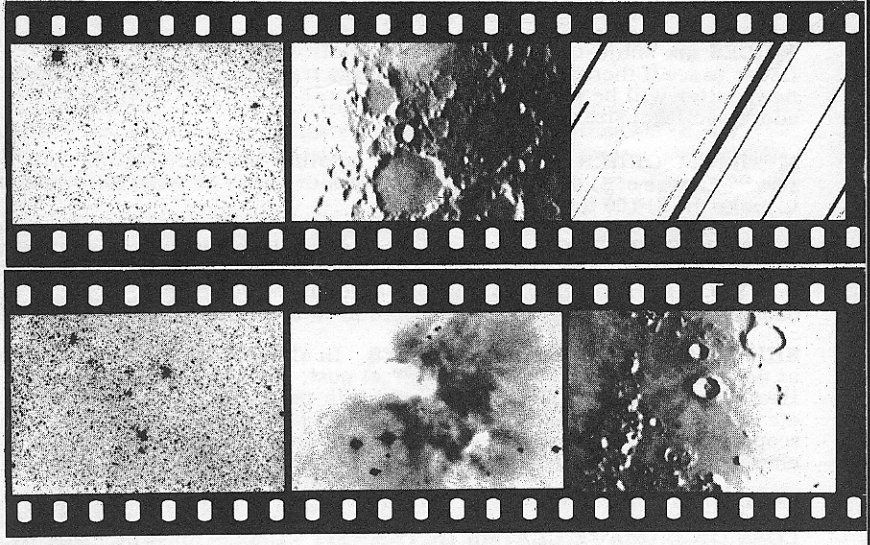
50¢

OPTICA b/c Company
4100 Mac Arthur Blvd.
Oakland, Calif. 94619

CATALOGUE NO. A-74

Astrophotography



Equipment • Systems • Supplies • Publications

OPTICA %

ASTRO-PHOTO

ORDER INFORMATION

PLEASE READ CAREFULLY BEFORE ORDERING

CONFIDENCE You can purchase OPTICA b/c equipment and supplies with confidence. You are dealing with a U.S. company that has an established reputation of quality, precision and service since 1939. Our products are used by educational institutions, governments, the military, observatories, planetariums and research institutions as well as amateurs the world over. Absolutely no rejects, seconds or toy quality products are merchandized by the OPTICA b/c Company or its subsidiaries. Optica b/c adheres strictly to the ethical standards for advertising as set forth by the Better Business Bureau (B.B.B.) and the Federal Trades Commission.

GUARANTEE: All OPTICA b/c products are guaranteed against defective materials and/or workmanship as stated in our Catalogs and on Guarantee Cards. No other Warranty or liability is given or implied. Do read instructions which accompany our products.

SERVICE All replacement parts, down to the tiniest screw, are available, no matter which of the OPTICA b/c factories throughout the world produced the instrument. A Sales-Service Division stands ready to supply information and technical expertise relative to all products. We invite you to make use of these services.

FAST Orders shipped same day as received. For special orders, custom work, heavy equipment and out-of-stock items, you are advised of the expected shipping date. Avoid delays: print your name and address clearly, including Zip Code number. Order by item description, Stock No. and price. When ordering publications, include title, author and price.

C.O.D. No C.O.D. orders accepted under $50.00, 25% down, balance plus shipping and transportation charges C.O.D. You save on cash orders.

TAXES California residents add sales tax.

PRICES are subject to change without notice. Do check the latest OPTICA b/c News Letter to see if there have been any changes from catalog prices. The latest edition of this news letter will be sent to you free of charge. Simply request same, and include a self-addressed legal size stamped envelope.

MINIMUM ORDER Orders received totaling less than $10.00 will be subject to a service charge of $1.00. Please note that products may be ordered from any of the catalogs to make the $10.00 total.

OPEN ACCOUNT Governments and educational institutions may order on open account. Terms: Net E.O.M. Due to the high cost of accounting, orders received for less than $25.00 are subject to a $3.00 open account service charge.
Shipping and insurance charges will be added to all open account orders. F.O.B. Oakland, California.

SHIPPING AND CRATING CHARGES In all catalogs, lightweight items are packaged at no charge and usually shipped parcel post; we pay postage, except C.O.D. shipments. Heavy items (such as telescopes, mirror kits, processing chemicals, large mirrors mounts, etc.) and light but bulky items (such as the large celestial globe, the Lunasphere, telescope tubes, etc.) will be shipped F.O.B. Oakland, California. There is a minimum crating charge on larger telescopes and other heavy equipment.

SAFE DELIVERY Insured by careful packaging, and all major items are insured.

LOSS OR DAMAGE CLAIMS IN TRANSIT Claims must be made by you directly to carrier. Claims for shortages in shipment must be made to OPTICA b/c within five days of receipt.

REQUESTS FOR ADDITIONAL INFORMATION: Address correspondence to our Sales-Service Division.

TELEPHONE (415) 530-1234. Switch board is open 10 a.m. to 5:30 p.m., including Saturday, Pacific Standard time. Collect calls cannot be accepted.

OPTICA b/c, 4100 MacArthur Blvd., Oakland, California 94619, USA

LATEST MODELS We reserve the right to supply our latest models, which may not always be exactly as those currently illustrated in our catalog. Consult the latest edition of the OPTICA b/c News Letter, in which we make every effort to keep you informed of any product changes. One will be sent to you **FREE** if you simply enclose a legal size, self-addressed stamped envelope with your request.

IMPORTANT NOTICE TO EDUCATORS OPTICA b/c equipment and materials have been approved over the years for purchase with National Defense Education Funds, and other aid grants. Qualification is dependent upon use. We recommend you consult your state department of education for information and approval.

ORDERS FROM FOREIGN COUNTRIES Orders received totaling less than $25.00 will be subject to a service charge of $1.00. In addition, **all** orders, regardless of the amount, will be subject to a surcharge of $5.00, to cover special handling required for export.

NEW: CATALOGS, EVENTS CALENDAR AND NEWS LETTERS OPTICA b/c catalogs are up-dated and revised annually. They contain a wealth of useful information, and are liberally illustrated with diagrams and photographs. There is a minimal charge for handling and postage which may be paid in cash, check or U.S. postage stamps. When you order catalogs you will receive **FREE** the latest copy of the OPTICA b/c News Letter and a current Astronomical Events Calendar.

TELESCOPES - ACCESSORIES & SUPPLIES CATALOG Terrestial, celestial, refractors and reflectors, mounts, drives, diagonals, spectroscopes, erectors, solar observation system, eyepieces, variable density polaroid system, adapters, cleaning supplies, filters, etc. . . . Send 50¢.

ASTROPHOTOGRAPHY SYSTEMS - EQUIPMENT AND SUPPLIES CATALOG Camera-telescope adapters, cameras for astrophotography, films and plates—regular and specialized emulsions (such as spectroscopic), camera brackets, books, paper, chemicals, processing equipment, etc. . . . Send 50¢.

