



Preliminary GEK-24969

GE DRIVE SYSTEMS

INSTRUCTIONS

SERIAL COMMUNICATIONS ISOLATOR

(36C774507A_G03)

CAUTION: To ensure proper operation of the equipment, these instructions must be followed for proper set-up and installation of this device.

These instructions do not purport to cover all details or variations in equipment nor to provide for every possible contingency to be met in connection with installation, operation or maintenance. Should further information be desired or should particular problems arise which are not covered sufficiently for the purchaser's purposes, the matter should be referred to General Electric Company.

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SAFETY PRECAUTIONS

WARNING, CAUTION AND NOTE LABELS PLACED ON THE EQUIPMENT

The following format is used on the safety and informative labels placed on the equipment. Read all labels and follow the directions of them whenever working on the equipment.

WARNING: Denotes operating procedures and practices that may result in personal injury or loss of life if not correctly followed.

WARNING labels will be red in color with black or white lettering.

CAUTION: Denotes operating procedures and practices that, if not strictly observed, may result in damage to, or destruction of the equipment.

CAUTION labels will be amber in color with black lettering.

NOTE: Notes call attention to information that is especially significant in understanding and operating the equipment.

NOTE labels will be white in color with black lettering.

WARNING, CAUTION AND NOTE PARAGRAPHS WITHIN THIS INSTRUCTION

The following paragraphs list some general safety reminders and safety recommendations to be followed when operating or installing this equipment. These safety precautions will be repeated throughout this instruction book where applicable.

WARNING - ELECTRICAL SHOCK HAZARD: Make sure all electrical power to controller is disconnected before working on it. Circuit breakers, if supplied as part of the total system, may not disconnect all power to the equipment (see system elementary diagrams). Whether the AC voltage is grounded or not, high voltage to ground may be present at many points.

WARNING - ELECTRICAL SHOCK AND BURN HAZARD: When using instruments such as oscilloscopes to work on live equipment, the oscilloscope's chassis should be grounded and a differential amplifier input should be used. Care should be used in the selection of probes and leads and in the adjustment of the oscilloscope so that accurate readings may be made. See instrument manufacturers instruction book for proper operation and adjustments to the instrument.

CAUTION: Do not remove connections or printed circuit cards from the controller while power is applied. This can damage the equipment.

CAUTION: Do not remove input power from the drive until it has fully executed a stop sequence as this can damage the drive system.

CAUTION: Installation wiring must be in accordance with the National Electrical Code and be consistent with all local codes. Secondaries of the 115 volt control transformers typically have one side fused and the other grounded or available for grounding by the user.

CAUTION: Meggering can damage electronic components. Do not megger or Hi-Pot the drive system without consulting GE DRIVE PRODUCTS OPERATION, ERIE, PA.

CAUTION: Communication errors may be caused by improper or inadequate grounding practices. Care must be exercised to assure that there are no "Ground Loops" created when grounding the cable shields. Capacitors are provided in the Serial Communications Isolator Balun Assemblies that are connected between chassis ground (Terminal "G" and Terminals "C1, C2") for use in isolating grounds where required.

CAUTION: It is critical that, relative to one Serial Communications Isolator, the transmit signals (TX+ and TX-) remain physically paired in one shielded cable, and the receive signals (RX+ and RX-), paired in another separate cable (see FIGURE 4). Incorrect pairing of the cables will result in cross-talk and communications errors.

NOTE: Always read the complete instructions prior to applying power or troubleshooting the equipment and follow the start-up procedures step by step.

NOTE: Read and heed all WARNING, CAUTION and NOTE labels posted on the equipment.

