

701A Digital Speed Control for reciprocating engines



APPLICATION

The Woodward 701A Digital Speed Control offers improved speed control with models designed specifically for low-speed to high-speed diesel, gas, or pilot-fuel engines (one actuator moving two sets of linkages to the gas fuel valve and the diesel injection system).

The 701A control uses a 16-bit microprocessor for all control functions.

The control has enhanced control dynamics that give smooth steady-state operation, yet the control retains fast response to engine speed and load changes.

An external contact input allows switching between two independent sets of automatic variable dynamics. This is especially useful for engine systems with different operation conditions, such as open or closed clutches or pilot-fuel engines. The contact could also be wired to change dynamics based on utility tie breaker status.

SPECIFICATIONS

Environment

Operating Temperature	-40 to +70 °C (-40 to +158 °F)
Storage Temperature	-40 to +100 °C (-40 to +212 °F)
EMI/RFI Susceptibility and Emissions	EN50082-2, EN50081-2

Control Characteristics

Steady State Speed Band	Rated speed $\pm 0.25\%$ over all operating conditions
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Inputs

Speed Signal Input and Range	Magnetic pickup or proximity switch
Magnetic Pickup Input	60 to 15 000 Hz (8 to 2100 rpm)
Proximity Switch Input*	7.5 to 1000 Hz (8 to 2100 rpm)*

*Use of proximity probes is not recommended for EU EMC directive applications at this time.

Power Supply	18 to 40 Vdc (24 or 32 Vdc nominal) 88 to 132 Vac 50/60 Hz (120 Vac nominal) 90 to 150 Vdc (125 Vdc nominal)
Power Consumption	8 W nominal

- Adaptive (learning) speed-sensing algorithm
- Two independent sets of engine-mapped variable dynamics
- Enhanced steady-state dynamics
- Self diagnostics
- Start, load, and torque limiters
- Remote speed setting
- Tachometer or load-signal output
- Reduced cost
- Generator set and other constant-speed or variable-speed applications
- EU Directive Compliant

Discrete Inputs	On/off command inputs for the control. Optional voltages are 24 Vdc, 5 Vdc, and a control-supplied auxiliary voltage of 21 Vdc. A—Run/Stop B—Idle/Rated (Start/Max Fuel Limit) C—Lower Speed D—Raise Speed C & D—Local/Remote Speed Reference E—Dynamics 1/2 F—Failsafe Override
Remote Speed Setting Input	4 to 20 mA or 1 to 5 Vdc for remotely setting engine speed Auxiliary input for connection of Woodward Generator Load Sensor for load sharing or Power Output Sensor for mechanical loads

Outputs

Actuator	0 to 200 mA or 4 to 20 mA for pneumatic, electric, and electrohydraulic actuators
Serial Port	RS-422 with a 9-pin D connector. The serial port operates in full duplex at a baud rate of 1200. The control includes RS-422 interface and terminal power for the Woodward hand-held control/display terminal. The serial port is compatible with other terminals and computers with an RS-422 serial port. Used for initial setup and diagnostics only.
Tachometer Output	4 to 20 mA for an analog meter or as input to another computer

Adjustments

All adjustments are done with the Woodward 9907-205 Hand Held Programmer with an RS-422 serial port. This hand held terminal displays two parameters simultaneously and continuously updates them for easier monitoring.

After all set points are adjusted to the desired value, the control saves them permanently in nonvolatile memory, which does not require batteries or other power sources to retain data. Entries can be changed at any time using the Hand Held Programmer.