PUBLICATIONS AND AUDIO VISUAL AIDS CATALOG Our largest selection of astronomical related materials. Over 300 different publications covering a wide variety of subjects. Also: Atlases, maps, charts, planispheres, plus slides and posters. Recorded lectures are offered on: records, standard tapes and tape cassettes. Celestial, Lunar, and Mars globes are included, plus Orreries, and teaching aids. And there's more . . . Send 50¢.

AMATEUR TELESCOPE MAKER'S CATALOG
Now you can satisfy all your telescope making needs from one source, over 400 items. Includes: standard parts, difficult-to-find items, and the many exclusive products available only from OPTICA b/c — from "A" (Abrasives) to "Z" (Zone Testing Masks). The "All Together" concept also includes complete units, components, supplies, books on optics, and services ..... send 50¢

OPTICA OPTICA OPTICA OPTICA OPTICA OPTICA OPTICA OPTICA OPTICA OPTICA OPTICA

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CHARGE BY PHONE, MAIL OR IN PERSON For the convenience of its customers, OPTICA b/c honors both Master Charge and Bank Americard - include both card number and expiration date. Please - no charges under $25.00.

OPTICA b/c

When you see this trade-mark, you know it is the finest that Photo-Optical Instrumentation Engineering can produce.

Astrophotography Systems by OPTICA b/c

Now you can experience the thrill and satisfaction of superb astrophotographs of the sun moon, stars, planets, and other fascinating celestial phenomena. Remember, success in this endeavor is governed by the quality and practicability of the system, and since OPTICA b/c is a pioneer in this field, you expect and receive systems of design superiority.

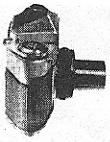
		Astrophotography System – I	Astrophotography System – II*	Astrophotography System – III*	Astrophotography System – IV*	Astrophotography System – V (OPTICA b/c Mirax)*
METHODS USABLE	Prime Focus (First focus)	X	X	X	X	X
	Eyepiece (Positive) Projection			X X	X X	X X
	Negative (Barlow) Projection	X	X	X X	X X	X X
	Eyepiece Camera (Afocal)				X X	
COUPLERS INCLUDED	Telescope Coupler, Standard	X	X			
	Telescope Coupler, Deluxe			X	X	X
	Camera Body Coupler	X	X	X	X	X
	Camera Lens Coupler				X	X
EXTENSION TUBES 1"				X	X	X
EXTENSION TUBES 2"					X	X
EXTENSION TUBES 3"						X
CAMERA LENS	Lens			50mm	50mm	
	Lens f/ Range			f/2.8 - f/22	f/2.0 - f/16	
	Focusing Range			2.5' to ∞	1.3' to ∞	
	Auto Diaphram			X	X	
	Lens Threaded For Accessories			X	X	
	Interchangeable Lens Feature	X	X	X	X	X
CAMERA BODY	Single Lens Reflex	X	X	X	X	X
	Film Size	35mm	35mm	35mm	35mm	35mm
	Viewfinder	Line of Sight Penta Prism	Line of Sight Penta Prism	Line of Sight Penta Prism	Line of Sight Penta Prism	90° Focusing Magnifier
	Instant Return Mirror		X	X	X	X
	Focal Plane Shutter		X	X	X	X
	Shutter Speeds	1/30 – 1/175 Sec. + "B"	1 Sec.- 1/1000 + "B"	1 Sec.- 1/1000 + "B"	1 Sec.- 1/1000 + "B"	1 Sec.- 1/125 + "B"
	Synchronization	MX	X	X	FP X	X
	Double Exposure Prevention	X	X	X	X	X
	Rapid Rewind	X	X	X	X	X
	Standard Tripod Socket	X	X	X	X	X
MISC.	Locking Cable Release	X	X	X	X	X
	Case			X	X	
	Instruction Booklets	X	X	X	X	X
24.5mm	Stock Number	APS1-2	APS2-2	APS3-2	APS4-2	APS5-2
1¼"	Stock Number	APS1-1	APS2-1	APS3-1	APS4-1	APS5-1

"X" Features included
*See details

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METHODS USABLE

Each method of astrophotography (prime, negative projection, positive projection and afocal) offers the astrophotographer a distinct advantage; see "Couplers, Camera to Telescope."



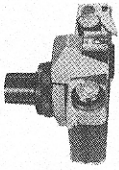
Astrophotography System I

COUPLERS INCLUDED

For description of each, see "Couplers, Camera to Telescope."

EXTENSION TUBES

These tubes are used when employing the eyepiece projection method of astrophotography to increase magnification. Example: if the distance from a 25mm eyepiece lens to the film plane is 2½" and you add a 2" extension tube, magnification would be increased by about 1½ times.



Astrophotography System II

CAMERA LENS

LENS: A system supplied with a camera lens makes it possible to utilize all four methods of astrophotography. It can also be coupled to our Astronomical Spectroscopes, and the camera can be used for regular snapshooting. A wide variety of lenses are available for any of the astrophotography systems, including those not supplied with a lens originally. These may be added at a later date if desired.

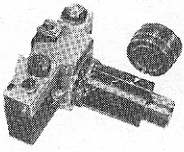
LENS f/ RANGE: Full manual control is provided over lens opening.

FOCUSING RANGE: The scientifically inclined photographer needs a camera that provides for close-up work.

AUTO DIAPHRAM: Advantageous in terrestrial snapshooting.

LENS THREADED FOR ACCESSORIES: Important for perfect coupler alignment and snapshooting accessories.

INTERCHANGEABLE LENS FEATURE: Lenses may be added or removed at will so that all methods of astrophotography may be employed as well as permitting telephoto, wide angle and close up work.



Astrophotography System III

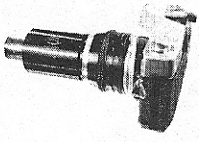
CAMERA BODY

SINGLE LENS REFLEX: A highly desirable feature for those shooting through telescopes, microscopes, etc. Offers the advantage of being able to observe the field limits, degree of magnification and focus, right through the optical train, thereby eliminating many errors often encountered with other types of cameras.

FILM SIZE: 35mm offers the widest selection in either black and white or color films (prints or slides) suitable for both astrophotography and snapshooting.

VIEWFINDER: Finders are selected to make accurate focusing easy. Other style finders are also available for all camera systems. These may be added later if desired.

INSTANT RETURN MIRROR: Definitely advantageous for snapshooting.



Astrophotography System IV

FOCAL PLANE SHUTTER: This type of shutter allows for high speeds, better accuracy with years of use, and greater economy when changing lenses.

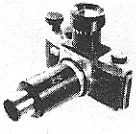
SHUTTER SPEEDS: The extreme brightness differential of astronomical subjects requires a variety of shutter speeds including "B" for time exposures.

SYNCHRONIZATION: Important advantage for flash and strobe photography.

DOUBLE EXPOSURE PREVENTION: Eliminates accidental double exposure.

RAPID REWIND: Facilitates quick and easy film handling.

STANDARD TRIPOD SOCKET: Permits use of our astrophoto brackets as well as a regular camera tripod for snapshooting.



Astrophotography System V

MISCELLANEOUS

LOCKING CABLE RELEASE: A flexible cable to reduce vibration when releasing the shutter. This cable can also lock the shutter open for long time exposures.

CASE: Protects the camera during storage and transportation.

INSTRUCTION BOOKLETS: Complete operational instructions specifically designed for each system are included.

MORE ON THE ASTROPHOTOGRAPHY SYSTEM II and III

These deluxe systems feature: a steel focal plane shutter • wide range of shutter speeds • shutter cocking warning signal • microprism focusing screen. **System III** adds a sharp, fast lens permitting all methods of astrophotography and complete terrestrial photography. System III is not recommended for astro-spectrography.

MORE ON THE ASTROPHOTOGRAPHY SYSTEM IV

A superbly designed system of highest quality that offers an important bonus — a **behind-the-lens metering system** that really simplifies terrestrial snapshooting and some types of astrophotography. This is the system for you if you want high quality and unlimited versatility in regular photography, photomicrography and astrophotography. **PLUS —** this system permits high quality photographs through our astronomical spectroscopes.

MORE ON THE ASTROPHOTOGRAPHY SYSTEM V

Here is the first system of its kind exclusively designed to fulfill the exact requirements of the astrophotographer. In addition to the long list of features indicated on the chart, a number of exclusive features make this system the best in its class:

1. High eye-relief, 29mm diameter, multi-element magnifying viewfinder with dioptric focusing adjustment and a bright, easy-to-see, transparent focusing screen that features both single and dual crosshairs. This enables a highly accurate check on polar alignment in lieu of a crosshair eyepiece, and insures faster, easier, more critical focusing. It's perfect for those who must wear glasses!
2. Unique, vibration dampening design eliminates shutter bounce.
3. Two cable release sockets (front and top of camera) for convenient shutter actuation, regardless of camera position.
4. Oversize film advance knob — easier to advance film in the dark or when camera is in awkward positions.
5. Extra large (46mm) camera body opening to eliminate image obstruction at the corners.
6. Extra large, shockproof mirror for full coverage without image cut-off.
7. Detachable back permits image measurements and light meter readings through the entire optical train.
8. Complete set of extension tubes (1", 2", and 3") are included for increased projection magnifications.

ADDITIONAL

A. **Threaded:** all our telescope couplers are threaded to accept filters and other accessories.

B. **Filters:** A must for the most rewarding astrophotography with that professional look of quality.

C. **Fully Adaptable:** OPTICA b/c astrophotography systems may be coupled to any brand microscope. See "Couplers, Camera to Microscope."

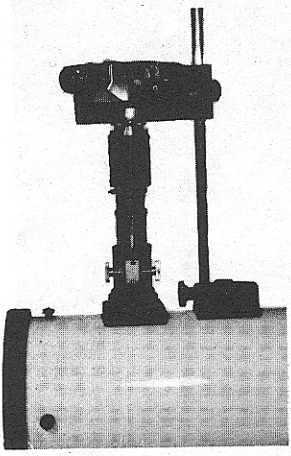
D. **Questar Owners: Now You Have A Choice:** All OPTICA b/c Astrophotography Camera Systems in the 1¼" size are **available for Questar.** The custom-made coupling units permit the use of all methods indicated for each respective camera system in the chart **plus** the use of all OPTICA b/c filters, eyepieces, spectroscopes, etc. When ordering, use the regular stock numbers, but add the words: "For Questar" to your order. See the current Astrophotography Catalog Price Sheet for the price of the **Custom Questar Couplers** which is to be added to the cost of the Astrophotography Camera System. **Stock No. CQC-01**



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A-74-6

Brackets, Astrophotography



Brand New! Two of the most versatile astrophoto camera bracket assemblies available; fit telescope tube or rack and pinion mounts.

ADDED UTILITY

Simple to install and use—accepts all cameras with tripod sockets—fits any size telescope, reflector or refractor. Reduces torque-strain and potential damage on your camera lens and rack and pinion. To insure the necessary, accurate alignment of your camera on the optical axis, astrophoto camera adapters should be used with these bracket assemblies.

UNIQUE DESIGN

On occasions, you may desire to use the camera and its regular lens for wide field photography, such as constellation or comet photography, lunar photography with a telephoto, etc. The adjustable camera base plate may be repositioned so that the camera optical axis is parallel to the telescope tube. Thus, you can utilize the telescope's mount and drive for time exposures. The tremendous versatility of this design also means that when you change or add telescopes, reflector or refractor, the bracket will be completely interchangeable on all instruments.

SOLAR OBSERVATION

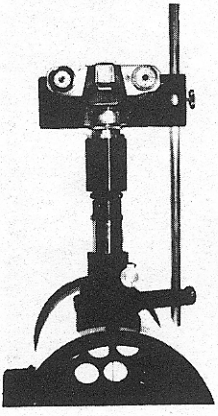
A sun projection screen is included with each bracket assembly.

CONSTRUCTION

Rigid, lightweight, attractive black crinkle finish.

COMPLETE

Supplied with: tube mounting bracket or rack and pinion clamp, extension rod, adjustable camera base plate, screws and bolts.



BRACKET, TUBE MODEL

Drill four holes in your tube, secure the bracket to the tube, and you are ready. The uniquely designed tube bracket makes it possible to utilize one of any of three mounting positions: side-of-tube or top-of-tube for reflectors, and parallel on any refractor.

Stock No. BATM-1

BRACKET, RACK & PINION MODEL

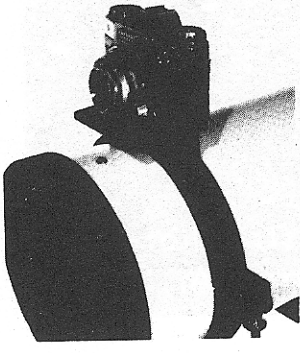
Drill no holes! The rack and pinion clamp is secured directly to the base of OPTICA b/c Standard (2⅜" diameter) or Deluxe (2¾" diameter) Rack and Pinions. We can machine the clamp for any other diameter rack and pinion, up to 2⅞" for $7.50 machining charge.

Stock No. BARP-1

*See: "COUPLERS, CAMERA" in the Astrophotography Systems Catalog.

LOOK: ANOTHER PLUS FOR OPTICA b/c CAMERA BRACKETS!

Most camera brackets hold cameras perpendicular to the focuser, rendering them useless when utilizing **a sun or star diagonal.** Not so with the OPTICA b/c system! Our brackets are designed to hold cameras both ways. This versatility in design makes photography through diagonals a cinch.



BRACKET, TUBE CLAMP

These camera brackets clamp directly onto the tubes of the OPTICA b/c 4" and 6" deluxe telescopes and corresponding OPTICA b/c fiberglass tubes. Designed to support up to and beyond the capacity of the previously mentioned brackets. Sturdy enough to support larger cameras, cameras with heavy telephoto lenses or the so-called mirror telephotos. Clamps on in seconds.

Size	Stock No.
To fit 4" telescope	BATC-4
To fit 6"telescope	BATC-6

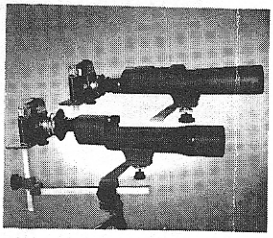
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BRACKET/ADAPTER SYSTEM—SPOTTING SCOPES

BRACKET ASSEMBLY

Convert your Bausch & Lomb 60mm or similar type spotting scopes for either astro or terrestrial photography. Accepts any camera with standard tripod socket. For best results with the Bausch & Lomb both the bracket and adapter are recommended.

Stock No. BA-060



ADAPTER, BAUSCH & LOMB

The adapter is a custom-machined coupler that screws onto the Balscope 60 Zoom telescopes and into the camera lens. This insures the necessary optical alignment between camera and telescope; it also serves to eliminate any extraneous light.

Stock No. ABL-60



LIGHT GUARD not necessary for any OPTICA b/c adapter, astro camera or outfit. Use with Bracket and other assemblies to eliminate stray light. ---------- Stock No. **AP506**



Astrophoto by Merrill D. Martin.

Couplers, Camera to Telescope

OPTICA b/c offers the largest selection of astro camera couplers for the amateur astronomer available in the world. Couplers are available to fulfill the requirements of **over 10,000 different camera lens and body combinations**; virtually every popular camera produced since the early thirties is covered. In addition, these systems offer the greatest versatility for the price.

FUNCTIONALLY DESIGNED

A. Accurately machined to insure perfect alignment in relation to the optical train.

B. Telescope couplers are threaded to accept all OPTICA b/c filters for astrophotography.

C. Lightweight, black anodized aluminum.

D. Components are instantly interchangeable. If you purchase another camera or wish to use more than one camera, OPTICA b/c has couplers to satisfy your requirements.

E. Available to fit either 24.5mm or 1¼", standard eyepiece holders.

F. Instructions included.

G. Light-tight, machined fit—no light guards required.

H. The Standard Telescope Coupler, with its appropriate Camera Body Coupler, allows one to utilize either the prime focus or negative projection methods of astrophotography.

I. The Deluxe Telescope Coupler differs from the Standard in that it is internally machined to accept eyepieces. When used with the proper components one may choose the negative (Barlow) projection, positive (eyepiece) projection, prime focus, or afocal (eyepiece-camera) methods. Being able to use all four methods greatly increases utility. An Allen-type setscrew and wrench are provided to lock eyepieces in the proper position.

TUBES, EXTENSION — ASTRO CAMERA

For those utilizing the eyepiece projection method, there is an additional method of obtaining increased image magnification - Extension Tubes. These tubes screw onto your astro camera coupler, fitting the threads on both the 24.5mm and 1¼" couplers. The greater the length, the greater the magnification.

EXTENSION TUBES FOR BOTH 24.5mm AND 1¼" ADAPTERS

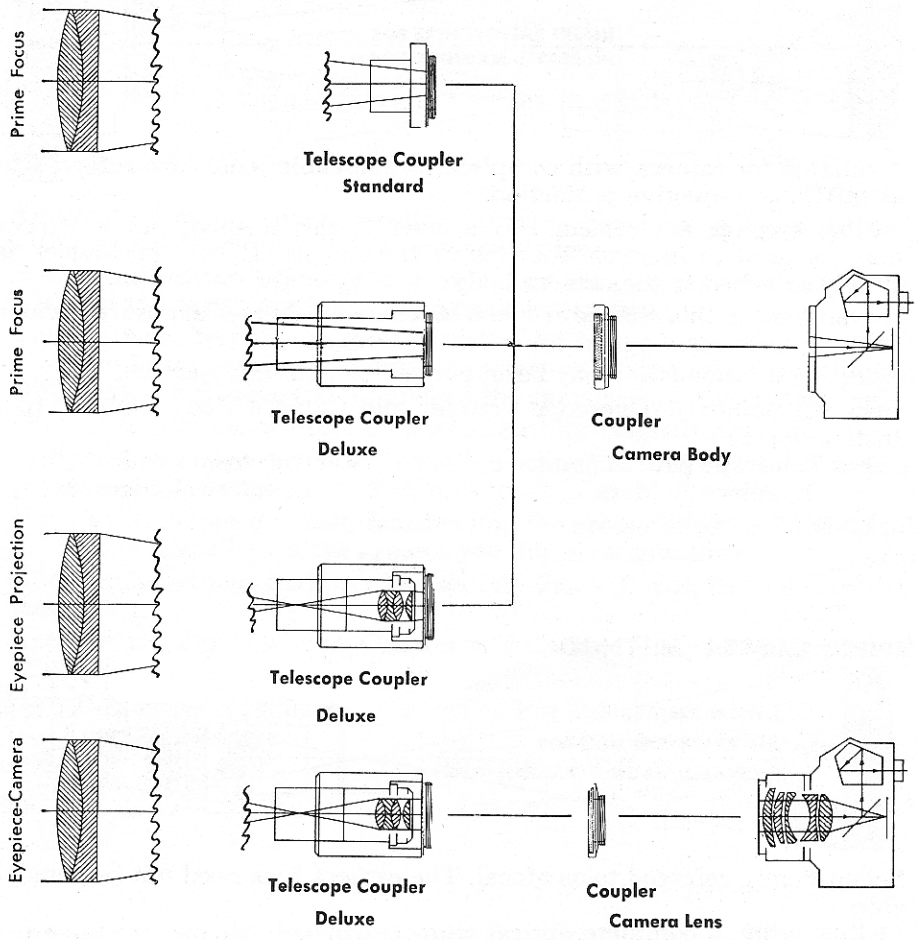
	STOCK No.
¼ inch extension	TEA-14
1 inch extension	TEA-10
2 inch extension	TEA-20
3 inch extension	TEA-30



¼ inch 1 inch 2 inch 3 inch

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COMPONENTS, CAMERA TO TELESCOPE



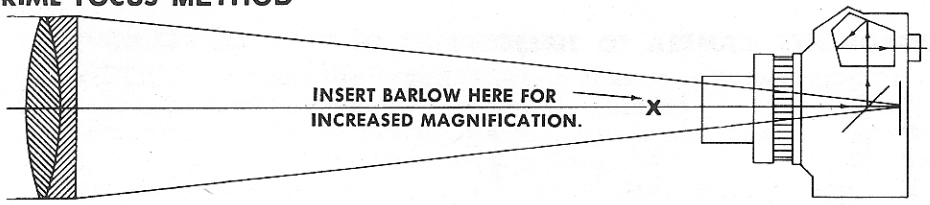
	For Telescopes with 24.5mm Eyepiece Holders Stock No.	For Telescopes with 1¼" Eyepiece Holders Stock No.
Coupler, Camera Lens	CCL-02	CCL-01
Coupler, Camera Body	CCB-02	CCB-01
Coupler, Standard Telescope	CST-02	CST-01
Coupler Deluxe Telescope	CDT-02	CDT-01

COUPLER COMPONENTS AVAILABLE SEPARATELY

OPTICA b/c systems are so designed that components are instantly interchangeable, if you purchase another camera or wish to use more than one camera, OPTICA b/c converters are available. Another design feature that saves you time and money.

