

1.0 INTRODUCTION

This document will cover the theory of operation and specification for the GDO 98 firmware and pcb assembly. Refer to block diagram 214738 and schematic 214739 for this discussion. The functions of the operator should be the same as current pegasus control board with the exception of the learn mode (on board radio), the diagnostic mode and the I/R beam. The operator must be UL325 compliant and F.C.C. part 15 approved.

2.0 DOOR OPERATOR FUNCTIONS

Use same parameters as current controller

When unit is powered up, door always goes in up direction until limit is reached

Door always goes in opposite direction when operated

Operator only looks at beam input when door is going down

Operator looks at motor speed (torque) whenever motor is running (after 800 msec)

When door is going down and hit obstacle, it reverses

When door is going up and hits obstacle, it stops

When push button is held down, beam is ignored

An overall time out of 25 seconds will also stop the door in either direction

A maximum of 10 transmitters will be stored in EEPROM

If door operation is stopped or not started due to an error condition,

Operator light and LED will flash out a diagnostic code

Diagnostic Conditions:

Learn in transmitter – flash 1 time

Beam Failure (door stopped because of beam break) – flash 2 times

Motor speed sensor failure (door stopped because of torque) – flash 3 times

No RF due to Vacation Mode (door won't open with radio) – flash 4 times

Pushbutton/Wall Station Wire Shorted (see definition below) – flash 5 times

Operator time out failure (door stopped because of long run time) – flash 6 times

Flash rate to be ½ sec on and ½ sec off

Only one failure code will be flashed if multiple errors (priority to fewer flashes)

Pushbutton /Wall Station wire shorted to be determined by the following:

If operator is started by radio reception and the button measures open/close door input level, then flash diagnostic code

3.0 OPERATIONAL MODES

The operator shall use the following input/output assignments and timing parameters.

Radio:

Input from radio receiver

Megacode pulse position modulated format

1000 usec nominal - 6 msec frames – 23 frames in each word

256 usec sampling rate

Pulse and gap timings per Megacode chart (as close as possible)

Input on RB0 pin

Data will be decoded after receipt of first valid word

A new transmission will be assumed if there is no RF activity for 2 words

Wall Station:

Input from push button or wall station or external add-on radio

Debounce 80 msec

I/R Beam:

Inputs a 1000 usec positive pulse every 11 msec if good

If low, beam is not connected or not aligned (bad)

If any missing pulse beam has been interrupted

Input on RA4 pin

Tachometer Detector:

Inputs a 1 msec negative pulse approx every 5 msec

Indicates the motor speed

Must let settle for 800 msec after motor is started

Average the tachometer period over 16 measurements

Make a reference measurement and compare to current speed

Door is stopped if motor speed is slower than torque setting

Use same torque curve as current unit

Input on RB4 pin.

Up Limit:

Shows when door has reached the upper limit of travel

Input low when at limit

Input on RA1/AIN1 pin

Down Limit:

Shows when door has reached the lower limit of travel

Input low when at limit

Input on RA0/AIN0 pin

Up and Down Torque:

Input is Up Torque adjustment when up motor relay is turned on

Input is Down Torque adjustment when down motor relay is turned on

Perform an A/D conversion

Use internal reference for a "4 bit" A/D

Allow for reference settling time

Input on RA3/AIN3 pin (comparator mode)

Learn Switch and Radio LED:

Input and Output

If input, reads learn switch if low

If output, lights LED if low

Switch and LED will operate as follows:

Push switch for 0 to 2 seconds – learn a transmitter

Push switch for 10 seconds – delete all transmitters

Flicker LED when RF is busy

Flash LED for diagnostics

Input/output on RB5 pin

I2C Clock:

Output to EEPROM

Output on RB7 pin

I2C Data:

Input/Output to EEPROM

Output on RB6 pin

Motor Up:

Output to activate motor in up direction

Output on RB3 pin

Motor Down:

Output activate motor in down direction

Output on RB2 pin

Light Relay:

Output to turn on light

Output on RB1 pin

4.0 CIRCUIT DESCRIPTION

Power Supply:

A.C. power is supplied to T1 through J1-9 and J1-15. RV2, RV3 and R19 provide surge protection. Output of T1 is bridge rectified, filtered by C21 and is used as the 24 V.D.C. unregulated supply. 5 volt regulator (U2) supplies regulated power to microprocessor (U3) and to radio.