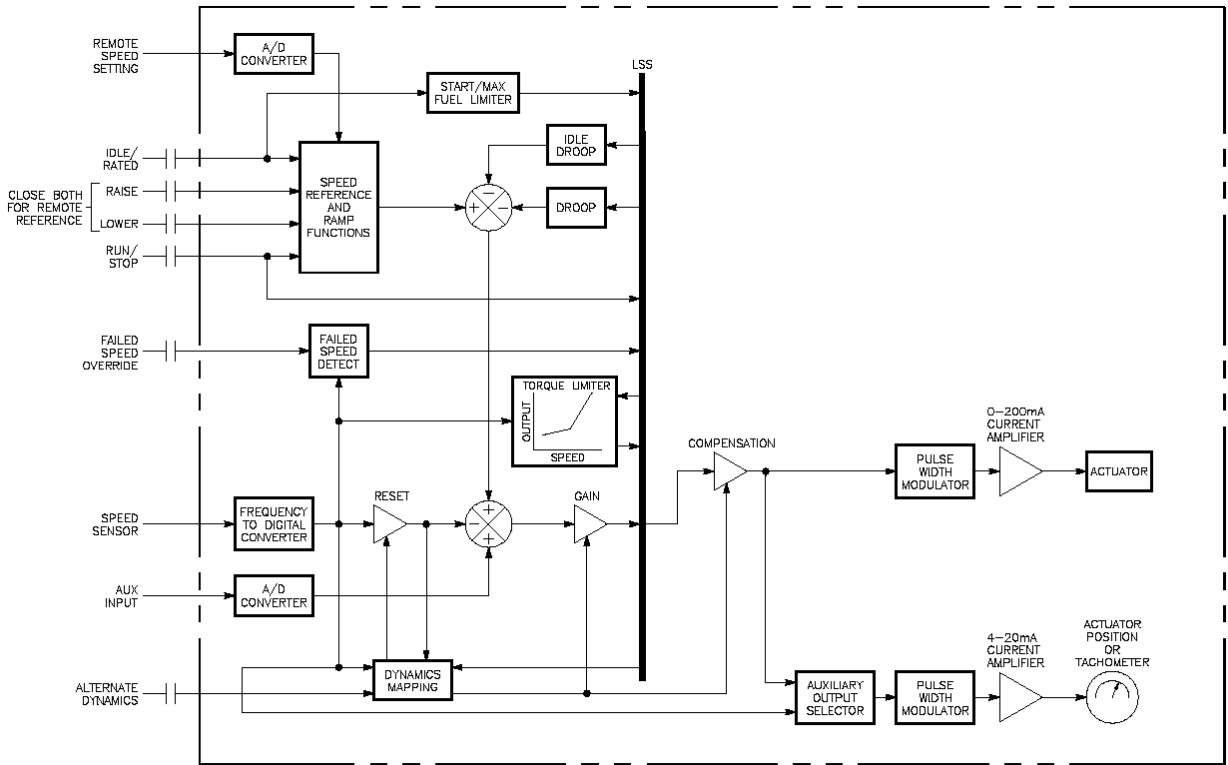
The control has nine convenient “menus” for operation and adjustment:

Menus 1 (Dynamics)	
Menu 2 (Aux Dynamics)	Gain, Stability, Compensation, Gain Ratio, Window Width, Gain Slope Breakpoint, Gain Slope
Menu 3 (Speed Setting)	Raise Speed Limit, Lower Speed Limit, Idle Speed Reference, Accel Ramp Time, Decel Ramp Time, Raise Speed Rate, Lower Speed Rate, 20 mA Remote Reference, 4 mA Remote Reference, Tach at 20 mA Output, Tach at 4 mA Output, Droop, Low Idle Breakpoint, Low Idle Droop, Torsional Filter
Menu 4 (Fuel Limiters and Control Output)	Maximum Fuel Limit, Start Fuel Limit, Start Speed, Idle Fuel Limit, Torque Limit Breakpoint, Minimum Torque Limit, Breakpoint Torque Limit, Maximum Torque Limit, 20mA Aux Actuator, 4mA Aux Actuator
Menu 5 (Configuration)	Configuration Key, Rated Speed, Num Gear Teeth, Num Samples, Engine Type, Actuator Sense, Dynamics Map, Remote Input Fault, Speed Sense, Aux Output
Menu 6 (Calibration)	Calibration Key, Remote Input Cal, Aux Input Cal, Aux Output Cal
Menu 7 (Display 1)	Engine Speed, Speed Reference, Actuator Output, Aux Output, Remote Input, Aux Input, Control Mode
Menu 9 (Display 2)	Run/Stop Contact Status, Idle/Rated Contact Status, Lower Speed Contact Status, Raise Speed Contact Status, Dynamics Switch, Failsafe Override Contact
Menu 0 (Status)	Watchdog Status, Diagnostics Result, ROM Checksum

Declaration of Incorporation

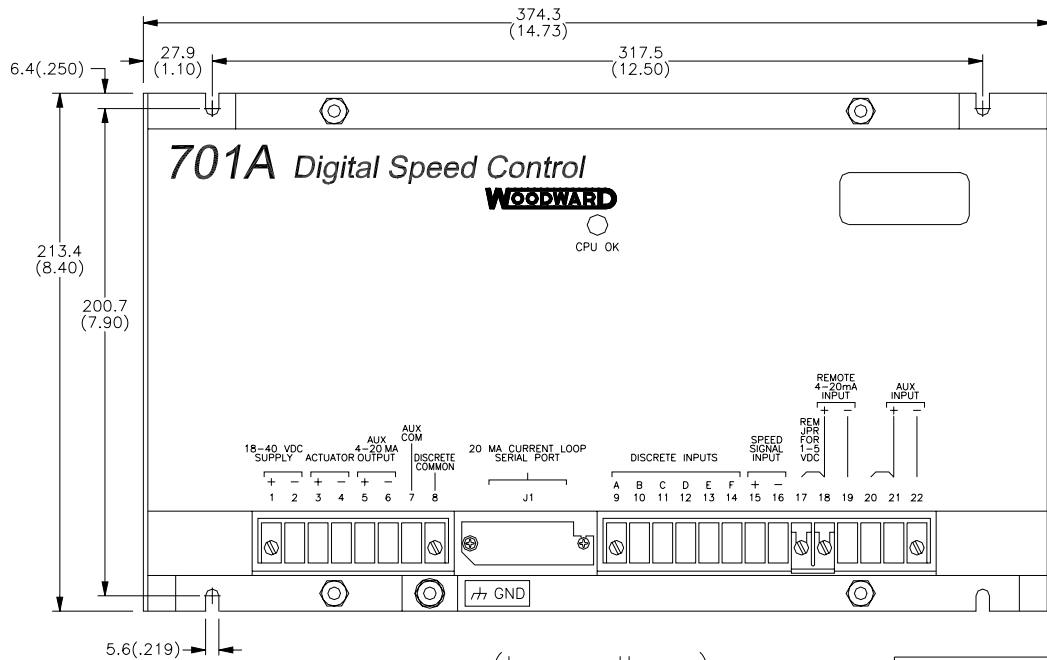
In accordance with the EMC Directive 89/336/EEC and its amendments, this controlling device, manufactured by the Woodward Governor Company, is applied solely as a component to be incorporated into an engine prime mover system. Woodward Governor Company declares that this controlling device complies with the requirements of EN50081-2 and EN50082-2 when put into service per the installation and operating instructions outlined in the product manual.

NOTICE: This controlling device is intended to be put into service only upon incorporation into an engine prime mover system that itself has met the requirements of the above Directive and bears the CE mark.



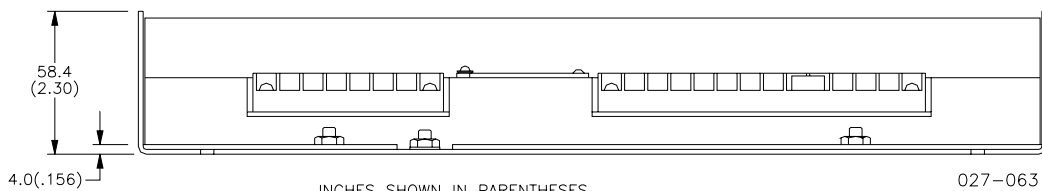
851-703
93-4-12 RAM

701A Block Diagram



(low voltage)

