

# Radar Phase-Coded Pulse Compression Training System

8121494 (8097-C0)

**FESTO**

LabVolt Series

Datasheet



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## General Description

Radar Pulse Compression is a signal processing technique used to increase the range resolution and signal-to-noise ratio of any pulse radar. The design of a radar is usually a question of compromise. In many cases, a trade-off must be made between desirable characteristics. For only a modest increase in cost and complexity, pulse compression improves the range resolution without sacrificing the signal-to-noise ratio. This is why all modern radars use pulse compression.

The Phase-Coded Pulse Compression System is an add-on to the Basic Radar and Radar Processor/Display Training Systems.

The system includes the Phase-Coded Pulse Compression Processor that encodes the radar pulses before transmission and compresses the received pulses. It also includes the Pulse Compression Parabolic Dish Antenna, which is designed to prevent internal reflections from interfering with the radar signal, and two attenuators (4 dB and 10 dB) used to facilitate measurements. The LVRTS software with the Phase-Coded Pulse Compression application is also included. (Note that the LVRTS software is also included with the Radar Processor / Display add-on and can be downloaded from Festo Didactic's website.)

## Features & Benefits

- FPGA-based signal processing.
- Seamless integration with the Series Radar Training System.
- User-configurable Pulse Compression Processors for wide topic coverage.
- Multiple test-points for complete learning experience.
- Turnkey solution, including high quality student and instructor manuals.

## List of Equipment

Qty	Description	Model number
1	Pulse Compression Radar Antenna _____	592570 (9604-B0)
1	Phase-Coded Pulse Compression Processor _____	592571 (9615-00)
1	_____	8092757 (9690-G0)

## List of Manuals

Description	Manual number
Phase-Coded Pulse Compression (Student Manual) _____	593926 (52919-00)
Phase-Coded Pulse Compression (Instructor Guide) _____	593927 (52919-10)

## Table of Contents of the Manual(s)

### Phase-Coded Pulse Compression (Student Manual) (593926 (52919-00))

- 1-1 Introduction to Phase-Coded Pulse Compression
- 1-2 Basic Concepts and Techniques
- 1-3 Pulse Compression Ratio and SNR Improvement
- 1-4 Phase-Code Compression Processing
- 2-1 Near-Perfect, Pseudo Random, Combined Barker, and Polyphase Codes
- 2-2 Golay Codes and Optimum Mismatched Filters

## Equipment Description

### Pulse Compression Radar Antenna 592570 (9604-B0)



The Radar Pulse Compression Antenna mounts on the rotating antenna pedestal and is fully compatible with the miniature plug-in RF quick connector. It uses an offset-feed design to reduce masking effects. It also comprises a low-loss cable for adding delay in pulse-compression exercises.

## Specifications

Parameter	Value
<b>Type</b>	Offset Feed
<b>Feed Type</b>	Single Horn
<b>Beamwidth (at -3 dB)</b>	6°
<b>Gain</b>	21 dB (typical)
<b>Impedance</b>	50 Ω
<b>Polarization</b>	Linear, vertical
<b>Physical Characteristics</b>	
Dimensions (H x W x D)	425 x 375 x 515 mm (16.8 x 14.8 x 20.3 in)
Net Weight	2.56 kg (5.63 lb)

## Phase-Coded Pulse Compression Processor 592571 (9615-00)



The Phase-Coded Pulse Compression Processor allows to experiment pulse compression with the radar training system. It is divided into three sections: Dual-Channel Sampler, Pulse Compressor and Pulse Generator.

The Dual-Channel Sampler samples the I- and Q-Channel baseband signals from the receiver and stretch these signals in time in order to facilitate observation and measurement. It also allows to set the origin (radar display "window") and select the range span. A time base output is available to trig an oscilloscope when displaying the A-Scope.

The Pulse Compressor compresses the pulses by correlating the digital data with the selected code using one or two compressor stages. It allows to select the sample rate of the A/D converter,

select the filter mode (matched or optimum mismatched). Test points are also available to monitor the different signals using an oscilloscope.

The PRF and Sync. signals need to be inputted into the module. Note that only the 288 Hz PRF mode is supported.

The Pulse Generator allows to select the pulse compression code used to encode the baseband pulse.

A switch at the back of the module allows to inject noise into the system to experiment real-life conditions.

### Additional Equipment Required to Perform the Exercises

Qty	Description	Model number
1	Power Cord - Type F _____	789182 (93992-05) <sup>1</sup>
1	Power Cord - Type B _____	789405 (95451-00) <sup>2</sup>
1	Power Cord - Type I _____	789406 (95451-0A) <sup>3</sup>

<sup>1</sup> The power cord line is not included with stand-alone Phase-Coded Pulse Compression Processor. Please add the right power cord line for the region. Note that when ordering a system, all power cord lines are included.

<sup>2</sup> The power cord line is not included with stand-alone Phase-Coded Pulse Compression Processor. Please add the right power cord line for the region. Note that when ordering a system, all power cord lines are included.

<sup>3</sup> The power cord line is not included with stand-alone Phase-Coded Pulse Compression Processor. Please add the right power cord line for the region. Note that when ordering a system, all power cord lines are included.

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