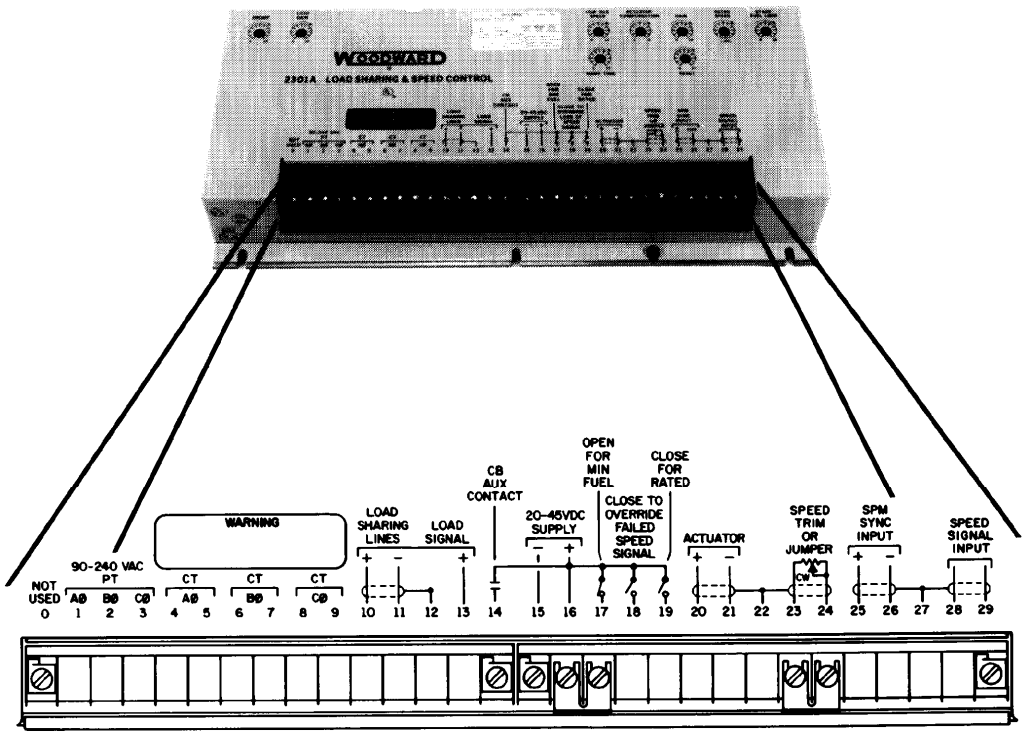
WOODWARD

Application Note 50533
(Revision B)
Original Instructions



Wiring Differences between the 2301 Series and 2301A (9905 Series) Load Sharing and Speed Control

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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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 Out-of-date translations are marked with ⚠.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.

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 Differences between the 2301 Series and 2301A (9905 Series) Load Sharing and Speed Control

Woodward's 2301A (9905 Series) Load Sharing and Speed Control looks like the familiar 2301 and 2301A (8272 Series). It was designed as a direct replacement for the 2301 series in both application and operation and can even be combined with the 2301 series in the same system.

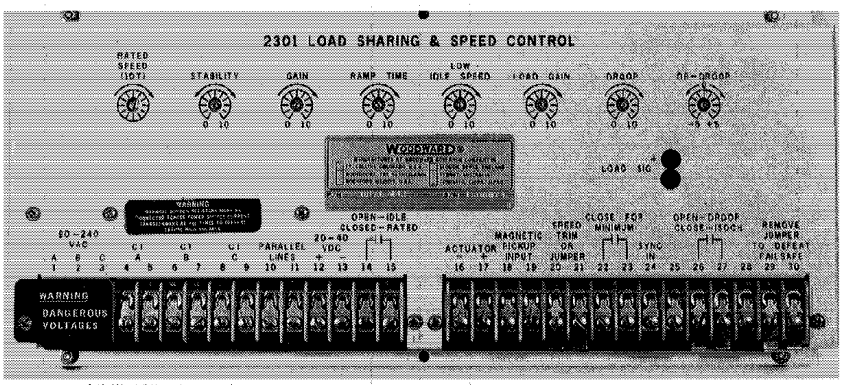
The 2301 Series includes both the single module 2301 control and the four module 2301 panel assembly.

The 2301A is an entirely new control, however, designed for superior performance and durability in all operating environments. It's advanced circuitry simplifies wiring installation and provides maximum protection from outside influences (including human error).

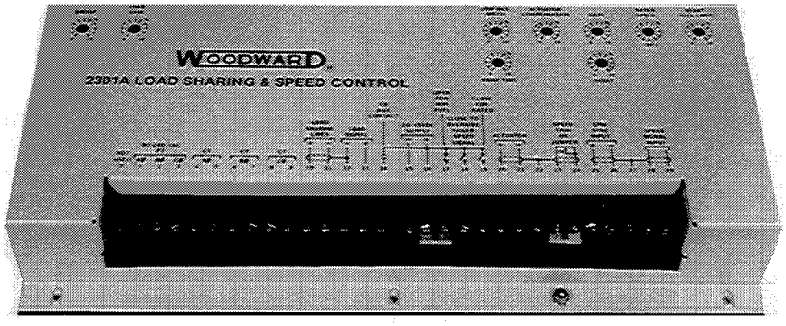
Wiring Comparisons

This new circuitry requires some wiring connections that differ from the 2301 series. These differences must be observed for proper operation. The 2301A wiring connections that differ from the 2301 series are listed below and shown on the following pages. Wiring for both the 2301A and 2301 series are shown for comparison.

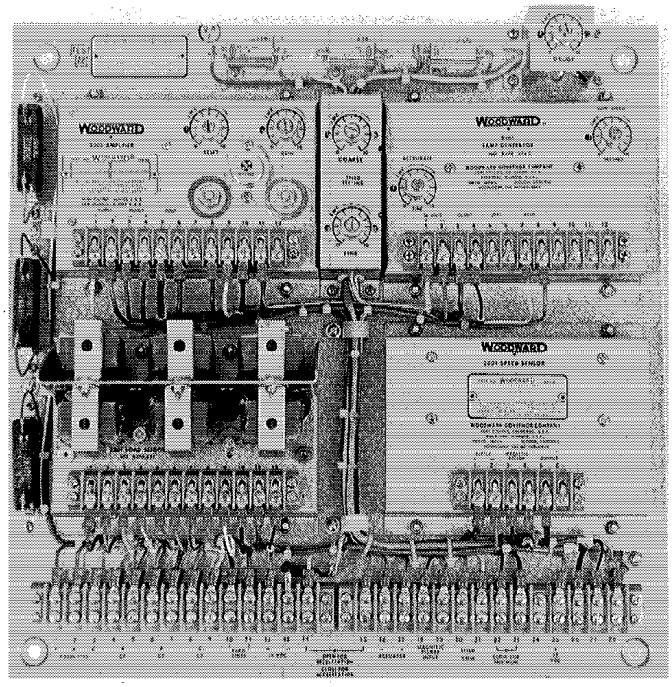
Woodward application engineers are always available to assist you in selection of the correct control for your system, or to answer questions concerning control installation, operation, or calibration. Contact information for all Woodward locations is on our website (**www.woodward.com**).