METRIC



INCHES SHOWN IN PARENTHESES

027-063
94-10-31 RAM

701A Digital Speed Control

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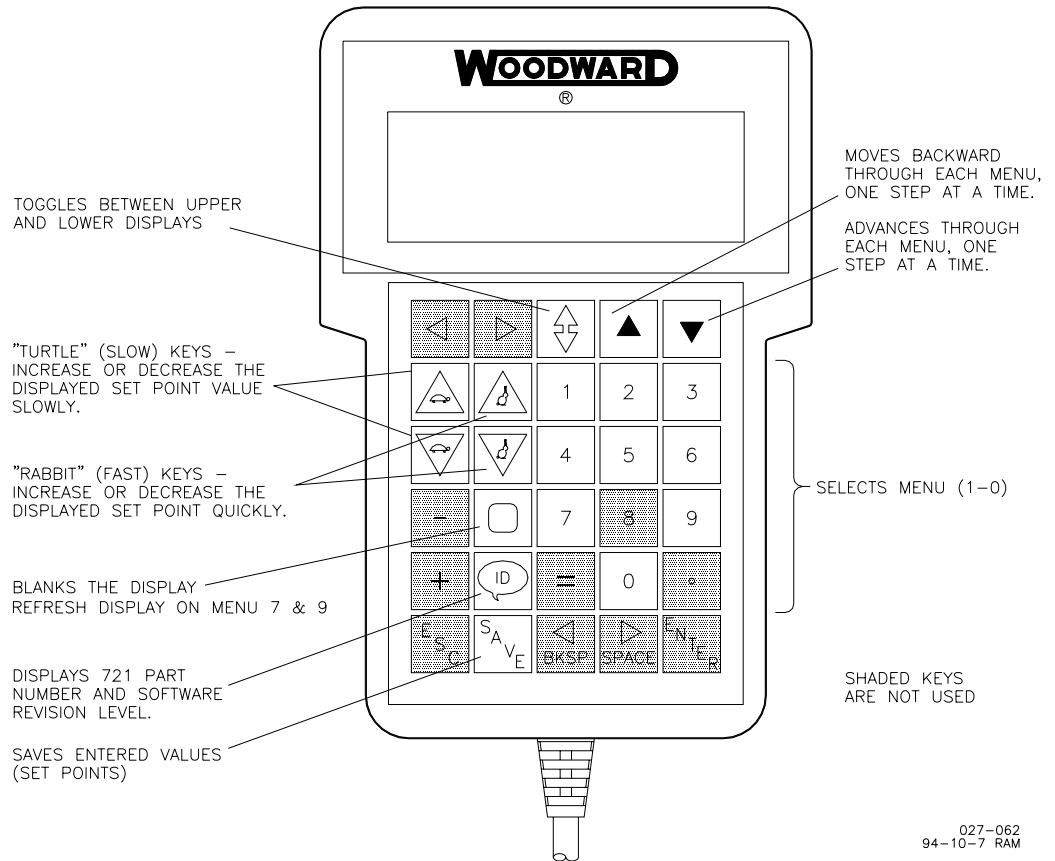
www.woodward.com

701A Digital Speed Control

(medium-speed diesel, dual-fuel, or gas engines, forward or reverse acting, software selectable)

- Recommended for all engines below 500 rpm
- All 701A Digital Speed Controls have dual selectable dynamics

Control	Part Number	Approval
701A Speed Control 18–40 Vdc Low Voltage (Magnetic Pickup, 0–200 mA Actuator)	8280-192	EC
701A Speed Control 88–132 Vac/90–150 Vdc High Voltage (Magnetic Pickup, 0–200 mA Actuator)	8280-193	EC
701A Hand Held Programmer	9907-205	EC



Hand Held Programmer

027-062
 94-10-7 RAM

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