COUPLER METHODS

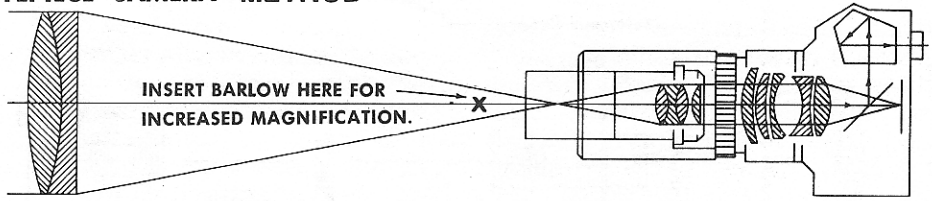
PRIME FOCUS METHOD



1. Available for camera with completely removable lens. Also referred to as mirror or objective projection.
2. Neither eyepiece nor camera lens is used in this method, but a Barlow may be used to increase the size of the image. Here, the coupler is simply attached to the camera body.
3. Advantages in this method are: less investment, shorter exposures, wider field.
4. Additional method that may be employed - negative projection.
5. Receive: Standard Telescope Coupler and Camera Body Coupler plus Instructions.

For Telescope with 24.5mm Eyepiece Holders	For Telescopes with 1¼" Eyepiece Holders
Stock No.	Stock No.
PFM-02	PFM-01

EYEPIECE CAMERA METHOD



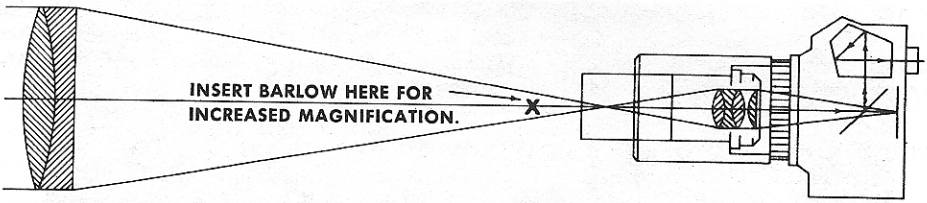
1. Scientifically referred to as afocal. The camera lens need not be removable.
2. In this setup a complete optical train is utilized: Mirror or objective, eyepiece, and camera lens. Here again magnification may be increased by using a Barlow lens.
3. This is the only method one may utilize if their camera lens cannot be removed. It also produces images larger than one can produce with the Prime Focus Method.
4. No vignetting of corners—utilizes entire frame of film.
5. Provides vast range of image magnification—second only to the Eyepiece Projection Method.
6. This method is highly functional for small comets, planets, small lunar features, etc.
7. Image size can be varied by changing the eyepiece, by changing the camera lens (on interchangeable models), and by adding a Barlow.
8. Receive: Deluxe Telescope Coupler and Camera Lens Coupler plus Instructions.

ECM-02	ECM-01

OPTICA b/c, 4100 MacArthur Blvd., Oakland, California 94619 U.S.A.

COUPLER METHODS

EYEPIECE PROJECTION METHOD



1. Also known as positive projection. This method may only be utilized with cameras with completely removeable lens.
2. In this method the eyepiece is used in the coupler and the coupler is attached to the camera body, no camera lens is used.
3. This method offers the greatest potential for image magnification; it can be altered three ways: a. Change the eyepiece, b. use a Barlow lens, and c. add extension tubes (q.v.) between the eyepiece and the camera body.
4. Utilizes full frame of film—no corner cutting (vignetting).
5. This method is necessary for effective work on small objects, such as planetary images, sunspots, transits, etc.
6. Use a zoom eyepiece, and you can set it at the proper effective focal length to "fill the frame" with the subject you are photographing.
7. Additional methods that may be used: A) Prime Focus, B) Negative Projection.
8. Receive: Deluxe Telescope Coupler and Camera Body Coupler plus Instructions.

For Telescope with 24.5mm Eyepiece Holders	For Telescopes with 1¼" Eyepiece Holders
Stock No.	**Stock No.**
EPM-02	**EPM-01**

ALL METHODS

1. Camera must have the completely removable lens feature.
2. Any of the aforementioned optical set-ups may be utilized.
3. The All Methods unit offers complete versatility and magnification; field width can easily be changed in a matter of a few seconds.
4. Receive: Deluxe Telescope Coupler, Camera Body Coupler, and Camera Lens Coupler plus Instructions.

For Telescope with 24.5mm Eyepiece Holders	For Telescopes with 1¼" Eyepiece Holders
Stock No.	**Stock No.**
AM-002	**AM-001**

COMPATIBLE SYSTEMS

The compatibility design technique is utilized by our photo-optical instrumentation engineers. This makes your equipment even more valuable, since it has numerous optical applications. Standardized coupling can save you hundreds of dollars. Only the appropriate coupler, and not a whole system, need be purchased for each different application.

COUPLER, CAMERA TO OPTICA b/c ASTRONOMICAL SPECTROSCOPES ..... **Stock No. CCS-01**

*Camera must have lens. Price applies to all OPTICA b/c Astrophotography Systems which are supplied with a lens. For coupling other cameras, send complete lens information. Non-standard sizes may require additional machining ($7.50 to $11.25 extra). We will quote. Price includes camera supporting bracket and couplers.

COUPLERS, CAMERA TO MICROSCOPE

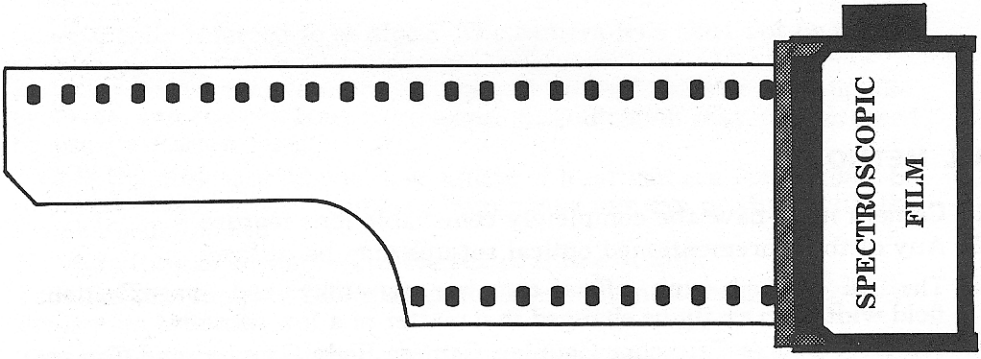
Couple your camera to a microscope. To use the most popular method, eyepiece projection, your camera lens must be removable. If you already own an OPTICA b/c camera body coupler you need only purchase the microscope coupler. The threads are compatible. For those who own a camera without a removable lens, we will be glad to supply quotations; please send complete information on camera and lens.

Coupler, Microscope Standard: fits all OPTICA b/c Laboratory Models and all other brands with microscope tube diameters of 25mm O.D.

Microscope Coupler Only (Camera body coupler not included).
Stock No. CMS-01
Microscope Coupler Including Camera Body Coupler (State complete camera information.)
Stock No. CMS-02

Coupler, Microscope Custom: for tube sizes other than 25mm O.D. We machine to your specific microscope tube diameter. Send specifications.

Custom Coupler Only (Camera body coupler not included).
Stock No. CMC-01
Custom Coupler Including Camera Body Coupler (State complete camera information.)
Stock No. CMC-02

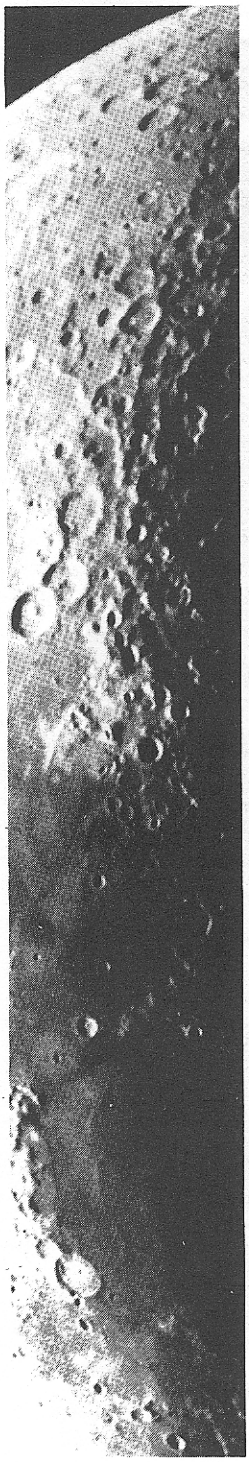


QUESTAR OWNERS — ATTENTION!

Now you can couple your own camera to a Questar and utilize all four methods of astrophotography — prime, eyepiece projection, negative projection, and afocal. All you need is our custom, four part coupler system. The couplers permit use of both Questar eyepieces and the complete selection of OPTICA b/c eyepieces. Our spectroscopes can also be utilized, and you will be delighted to know that you can take advantage of all OPTICA b/c filters for observation and astrophotography. **Questar Coupler System — Stock No. QCS-04**



Star trails cut by satellite. 15 min. exposure through yellow filter. Astrophoto by Merrill D. Martin.



Films and Plates for Astrophotography

35mm FILMS FOR ASTROPHOTOGRAPHY

For the first time OPTICA b/c makes it possible for you to use the very same films the professional astronomer employs. These films are difficult and in most cases, impossible to obtain from regular sources. Our leadership in this field makes it possible for you to purchase in smaller quantities at popular prices.

A polarizing filter increases atmospheric penetration when used with all the following films, black & white or color. For most B & W films, red, orange, yellow, and sometimes green filters also help.

HIGH CONTRAST PAN, Black and White, ASA 64

This film is ultra fine grain and has unusually high resolving power; maximum enlargements are possible. It is recommended for planetary as well as lunar work, particularly of the full moon. In stellar photography it produces good contrast between star and space background. All filters may be used with the exception of infrared and some red filters. 36 exp.

Stock No. HC-135

HIGH CONTRAST PAN, EXTENDED RED, BLACK AND WHITE, ASA 160

Newly released film of superior qualities for low contrast subjects. Very high contrast and extremely fine grain combine to give superb resolving power. Extended red permits use of all filters — even red which cannot be used with the older High Contrast Pan. A companion film to the new High Definition Color Film. Highly recommended for the full moon, planetary photography, photomicrography, etc. 36 exp. **Stock No. HCER-135**

HIGH DEFINITION COLOR FILM, ASA 16

Brand new color reversal film with exceedingly high definition, high contrast, and excellent color saturation. Daylight balanced, estar base. Now you can produce high resolution, extremely fine grain slides as never before. Commercial or home processing. Excellent for Sun, Moon, Planets, wherever increased contrast and resolution are desirable. 36 exp.

Stock No. HDC-135

HIGH SPEED, Black and White, ASA 4000

The combination of this film's high speed and extended red sensitivity, makes it highly desirable for astrophotography. In the main, regular panchromatic films are sensitive in the red region of the spectrum up to about 640nm. This film extends this sensitivity to about 700 nm. Its outstanding advantage is its ability, with minimum exposures, to record extremely faint objects over a wide range of the spectrum. 36 exp. **Stock No. HS-135**

125 feet **Stock No. HS-417-135**

HIGH SPEED COLOR SLIDE, ASA 500

With forced processing one may reach an effective film speed of 1,000. 20 exp. **Stock No. HSCS-135**

INFRARED, High Speed, Black & White

This new, high speed film records "invisible light" out to 900 nm! It is nearly 10x faster than the old infrared film making it possible to record many more celestial objects with far shorter exposures. Faint red stars, Martian surface detail, etc. can be photographed as with no other film! It is also sensitive to visible light, making it superb for atmospheric haze penetration in visible light and pseudo-infrared results with red or orange filters. For true infrared results, use the OPTICA b/c Infrared Filter. Also useful for deep blue, violet and ultraviolet photography with appropriate filters.

Infrared, high speed, 20 exp. . . . . **Stock No. HIE-135**

Infrared, high speed, 150 feet . . . . . **Stock No. HIE 421-135**

OPTICA b/c, 4100 MacArthur Blvd., Oakland, California 94619 U.S.A.

INFRARED COLOR

The results with this film for lunar and planetary work defy description. Even Eastman Kodak is excited with lunar studies accomplished by two OPTICA b/c customers. For normal use we recommend an OPTICA b/c yellow filter, or for increased atmospheric penetration use orange. Actually a complete set of filters can be utilized, each creating a different effect and accentuating different details with clearer definition than obtainable with regular color film, 20 exp. **Stock No. IE-135**

SPECTROSCOPIC FILM, Type 103a, Black & White, 36exp.

Now anyone can purchase these special films in convenient size rolls. Supplied in reusable, snapcap magazines (cassettes) and air-tight cans. Conventional tongue cut for easy loading. Highest volume, deep freeze storage. Price includes airmail shipping for **freshest film. FREE** copyrighted instructions answer questions before you can ask!

	Stock No.
103a-E, 35mm, 36 exposures	**E35-36**
103a-F, 35mm, 36 exposures	**F35-36**
103a-O, 35mm, 36 exposures	**O35-36**
Five Rolls, Any Assortment	**5-35-A**

ULTRA HIGH SPEED, Black & White, ASA 8,000

Until just a few years ago, such a fantastic film speed was considered impossible. Record all stars possible with ASA 4,000 film, plus approximately an additional magnitude, or record the same number of stars with approximately one-half the exposure time (Also see **Chemicals —** MX-857 Developer.) 150 feet **Stock No. UHS-135**

35mm SNAP-CAP MAGAZINES (Cassette)

These magazines make it possible for you to load your own bulk film; reusable **Stock No. SCM-35**

WE SELL **Kodak**

NOW IN 36 exp ROLLS!