Radio:

Transmitted RF signals are received through an antenna wire attached to the PCB. This signal is coupled through an RF buffer, Q1, and preamplifier, Q2, and capacitively coupled to the top of the tuning tank of the super-regenerative detector, Q3. The detector operates as a self-quenching oscillator responding

logarithmically to the signal amplitude at the moment oscillation commences. To reduce radiated energy from the detector, the primary feedback path for the oscillator is C9, which is in close proximity to Q3. In addition RF stage Q1 provides additional isolation between the antenna and the regenerative detector circuit.

The detected audio signal is low-pass filtered by R11 and C15, amplified by U1C, and detected by U1D, an input offset is created by R14 and R15. Additional low pass filtering is done with R16 and C19, and output buffering by U1F and U1E.

The output pulse train signal from U1 is distributed to the micro-processor U3 for decoding.

Wall Station:

Wall station power is supplied by constant current source Q4, Q5. Voltages developed by switches in wall station are scaled by R23 and R27 and applied to U3-1. D6, D8 and R24 provide surge protection.

I/R Beam Input:

Beam power to the emitter and detector is supplied by R39. Pulses from beam are level shifted and inverted by Q9 and applied to U3-3. D13, D14 and R42 provide surge protection.

Tachometer:

R30 supplies power to the emitter (J1-2). R29 (J1-1) is the pull up for the detector and applied to U3-10 through R31.

Up/Down Limit:

The up/down limit (J1-4, J1-5) switches supply ground to U3-18 and U3-17. R21 and R22 are the pull up resistors. R25 and R26 provide surge protection.

Up/Down Torque Adj.:

Power is applied to up torque potentiometer when up motor relay is energized. Resultant voltage is applied to U3-2 for A/D conversion. Down torque setting is measured in same manner when down motor relay is energized.

Learn Switch/LED:

Learn switch and LED share the same port U3-11.

EEPROM:

Eeprom (U4) is connected to U3-12 and U3-13 using IIC interface.

Relay Control:

**SPECIFICATION,
GDO 98**

U3-7, U3-8 and U3-9 control the light relay (K1) the up motor relay (K2) and the down motor relay (K3). These relays distribute the A.C. to J1-12, J1-13 and J1-14.

5.0 SPECIFICATIONS

Model: GDO 98

Part Number: AAE00406

RF Center Frequency: 318 MHz $\pm$ 500 KHz.

RF 3 dB Bandwidth: 6 MHz typical

Sensitivity: -91 dBm, min., -93 dBm, typical

Emissions: FCC Part 15 Compliant

RF Modulation: A1D PPM, @ 150 BITS/SECOND

Encoding Technique: Linear Megacode

Number of Codes: 1,048,576 unique codes

Power Requirements: .115 vac

Operating Temp. Range: 0°C to 50°C.

Storage Temperature: -55°C to +85°C

ALL SPECIFICATIONS ARE NOMINAL

**Radio Standard Specification
Low Power Communication Devices
FCC Rules Part 15, Subpart B**

1.0 General:

1.2, Exclusions to TV Broadcast Freq. N/A

2.0 Related Documents:

Reference Documents for Application: CFR 47, Parts 2 & 15
ANSI/IEEE C63.4-1992

3.0 Test Equipment:

Supply Voltage: 120 VAC, Line Operated Device

Test Equipment List See Report of Measurements

Signal Detector: Peak Signal Reported

4.0 Certification and Test Results:

Summary of Results See Page 1 of this section

5.0 General Technical Requirements:

5.1 Testing Methods: Peak Signal

5.1 Reference Standard: C63.4-1992 (IEEE Procedure)

5.3 External Controls: No user serviceable parts

5.4 Accessories: None Required

5.5 Detector Bandwidth: < 1 GHz = 100 KHz (minimum)
> = 1 GHz = 1 MHz (minimum)

5.6 Equipment Labels: See Label Facsimile

5.7 Manual Disclaimer: Complies

5.9 Usage Restrictions: Digital Pulse Code Only

6.0 Receiver Characteristics and Tests: