WOODWARD

Application Note 51191
(Revision NEW)
Original Instructions

Wiring Instructions for 2301A Controls Replacing Caterpillar 2301 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.

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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 2301A Controls Replacing Caterpillar 2301 Controls

Introduction

The following 2301 speed control is no longer in production, and has been replaced by an updated 2301A speed control (both fixed speed and variable speed versions):

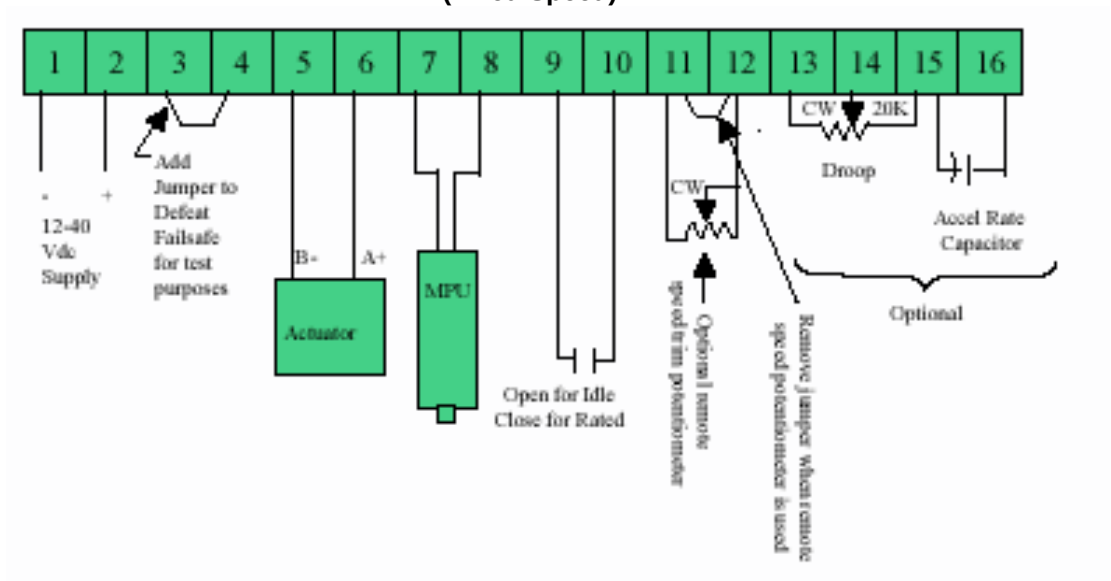
Old 2301		Recommended Replacement 2301A	
Woodward part number	**Caterpillar part number**	**Woodward part number**	**Caterpillar part number**
8272-689	4W-5790	9907-014	131-5453

Refer to Woodward manual 82020 for details on control installation, operation, adjustment, and troubleshooting.

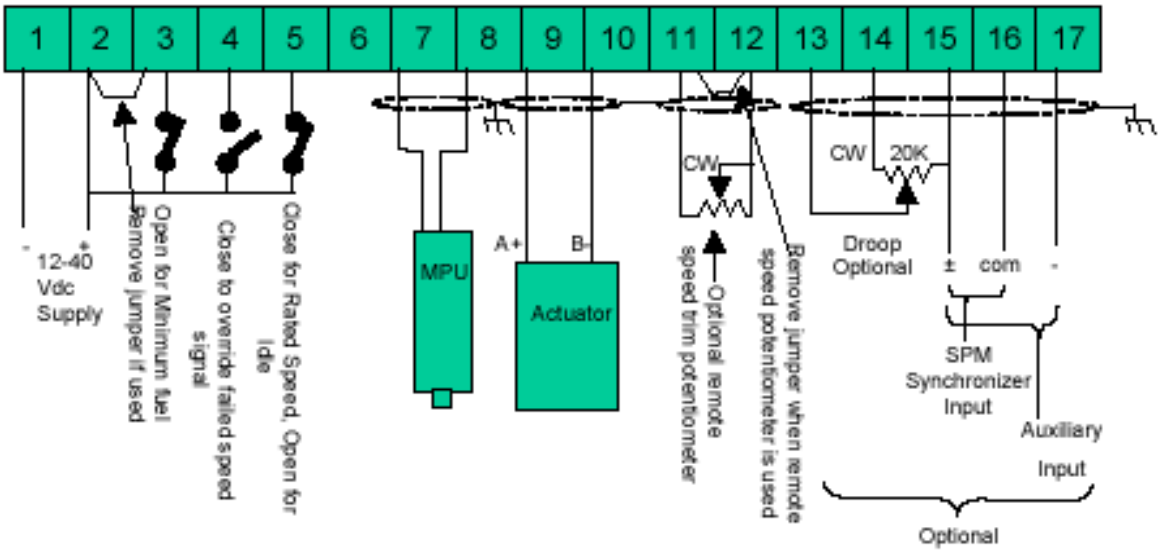
Fixed Speed Version

Woodward 2301 speed control 8272-689 (Caterpillar part number 4W-5790) is no longer in current production. The improved standard 2301A speed control 9907-014 (Caterpillar part number 131-5453) is recommended for replacement. Due to internal control design differences, the customer wiring to the control terminals is different. This application sheet illustrates the differences in wiring. Refer to Woodward manual 82020 for control installation, operation, adjustment, and troubleshooting.

Old Standard Wiring Speed Control 8272-689 (Cat # 4W-5790)
(Fixed Speed)



New Standard Wiring Speed Control 9907-014 (Cat # 131-5453)
(Fixed Speed)

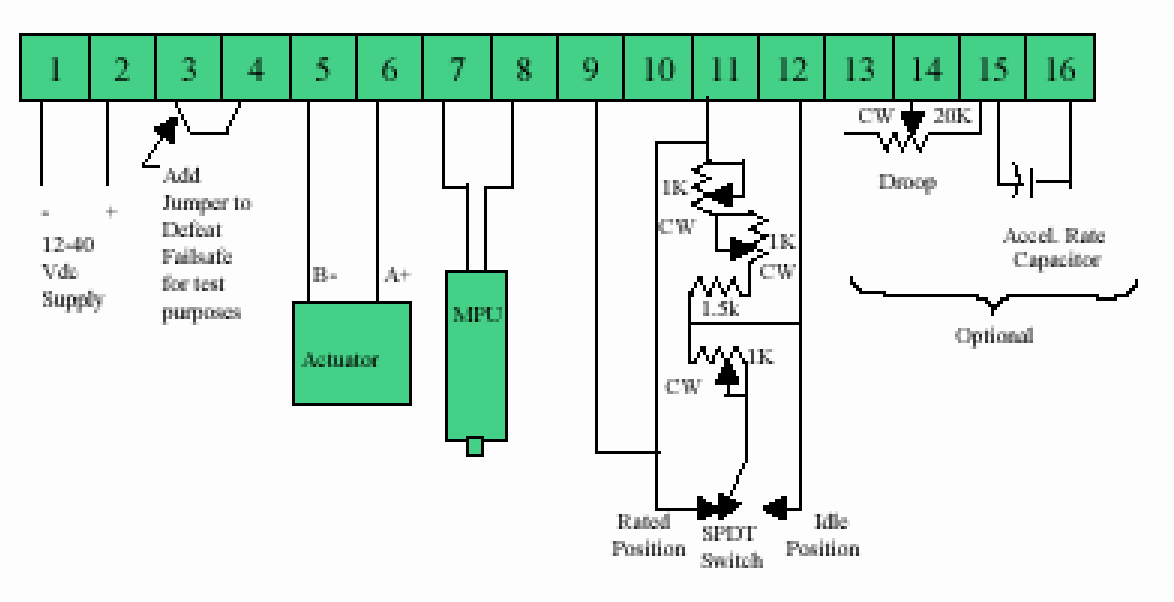


Wiring differences between 8272-689 (4W-5790) and 9907-014 (131-5453) used for standard wiring (fixed speed) speed control:

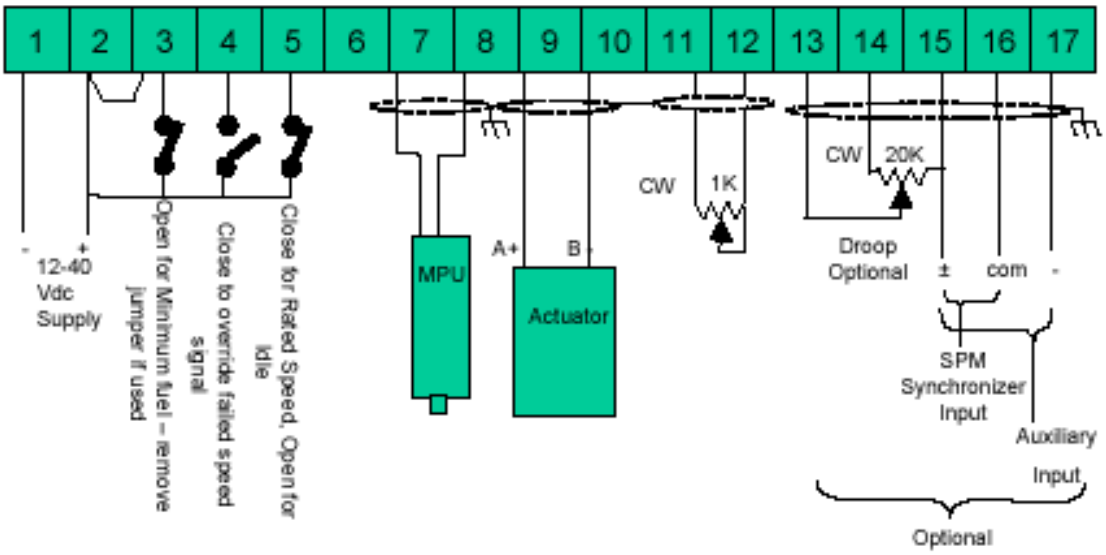
- Actuator connections have moved from terminals 5(–) & 6(+) to terminals 9(+) & 10(–).
- Optional external Accel Rate Capacitor removed—This function is internal and adjusted using the Ramp Time potentiometer on the 9907-014 control.
- Terminals 15 and 16 on 9907-014 control can be used for optional SPM Synchronizer input.
- Terminals 15(+) and 17(–) on the 9907-014 control can be used for optional Auxiliary input.
- Optional external Droop potentiometer slider is moved from terminal 14 to 13, and the clockwise lead is moved from terminal 13 to 14.
- Close for Rated speed and Open for Idle speed contact is moved from terminals 9 & 10 to terminals 2 and 5.

Variable Speed Version

Old Customer Remote Idle and Rated Speed Control 8272-689 (Cat # 4W-5790) (Variable Speed)



New Customer Remote Rated Speed Control 9907-014 (Cat # 131-5453) (Variable Speed)



Wiring differences between 8272-689 (4W-5790) and 9907-014 (131-5453) used for Customer Remote Idle and Rated Speed Adjustment:

- Actuator connections have moved from terminals 5(–) & 6(+) to terminals 9(+) & 10(–).
- Optional external Accel. Rate Capacitor removed—This function is internal and adjusted using the Ramp Time potentiometer on the 9907-014 control.
- Terminals 15 and 16 on 9907-014 control can be used for optional SPM Synchronizer input.
- Terminals 15(+) and 17(–) on the 9907-014 control can be used for optional Auxiliary input.

- Optional external Droop potentiometer slider is moved from terminal 14 to 13, and the clockwise lead is moved from terminal 13 to 14.
- If the application used the remote mounted Idle and Rated Potentiometers, the single pole double throw Switch connected to terminals 9, 10 or 11, and 12 should be wired between terminals 2 and 5 on the control (Close for Rated and Open for Idle).
- The Remote Potentiometer Assembly should be replaced by a single 10-turn 1K potentiometer as illustrated.
- Terminal 11 on the control is wired to the CCW lead of the Remote Rated Speed potentiometer.
- Terminal 12 on the control is wired to the CW lead of the Remote Rated Speed potentiometer.

Refer to Woodward manual 82020 for installation, checkout, and setting instructions.

The following procedure is for setting up the Remote Rated Speed Setting potentiometer:

- Install jumper between control terminals 11 and 12.
- Install single-pole double-throw switch between control terminals 2 and 5.
- Adjust Rated Speed potentiometer on the control to produce 1980 rpm.
- Open switch between terminals 2 and 5 on the control.
- Adjust Low Idle Speed potentiometer on the control to 700–1000 rpm range.
- Shut engine down, then remove jumper from terminals 11 and 12.
- Prior to attaching the Remote Rated potentiometer assembly to terminals 11 and 12, rotate the potentiometer to minimum resistance. Attach an ohmmeter to the potentiometer leads to assure less than 5 Ω reading.
- Attach leads from the Remote Rated potentiometer assembly to terminals 11 and 12 on the control as illustrated.
- Put switch in Rated position and verify engine goes to 1980 rpm.
- Adjust Remote Rated potentiometer for 1960 rpm.
- Put switch in Idle position, and verify that engine speed is within the 700–1000 rpm range.

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