2301 Load Sharing and Speed Control



2301A Load Sharing and Speed Control



2301 Load Sharing and Speed Control Panel Assembly

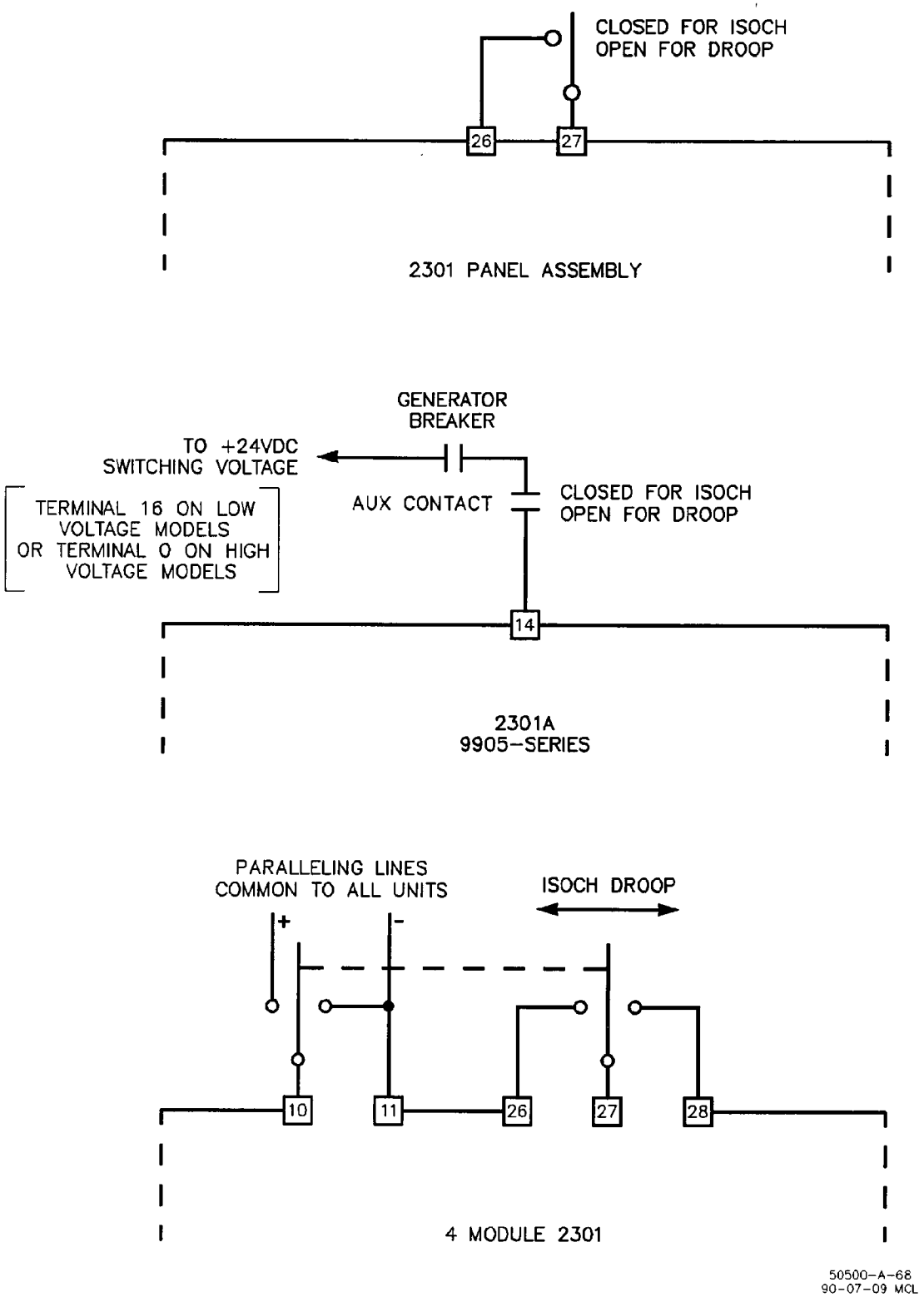
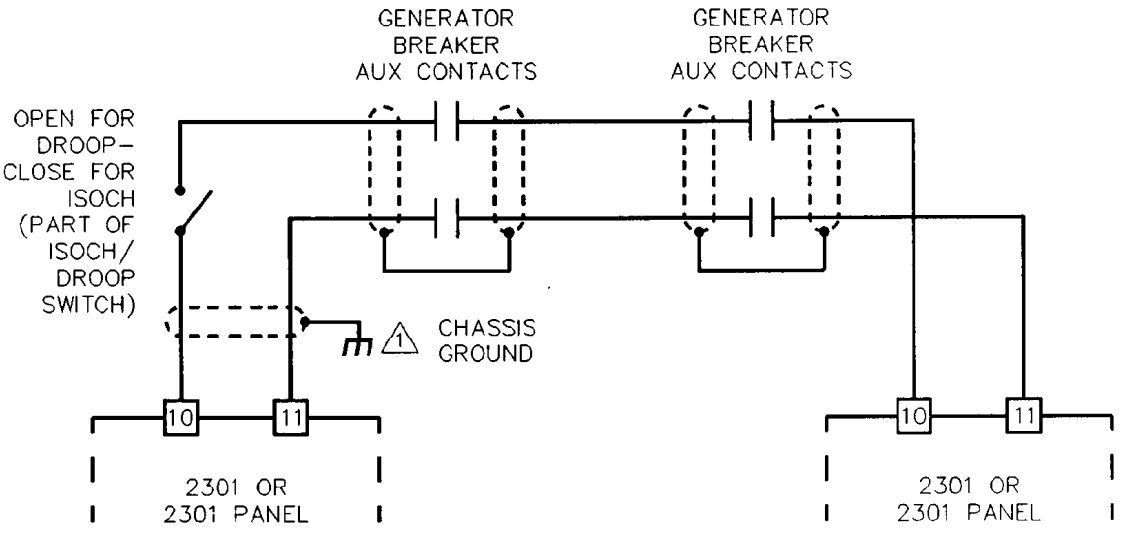


