

**10 MHz Function-Pulse-Data Generator
With Frequency Counter
Caddo 4065**

**Operating Manual
Ver.1.1**

An ISO 9001 : 2000 company



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The certificate is valid until 2010-11-20

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RoHS Compliance



Scientech Products are RoHS Complied.

RoHS Directive concerns with the restrictive use of Hazardous substances (Pb, Cd, Cr, Hg, Br compounds) in electric and electronic equipments.

Scientech products are “Lead Free” and “Environment Friendly”.

It is mandatory that service engineers use lead free solder wire and use the soldering irons upto (25 W) that reach a temperature of 450°C at the tip as the melting temperature of the unleaded solder is higher than the leaded solder.

Safety Instructions

Read the following safety instructions carefully before operating the instrument. To avoid any personal injury or damage to the instrument or any product connected to it.

Do not operate the instrument if suspect any damage within.

The instrument should be serviced by qualified personnel only.

For your safety :

Use proper Mains cord : Use only the mains cord designed for this instrument. Ensure that the mains cord is suitable for your country.

Ground the Instrument : This instrument is grounded through the protective earth conductor of the mains cord. To avoid electric shock the grounding conductor must be connected to the earth ground. Before making connections to the input terminals, ensure that the instrument is properly grounded.

Observe Terminal Ratings : To avoid fire or shock hazards, observe all ratings and marks on the instrument.

Use only the proper Fuse : Use the fuse type and rating specified for this instrument.

Use in proper Atmosphere : Please refer to operating conditions given in the manual.

- 1. Do not operate in wet / damp conditions.**
- 2. Do not operate in an explosive atmosphere.**
- 3. Keep the product dust free, clean and dry.**

Features

- **Sine, Square, Triangle, Ramp Pulse TTL & Binary Data Output**
- **1 Hz to 10 MHz Frequency Range**
- **20 Vpp Signal Output**
- **AM Balance, AM Standard, FM, ASK, FSK & PWM Modulation**
- **Internal Modulation Generator**
- **Internal Sweep**
- **DC Offset**
- **Binary Data Output**
- **TTL Output**
- **20 dB & 40 dB Fixed & 20 dB Variable Attenuation**
- **LCD Controlled by Menu Keys**
- **Rise & Fall Time \leq 50 ns**
- **Low Distortion**
- **Compact & Lightweight**

Technical Specifications

| | |
|---|--|
| Operating Modes | : Sine, Square, Triangle, Ramp, Pulse, TTL, and Binary Data |
| Frequency Range | : 1 Hz - 10MHz Sine wave 1 Hz - 2MHz others |
| Frequency Accuracy | : $\pm 0.5\%$ |
| Sine wave Distortion | : 1.0% (2MHz) 2.0% (10MHz) typical |
| Square wave / Pulse Rise & Fall time | : $\leq 50\text{ns}$ |
| Pulse Duty Cycle | : 15%-85% variation (minimum width 200ns) |
| Triangle Non-Linearity | : $\leq 1\%$ (typical) |
| Frequency Display | : LCD controlled by menu keys |
| Output impedance | : 50Ω |
| Output Voltage | : 10Vpp into 50Ω , 20Vpp (Open Circuited) |
| Attenuation | : 20dB, 40dB, (20dB variable in between) |
| Level Flatness | : $\pm 0.5\text{ dB}$ (2MHz), $\pm 1.5\text{ dB}$ (10MHz) typical |
| DC Offset | : $\pm 5\text{V}$ (approximately) adjustable |
| Internal Sweep | : 20 ms – 4 s variable |
| Modulation | : AM Balance, AM Standard, FM, ASK, FSK & PWM Modulation |
| Modulation Frequency Range | : DC – 20 KHz |

