NEOS TECHNOLOGIES
A Gooch & Housego Company

OPERATING MANUAL

ACOUSTO OPTIC MODULATOR
MODEL NUMBER:

15180-1.06-LTD-GAP

DOCUMENT NUMBER: 51A18618

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SECTION I

INSPECTION PROCEDURE

Examine the shipping carton for damage. If the shipping carton or packing material is damaged it should be kept for the carrier's inspection. Notify the carrier and NEOS Technologies. Check the contents of the shipment for completeness, mechanical damage, and then test the equipment electronically. Operating procedures are contained in Section VI. If the contents are incomplete, or the equipment does not pass the electrical testing please notify NEOS Technologies.

If there is any problem with the use of this equipment, or if the equipment fails to function as expected contact NEOS Technologies, do not try to trouble shoot or repair this equipment. Consult with a NEOS service engineer. If the equipment needs repair or replacement, contact NEOS Technologies, Inc for a Return Authorization Number.

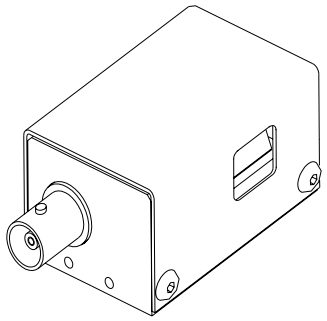
SECTION II

DESCRIPTION

15180-1.06-LTD-GAP

The 15180-1.06-LTD-GAP modulator system is a Gallium Phosphide crystal with a Lithium Niobate transducer. Optimum diffraction efficiency will be provided with a rise time of 10 nanoseconds or greater correlating to a waist diameter in the crystal of 0.1 millimeter. The modulator assembly should be mounted on a fixture to provide sufficient adjustment to peak the modulator efficiency (Bragg angle, horizontal, and vertical position) and the lenses must be supplied to achieve the rise time. The 15180-1.06-LTD-GAP modulator assembly can be purchased with a Bragg mount Model 72000.

The modulator can be driven with any good driver with a nominal 50 Ω output of 180 MHz, however, it is recommended that a NEOS driver drive this modulator to achieve optimum performance. The RF input should not exceed 2 Watts CW. Be extremely careful not to focus the laser beam on the gold bond wires on the acoustic transducer, which may vaporize the bond wires. NEOS will not warranty any such damage. The modulator has been designed and verified to satisfy the specifications.



15180-1.06-LTD-GAP

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SECTION III

SPECIFICATIONS

MODEL NUMBER: 15180-1.06-LTD-GAP

PARAMETER	SPECIFICATION
Interaction Material	GaP
Acoustic Mode	Longitudinal
Operating Wavelength	1.06 μm
Window Configuration	AR "V" coated
Static Transmission	>90 %
Operating Frequency	180 MHz
Diffraction Efficiency	>70 %
Light Polarization	Linear, horizontal
Acoustic Aperture Size	300 μm
Rise Time	10 ns*
Deflection Angle	28.7 mrads
RF Power Level	1.7 Watts
Impedance	50 Ω nominal
VSWR	<1.5:1 at 180 MHz
Package	53B0624

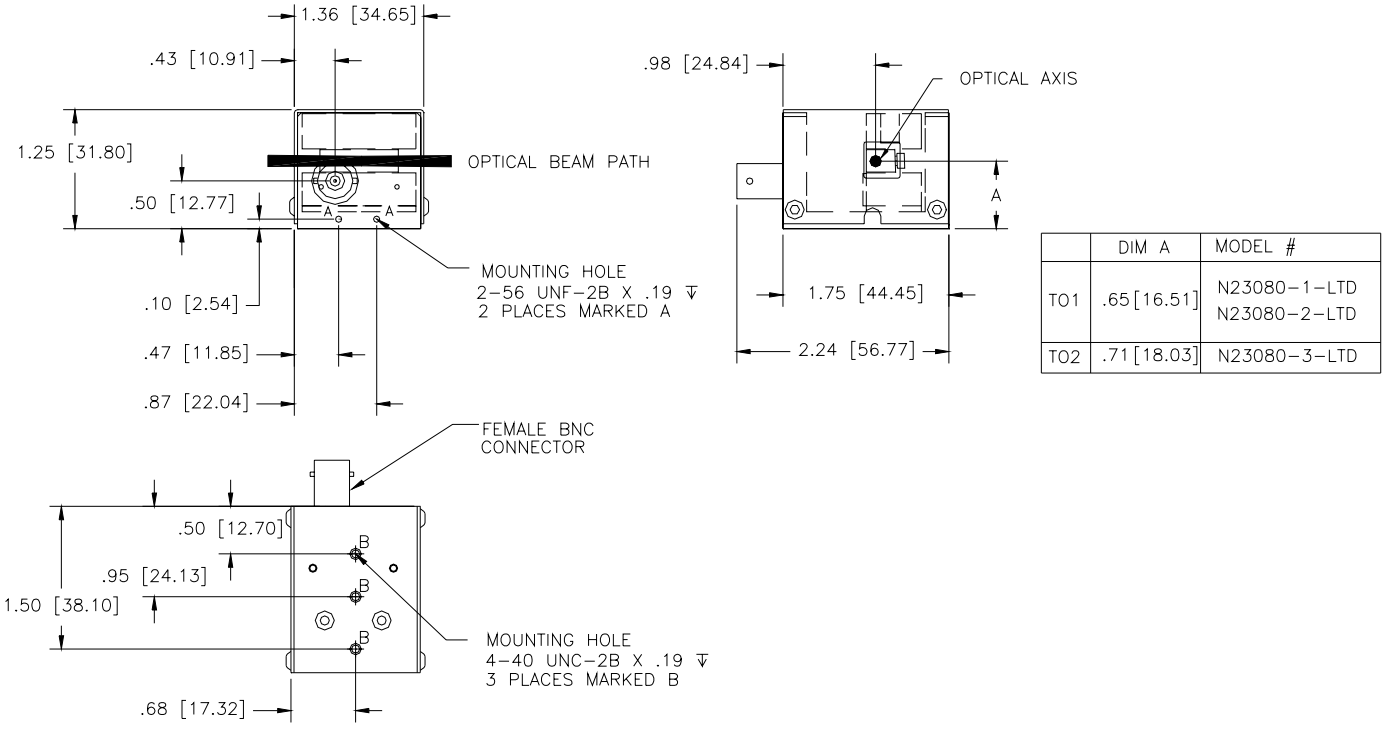
* Does not include electronics rise time

Recommended Drivers:

Digital Driver System: 21180-2DS
Digital Driver Module: 21180-2DM

Analog Driver System: 21180-2AS
Analog Driver Module: 21180-2AM

SECTION IV
OUTLINE DRAWING



	DIM A	MODEL #
TO1	.65 [16.51]	N23080-1-LTD N23080-2-LTD
TO2	.71 [18.03]	N23080-3-LTD

15180-1.06-LTD-GAP

53B0624

Dimensions are in inches Tolerances: Decimal: .xx = .01 .xxx =.005

Dimensions in [ ] are in mm. Millimeter: .xx = .25mm .xxx = .127mm

Angle: = ± 30'

SECTION V
CALCULATIONS

- The equations to determine the AOM rise time "t_r" are as follows:

  First determine the waist size by the equation, $d_0 = \frac{4f\lambda}{\pi d_1}$

  Where: f = lens focal length in mm

  λ = the optical wavelength in 1060×10^{-6} m

  d_1 = the input optical beam diameter in mm

  d_0 = the waist diameter inside the modulator in 10^{-6} m

  Knowing the waist size inside the modulator, then the modulator rise time can be calculated from the relationship:

  $$t_r = \frac{1.3 d_0}{2V}$$

  Where: V = the acoustic velocity of the modulator material which is 6650 m/s

- The focal length of the lens is the F# of the lens times the input spot diameter:

  $$F\#\ d_1 = f_{lens}$$

  f_{lens} should be between 80 to 130 mm depending upon λ.

- The deflection angle "$\varnothing_d$" is defined as the acoustic drive frequency in megahertz times the wavelength, divided by the acoustic velocity of the material:

  $$\varnothing_d = 2\theta_{Bragg} = \frac{f_a \lambda}{V} = \frac{180 \times 10^6 \lambda}{6650\ m/s}$$

  Where: θ_{Bragg} = Bragg angle of the modulator.

SECTION VI.
OPERATING INSTRUCTIONS

Use a IR viewer or IR card to view the laser beam.

Mount the modulator in the optical path with the laser beam passing through the device window centered on the window vertically and close to the transducer (connector side). The modulator is polarization sensitive and requires linear polarization, oriented parallel to the acoustic propagation axis. The modulator mount assembly must have sufficient adjustments to peak the modulator efficiency (Bragg angle, horizontal, and vertical position) and the lenses must be supplied to achieve the rise time. Be extremely careful not to focus the laser beam on the gold bond wires on the acoustic transducer, which may vaporize the bond wires. NEOS will not warranty any such damage.

If using the NEOS driver system, be sure the mode switch is in the CW position. Make sure that the RF power does not exceed 2 Watts. NEOS will not warranty any failure resulting from the application of too much RF power. Using a 50 Ω coaxial cable, connect the "RF out" of the driver to the modulator. Turn on the RF power.

With the laser beam going through the optical crystal, and close to the transducer, adjust the Bragg angle, by rotating the modulator, to allow the diffracted first order beam away from the transducer electrode to be the most intense. See figure 3.

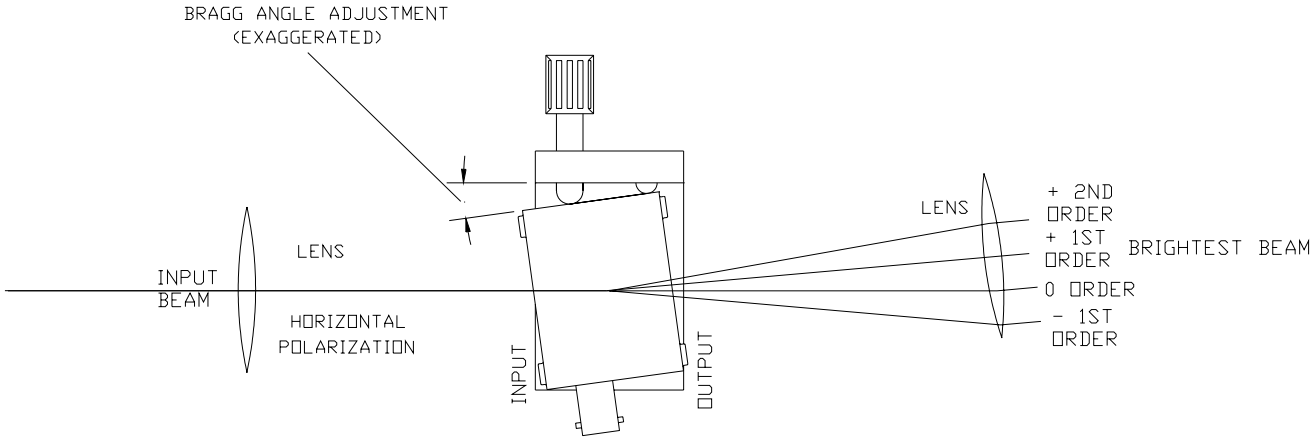
Install the input lens, one "f" away, and adjust the height of the modulator to achieve diffraction. Make changes in the Bragg adjustment screw to obtain optimum efficiency. Adjust, if necessary, the RF driver for power level to obtain maximum diffraction efficiency. If the driver and modulator are purchased together, the driver will be adjusted for optimum performance before shipment. Install the output lens, one "f" away, to collimate the output beam

The modulator has been designed and verified to satisfy the specifications.

To operate the modulator use the first order diffracted beam with the driver mode switch set to normal. See the driver manual for other information.

Figure 3

AOM BRAGG ADJ.



SECTION VII.

OPTICAL CLEANING

Periodic cleaning of the AO device is a normal part of maintaining an optical system. When the device is installed in an optical system, make sure that there is access to allow removal of the protective cover and room to clean the device. If removal from the system is necessary, then follow the alignment procedure in this manual to reinstall, realign and, adjust the AO device.

To clean the AO device, remove the screws that hold the cover to the mount. Caution must be used when placing a screw driver near the window opening in the cover, as it is best to protect the opening with tape or cover the opening with your finger (without touching the crystal) to protect it. NEOS will not warrant any damage or scratches caused by inserting the screwdriver into the window opening.

- Remove the protective cover.
- Blow off any visible dust with canned air. Do not use an air gun unless it is filtered and water and oil free!
- Fold (4 times) a new lens tissue into a triangle to make a cleaning tool.
- Dip the tip of the lens tissue into fresh acetone or spray fresh acetone from a squeeze bottle onto it. Then shake excess fluid out of the lens tissue. Do not handle the wet area of the tissue, as your finger oil will be absorbed and contaminate the optical surface of the crystal.
- Wipe (only once) across the crystal in an even motion, starting near the transducer and drawing the tissue across the optical surface toward the other end. Do not damage the bond wires! Do not reuse the tissue as the mounting silver epoxy may be spread onto the window of the crystal.
- Repeat with a new tissue each time and for each surface that needs cleaning.
- Replace the protective cover and screws.
- Realign the device in your system and adjust the Bragg angle for maximum diffraction efficiency.

Notes:

- The lens tissue must be lint free and the best grade available.
- Only use each tissue once, for only one surface. Do not reuse the tissue, as it will redistribute the removed dust or mounting silver epoxy.
- The acetone must be electronic grade. The acetone must be fresh from a new bottle, as the acetone will absorb water from the air and cause streaks. Discard any acetone, which has been exposed to the air for more than 4 hours. If the bottle is half- empty, do not use.