Figure 1. Isochronous/Droop Wiring

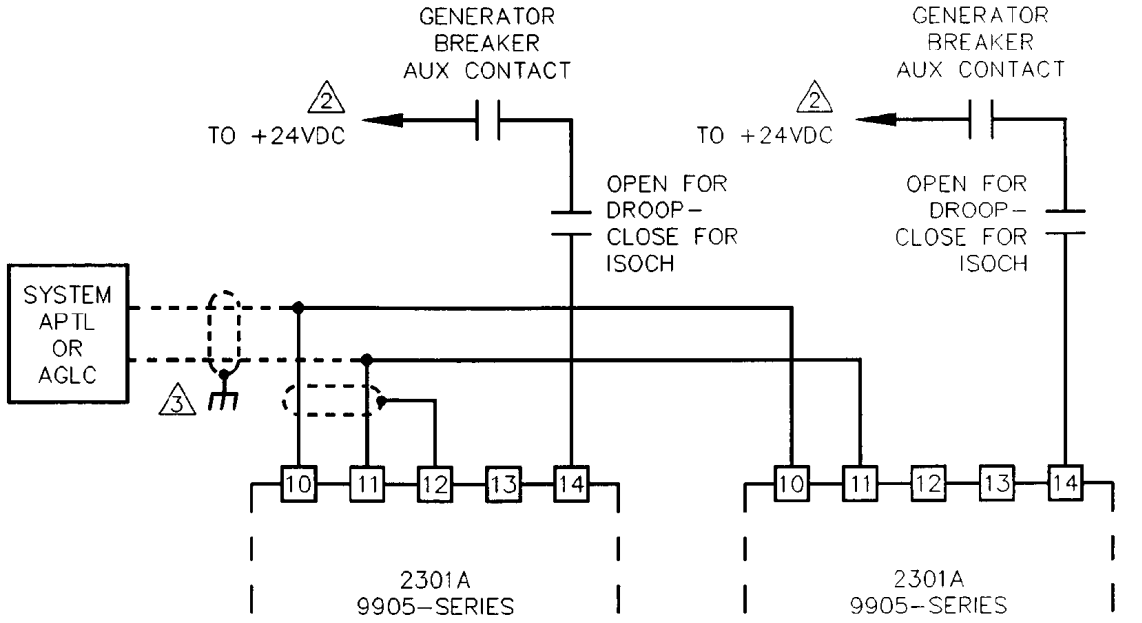


1 GROUND SHIELDING AT ONE POINT ONLY

2 MUST BE SAME 24VDC SOURCE THAT POWERS 2301A

SEE THE NOTE AND DRAWINGS ON PAGE 3 BEFORE CONNECTING 2301 AND 2301A CONTROLS ON THE SAME SYSTEM

50500-A-41
12-12-88RM



1 GROUND SHIELDING AT ONE POINT ONLY

2 MUST BE SAME 24VDC SOURCE THAT POWERS LOW VOLTAGE OR SWITCHING VOLTAGE FROM TERMINAL 0 ON HIGH VOLTAGE 2301A