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| | | |
|-------------------------------|---|-----------------------------|
| Frequency Counter | : | |
| Frequency Range | : | DC to 40 MHz |
| Resolution | : | 1Hz |
| Sensitivity | : | 0.5 Volts |
| Frequency Accuracy | : | ± 0.5% |
| Frequency Display | : | LCD controlled by menu keys |
| Input Impedance | : | 1 MΩ |
| Maximum Input Voltage: | | 200 V (DC + AC Peak) |
| Power Supply | : | 230 V AC ± 10%, 50Hz |
| Fuse Rating | : | T150 mA |
| Power Consumption | : | 19 VA (approximately) |
| Operating Conditions | : | 0-40°C, 95% RH |
| Dimensions (mm) | : | W 262 x H 316 x D 130 |
| Weight | : | 3 Kgs. (approximately) |

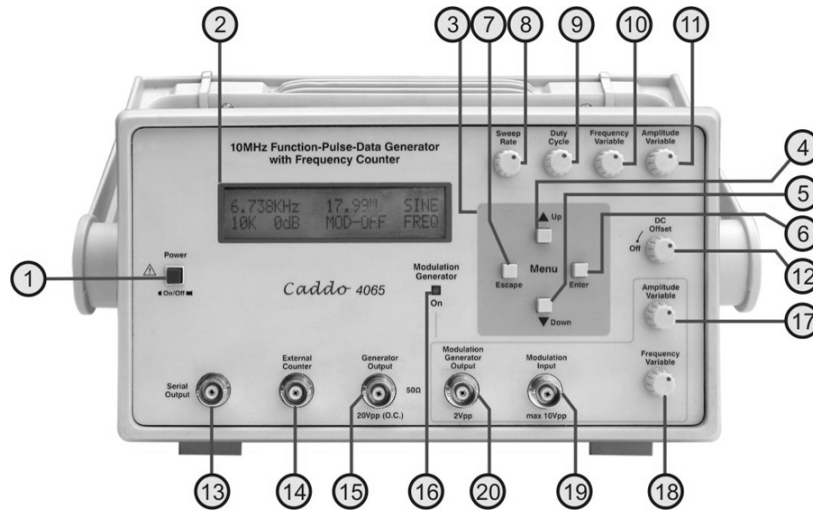
(Subject to Change)

Introduction

The new **10MHz Function-Pulse-Data Generator Caddo 4065** is a versatile instrument having AM-FM and other modulation facility. Any of the output waveforms can be modulated with the external input signal. The pulse and PWM output is a special feature which will find application in most ASK, FSK & PWM applications. A variable frequency control facilitates accurate frequency measurement. The distortion is kept within 2% for majority of the frequency ranges. The internal sweep mode is provided for response measurement. Frequencies are displayed in a bright Duck lit LCD display controlled by microcontroller.

Output can be attenuated as low as 60dB, giving a minimum of 20mV level. The square wave rise and fall time is within 50ns, thus giving you very good square wave even at 2MHz. Standard AM, balanced AM, FM ASK, FSK & PWM modulation which are taught in the classroom can be demonstrated very easily to the students using 10MHz Function-Pulse-Data Generator **Caddo 4065** internal or external modulation.

Front Panel Controls



- 1 **Power** : Push-button switch to supply power to the instrument.
- 2 **LCD Display** : 24 x 2 Character bright back lit liquid crystal display.
- 3 **Menu Block** : This block contains four switches used for Up key, Down key, Enter key and Back (Esc) key for selection of frequency, function, attenuation, modulation, modulating generator, external counter and serial data.
- 4 **& 5 Up Key & Down Key** : Used for selection of parameters and step variable for selected parameters.
- 6 **& 7 Enter Key & Back Key** : Used for selection of particular parameter and come out from selected parameter to Menu.
- 8 **Sweep rate** : Control provided to vary internal sweep. When internal sweep function is selected this controls the variation of sweep is between 20ms - 4s.
- 9 **Duty Cycle** : When pulse output function is selected this controls the pulse duty cycle from 15% to 85%.
- 10 **Frequency Variable** : In conjunction with frequency range, selected by Menu key on LCD display.
- 11 **Amplitude Variable** : In conjunction with attenuators, selected by Menu key on LCD display.
- 12 **DC Offset** : This control provides DC offset. Approximately ± 5 V DC is superimposed on the output. Keep the control off if DC offset is not required.
- 13 **Serial Output (BNC connector)** : Output of serial binary data generator when serial mode is selected by menu keys on LCD display.
- 14 **External Counter (BNC connector)** : Input BNC connector for measure the frequency of external signal when EXTC mode is selected by menu keys on LCD display.

