

Model 70706

Photomultiplier Power Supply



User's Manual

DRIEL
INSTRUMENTS
A Newport Corporation Brand

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1 SAFETY

DO NOT OPERATE THIS EQUIPMENT UNTIL YOU HAVE READ THIS MANUAL. THE HAZARDS ASSOCIATED WITH THE OPERATION OF THIS EQUIPMENT FALL UNDER THE ELECTRICAL HAZARDS. THIS POWER SUPPLY IS DESIGNED AND HAS NO HAZARD DURING NORMAL OPERATION IN ACCORDANCE WITH THE PRECAUTIONS PRESENTED IN THIS MANUAL.

1.1 SYMBOLS

The following terms and symbols are used in this documentation and also appear on the Power Supply where safety-related issues occur.

Electric Shock



The Electrical Shock Symbol in the figure above indicates a hazard arising from dangerous voltage. Any mishandling could result in irreparable damage to the equipment, and personal injury or death.

European Union CE Mark



The presence of the CE Mark on Newport Corporation equipment means that it has been designed, tested and certified as complying with all applicable European Union (CE) regulations and recommendations.

Alternating Voltage



This international symbol designates an alternating voltage or current.

Waste Electrical and Electronic Equipment (WEEE)



This symbol on the product or on its packaging indicates that this product must not be disposed of with regular waste. Instead, it is the user responsibility to dispose of waste equipment according to the local laws. The separate collection and recycling of the waste equipment at the time of disposal will help to conserve natural resources and ensure that it is recycled in a manner that protects human health and the environment. For information about where the user can drop off the waste equipment for recycling, please contact your local Newport Corporation representative.

2 GENERAL DESCRIPTION

The 70706 Photomultiplier Power Supplies has been specifically designed by Newport to supply the highly regulated voltage, which photomultiplier tubes (PMT's) require.

The 70706 is used to supply negative voltages to -2000V and has positive ground.

PMTs and PMT housing are purchased separately.

2.1 FEATURES

Both the 70706 power supply has an LED digital display and two high voltage BNC outputs for photomultiplier tubes. Since both outputs are on the same power supply, this ensures that two similar PMT's can be operated with a minimum of independent drift. This can be critical when one PMT is monitoring a reference light beam, for instance, while the other is measuring the sample signal.

A switch and banana jack inputs on the back of the unit enable the high voltage to be switched on and off by a mechanical circuit breaker. This is a useful feature to protect a powered PMT from exposure to high light levels by means of micro-switches on sample compartment doors and other devices. The high voltage can also be switched on and off by a TTL signal and can therefore be easily controlled by a computer.

Further switch and banana jack inputs on the back of the power supply enable the high voltage to be controlled by an applied 0 to 9 volt signal instead of the front panel knob. This enables the supply to be controlled by a computer and DIA converter.

3 SPECIFICATIONS

Voltage Range (70706):	-200 to -2000 Volts
Outputs:	2 High Voltage BNC connectors
Current Load:	2 mA
Line Regulation:	0.001%
Load Regulation:	0.001%
Drift Stability:	0.1% / 8 hrs.
Temperature Stability:	50 ppm / C
Accuracy:	1%
Repeatability:	2 Volts
Remote Enable:	Contact closure or 0 volt TTL low
Remote Control:	0 to 9 Volts
Mounting:	Table stand; optional rack mount
Power Requirements:	95 to 132V AC, 50/60 Hz 0.5A Fuse, Std. Speed
	190 to 264V AC, 50/60 Hz 0.25A Fuse, Std. Speed
Dimensions:	16.63 x 13.38 x 4.06 inches Overall (422 x 340 x 103 mm)
Weight:	10 lbs., 6 oz. (5.1 kg)

4 PREPARATION FOR USE

4.1 INSPECTION

Upon unpacking the power supply, inspect it for any damage, which may have occurred in transit. Save all packing materials in case the unit needs to be returned. Visually check to confirm that there are no broken controls or connectors and that the case and panel surfaces are free from dents and scratches. If any damage is detected, contact ORIEL.

You should have the following components:

- Photomultiplier Power Supply
- Power Cable

Check that the line voltage (AC power source) is correctly switched for your location. The indicator is on the back of the unit, in the power receptacle, and will be either 120V or 240V. See Item 2 for instructions on changing the line voltage selection.

Switch on the power supply and check that the indicator light goes on.

4.2 RE-CONFIGURING THE POWER INPUT MODULE

The power entry module mounted on the rear panel provides an international IEC receptacle for power cord attachment. It has 120/240 VAC selection capability and the facility for North American and European fusing configurations.

This unit has been set at the factory, based on destination, for either 120 VAC/ North American fused operation or 240 VAC/European operation. Note that two European fuses are required. The configuration can be easily verified by noting the position of the white indication pin on the power module.

To change the selected voltage or fuse configuration, unplug the power cord from the unit and pry off the cover/fuse block assembly with a small blade screwdriver or similar tool.

Use the indicator pin to pull the voltage selector card straight out of the housing. Orient the indicator pin so that it points in the opposite direction from the desired voltage, as indicated on the board. Re-insert the board with the voltage indication entering the module first and the pin pointing out. When the cover is replaced, verify that the pin indicates the correct voltage.

The fuses are mounted on the inside of the cover. The fuse(s) furthest into the housing are the active set. To change the fuse configuration, loosen the Phillips Head Screw, which holds the fuse block, by two turns. Lift the fuse block up at the screw end and then slide the block away from the screw. Invert the block and re-assemble, making sure that the end of the block opposite the screw is engaged before seating the block at the screw end and re-tightening the screw.

(For operation at 240 VAC, the alternative North American fusing arrangement may be used for polarized (non reversible) power socket/plug combinations. The fuse should be rated at one half the original 120V value.)

4.3 INSTALLATION

The power supply is housed in a bench-top enclosure which includes a flip stand to tilt the unit to facilitate its use.

5 USING THE POWER SUPPLY

5.1 MANUAL CONTROL

- **DO NOT CONNECT A PMT TO A POWER SUPPLY WHEN THE SUPPLY IS SWITCHED ON!!**
- Make sure that the Remote Enable switch on the back panel is switched **off**.
- Make sure that the Output Voltage Control switch on the back panel is switched to **Front Panel**.
- Make sure that the supply is switched **off** and that the voltage control knob is turned all the way **anti-clockwise**.
- Connect one or two photomultiplier tubes to the power supply via a (two) high voltage 70097 BNC cable(s).
- Plug in the power cable and switch **on**.
- **CHECK THE MAXIMUM VOLTAGE RATING FOR YOUR PMT!!**
- Adjust the high voltage to the PMT with the control knob. The voltage reading will be shown on the LED display.

< < < **WARNING** > > >

Make sure the power supply is **OFF** when connecting or disconnecting any cables to or from the unit.



Figure 1: 70097 Cable MHV to SHV plug

5.2 EXTERNAL CONTROL

- **DO NOT CONNECT A PMT TO A POWER SUPPLY WHEN THE SUPPLY IS SWITCHED ON!!**

- Make sure that the Remote Enable switch on the back panel is switched to **Remote**.

- **Enable/Disable Switch**

The high voltage output from the power supply can be switched on or off from an external source; this is termed disabling the supply.

A simple micro-switch can be used to control the operation of the power supply.

When there is an open circuit between the two input banana jack terminals on the back panel, the power supply is disabled; when there is a short circuit, the power supply is enabled.

- **Computer Control of Enable/Disable Switch**

The power supply can be controlled by a computer with a TTL interface.

TTL high will disable the power supply and TTL low will enable the power supply.

- **External Voltage Control**

A computer with a DIA interface can be used to adjust the output voltage for programmed control.

Make sure that the Output Voltage Control switch on the back panel is switched to **Remote**.

The high voltage output from the power supply can be adjusted from an external source. A 0 to 9 volt DC signal applied to the input banana jack terminals on the back panel will control the output voltage from 0 to -2000 volts. The control voltage to output high voltage ratio is not precisely 9:2000.

The minimum guaranteed high voltage is 200V at 0V input and the maximum is 2000V at 9V input, although the actual output voltage may exceed this range. The voltage reading will be shown on the LED display.

CHECK THE MAXIMUM VOLTAGE RATING FOR YOUR PMT!!

6 TROUBLESHOOTING

6.1 FAULT DIAGNOSIS

If operational problems are encountered, the configuration of the instrumentation should be checked before the power supply is considered defective. The following list of externally recognizable problems is provided to assist in this determination.

- **No power on indication and meter not illuminated**
Check connection to AC supply and fuse(s).
- **Output can not be adjusted from the front panel**
First, disconnect the load from the high voltage BNC connectors. If this does not alleviate the problem, check that Remote Enable on rear panel is switched **off** or, if Remote is elected, that the binding posts do in fact have a low level TTL signal or a contact closure/short circuit applied. Check that the rear panel Output Voltage Control is set to the Front Panel position.
- **Output can not be adjusted using remote voltage control**
Check as above except Output Voltage Control **must** be set to **Remote**.

Verify that appropriate control voltage is being applied.
- **Remote enable function not effective**
Check switch selection on rear panel. Measure control levels at Remote binding posts to be either TTL (<0.8 VDC low, >2.4 VDC high) or, with contact closure, 0 volts for a low and 5 volts for a high. Note that the output voltage response to a high level on this control input may require several seconds for full decay if lightly loaded.

If the above checks have not resolved the problem, contact the Customer Service Department to arrange for service.

< < **WARNING** > > >

POTENTIALLY LETHAL VOLTAGE LEVELS EXIST WITHIN THIS UNIT WHEN POWER IS APPLIED AND FOR MANY MINUTES AFTER POWER HAS BEEN REMOVED. NEVER REMOVE THE COVER FROM THIS UNIT.

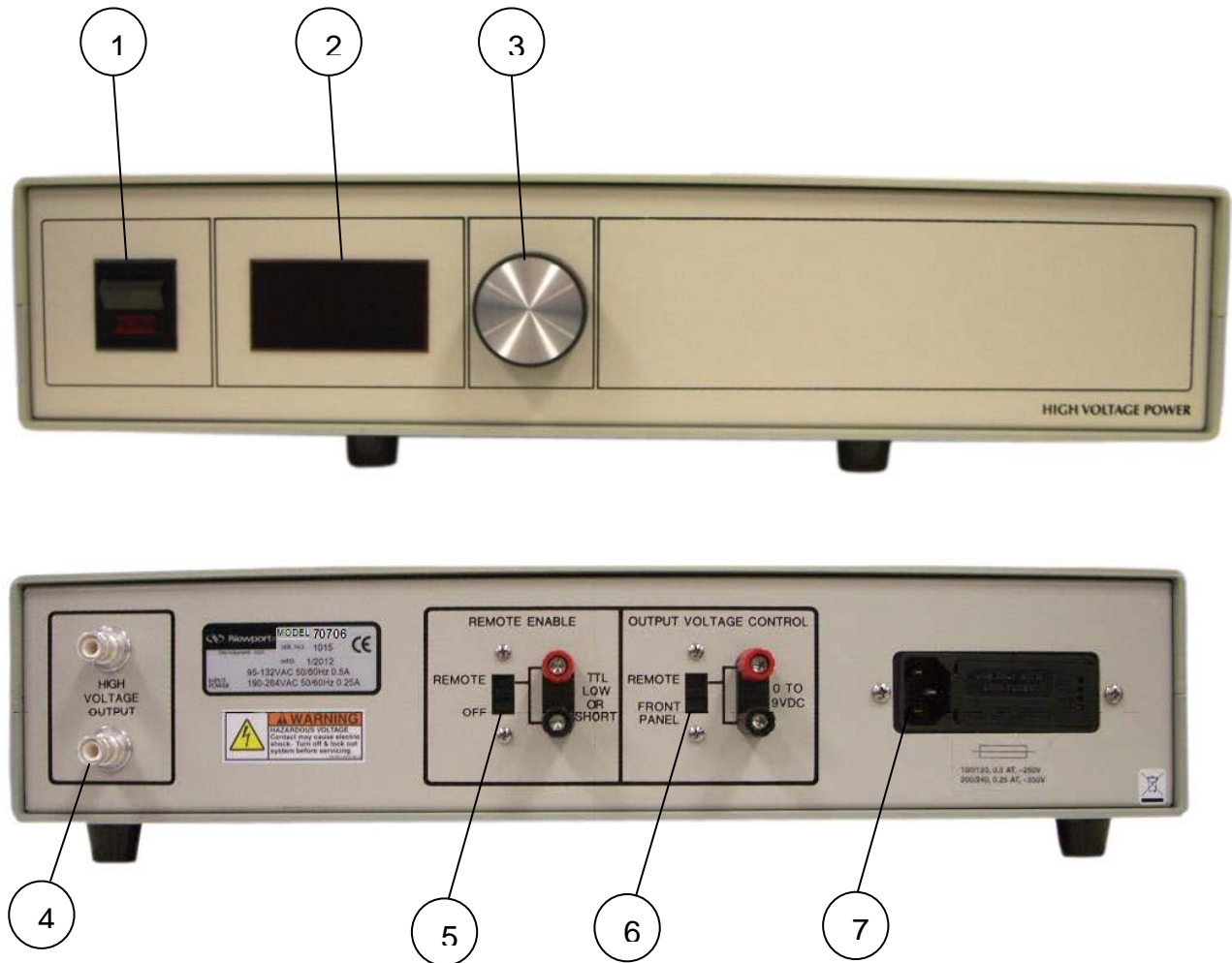




Figure 2: Power Supply Features

- 1. Power Switch
- 2. LED Display
- 3. Voltage Control Knob
- 4. Dual High Voltage Outputs
- 5. Front Panel/Remote Enable/Disable Switch
- 6. Front Panel/Remote Voltage Control Switch
- 7. 120/240V AC Line Selection/Fuse Location

7 DECLARATION OF CONFORMITY

EC DECLARATION OF CONFORMITY	
Manufacturer's name:	Newport Corporation
Manufacturer's address:	150 Long Beach Boulevard Stratford, CT 06615 USA
Declares that the product:	
Product Name:	ORIEL® Photomultiplier Power Supply
Model Numbers:	70706
Type of equipment:	Electrical equipment for measurement, control and laboratory use in industrial locations
conforms to the following Product Specifications:	
Safety:	EN 61010-1:2010
EMC:	EN 61326-1:2006+cor:2008+cor:2010
complies with the following Directives:	
	2004/108/EC EMC Directive 2006/95/EC Low Voltage Directive
and accordingly, carries the CE mark	
CE mark affixed:	Beaune; June 6, 2011
	
Domenic Assalone	Bruno Rety Authorized to compile technical documentation
Site Manager, Oriel Products Division	Group Director, PPT Instrument and Motion Europe
150 Long Beach Boulevard	Micro-Controle Division of Newport Corporation
Stratford, CT 06615 USA	Zone Industrielle 45340 Beaune la Rolande, France

8 WARRANTY AND SERVICE

8.1 CONTACTING NEWPORT CORPORATION

Oriel Instruments belongs to Newport Corporation's family of brands. Thanks to a steadfast commitment to quality, innovation, hard work and customer care, Newport is trusted the world over as the complete source for all photonics and laser technology and equipment.

Founded in 1969, Newport is a pioneering single-source solutions provider of laser and photonics components to the leaders in scientific research, life and health sciences, photovoltaics, microelectronics, industrial manufacturing and homeland security markets.

Newport Corporation proudly serves customers across Canada, Europe, Asia and the United States through numerous international subsidiaries and sales offices worldwide. Every year, the Newport Resource catalog is hailed as the premier sourcebook for those in need of advanced technology products and services. It is available by mail request or through Newport's website. The website is where one will find product updates, interactive demonstrations, specification charts and more.