3 WHERE SYSTEM LOAD IS CONTROLLED BY APTL, AGLC, ETC. GROUND LOAD LINE SHIELDING ONLY AT CONTROLLING DEVICE

50500-A-69
12-12-88RM

Figure 2. Load Sharing Line Wiring

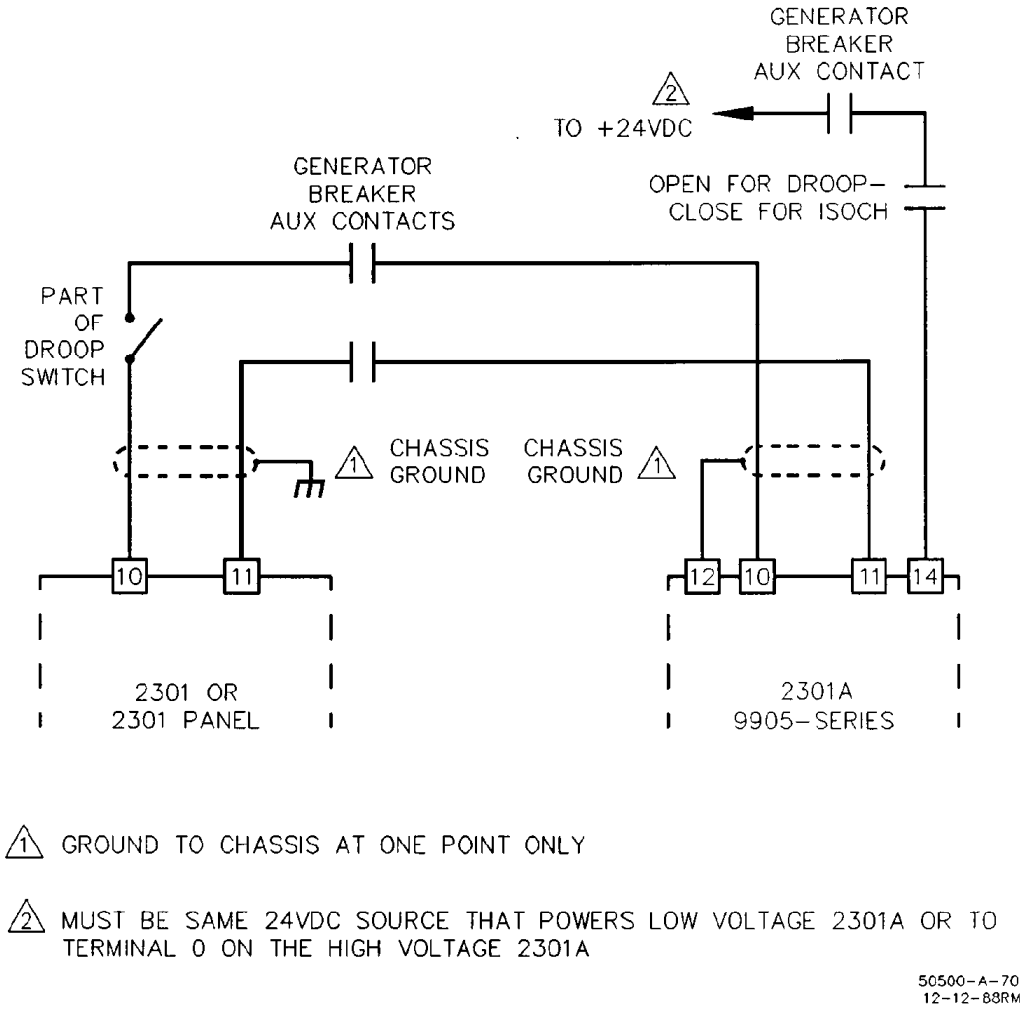


Figure 3. Load Sharing Line Wiring with both 2301 and 2301A Controls

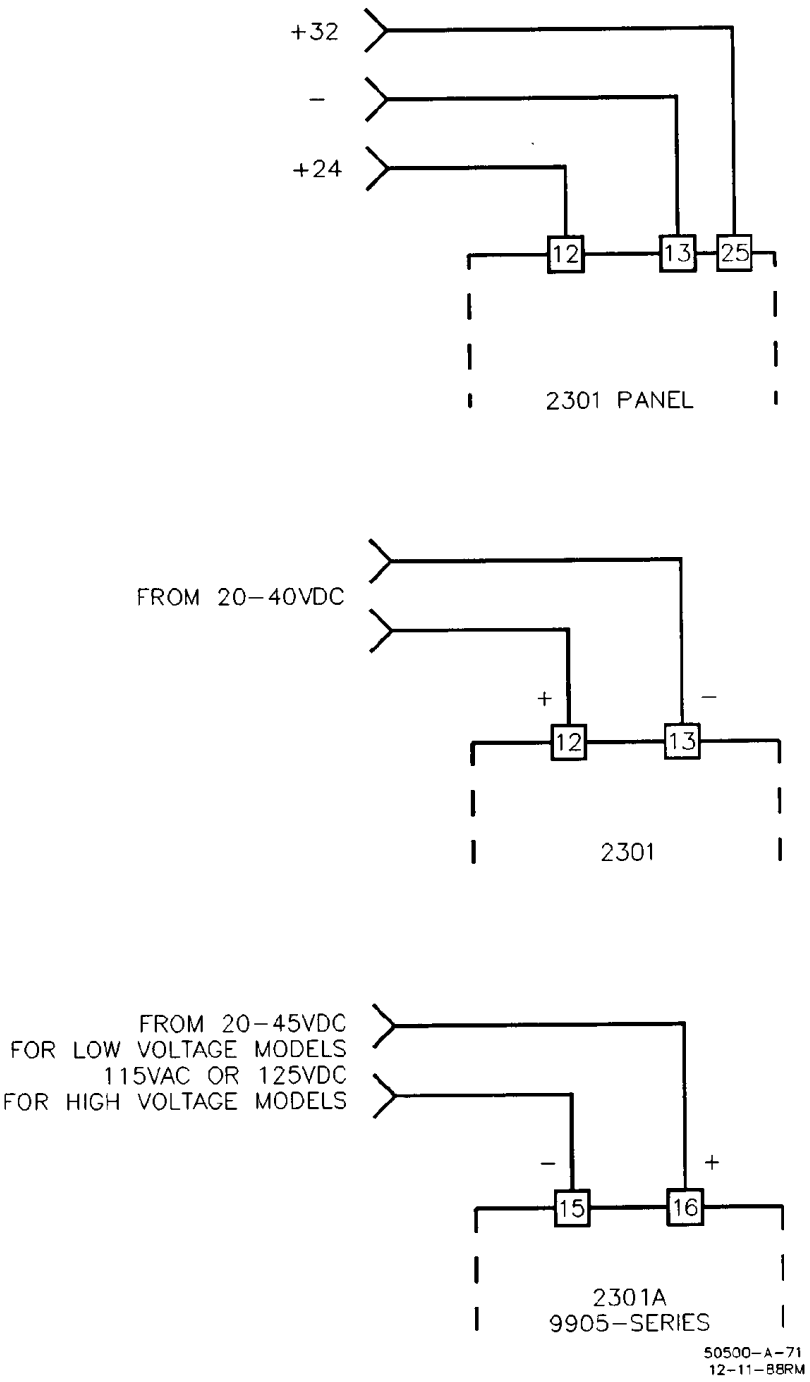
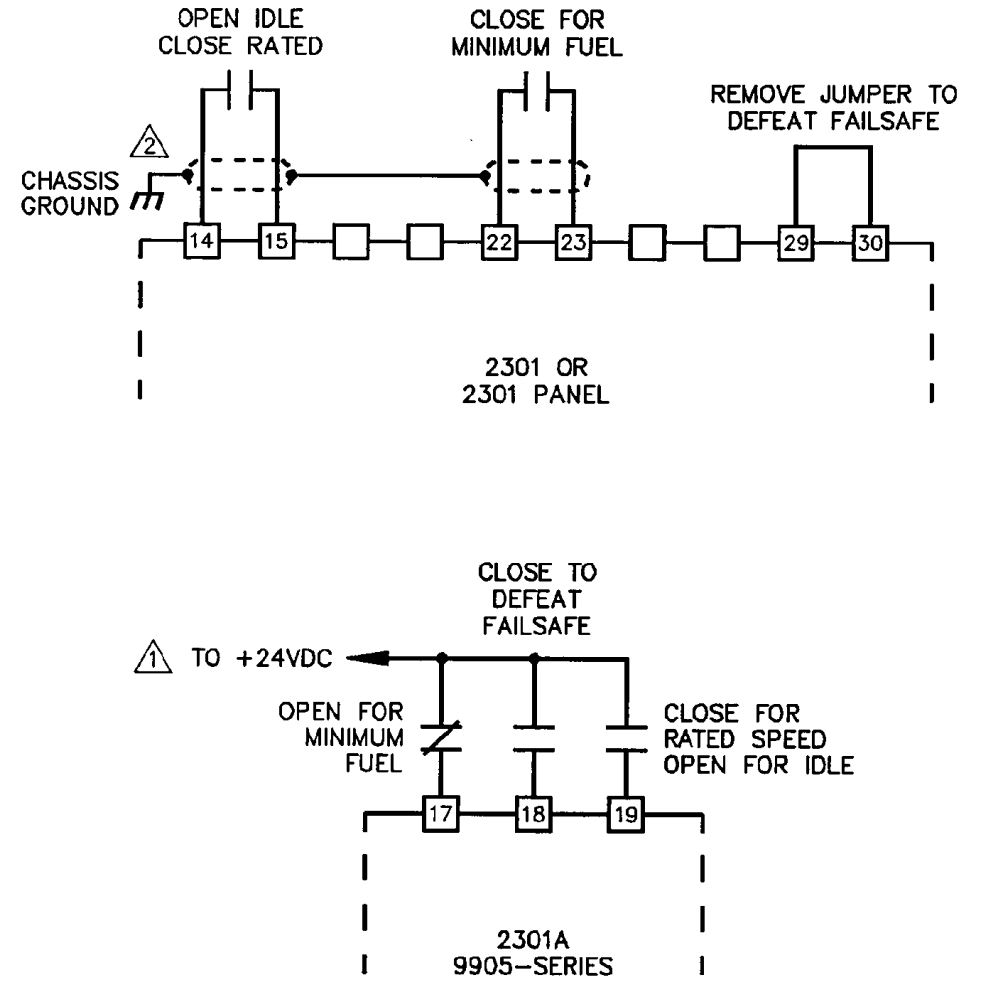


