WOODWARD

Application Note 51242
(Revision NEW)
Original Instructions

Wiring Instructions for Replacement of 2301A Load Sharing and Speed Controls with 2301D Load Sharing and Speed Controls

General Precautions

Read this entire manual and all other publications pertaining to the work to be performed before installing, operating, or servicing this equipment.

Practice all plant and safety instructions and precautions.

Failure to follow instructions can cause personal injury and/or property damage.

Revisions

This publication may have been revised or updated since this copy was produced. To verify that you have the latest revision, check manual *26311* , *Revision Status & Distribution Restrictions of Woodward Technical Publications*, on the *publications page* of the Woodward website:

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The latest version of most publications is available on the *publications page*. If your publication is not there, please contact your customer service representative to get the latest copy.

Proper Use

Any unauthorized modifications to or use of this equipment outside its specified mechanical, electrical, or other operating limits may cause personal injury and/or property damage, including damage to the equipment. Any such unauthorized modifications: (i) constitute "misuse" and/or "negligence" within the meaning of the product warranty thereby excluding warranty coverage for any resulting damage, and (ii) invalidate product certifications or listings.

Translated Publications

If the cover of this publication states "Translation of the Original Instructions" please note:

The original source of this publication may have been updated since this translation was made. Be sure to check manual *26311* , *Revision Status & Distribution Restrictions of Woodward Technical Publications*, to verify whether this translation is up to date. Out-of-date translations are marked with ⚠. Always compare with the original for technical specifications and for proper and safe installation and operation procedures.

Revisions—Changes in this publication since the last revision are indicated by a black line alongside the text.

Warnings and Notices

Important Definitions

This is the safety alert symbol. It is used to alert you to potential personal injury hazards. Obey all safety messages that follow this symbol to avoid possible injury or death.

- **DANGER**—Indicates a hazardous situation which, if not avoided, will result in death or serious injury.
- **WARNING**—Indicates a hazardous situation which, if not avoided, could result in death or serious injury.
- **CAUTION**—Indicates a hazardous situation which, if not avoided, could result in minor or moderate injury.
- **NOTICE**—Indicates a hazard that could result in property damage only (including damage to the control).
- **IMPORTANT**—Designates an operating tip or maintenance suggestion.

⚠WARNING

Overspeed / Overtemperature / Overpressure

The engine, turbine, or other type of prime mover should be equipped with an overspeed shutdown device to protect against runaway or damage to the prime mover with possible personal injury, loss of life, or property damage.

The overspeed shutdown device must be totally independent of the prime mover control system. An overtemperature or overpressure shutdown device may also be needed for safety, as appropriate.

⚠WARNING

Personal Protective Equipment

The products described in this publication may present risks that could lead to personal injury, loss of life, or property damage. Always wear the appropriate personal protective equipment (PPE) for the job at hand. Equipment that should be considered includes but is not limited to:

- **Eye Protection**
- **Hearing Protection**
- **Hard Hat**
- **Gloves**
- **Safety Boots**
- **Respirator**

Always read the proper Material Safety Data Sheet (MSDS) for any working fluid(s) and comply with recommended safety equipment.

⚠WARNING

Start-up

Be prepared to make an emergency shutdown when starting the engine, turbine, or other type of prime mover, to protect against runaway or overspeed with possible personal injury, loss of life, or property damage.

⚠WARNING

Automotive Applications

On- and off-highway Mobile Applications: Unless Woodward's control functions as the supervisory control, customer should install a system totally independent of the prime mover control system that monitors for supervisory control of engine (and takes appropriate action if supervisory control is lost) to protect against loss of engine control with possible personal injury, loss of life, or property damage.

NOTICE

Battery Charging Device

To prevent damage to a control system that uses an alternator or battery-charging device, make sure the charging device is turned off before disconnecting the battery from the system.

Electrostatic Discharge Awareness

NOTICE

Electrostatic Precautions

Electronic controls contain static-sensitive parts. Observe the following precautions to prevent damage to these parts:

- **Discharge body static before handling the control (with power to the control turned off, contact a grounded surface and maintain contact while handling the control).**
- **Avoid all plastic, vinyl, and Styrofoam (except antistatic versions) around printed circuit boards.**
- **Do not touch the components or conductors on a printed circuit board with your hands or with conductive devices.**

To prevent damage to electronic components caused by improper handling, read and observe the precautions in Woodward manual *82715*, *Guide for Handling and Protection of Electronic Controls, Printed Circuit Boards, and Modules*.