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- 15 Output (BNC connector) :** Output of 10 MHz function generator i.e. 20Vpp (Open Circuited)
- 16 Modulation Generator LED Indicator :** LED 'On', when MODG (modulation generator) selected on LCD by menu keys.
- 17 Amplitude Variable :** To control the level of modulation generator.
- 18 Frequency Variable :** Frequency variable for modulation generator.
- 19 Modulation Input :** BNC terminal provided to feed modulation signal for modulation, selected on LCD.
- 20 Modulation Generator Output :** Output of modulation generator i.e. 2Vpp.

Operating Instructions

General Information :

The logical front panel layout of **Caddo 4065** makes it easy to become familiar with the operation of the instruments. However, even experienced users should read the following instructions thoroughly before using the instrument.

After unpacking the instrument, check for any mechanical damage or loose parts inside. Should there be any transportation damage, inform the supplier immediately and do not put the instrument into operation.

Safety :

The case chassis and all measuring parts are connected to the protective earth contact of the inlet. The mains plug shall only be inserted in a socket outlet provided with a protective earth contact. The protective action must not be negated by the use of an extension cord without a protective conductor.

Warning!

Any interruption of the protective conductor inside or outside the instrument or disconnection of the protective earth terminal is likely to make the instrument dangerous. Intentional interruption is prohibited. The mains/line plug should be inserted before connections are made to measuring circuits.

When removing the metal case or replacing, the instrument must be completely disconnected from the mains supply. If any measurement or calibration procedures are unavoidable on the opened-up instrument, these must only be carried out by qualified personnel acquainted with the danger involved.

Operating Conditions :

The ambient temperature range during operation should be between +0°- 48°C; 90% RH and should not exceed -20°C to +70°C during transport or storage. The operational position should be normal. However; the ventilation holes on the **Caddo 4065** must not be obstructed. Prior to calibration a preheat run of approximately 30 minutes is required.

First Time Operation :

After unpacking the instrument check for any mechanical damages. The instrument should be plugged in mains-plug of proper mains supply $230V \pm 10\%$. Switch 'On' the instrument, the power 'On' is indicated by lighting of displays.

Function Selection (Function) :

The type of output signal is selected with the menu block **(3)**. A total number 6 different waveform - *sine, square and triangle, ramp, Pulse and TTL* are available. The functions are marked with the corresponding symbols.

Frequency Adjustment (frequency) :

Coarse adjustment is performed with the menu block **(3)** divided into decades. The desired frequency is selected by turning the *Variable* control. The selected frequency appears on the LCD **(2)**, compared to analog knob scales this display has a much higher resolution.

Signal Output :

Connect a BNC-BNC cable at the output and other end to oscilloscope. Keep both attenuators (20 & 40 dB in released position). Adjust the desired output with the help of amplitude variable **(11)** and attenuator. The generator provides a maximum of 20Vpp and minimum of 2mVpp (approximately) output. It is recommended to use the terminated cable (50Ω) for observing square wave or pulses to reduce overshoot and ringing etc. With 50Ω termination the maximum output is 10Vpp.

Internal Modulation Generator (MODG) :

Internal modulation generator provides ready to use modulation input for main generator. When in *sine, square or triangle* select mode the generator gets internally connected to the modulation input of main generator. In ext select the external input can be given.