Figure 4. Power Input Wiring



1 MUST BE SAME DC SOURCE THAT POWERS LOW VOLTAGE 2301A OR TO TERMINAL 0 ON THE HIGH VOLTAGE 2301A

2 GROUND TO CHASSIS AT ONE POINT ONLY

50500-A-72
90-06-20 MCL

Figure 5. Logic Input Wiring

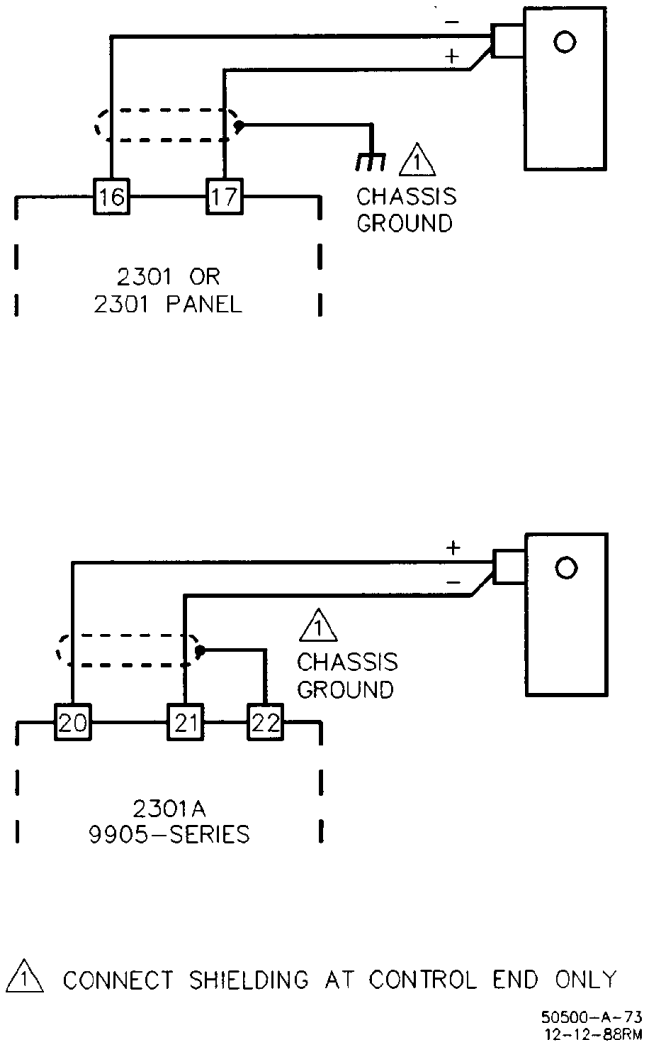