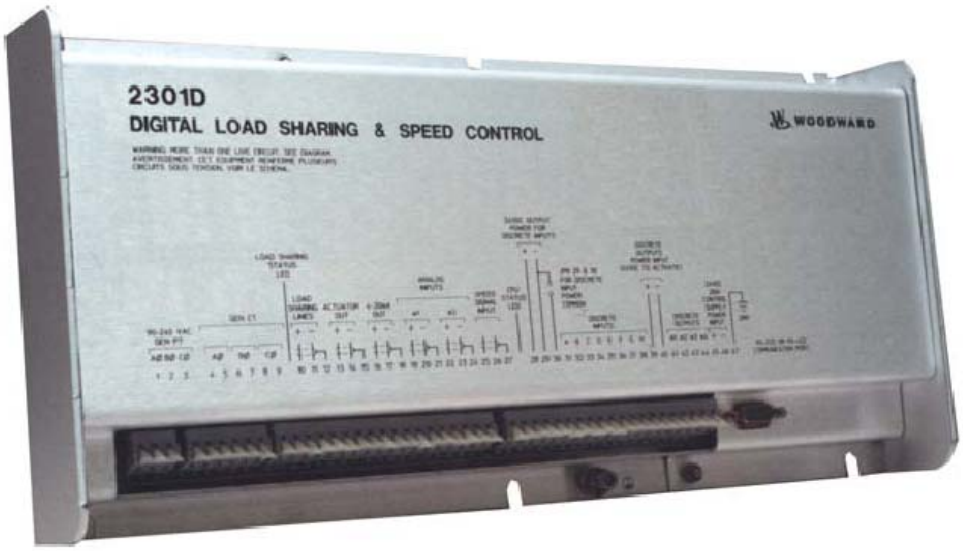
Follow these precautions when working with or near the control.

1. Avoid the build-up of static electricity on your body by not wearing clothing made of synthetic materials. Wear cotton or cotton-blend materials as much as possible because these do not store static electric charges as much as synthetics.
2. Do not remove the printed circuit board (PCB) from the control cabinet unless absolutely necessary. If you must remove the PCB from the control cabinet, follow these precautions:
   - Do not touch any part of the PCB except the edges.
   - Do not touch the electrical conductors, the connectors, or the components with conductive devices or with your hands.
   - When replacing a PCB, keep the new PCB in the plastic antistatic protective bag it comes in until you are ready to install it. Immediately after removing the old PCB from the control cabinet, place it in the antistatic protective bag.

Wiring Instructions for Replacement of 2301A Load Sharing and Speed Controls with 2301D Load Sharing and Speed Controls

Introduction

Woodward's 2301D Load Sharing and Speed Control was designed as a functional replacement for the 2301A Load Sharing and Speed Control, but not a direct wire-for-wire replacement of the 2301A Load Sharing and Speed Control. The 2301D was designed with many new features and functions that are not built into the 2301A.

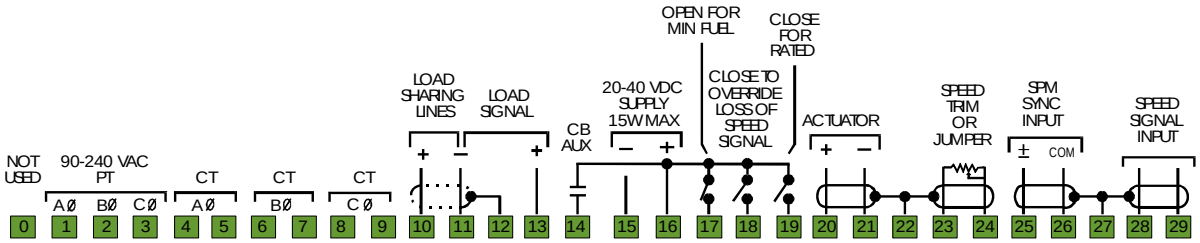


Refer to Woodward manual 26247 for details on the 2301D control installation, operation, adjustment, and troubleshooting.

