured in any way, refer to the applicable *User's Guide* for the drive/source for procedures.

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4. Raise the board carrier back up into its normal position, slide the board carrier retainers in to secure it in this position, and close the drive cabinet door.

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# *Notes*



***GE Industrial Systems***

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