SPECTROSCOPIC EMULSIONS FOR PHOTOGRAPHY

SPECTROSCOPIC FILMS, Black and White

Do not be misled by the name; these films are not only used for spectroscopy, but they are among the most popular in the world for regular astrophotography. Browse through any astronomical publication reproducing amateur or professional work and you will consistently find reference to these films. They offer controlled photography in specific regions of the spectrum and are ideal where long exposure times are required, since those emulsions designed for astronomy suffer relatively little reciprocity failure. This means you can photograph more stars and fainter objects than with regular film at the same exposure. Accurate spectral classification of stars also becomes a reality with these films.

DO YOU HAVE $522.90 FOR SPECTROSCOPIC FILM?? IF NOT, READ THIS!

DO YOU WAIT 3-4 MONTHS FOR DELIVERY?? IF SO, READ THIS!

OPTICA b/c now offers the following spectroscopic films in 35mm, 125 ft. rolls as regularly stocked items. Orders are accepted for any quantity — even single rolls — and they are shipped airmail, usually within 24 hours.

103a0 — is preferred for blue-violet photography. Most useful sensitivity ranges from 250nm to 500nm. This film can be made more selective to record blue and violet with the use of these color filters.

Stock No. O-135-125

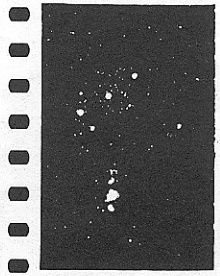
103aF — is panchromatic, making it the most popular, all-around film. It's large sensitivity range (250nm — 690nm) is most useful and relatively uniform between 450nm and 680nm. It may be used with any of the OPTICA b/c band-pass or interference filters with good effectiveness.

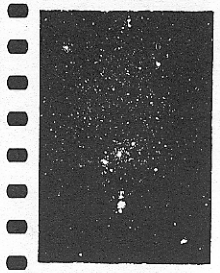
Stock No. F-135-125

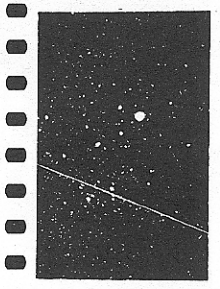
103aE — provides a higher red sensitivity than 103aF. It too is useful in a variety of colors, but OPTICA b/c red filters are usually selected to take advantage of the film's value for red light photography. Peak sensitivity is reached at 650 nm. **Stock No. E-135-125**

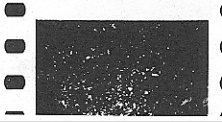












BACKING

Halation is a detrimental effect that results in fog or halos around bright objects in a photograph. In astrophotography this effect is disastrous. OPTICA b/c has researched this problem along with a number of observatories, and the consensus is that the rem jet, antihalation backing is the most effective solution. At OPTICA b/c we are always concerned about quality, so we automatically supply all spectroscopic film with this superior backing at no extra cost.

NOTE: We must adhear to the normal 15 roll minimum order for spectroscopic films other than those listed above. Please allow 2 to 4 months for delivery and, understandably, these orders may not be cancelled.

SPECTROSCOPIC FILM, Type 103a, Black & White, 36exp.

Now anyone can purchase these special films in convenient size rolls. Supplied in reusable, snapcap magazines (cassettes) and air-tight cans. Conventional tongue cut for easy loading. Highest volume, deep freeze storage. Price includes airmail shipping for **freshest film. FREE** copyrighted instructions answer questions before you can ask!

	Stock No.
103a-E, 35mm, 36 exposures	**E35-36**
103a-F, 35mm, 36 exposures	**F35-36**
103a-O, 35mm, 36 exposures	**O35-36**
Five Rolls, Any Assortment	**5-35-A**

SHEET FILM

Kodak Spectroscopic Films Available								
Class	Emulsion Types							
D E	103a	103					V	
F G GH	103a 103a	103				IV		649 649
H alpha N		103	I			IV		
O Z	103a	103	I I	11a	III			649

PLATES

Kodak Spectroscopic Plates Available											
Class	Emulsion Types										
D E	103a 103a		I	Ia	IIa						
F G	103a 103a	103	I		II II	IIa	III		IV	V	649
J								IIIa			
N O	103a	103	I I	Ia	II	IIa	III		IV		649
Z			I								

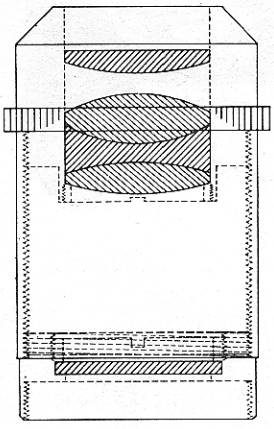
For additional emulsion types and sizes available, see current Astrophotography Catalog Price Sheet.

OPTICA b/c, 4100 MacArthur Blvd., Oakland, California 94619 U.S.A.

Filters For Observation and Astrophotography

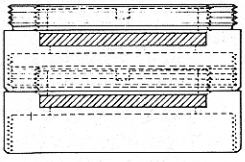
WHAT OPTICA b/c FILTERS DO FOR YOU

Join over a million filter users around the world—eliminate glare—penetrate the atmosphere—increase contrast—resolve finer detail—produce better astrophotographs. Both amateurs and professionals use and highly recommend them.



NEW! "Piggyback" FILTER HOLDERS

OPTCIA b/c does it again! Our filter holders are all new, better, and more functional. Each optical glass, plane-parallel filter is supplied in a "Piggyback" holder made of machined and threaded, black anodized aluminum. These holders are designed to screw into the eyepiece tube. Another feature that makes the holders unique is that they screw into each other. Using these filters in combination increases their value tremendously by combining the special effects of more than one filter at a time.



FILTERS AVAILABLE

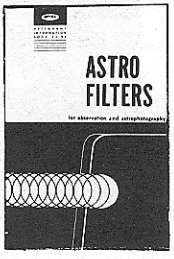
Colors	Neutral Density	Special	Types & Formats
Violet	80%	Polarizing	Bandpass
Blue	40%	Infrared	(light, medium
Green	20%	Ultraviolet	and dark)
Yellow	10%	Sun	Interference
Orange	1.0%	Moon	Glass
Red	0.1%		Gelatin
	0.01%		Laminated

For description and price information on all filters, see current Astrophotography Catalog Price Sheet.

ASTROFILTERS FOR OBSERVATION & ASTROPHOTOGRAPHY

The most comprehensive coverage of the subject available. The Why and How, Celestial objects listed, recommended filters for each. Easy to understand. Illustrated: Diagrams, Charts and Photographs.

HIGHLY RECOMMENDED ! ..... **Stock No. PA-002**



NOTE: For additional information on the filters listed, see ATM and TELESCOPES & ACCESSORIES Catalogues.

See Also: System, Variable Density Polarizing

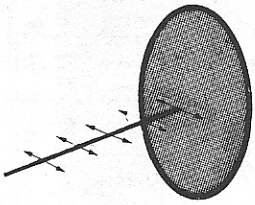
QUESTAR OWNERS CAN NOW USE OPTICA b/c FILTERS

What do you need? One, three piece, custom converter. The assembly increases observational potential of your instrument by permitting you to use our filters with Questar eyepieces. **An extra bonus:** You can also use all OPTICA b/c eyepieces, spectroscopes, etc. . . . a whole host of valuable accessories - **For 1¼".***

Questar Filter Converter — Stock No. QFC-03

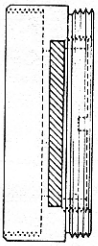
*Note: When ordering any OPTICA b/c Astrophotography Method for Questar or the Questar Coupler System, it is not necessary to purchase this Filter Converter, since it is included in the other two products.

