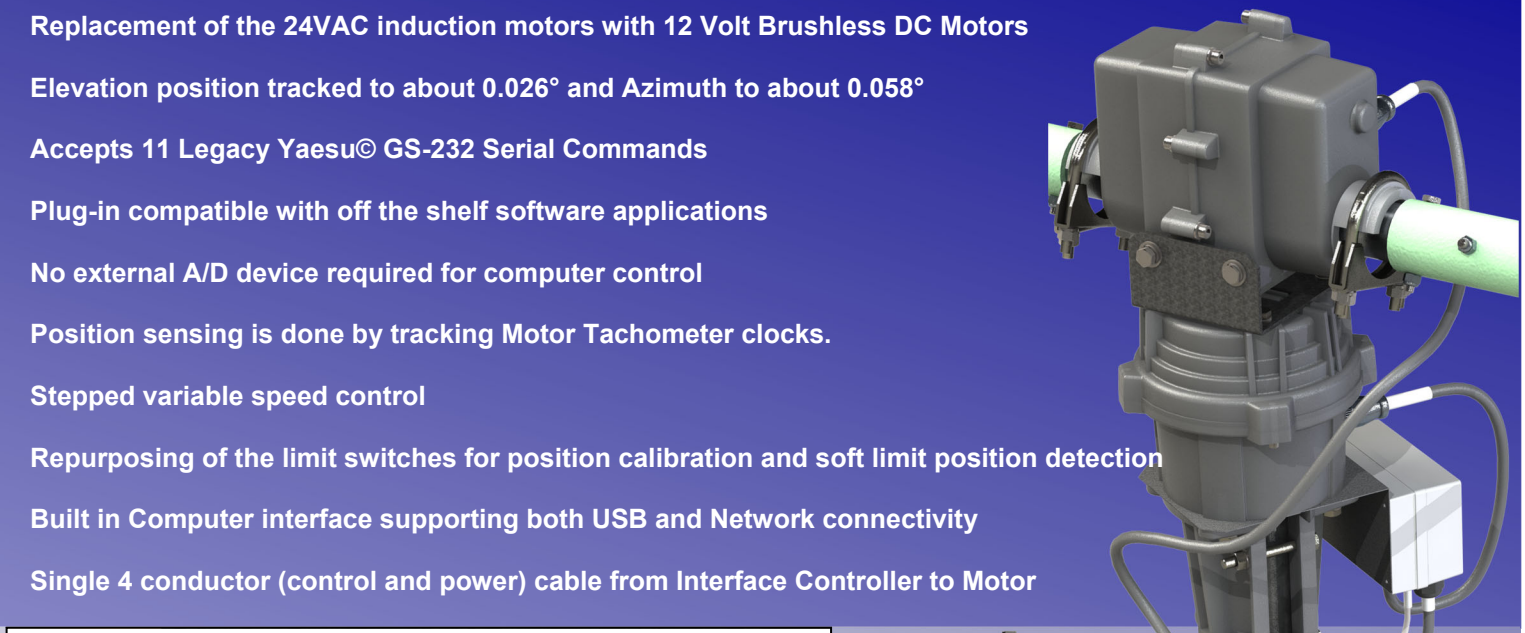
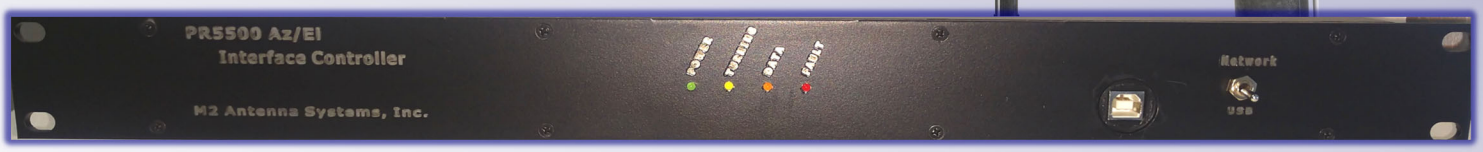
M2 Antenna Systems, Inc.
YAESU© Motor Upgrade
PR5500 AZ/EL Interface Controller