To obtain information regarding sales, technical support or factory service, United States and Canadian customers should contact Newport Corporation directly.

Newport - Oriel Instruments
1791 Deere Avenue
Irvine, CA 92606 USA

Telephone: 800-222-6440 (toll-free in United States)
949-863-3144

Fax: 949-253-1680

Sales: oriel.sales@newport.com
Technical assistance: oriel.tech@newport.com
Repair Service: rma.service@newport.com

Customers outside of the United States must contact their regional representative for all sales, technical support and service inquiries. A list of worldwide representatives can be found on the following website: <http://www.newport.com/oriel>.

8.2 REQUEST FOR ASSISTANCE / SERVICE

Please have the following information available when requesting assistance or service:

Contact information for the owner of the product.
Instrument model number (located on the product label).
Product serial number and date of manufacture (located on the product label).
Description of the problem.

To help Newport's Technical Support Representatives diagnose the problem, please note the following:

Is the system used for manufacturing or research and development?
What was the state of the system right before the problem?
Had this problem occurred before? If so, when and how frequently?
Can the system continue to operate with this problem, or is it non-operational?
Were there any differences in the application or environment before the problem occurred?

8.3 REPAIR SERVICE

This section contains information regarding factory service for this product. The user should not attempt any maintenance or service of the system beyond the procedures outlined in this manual. This product contains no user serviceable parts other than what is noted in this manual. Any problem that cannot be resolved should be referred to Newport Corporation.

If the instrument needs to be returned for service, a Return Material Authorization (RMA) number must be obtained prior to shipment to Newport. This RMA number must appear on both the shipping container and the package documents.

Return the product to Newport, freight prepaid, clearly marked with the RMA number and it either will be repaired or replaced at Newport's discretion.

Newport is not responsible for damage occurring in transit. The Owner of the product bears all risk of loss or damage to the returned Products until delivery at Newport's facility. Newport is not responsible for product damage once it has left the facility after repair or replacement has been completed.

Newport is not obligated to accept products returned without an RMA number. Any return shipment received by Newport without an RMA number may be reshipped by Newport, freight collect, to the Owner of the product.

8.4 NON-WARRANTY REPAIR

For Products returned for repair that are not covered under warranty, Newport's standard repair charges shall be applicable in addition to all shipping expenses. Unless otherwise stated in Newport's repair quote, any such out-of-warranty repairs are warranted for ninety (90) days from date of shipment of the repaired Product.

Newport will charge an evaluation fee to examine the product and determine the most appropriate course of action. Payment information must be obtained prior to having an RMA number

assigned. Customers may use a valid credit card, and those who have an existing account with Newport Corporation may use a purchase order.

When the evaluation had been completed, the owner of the product will be contacted and notified of the final cost to repair or replace the item. If the decision is made to not proceed with the repair, only the evaluation fee will be billed. If authorization to perform the repair or provide a replacement is obtained, the evaluation fee will be applied to the final cost. A revised purchase order must be submitted for the final cost. If paying by credit card, written authorization must be provided that will allow the full repair cost to be charged to the card.

8.5 WARRANTY REPAIR

If there are any defects in material or workmanship or a failure to meet specifications, notify Newport Corporation promptly, prior to the expiration of the warranty.

Except as otherwise expressly stated in Newport's quote or in the current operating manual or other written guarantee for any of the Products, Newport warrants that, for the period of time set forth below with respect to each Product or component type (the "Warranty Period"), the Products sold hereunder will be free from defects in material and workmanship, and will conform to the applicable specifications, under normal use and service when correctly installed and maintained. Newport shall repair or replace, at Newport's sole option, any defective or nonconforming Product or part thereof which is returned at Buyer's expense to Newport's facility, provided, that Buyer notifies Newport in writing promptly after discovery of the defect or nonconformity and within the Warranty Period. Products may only be returned by Buyer when accompanied by a return material authorization number ("RMA number") issued by Newport, with freight prepaid by Buyer. Newport shall not be responsible for any damage occurring in transit or obligated to accept Products returned for warranty repair without an RMA number. The buyer bears all risk of loss or damage to the Products until delivery at Newport's facility. Newport shall pay for shipment back to Buyer for Products repaired under warranty.