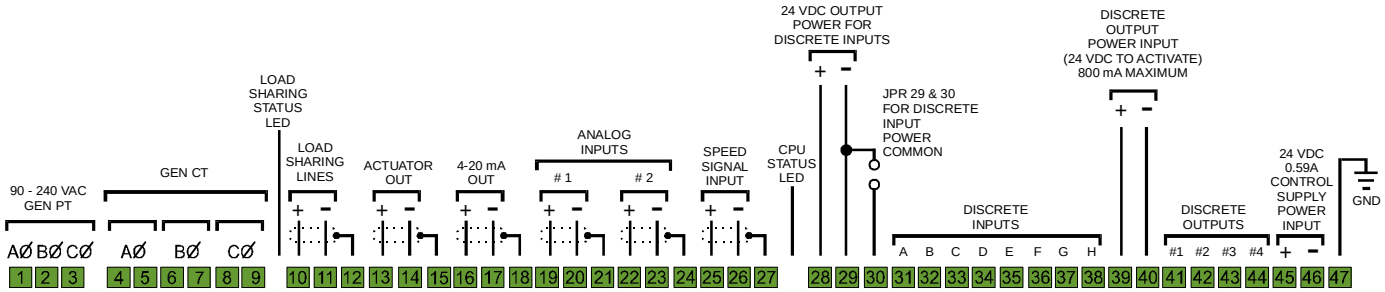
Wiring differences between the 2301A and the 2301D

This application sheet illustrates the differences in wiring between the two controls. Refer to Woodward manual 26247 for control installation, operation, adjustment, and troubleshooting.

2301A Load Sharing and Speed Control Wiring



2301D Load Sharing and Speed Control Wiring



Summary of wiring differences when replacing the 2301A with the 2301D control:

- The Load Sharing lines remain the same between the 2301A and the 2301D terminals 10(+) and 11(–). However, the Load Signal from terminals 11(–) to 13(+) of the 2301A is configured in the software of the 2301D and no longer has an external terminal connection.
- The Circuit Breaker Auxiliary Contact input on terminal 14 of the 2301A has moved to Discrete Input (D) terminal 34 of the 2301D.
- Power Supply inputs have moved from terminals 15(–) and 16(+) of the 2301A to terminals 45(+) and 46(–) of the 2301D. No high voltage version exists for the 2301D controls, only low voltage.
- The Open for Minimum Fuel discrete input on terminal 17 of the 2301A has moved to Discrete Input (A) terminal 31 of the 2301D.
- Closed to Override a Failed Speed Signal discrete input on terminal 18 of the 2301A has moved to Discrete Input (B) terminal 32 of the 2301D.
- The Closed for Rated discrete input on terminal 19 of the 2301A has moved to Discrete Input (C) terminal 33 of the 2301D.
- Actuator connections have moved from terminals 20(+) and 21(–) of the 2301A to terminals 13(+) and 14(–) of the 2301D, with the shield connecting to terminal 15.

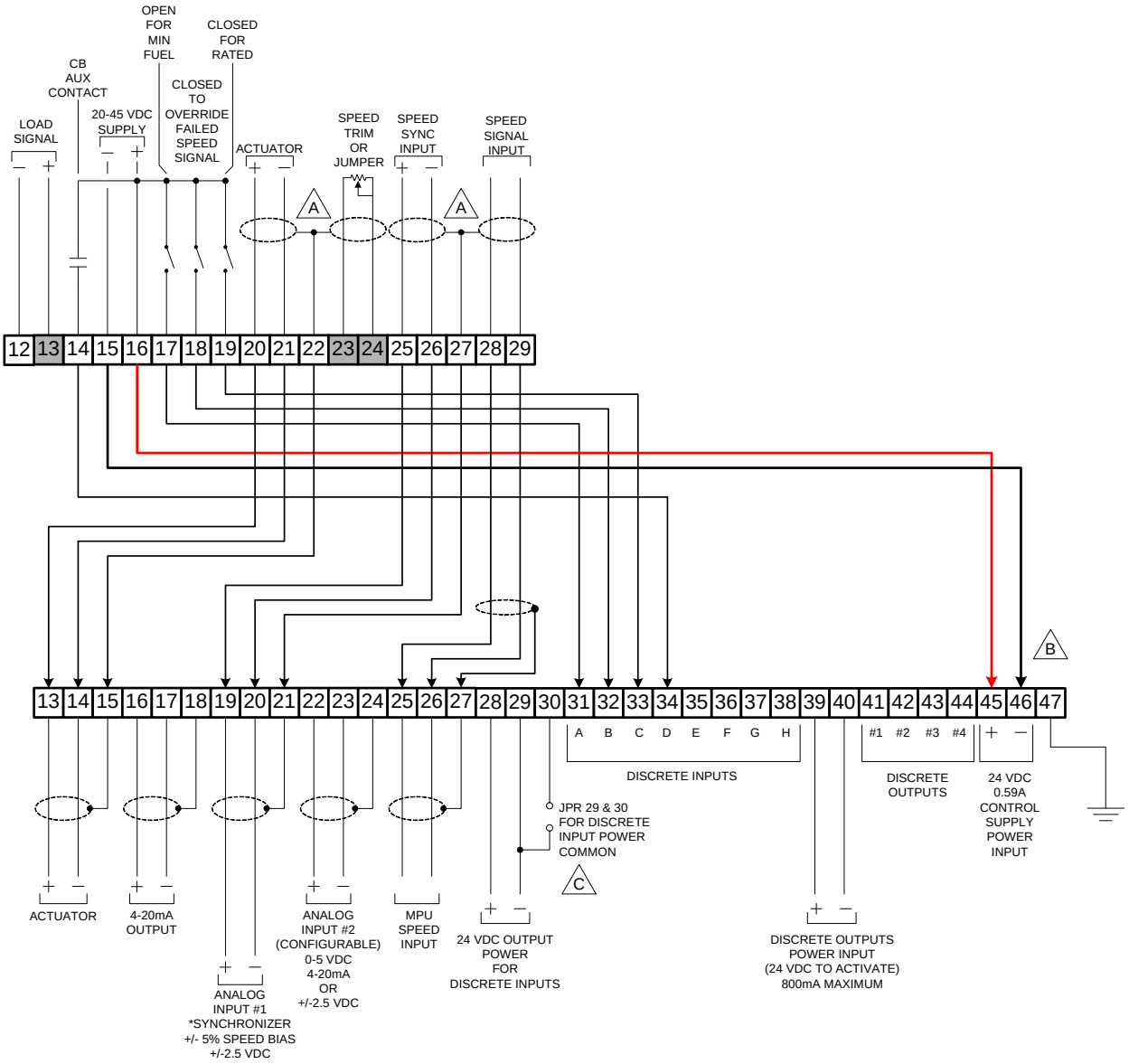
- The Speed Trim input no longer exists on the 2301D. Speed Trim is accomplished through the Discrete Input (E) terminal 35 Raise Speed, and Discrete input (F) terminal 36 Lower Speed of the 2301D.