- Replacement of the 24VAC induction motors with 12 Volt Brushless DC Motors
- Elevation position tracked to about 0.026° and Azimuth to about 0.058°
- Accepts 11 Legacy Yaesu© GS-232 Serial Commands
- Plug-in compatible with off the shelf software applications
- No external A/D device required for computer control
- Position sensing is done by tracking Motor Tachometer clocks.
- Stepped variable speed control
- Repurposing of the limit switches for position calibration and soft limit position detection
- Built in Computer interface supporting both USB and Network connectivity
- Single 4 conductor (control and power) cable from Interface Controller to Motor



PR5500 AZ/EL GUI Interface



PR5500 AZ/EL Interface Controller

Upgrade Introduction

The core system consists of 2 microcontrollers: the User Interface controller and the Motor Controller. The Interface controller is found in the 19 inch rack mount enclosure and manages overall system operation and the user interface communication. It also manages communication with the Motor Control processor located at the Rotor Units. The Motor Controller manages the BLDC Motor Drivers and monitors the limit switches. Communications between the 2 controllers is by a 2 wire RS-485 Simplex connection.

Due to the original gearing system, the degrees of rotation to Motor Tachometer Clocks (MTC-basic unit of movement tracking in this Digital Control System) does not allow for exact position reporting in integer values. The Azimuth rotor unit will provide about 17 MTCs per every 1 degree or antenna rotation. The Elevation rotor unit will provide about 39 MTCs for each degree of pitch movement. During the calibration process the exact values will be generated and provided to a 2 decimal places. These values will vary slightly based on mechanical differences found in each Rotor Unit and user adjusted calibration values.

Using the GS-232 command protocol, tracking errors of 1/2 of a degree are possible when using the GS-232 commands. When using the non-standard commands, movement and tracking accuracy down to 1 turn of the motor is possible.

***Note**: The Yaesu G-5400© Azimuth rotor does not have limit switches and therefore is not compatible with this product.

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YAESU© Motor Upgrade
Additional ACU Features

ACU Features:

The G5500 Upgrade Kit is intended to allow the owner of the Yaesu G-5500 Azimuth / Elevation rotor system to convert it into a fully integrated, network attached, digital control system by replacing all electronics found in the original model. The Upgrade includes all required parts to perform the upgrade.

This upgrade removes many of the negative features found in the old analog control system and adds many new features.

Key Features:

- The new interface Controller is enclosed into a 1U 19 Inch Rack Mountable Metal enclosure
- Replacement of the 24VAC Induction Motors with 12 Volt Brushless DC Motors. This part of the overall digital control system providing less than 0.1 degree resolution, with no motor overheating and damage of motors during extended motor on time
- Elevation position tracked less than 0.05 degrees and Azimuth less than 0.10 degrees
- Removal of analog position sensing potentiometer and inaccurate meter movements, no external A/D device required for computer control. Position sensing is done by tracking Motor Tachometer Clocks.
- This design allows for stepped variable speeds up to AZ: 9.47 D/S and EL: 8.75 D/S (Unloaded: no antennas attached)
- Repurposing of the limit switches in the rotor units for position calibration and soft limit position detection
- Built in Computer interface supporting both USB and optional TCP/IP Network connectivity
- Single 4 conductor (control and power) cable from Interface Controller to Motor Controller. Minimum size of 18 gauge for up to a 100 ft (30.5 meters) total distance replacing the dual 6 conductor cables
- 110/220 autosensing VAC power with optional 12 VDC operation

There are 2 microcontrollers used in this design. This Interface controller found in the 19 inch rackmount enclosure manages overall system operation and the user interface and communicates with the Motor Control processor located at the Rotor Units. The Motor Controller manages the BLDC Motor Drivers. Communications between the 2 controllers is by a 2 wire RS-485 Simplex connection.

The user interface consists of 11 Legacy Yaesu GS-232 serial commands and 6 additional serial commands used for both Configuration and higher precision operations.

Due to the original gearing system the degrees of rotation to Motor Tachometer Clocks (MTC-basic unit of movement tracking in this Digital Control System), the movement of the rotor units cannot be tracked in whole number degree units. The Azimuth rotor unit will provide about 17 MTCs per every 1 degree of rotation. The Elevation rotor unit will provide about 38 MTCs for each degree of movement. During the calibration process the exact values will be generated and expressed to 2 decimal places. These values may vary slightly based on mechanical differences found in each Rotor Unit.

Refer to the “System Control” Section for command details. Refer to the “Configuration” section for additional information on the operation of the system and the calibration procedure.

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