Figure 6. Actuator Wiring

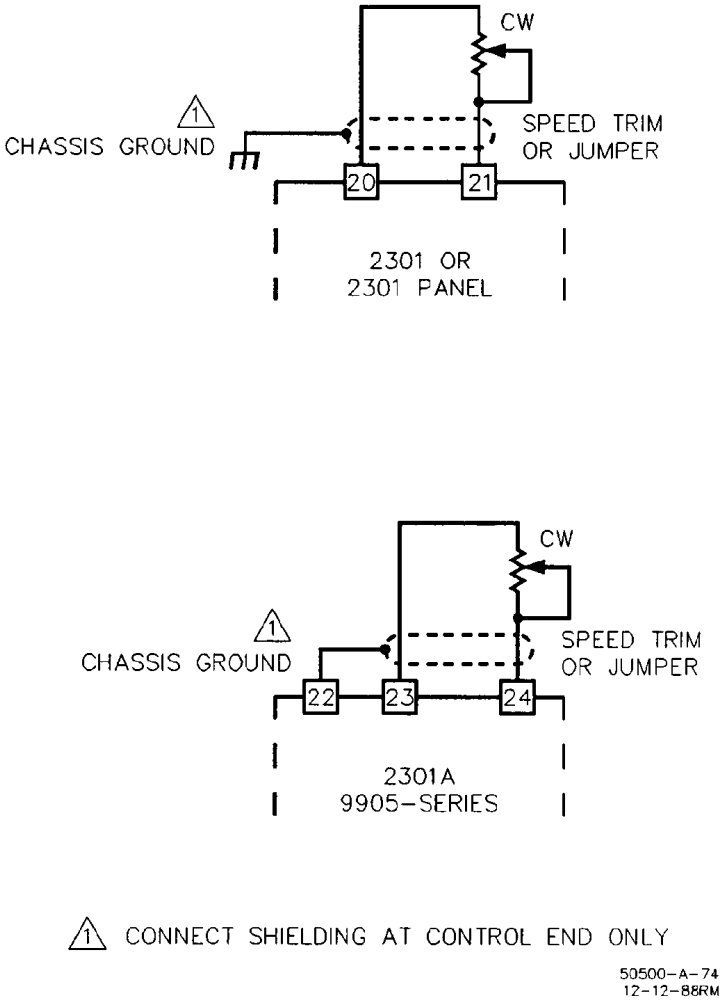


Figure 7. Speed Trim Potentiometer Wiring

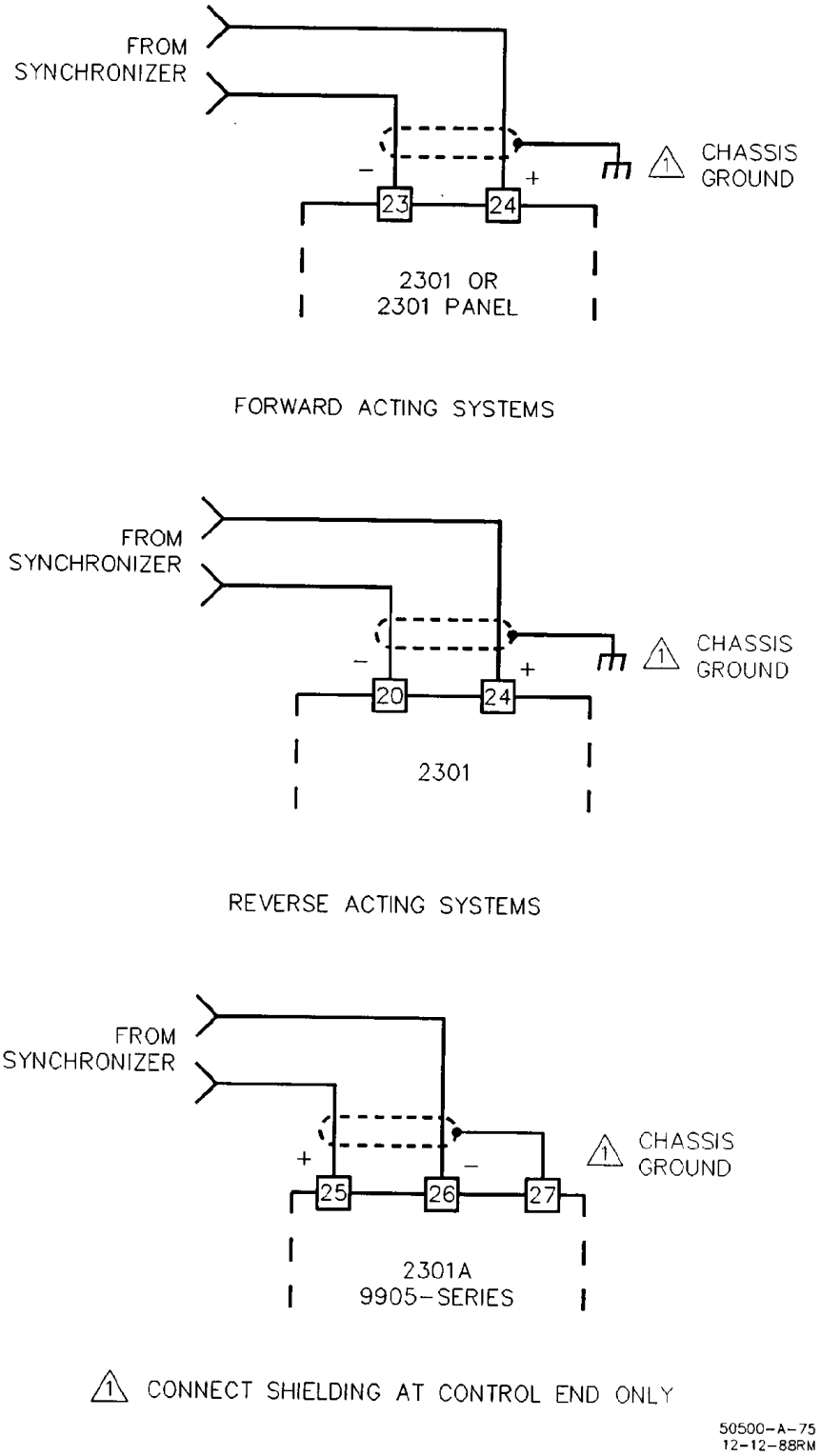


Figure 8. Synchronizer Input Wiring

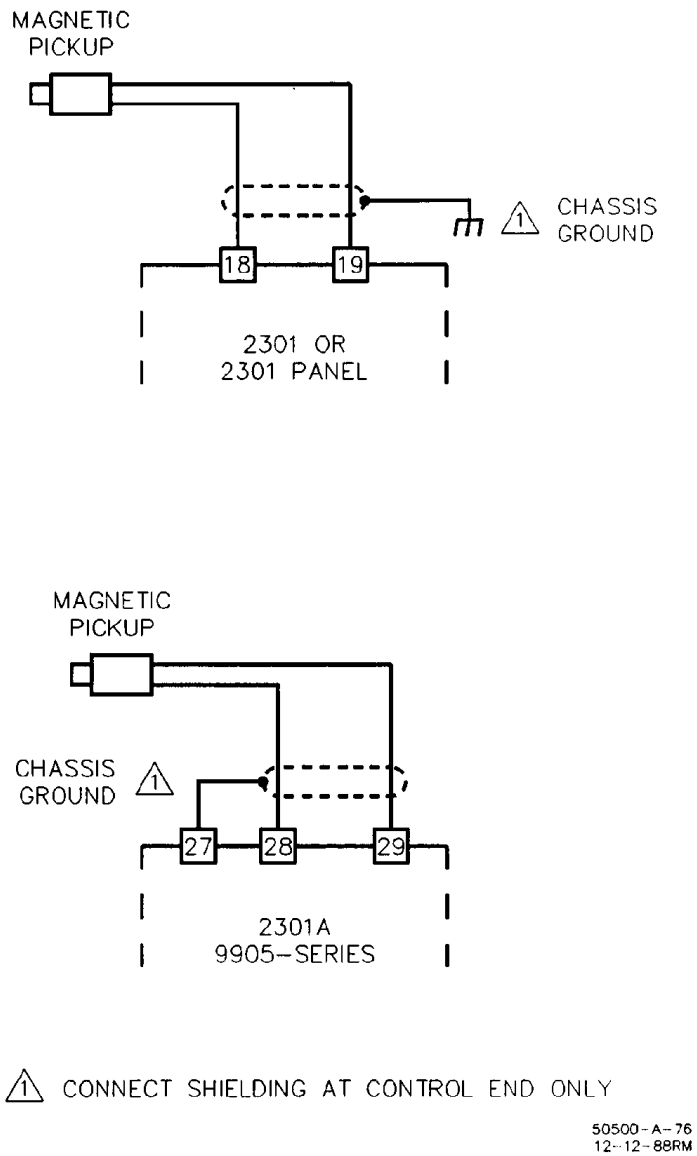


Figure 9. Magnetic Pickup Wiring

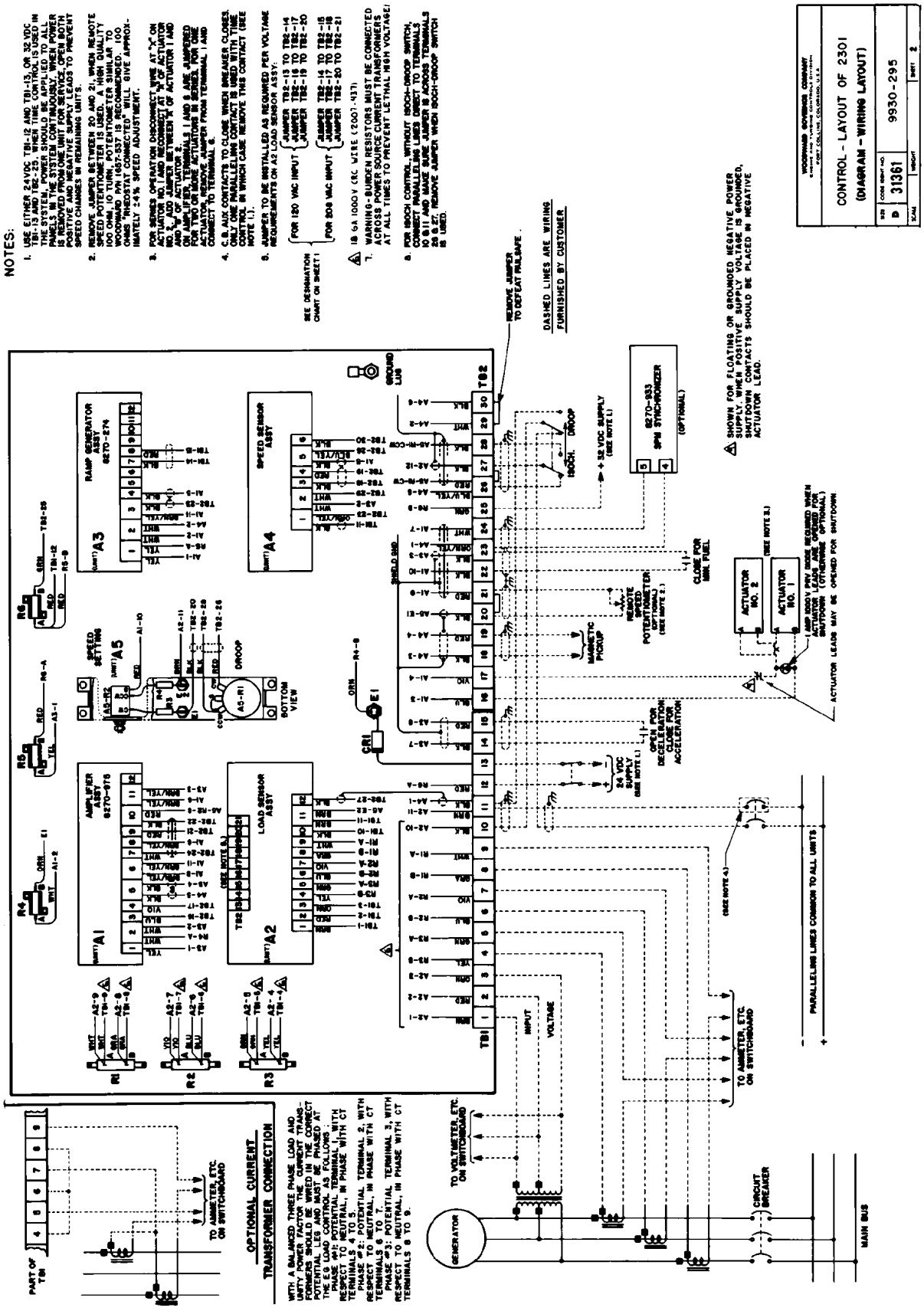