- The Synchronizer input has moved from terminals 25(±) and 26(COM) of the 2301A to Analog Input #1 terminals 19(+) and 20(–) by default of the 2301D. The shield is connected to terminal 27.

IMPORTANT **Analog Input #1 is defaulted in the 2301D configuration as the Synchronizer Input but can be reconfigured for several optional inputs.**

- The Speed Signal input (MPU) has moved from terminals 28 and 29 of the 2301A to terminals 25 and 26 of the 2301D with the shield to terminal 27.

2301A Load Sharing and Speed Control Wiring



2301D Load Sharing and Speed Control Wiring

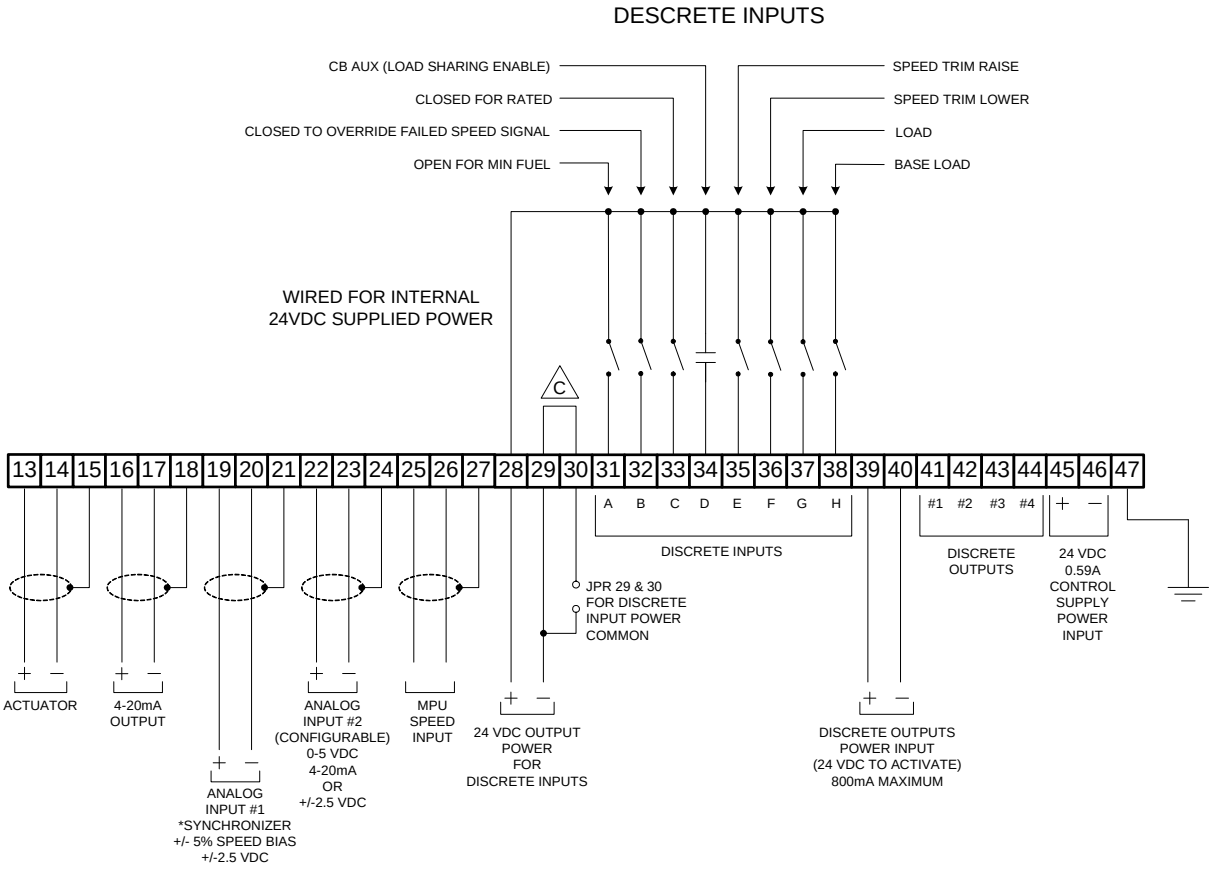
NOTES

A. The 2301D has terminal connections for each shield ground. Separate the shield grounds for each set of twisted pair wires and connect the shields to the correct terminal connection on the 2301D (Terminals 15, 18, 21, 24 or 27).

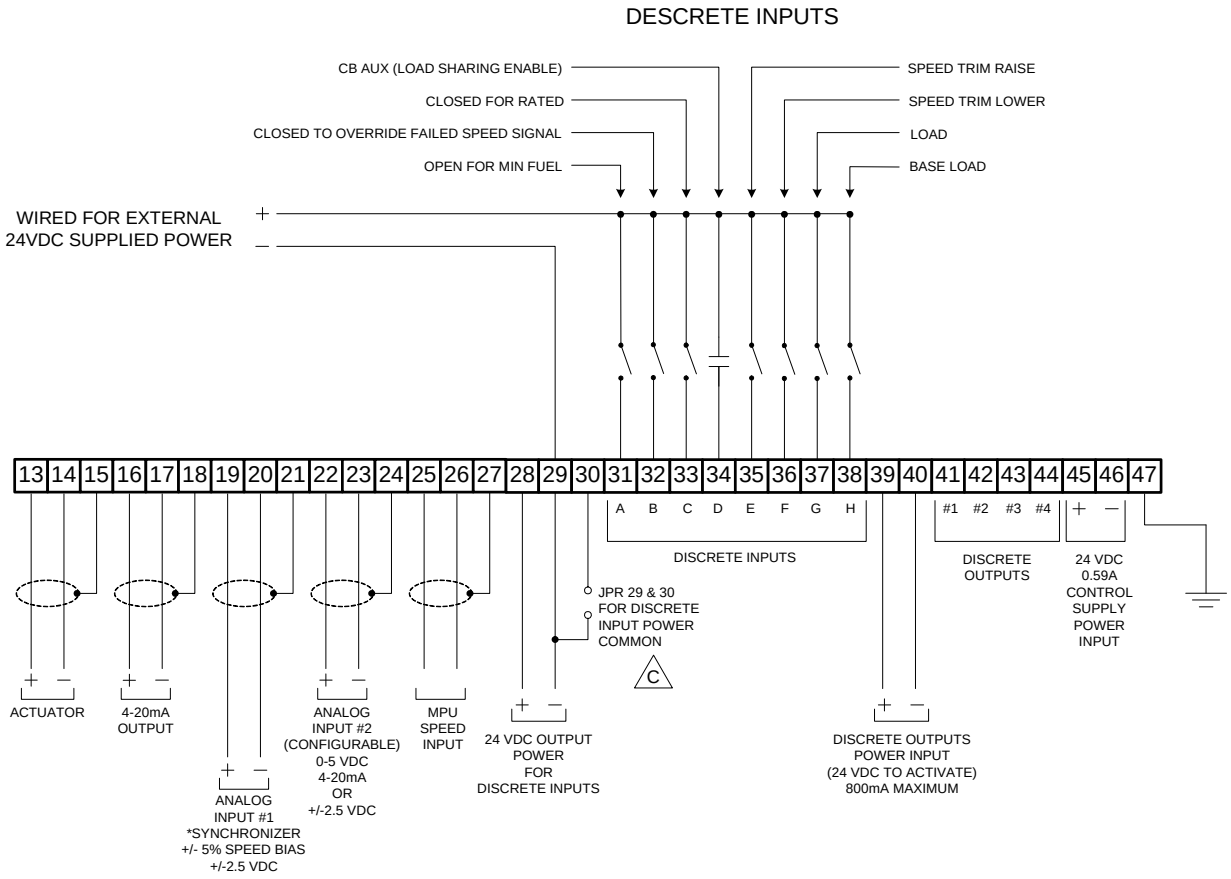
B. When power is applied, the 2301D begins performing internal memory tests to “boot-up” the processor—this takes approximately 30 seconds to complete. For systems requiring fast start functions, it will be necessary to continuously power the 2301D.