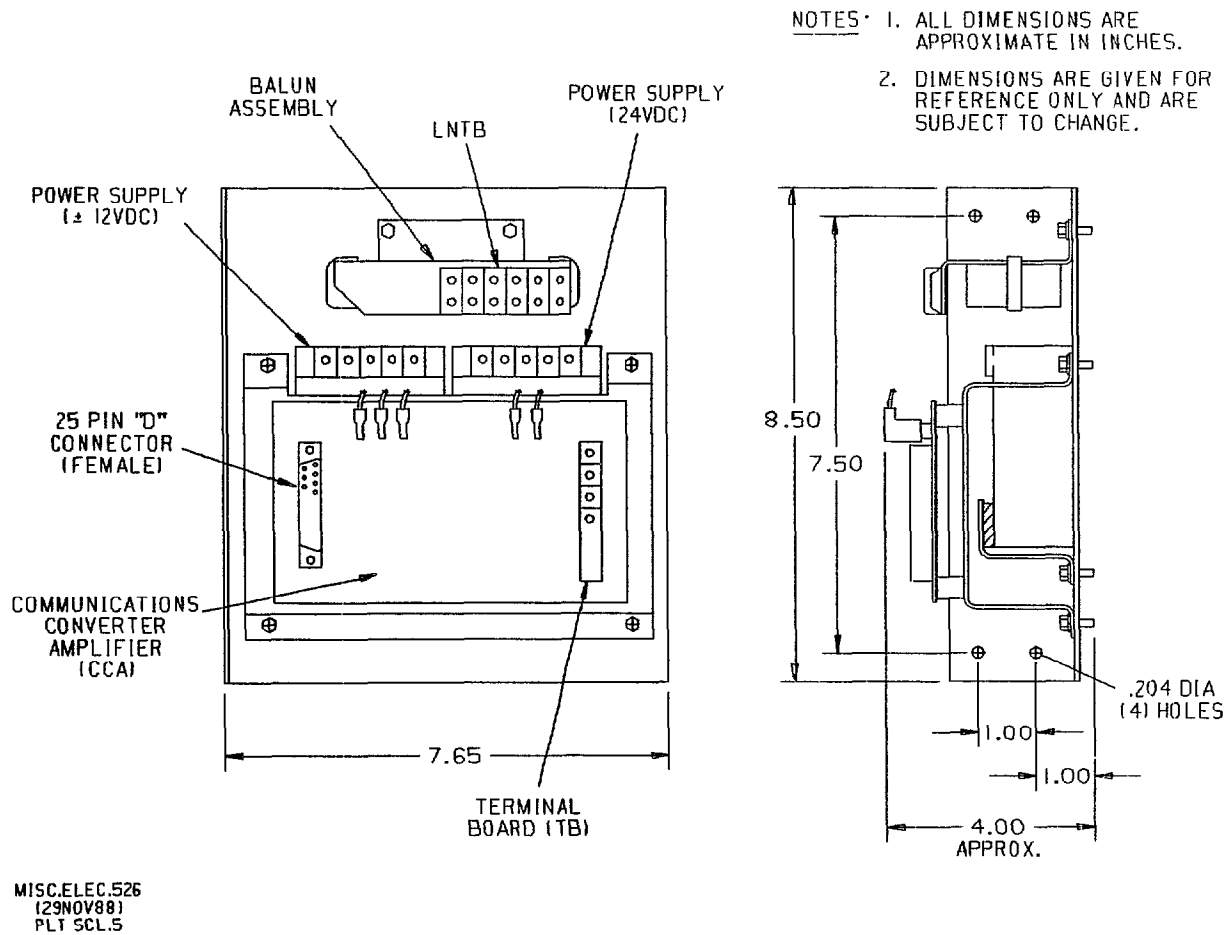


FIGURE 1. Serial Communications Isolator Layout Diagram

GENERAL DESCRIPTION

The Serial Communications Isolator (36C774507AAG03) provides data signal isolation and amplification to increase reliable transmission distances for industrial applications. It can be used with essentially any computer or data communications equipment that is capable of RS-232C or RS-422 data communications. Applications for the Serial Communications Isolator (SCI) include communications between terminals, computers, programmable controllers (and remote I/O racks), and encoders or "intelligent" controllers such as the DC-300™ Adjustable Speed Drive.

A pair of Serial Communications Isolators are required, one at each end of the communications cable. The isolators may be separated by up to 2000 feet of low capacitance data communications cable. Transmitters and receivers are selectable for either differential (RS-422) or single-ended (RS-232C) type communication signals. Depending on the requirements of the connected devices, each SCI may be selected for either RS-232C or RS-422 communications.

