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PTI Model OC-4000 Optical Chopper

OPERATION MANUAL

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1. DESCRIPTION

INTRODUCTION

PTI's Optical Chopper is ideal for a variety of optical applications. The unit is simple to install and operate. A standard 5 volt TTL output provides compatibility with lock-in amplifiers, signal averagers, oscilloscopes, computers and other TTL compatible equipment.

The control unit features an LED readout for direct frequency readings, a wide-range speed control, a phase adjuster and an internal/external control selector. External input allows the chopper speed to be regulated by computers or other outboard equipment; speed is controlled by applying 0 to 4 volts to the external input.

SPECIFICATIONS

Frequency range

- 5-sector disk: 5 to 667 Hz
- 30-sector disk: 30 to 4000 Hz

Exposure time

- 5-sector disk: 750 μ sec. to 100 msec.
- 30-sector disk: 125 μ sec. to 17 msec.

Accuracy: +/- 0.5 X the least significant digit over the entire range

Phase jitter, 5-sector disk

- 3.0% at 5 Hz
- 1.5% at 10 Hz
- 0.36% > 20 Hz

Phase jitter, 30-sector disk

- 0.18% at 25 Hz
- 0.12% at 50 Hz
- 0.06% > 100 Hz

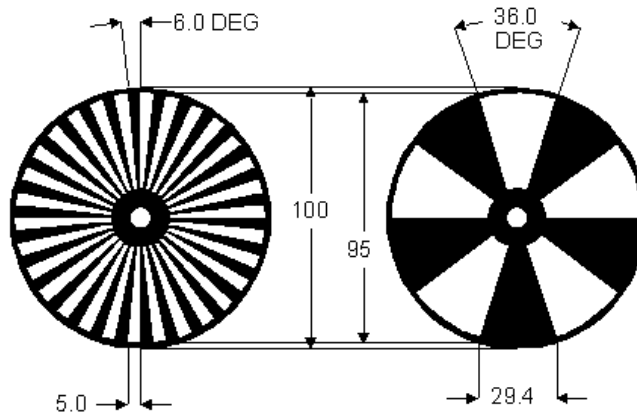
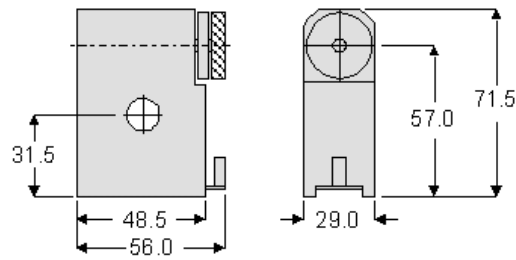
External control: 0 to 4 VDC

Linearity: +/- 0.5%

Reference output: Standard TTL, direct or inverted

Phase shift: 6 to 270 degrees

Dimensions(shown in mm)



CHOPPER DISKS

Chopper disks are available in a wide range of blade configurations to provide pulsed single-wavelength or alternating dual wavelength illumination. Disks are fragile and are carefully packed in rigid shipping materials.

NOTE: Some disks are fabricated from thin reflective glass and must be handled with extreme care to avoid damage to the reflective surface, blade breakage, and personal injury from sharp edges.

2. INSTALLATION

NOTE: If the chopper is already installed as part of a PTI optical system (such as a *DeltaScan™*), the assembly is not user-serviceable. Any chopper servicing should be performed by PTI personnel. Any user-adjustment of the assembly will void the System Warranty.

DISK ATTACHMENT

Attaching or replacing the disk is accomplished by first removing the knurled thumbscrew on the motor hub. The disk is placed on the spindle such that the blades pass through the slot in the photoelectric assembly on the base. Before replacing the thumbscrew, ensure that the disk is properly seated flat against the motor hub. Replace the thumbscrew onto the spindle and tighten *no more than finger-tight*. (Normal operation of the chopper will automatically provide any additional tightening as necessary.)

Be sure to store any unused disks in their original packaging to prevent damage.

MOUNTING THE MOTOR ASSEMBLY

The chopper base has provisions for mounting by means of two slots, 1/4 X 20 clear, in the bottom, and may be mounted in virtually any position. Ensure that the disk is given sufficient clearance as to allow for any slight (normal) wobble during rotation. Also, mounting hardware must be sturdy enough to prevent any motor assembly movement during operation; this is especially important when the disk is placed close to other components.

The chopper may be operated at very high rates of speed. Should the disk become accidentally damaged, it may fly apart, sending off fragments at extremely high velocities. For this reason, the chopper assembly should be completely enclosed to prevent the possibility of personal injury.

ELECTRICAL CONNECTIONS

At the back of the motor base is an electrical connector. Attach the appropriate cable end to this and plug the other end into the control unit.

Plug the control unit into AC line supply outlet.

3. OPERATION

INTERNAL CONTROL

1. Be sure that the Internal/External selector switch is set to "Internal".
2. Turn the control unit power switch on. The chopper will immediately begin to turn at a high rate; after a few seconds, it will slow down as it comes under the control of the unit.
3. Set the chopper speed by means of the speed control. When changing the speed, allow the motor a few seconds to stabilize.

NOTE: Ensure that the Disk Selector switch is set to correspond to the disk installed. "1" corresponds to a 5-sector disk; "2" corresponds to a 30-sector disk. Improper switch setting will result in meaningless speed control and display readouts.

EXTERNAL CONTROL

1. Be sure that the Internal/External selector switch is set to "External".
2. Turn speed control fully counter-clockwise to eliminate high ramp-up speed when powering up.
3. Turn the control unit power switch on.
4. Set the chopper speed by applying an analog signal of 0 to 4 volts to the external speed control input. The voltage-to-frequency relationship is linear, and the speed range is 0 to 660 Hz for a 5-sector disk and 0 to 4000 Hz for a 30-sector disk.

External frequencies up to 10 Mhz can be displayed when a 5-volt TTL signal is applied to the external frequency input. Be sure that the display selector is set to "Frequency".

A 5-volt TTL output signal of the disk frequency is provided at the output connector on the control unit. The Phase Control can be used to shift the phase relationship of the instantaneous blade position and the TTL output signal. Control range is from 0 to 180 degrees.

4. SERVICE

TROUBLESHOOTING

Disk wobbles.

Small side-to-side movement of the disk during rotation is normal. Excessive wobble may indicate a bent disk. Damaged disks should be replaced immediately to prevent possible disk failure. Be sure to store unused disks in their original packaging.

Chopper does not respond to speed control.

Be sure to set the Internal/External selector to "Internal".

Chopper does not respond to external voltage.

Be sure to set the Internal/External selector to "External".

Incorrect frequency is displayed.

Be sure to set the Disk Type selector to correspond with the disk in use. "1" corresponds to a 5-sector disk; "2" corresponds to a 30-sector disk.

Control unit appears dead when powered on.

Check the control unit fuse. If control unit continually blows fuses, call PTI for service. Attempting to service any other control unit components will void the warranty.



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