C. There are two methods of wiring the voltage supply to the discrete inputs, internal supplied power or external supplied power. If using the internal 24 Vdc supply for discrete inputs, a jumper must be installed to connect the internal COMMON connection from terminal 29 to 30 (see below).

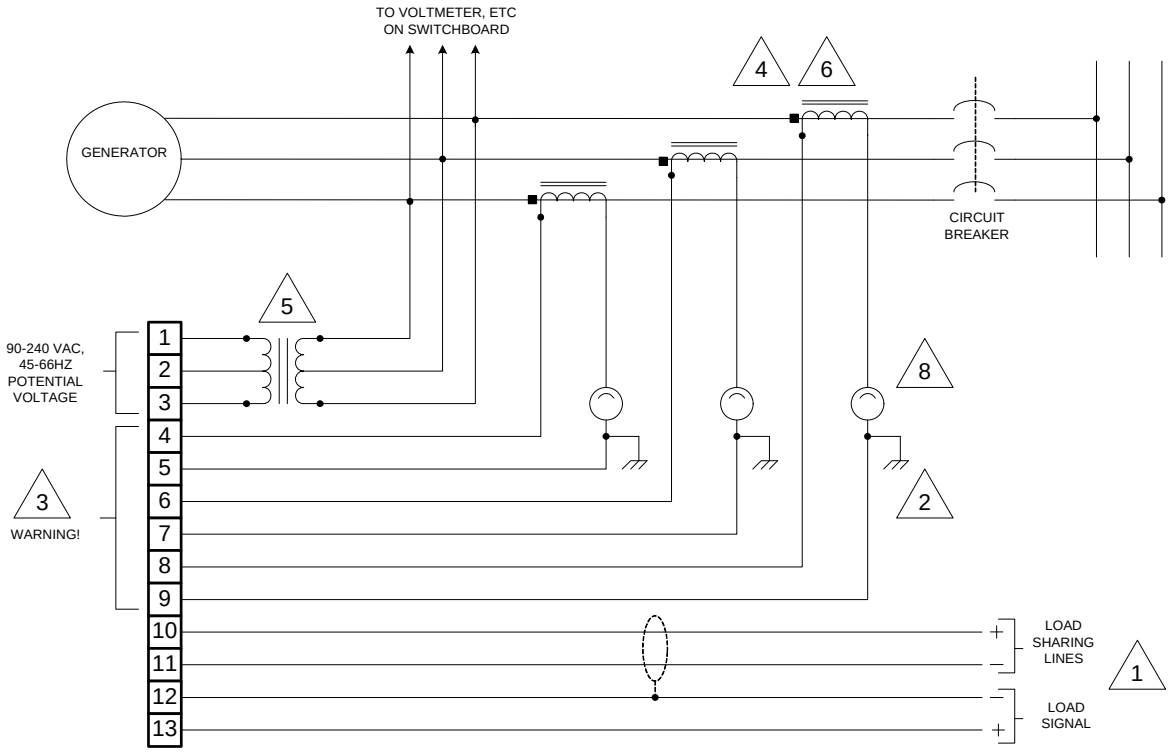
2301D Internal 24 Vdc Power Configuration For Discrete Inputs