Figure 10. Typical 2301 Panel Plant Wiring

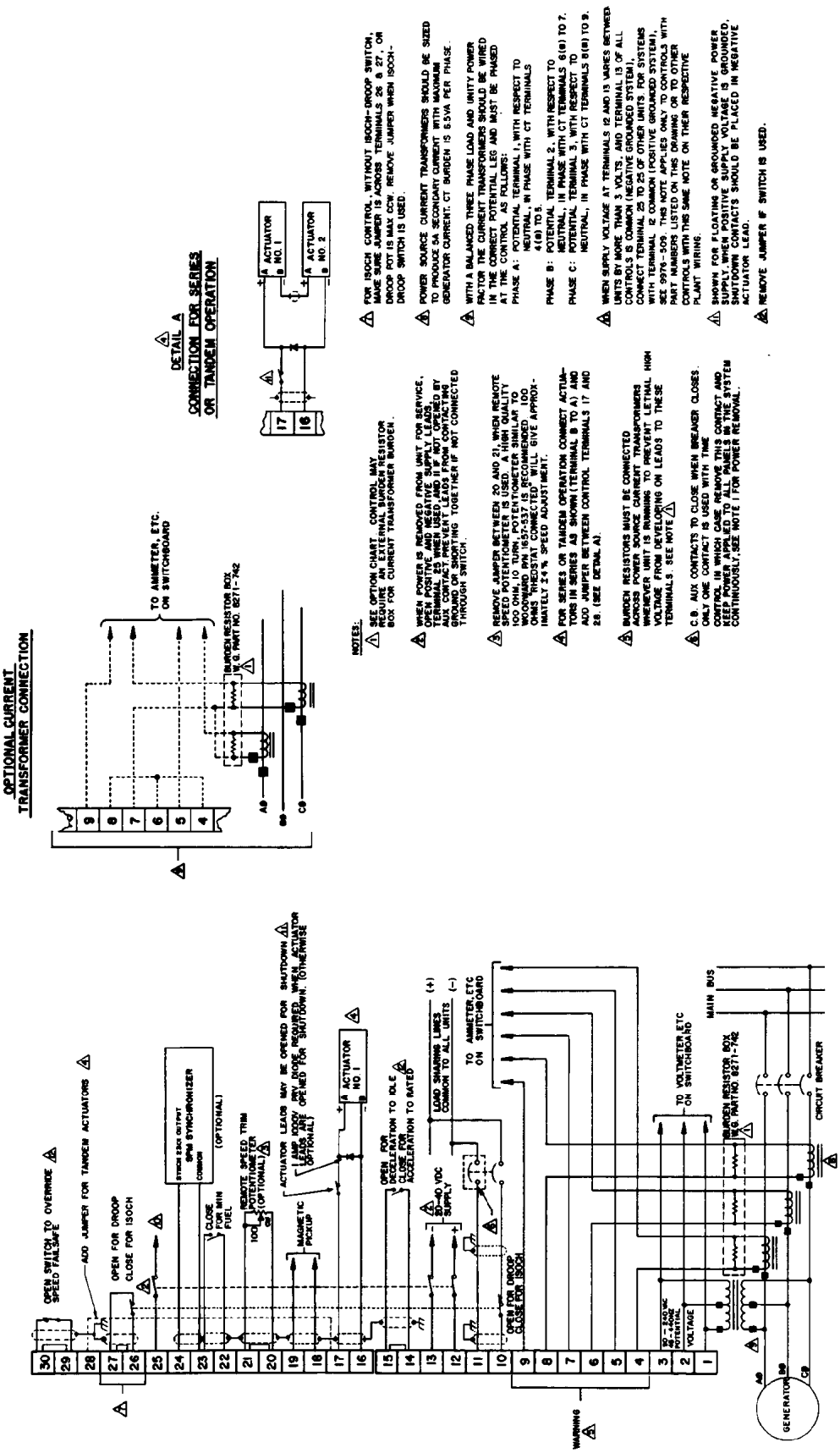


Figure 11. Typical 2301 Plant Wiring-Forward Acting Controls

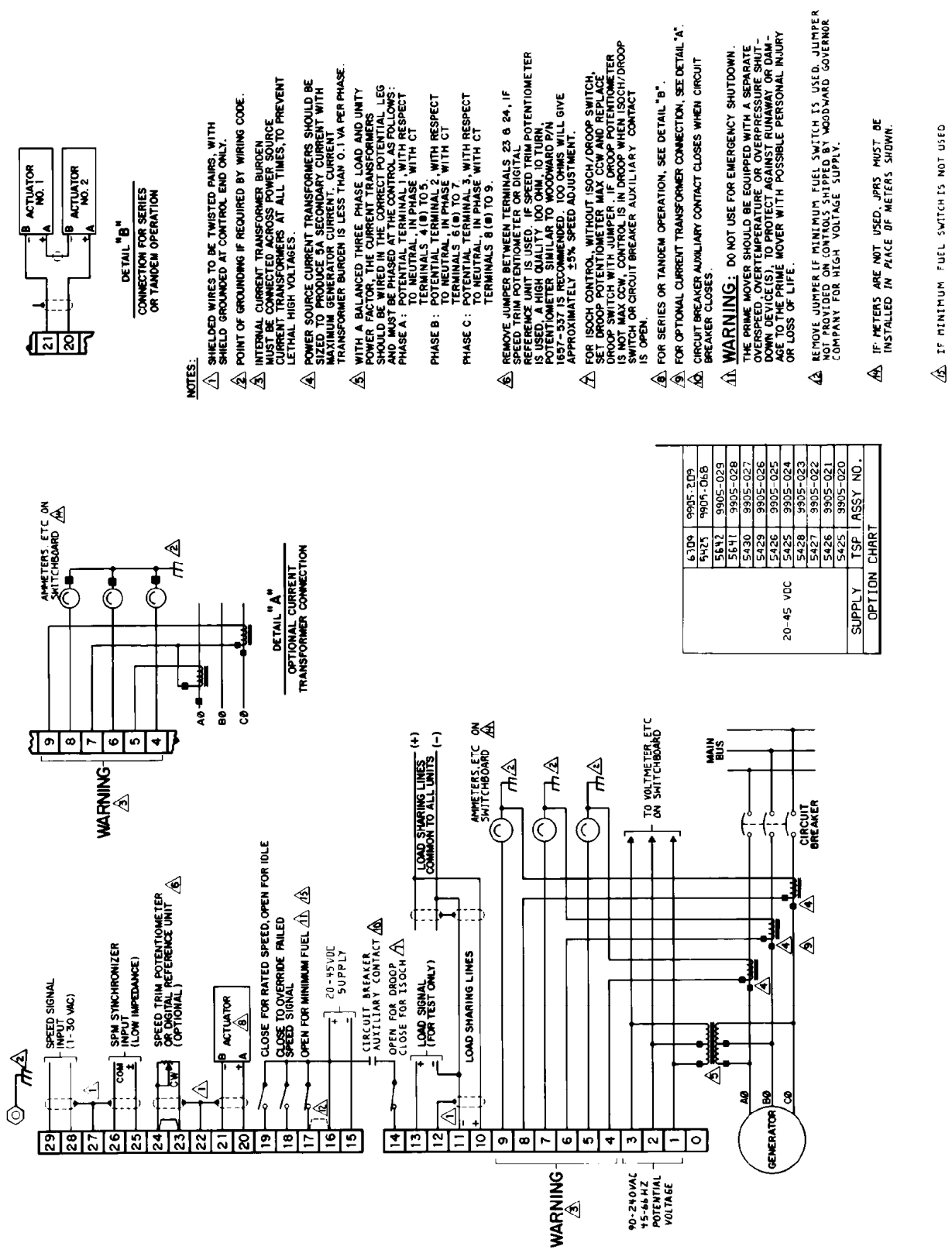


Figure 12. Typical 2301 Plant Wiring Reverse Acting Control