The Serial Communications Isolator is essentially transparent to communications equipment. Data flow control is not required (DTR, CTS or other "handshaking" signals are not used) and the effective data rate is determined by the connected equipment. Reliable communications may be provided with RS-422 signals at rates up to 57.6K Baud. No external power supply is required from the connected equipment; power for the SCI is provided internally by two isolated power supplies operating from a 115 VAC input.

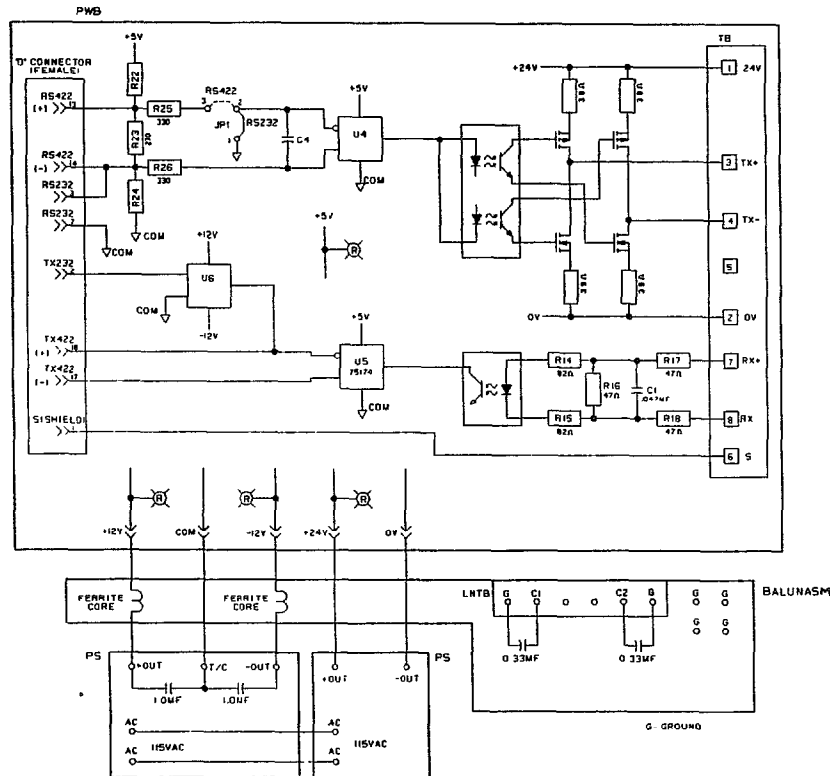


FIGURE 2. Serial Communications Isolator Schematic

COMPONENTS AND FUNCTION

The Serial Communications Isolator consists of four subassemblies as shown in the FIGURE 1, Serial Communications Isolator Layout Diagram. (A simplified schematic is shown in FIGURE 2.) These components are provided on a bracket assembly for easy panel mounting.

COMMUNICATIONS CONVERTER ASSEMBLY (CCA)

The Communications Converter Assembly consists of a printed circuit board carrying the signal transmitter and receiver, optical isolators, and amplifier drivers. LED indicators are provided to monitor the four power supply busses (+12VDC, -12VDC, +24VDC, and +5VDC). A 25 Pin female "D" connector (see FIGURE 3) and a Terminal Board (TB) provide for data signal and transmission cable connections, respectively. Jumper JP1 allows selection of either RS-232C (1-2 position) or RS-422 (2-3 position) communications.

Data to be transmitted is input from the connected equipment through the female "D" connector on the CCA card to the transmitter circuit, optically isolated by photo-transistors, and transmitted by the output driver transistors as a high level differential signal (+24VDC) through TB3 (TX+) and TB4 (TX-) over the communications cable.

Data received over the transmission cable through TB7 (RX+) and TB8 (RX-) is optically isolated through a photo-transistor, input to the receiver circuit, and output through the female "D" connector to the connected equipment.

POWER SUPPLIES (PS)

Two isolated power supplies provide power for the RS-232C or RS-422 data level circuits and the high level transmitter/receiver circuits. Input power is single phase, 115 VAC, 50/60 Hertz. One power supply is connected for +12 VDC to the CCA card data level circuits. The other power supply is connected to supply +24 VDC for the output driver circuit.