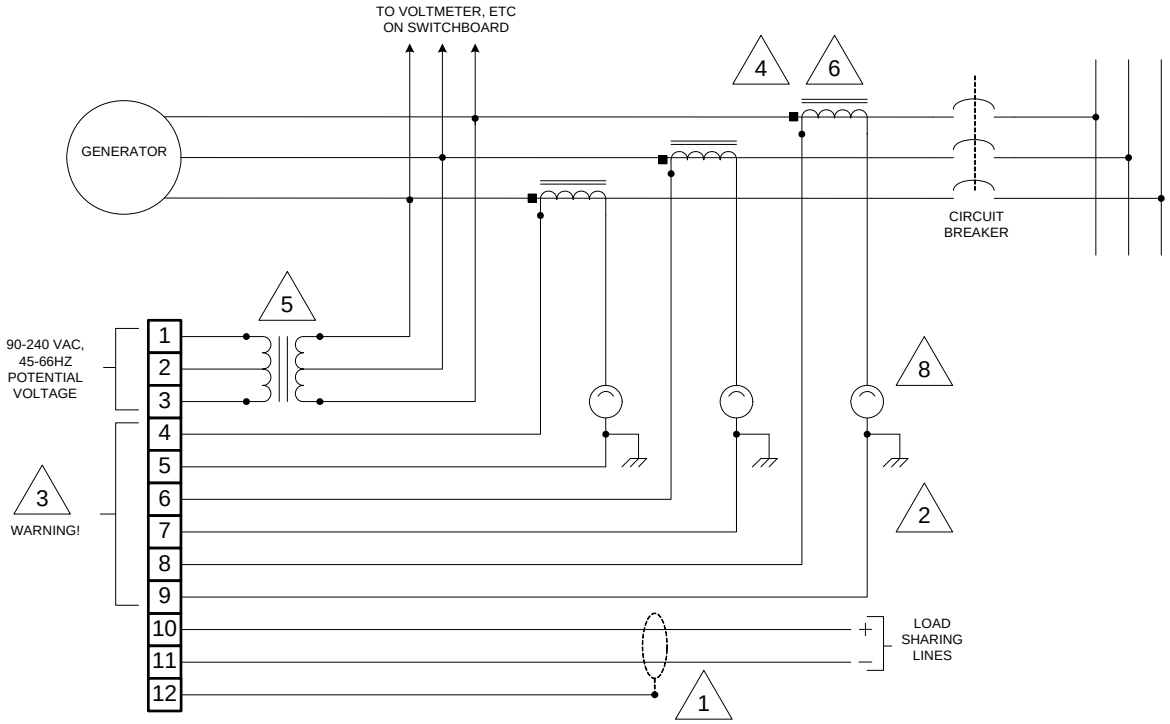
2301D External 24 Vdc Power Configuration For Discrete Inputs