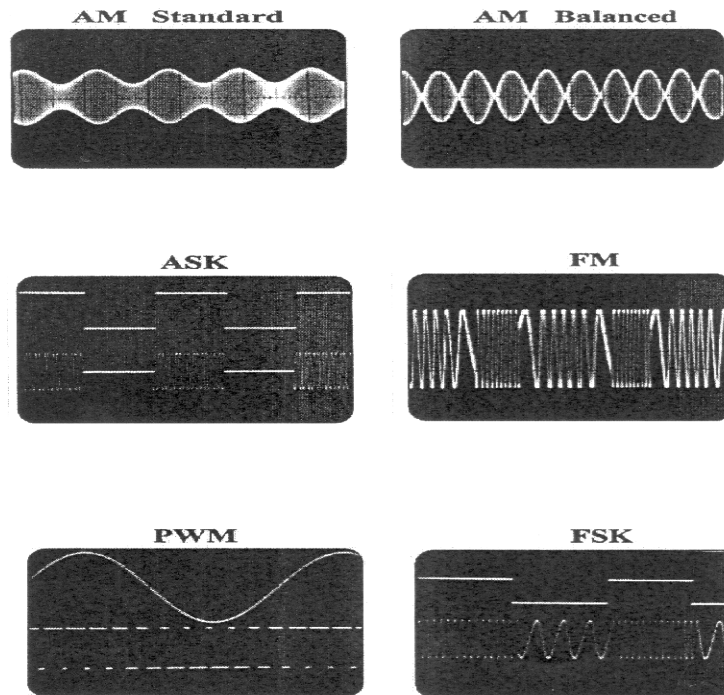
Modulation (MOD) :

The **Caddo 4065** has 6 types of modulation capabilities. The user can select the modulation function desired, by menu block. If no modulation is desired, keep this in 'Off' position.

The modulation signal is to be fed to Modulation Input BNC **(19)**, depending on choice of modulation, with voltage level not exceeding 10Vpp and 2Vpp respectively.

The user can select whether to use internal or external modulation generator. The output of modulation generator is available at the BNC **(20)** and this has to be connected to Mod In BNC **(19)** depending on type of modulation desired.

The 10 MHz generator of the instrument acts as carrier frequency source. The modulated output is available at OUTPUT BNC **(15)**.



Feed signal (Keep initially $1 V_{pp}$) at the Mod In terminal. Suppose you have pressed AM Standard then you will get Amplitude Modulated output varying linearly from 0% depth of modulation to 100% depth of modulation as modulating signal is increased. When AM balanced is selected then output is amplitude modulated but with suppressed carrier. Here the output will be directly related to the modulating signal input. Since power amplifier has a gain of 10, the output will be $10V_{pp}$ ($1V$ being the modulating signal).

To achieve an output of $20V$ increase the modulating signal to $2V_{pp}$ and you will get the same level of $20V_{pp}$. Thus student knows clearly the difference in standard and balanced modulation.

When FM is selected by menu key you will observe frequency modulation. Here again FM modulation increases as the input level is increased. Keep maximum Modulation input to $2V_{pp}$. When sweep is selected, all the external modulation gets cut off and function generator operates on the internal sweep varying from 20ms to 4s. Similarly when using ASK, FSK or PWM feed the signal at the modulation Input (19).

Frequency Counter (EXTC) :

Frequency Measurement:

Select the External Counter mode on LCD. The unknown frequency to be measure is applied at External counter BNC (14) and read the frequency on display.

Warranty

1. We guarantee the product against all manufacturing defects for 36 months from the date of sale by us or through our dealers. Consumables like dry cell etc. are not covered under warranty.
2. The guarantee will become void, if
 - a) The product is not operated as per the instruction given in the operating manual.
 - b) The agreed payment terms and other conditions of sale are not followed.
 - c) The customer resells the instrument to another party.
 - d) Any attempt is made to service and modify the instrument.
3. The non-working of the product is to be communicated to us immediately giving full details of the complaints and defects noticed specifically mentioning the type, serial number of the product and date of purchase etc.
4. The repair work will be carried out, provided the product is dispatched securely packed and insured. The transportation charges shall be borne by the customer.

For any Technical Problem Please Contact us at service@scientech.bz

List of Accessories

1. BNC to BNC Cable 1 No.
2. Mains Cord..... 1 No.
3. PC Interface Software..... 1 No.
4. RS Cable 1 No.
5. e-Manual 1 No.

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