BALUN ASSEMBLY

The Balun assembly incorporates two ferrite cores through which the data level power supply (+12 VDC) leads are passed for noise suppression. A terminal board, LNTB, mounted on the assembly, provides for termination of the transmission cable shield through a 0.33 microfarad capacitor. The capacitor is connected to chassis ground to drain high frequency "noise", while preventing circulating currents between it and the direct ground connection of the receiving cable shield (see FIGURE 4).

INSTALLATION GUIDELINES

The Serial communications Isolator is suitable for installation in most factory areas where similar equipment is installed. Following are minimum guidelines for installing this equipment.

LOCATION

The Serial Communications Isolator should be mounted in an adequately cooled enclosure in near proximity to the data equipment that it is to serve. The assembly should be mounted in a vertical orientation to allow maximum air flow across the Communications Converter Assembly circuit board.

ENVIRONMENTAL CONDITIONS

Ambient air temperature should not exceed 40 C (104 F), with relative humidity of 90% or less. Environments which contain one or more of the following should be considered hostile and provisions should be made to protect the equipment from them.

- Dust, dirt, or other foreign matter
- Moisture or vapors
- Caustic fumes
- Vibration or shock
- Excessive temperature excursions
- Power line fluctuations
- Electromagnetic interference ("noise")

WIRING

Data communications cables appropriate for the data rates and distances required (RS-232C or RS422) should be as specified by the manufacturer of the connected equipment. Low capacitance, twisted-pair conductors, with an overall shield should be used. A minimum size of 24 AWG conductor is recommended and shunt capacitance should be 35 pf/ft or less.

Transmission cable between the Serial Communications Isolators should be twinaxial, 24 AWG, twisted-pair, with an overall shield. This cable should have a maximum total shunt capacitance of 0.032 microfarad. Separate insulated cables should be used for the transmit and receive pairs to allow isolation of the shields.

CAUTION: It is critical that, relative to one Serial Communications Isolator, the transmit signals (TX+ and TX-) remain physically paired in one shielded cable, and the receive signals (RX+ and RX-), paired in another separate cable (see FIGURE 4). Incorrect pairing of the cables will result in cross-talk and communications errors.

Data communications cables should be run in conduit or wireways separate from control or power wiring. Signal wiring and power or control wiring may cross at right angles with a minimum of one inch separation. Avoid parallel runs between signal and power or control wiring. Where parallel runs cannot be avoided, a minimum of four inches separation must be maintained.

GROUNDING

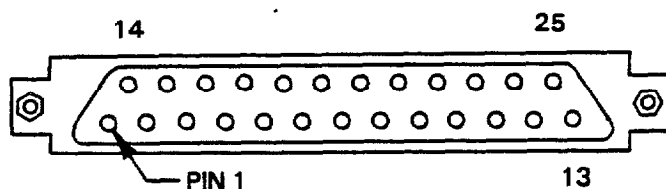
The shields of data communication and transmission cables must be solidly grounded at one end only. (FIGURE 4 shows a typical installation.) It should be noted that no ground loops are permitted. If the earth ground shown at the RS-232C or RS422 device is not available, the shield of the device to the Serial Communications Isolator cables may be grounded through the Serial Communications Isolator terminal board (TB). Connect terminal 6 to either "C1" (or "C2") or "6" on the LNTB as necessary to provide adequate grounding while assuring no ground loops are present.

CAUTION: Communication errors may be caused by improper or inadequate grounding practices. Care must be exercised to assure that there are no "Ground Loops" created when grounding the cable shields. Capacitors are provided in the Serial Communications Isolator Balun Assemblies that are connected between chassis ground (Terminal "G" and Terminals "C1, C2") for use in isolating grounds where required.

The chassis of the Serial Communications Isolator should be solidly tied to equipment ground. Equipment grounds of the SCI and connected equipment should be tied common with a conductor of ample size to assure that grounds are within a few volts of each other.

POWER SUPPLY

Input power to the Serial Communications Isolator is single phase, 115 VAC (+10, -5%) , 50 or 60 Hertz. Connection is made to the two terminals marked "AC" on the terminal board of one of the power supplies (PS).



<u>Pin #</u>	<u>Function</u>
1	S - Shield Connection
<u>RS-232C Standard Connections</u>	
2	TX232 - Data Out
3	RS232 - Data In
7	COM - Signal Common
<u>RS-422 Standard Connections</u>	
13	RS-422 (+) - Data In
14	RS-422 (-) - Data In
17	TX-422 (-) - Data Out
18	TX-422 (+) - Data Out

NOTE: *Unlisted terminals are not used.*

FIGURE 3. 25 Pin Female Connector

SEE TEXT FOR GROUNDING & WIRING INFORMATION AND CAUTIONS.

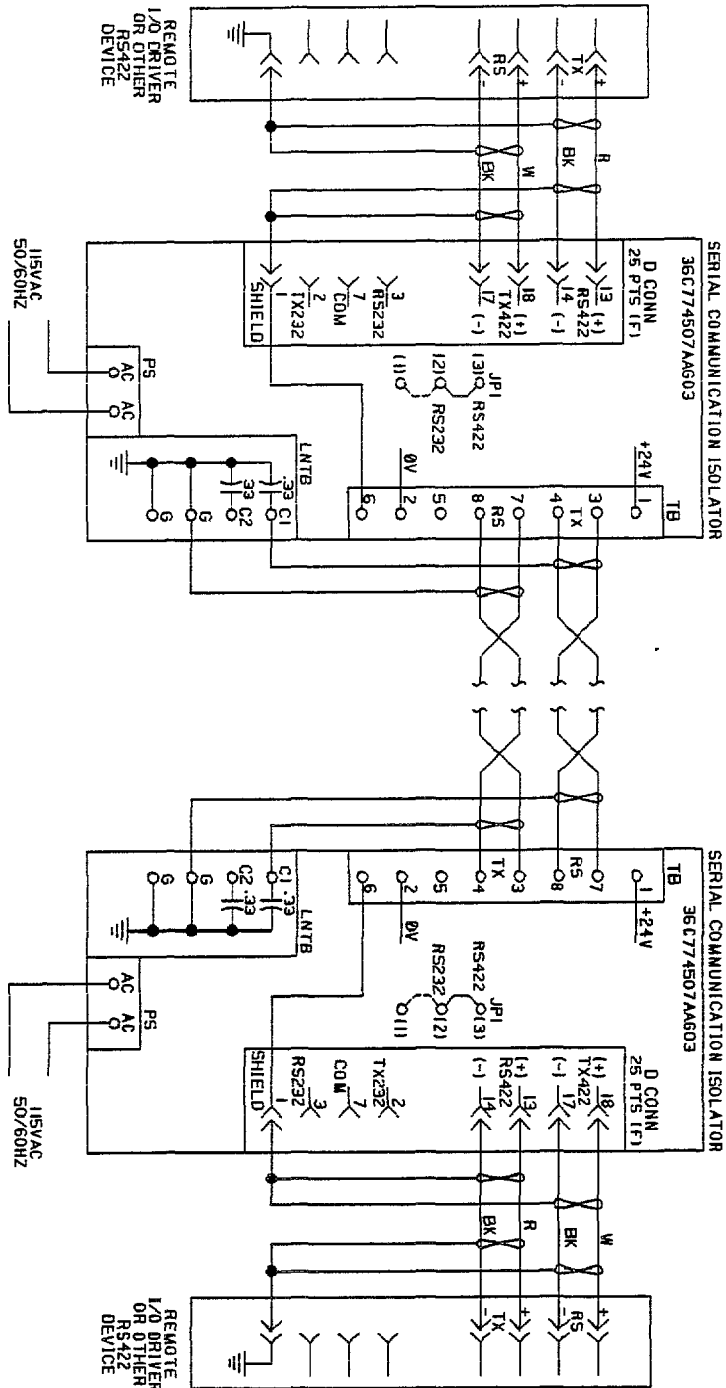


FIGURE 4. Typical Connections For Serial Communications Isolator

TROUBLESHOOTING AND PARTS LIST

EQUIPMENT PROBLEMS AND SUGGESTED PROCEDURES

Problem

NO OUTPUT

Suggested Procedures

- Verify that data input signals are present and to the proper terminals.
- Verify connection to "D" connector from connected equipment.
- Check 115 VAC at power supply (AC) inputs.
- Check power supplies (+12V, -12V) as indicated by the LEDES on the CCA card as detailed later in this section. Replace as indicated.
- Check connected equipment as recommended in the manufacturer's instructions.
- Check transmission and data cables for shorts or breaks.
- Replace Communications Converter Amplifier (CCA) card.