WARRANTY PERIOD

All Products (except consumables such as lamps, filters, etc.) described here are warranted for a period of twelve (12) months from the date of shipment or 3000 hours of operation, whichever comes first.

Lamps, gratings, optical filters and other consumables / spare parts (whether sold as separate Products or constituting components of other Products) are warranted for a period of ninety (90) days from the date of shipment.

WARRANTY EXCLUSIONS

The above warranty does not apply to Products which are (a) repaired, modified or altered by any party other than Newport; (b) used in conjunction with equipment not provided or authorized by Newport; (c) subjected to unusual physical, thermal, or electrical stress, improper installation, misuse, abuse, accident or negligence in use, storage, transportation or handling, alteration, or tampering, or (d) considered a consumable item or an item requiring repair or replacement due to normal wear and tear.

DISCLAIMER OF WARRANTIES: EXCLUSIVE REMEDY

THE FOREGOING WARRANTY IS EXCLUSIVE AND IN LIEU OF ALL OTHER WARRANTIES. EXCEPT AS EXPRESSLY PROVIDED HEREIN, NEWPORT MAKES NO WARRANTIES, EITHER EXPRESS OR IMPLIED, EITHER IN FACT OR BY OPERATION OF LAW, STATUTORY OR OTHERWISE, REGARDING THE PRODUCTS, SOFTWARE OR SERVICES. NEWPORT EXPRESSLY DISCLAIMS ANY IMPLIED WARRANTIES OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE FOR THE PRODUCTS, SOFTWARE OR SERVICES. THE OBLIGATIONS OF NEWPORT SET FORTH IN THIS SECTION SHALL BE NEWPORT'S SOLE LIABILITY, AND BUYER'S SOLE REMEDY, FOR BREACH OF THE FOREGOING WARRANTY. Representations and warranties made by any person including distributors, dealers and representatives of Newport Corporation which are inconsistent or in conflict with the terms of this warranty shall not be binding on Newport unless reduced to writing and approved by an expressly an authorized officer of Newport.

8.6 LOANER / DEMO MATERIAL

Persons receiving goods for demonstrations or temporary use or in any manner in which title is not transferred from Newport shall assume full responsibility for any and all damage while in their care, custody and control. If damage occurs, unrelated to the proper and warranted use and performance of the goods, recipient of the goods accepts full responsibility for restoring the goods to their original condition upon delivery, and for assuming all costs and charges.

Confidentiality & Proprietary Rights

Reservation of Title:

The Newport programs and all materials furnished or produced in connection with them ("Related Materials") contain trade secrets of Newport and are for use only in the manner expressly permitted. Newport claims and reserves all rights and benefits afforded under law in the Programs provided by Newport Corporation.

Newport shall retain full ownership of Intellectual Property Rights in and to all development, process, align or assembly technologies developed and other derivative work that may be developed by Newport. Customer shall not challenge, or cause any third party to challenge the rights of Newport.

Preservation of Secrecy and Confidentiality and Restrictions to Access:

Customer shall protect the Newport Programs and Related Materials as trade secrets of Newport, and shall devote its best efforts to ensure that all its personnel protect the Newport Programs as trade secrets of Newport Corporation. Customer shall not at any time disclose Newport's trade secrets to any other person, firm, organization, or employee that does not need (consistent with Customer's right of use hereunder) to obtain access to the Newport Programs and Related Materials. These restrictions shall not apply to information (1) generally known to the public or obtainable from public sources; (2) readily apparent from the keyboard operations, visual display, or output reports of the Programs; 3) previously in the possession of Customer or subsequently developed or acquired without reliance on the Newport Programs; or (4) approved by Newport for release without restriction.

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