Typical 2301A Plant Wiring for Load Control

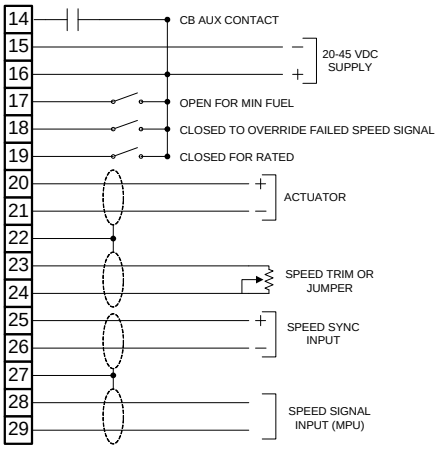


Typical 2301D Plant Wiring for Load Control

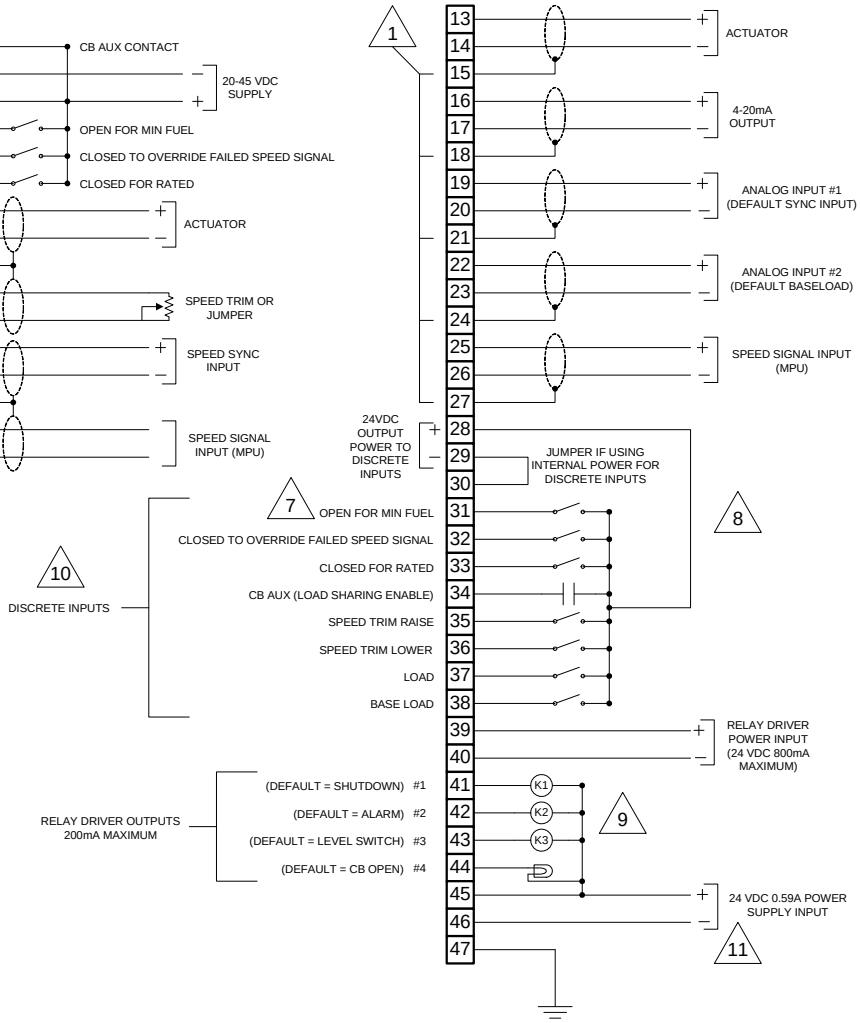


Typical 2301D Plant Wiring

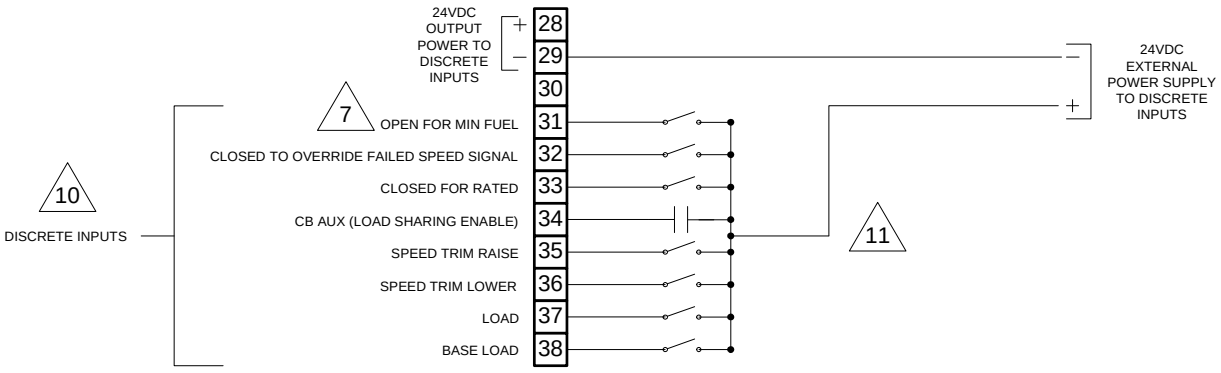
2301A Wiring Diagram



2301D Wiring Diagram



Alternate 2301D Discrete Input Voltage Supply Wiring



NOTES:

1. Shielded wires to be twisted pairs, with shield grounded at control end only.

2. Point of grounding if required by code.

3. Internal current transformer burden must be connected across power source current transformer at all times, to prevent lethal high voltages.

4. Power source current transformers should be sized to produce 5 A secondary current with maximum generator current, current transformer burden is less than 0.1 VA per phase.

5. With a balanced three-phase load and unity power factor, the current transformers should be wired in the correct potential leg and must be phased as follows:
   Phase A: potential terminal 1, with respect to neutral, in phase with CT terminals 4 to 5.
   Phase B: potential terminal 2, with respect to neutral, in phase with CT terminals 6 to 7.
   Phase C: potential terminal 3, with respect to neutral, in phase with CT terminals 8 to 9.

6. For optional current transformer connection see manual 26247.

7. Warning:

⚠WARNING

Do not use for emergency shutdown. The prime mover should be equipped with separate overspeed, overtemperature, or overpressure shutdown device(s) to protect against runaway or damage to the prime mover with possible personal injury or loss of life.

8. If meters are not used, jumpers must be installed in place of meters.

9. Indicates relay coil or lamp, 200 mA maximum per channel.

10. Some discrete inputs may not be used in all applications.

11. Discrete inputs with cable lengths greater than 30 m that are used for critical functions, such as emergency stop, should not be floated in either an on or off state. These inputs should be switched to +24 Vdc or ground.

We appreciate your comments about the content of our publications.

Send comments to: icinfo@woodward.com

Please reference publication 51242.

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