TRANSMISSION
ERRORS

- Check Transmission cable routing.
- Check Transmission cable signal pairing.
- Check Input data cable routing.
- Verify connections to "D" connector from connected equipment.
- Check grounding connections.
- Check shield connection.
- Verify power supply connection and use of Balun assembly ferrite cores for +12 VDC leads.
- Check connected equipment as recommended in the manufacturer's instructions.
- Replace Communications Converter Amplifier (CCA) card.

CHECKING POWER SUPPLIES

Power supply malfunction may be a result of loading on the supply or a failure of the power supply itself. To isolate the cause, it may be necessary to disconnect the power supply from the CCA card and check the Power Supply output (see FIGURE 2).

- If the power supply output is not correct with the CCA card disconnected, replace the Power Supply(s).
- If the power supply output is correct with the CCA card disconnected, replace the CCA card.
- If trouble persists after replacing the Power Supply(s) and CCA card, all wiring should be checked for shorts or grounding:
 - Internal to the Serial Communications Isolator
 - Data (RS-232C or RS422) Cables
 - Transmission Cables

PARTS LIST

Part

Communications Converter Amplifier
Balun Assembly
Power Supply (2 used)

Catalog Number

531X118CCAA_G1
36B605594AAG03
ACPDB12-30

PARTS AND SERVICE

RENEWAL PARTS AND SERVICE

Renewal parts may be obtained by contacting your local **GE Sales Office** or **GE DRIVE SYSTEMS Authorized Distributor**. Service may be obtained by contacting your area **GE Industry Services Engineering Office**.

IT IS RECOMMENDED THAT THE PARTS LIST BE REVIEWED AND A SET OF SPARE PARTS BE MAINTAINED TO MINIMIZE DOWN-TIME SHOULD REPAIRS BE REQUIRED.

WARRANTY PARTS AND SERVICE

1. Consult the **GE DRIVE SYSTEMS Terms and Conditions** for details of the product warranty, including *warranty period and parts or service coverage*.
2. Warranty replacement parts or service assistance may be obtained direct from the factory during regular working hours (8 a.m. - 5 p.m.; M-F) by calling:

**GE DRIVE SYSTEMS
PRODUCT SERVICE ENGINEERING
ERIE, PA:
(814) 875-3851**

3. An **EMERGENCY HOT-LINE** has been established by **GE DRIVE SYSTEMS** to provide 24 hour telephone answering service to our customers.

**GE DRIVE SYSTEMS
EMERGENCY HOT-LINE
(814) 875-3219**

For a **PROMPT RESPONSE THE NEXT WORKING DAY**, the answering service operator will record the required information and your **NAME, COMPANY and PHONE NUMBER**. In cases of emergency, where assistance must be obtained immediately, the operator may be requested to contact a Customer Service Representative (for parts) or a Product Service Engineer (for technical assistance) at home.

4. So that we may serve you more expediently, please have the following information ready whenever contacting the factory:

**DRIVE SERIAL NUMBER & MODEL NUMBER
PART NUMBER & DESCRIPTION**

5. **GE DRIVE SYSTEMS** may request that failed parts replaced under warranty be returned to the factory. A **RETURN AUTHORIZATION** tag or number is to be obtained and included with any parts being returned. When returning parts, pack them carefully to prevent damage in transit and ship to:

**GENERAL ELECTRIC COMPANY
DRIVE SYSTEMS
1100 LAWRENCE PARKWAY
ERIE, PA 16531
ATTENTION: PARTS REPAIR AND EXCHANGE**



GE DRIVE SYSTEMS

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**GENERAL ELECTRIC COMPANY
DRIVE SYSTEMS
1100 LAWRENCE PARKWAY
ERIE, PENNSYLVANIA 16531**