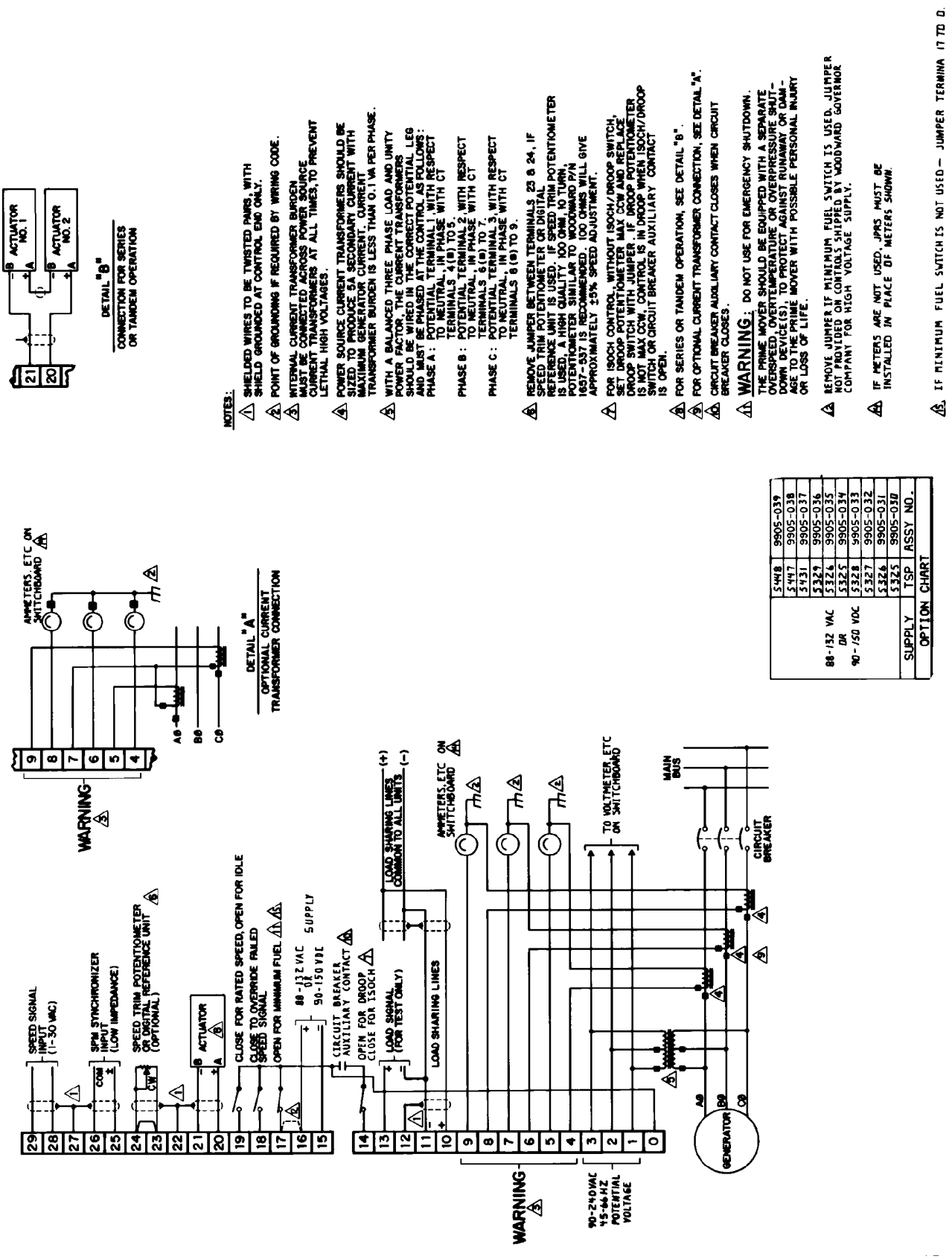


Figure 13. 2301A (9905-Series) Plant Wiring

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Send comments to: icinfo@woodward.com

Please reference publication 50533B.

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2012/11/Colorado