OPTICA b/c Filters

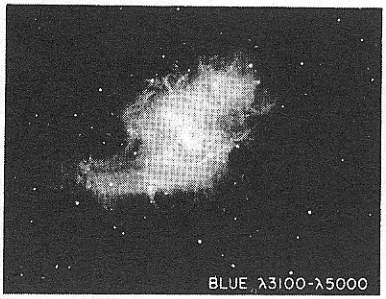


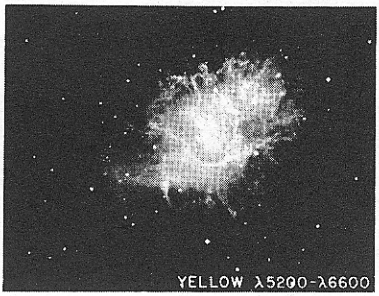
Before you purchase any filter, **ask these questions:**

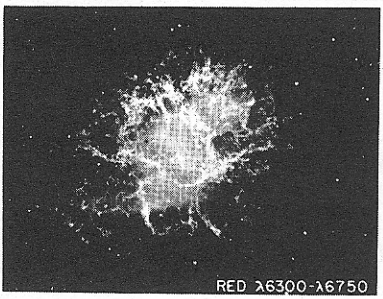
1. Is there 24 years of filter experience and development behind the product?
2. Was each filter researched by astronomy instructors and photo-optical instrumentation engineers and then tested by professional astronomers at leading observatories in several countries.
3. Do professionals as well as knowledgeable amateurs around the world use and recommend them?
4. Are the optical glass, color, band-pass filters:
   A. Dyed in the mass, plane parallel and anti-reflection coated?
   B. Are they available in a complete selection of the basic colors with each one available in light, medium and dark transmissions to fulfill the requirements of different apertures or different magnifications with the same aperture?
   C. Are they of sufficiently high quality not to destroy resolving power, even when used in combination?
   D. Can they be utilized with a wide variety of desirable accessories such as the Variable Density Polarizing System, Astrophotography adapters, Solar Observation System, etc.?
   E. Can they be effectively combined with: Interference, N.D. and Polarizing Filters?
5. Is there a detailed book published, which is devoted exclusively to the use of these filters?
6. Are instructions included when filters are purchased?
7. Considering the quality and functionality, are they the most reasonably priced?
8. Does a Sales/Service Division, staffed by experts, stand ready to advise you relative to unusual uses, such as which filters can be utilized to combat the problems caused by specific city lights, or other problems?

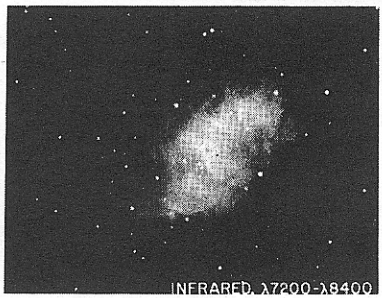


If the answer to all these questions is yes, the brand name is OPTICA b/c!









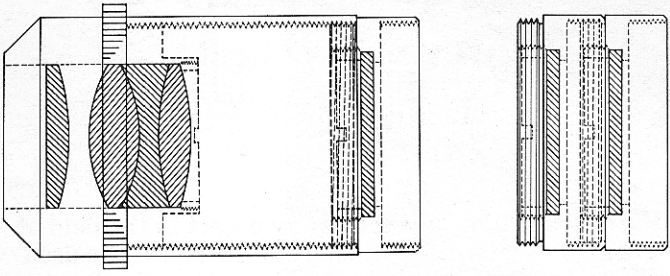
Crab Nebula in Taurus — an excellent example of much hidden detail revealed by filters. Mount Wilson and Palomar Observatories.

OPTICA b/c, 4100 MacArthur Blvd., Oakland, California 94619 U.S.A.

NEW! "Piggyback" FILTER HOLDERS

OPTICA b/c

FILTERS



FILTERS: The Astronomer's "Green" Thumb!

Astrophotography without filters is like food without seasoning! Filters are so vital because of their ability to enhance and diversify both visual and photographic observations that only those who have never used filters will be satisfied without them.

COLOR FILTERS

OPTICA b/c color bandpass filters come in Violet, Blue, Green, Yellow, Orange, and Red in any of three relative density levels—Light, Medium, and Dark. A complete set of these filters will equip the astrophotographer to improve his photographs of virtually every subject. Color filters provide increased contrast, specific color intensification, resolution of finer details, a reduction in background sky fog, etc. Though all three density sets may be used for astrophotography, the "Dark" set is by far the best, for these filters provide the sharpest cutting characteristics and the most contrast for revealing delicate hues. The Dark Red, Green, and Blue filters are so perfectly balanced that they may also be used for Tricolor Separation techniques.

For detailed applications of specific filters, reference should be made to the book listed at the end of this section. But just to get you started, try photographing Jupiter through a blue or green filter, and you will be amazed at the striking increase in cloud belt and Red Spot detail. Or, use a green filter to accentuate the polar caps or a red to enhance the maria on Mars. In many cases, each filter will reveal a different aspect of the object, allowing you to make detailed and diversified observations. The following table lists some popular objects on which the indicated filters have important effects:

GUIDE TO FILTER SELECTION

VIOLET — Sun — Venus, details — Jupiter, cloud contrast — Nebulae — Comets, etc.

BLUE — Jupiter, Red Spot, Bands—Mars, Atmosphere, Deserts—Venus, Markings—Pseudo Ultraviolet—Sun, etc.

GREEN — Jupiter—Mars, Polar Cap, Seasonal changes—Moon—Venus—Sun, etc.

YELLOW — Jupiter—Saturn—Increase contrast—Haze penetration—Sun—Moon, etc.

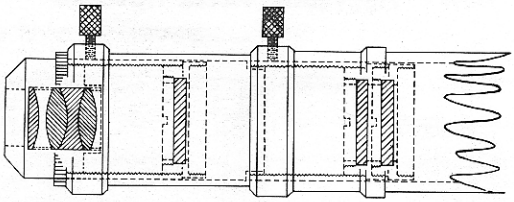
ORANGE — Mars, Maria, Seasonal changes, Canals—Sun—Moon—Haze penetration, etc.

RED — Mars, Melt Band, Atmosphere, Polar Cap, Maria—Jupiter, bands—Saturn, Rings—Comets—Sun—Moon—Occultations—dark-sky effect—Meteors—Stars, Faint Red, Color Temperature—Pseudo Infrared—Nebulae—Satellites—Star trails.

The preceding guide represents only a few of the popular uses of OPTICA b/c filters. For Solar work, use color filters in combination with a Solar Observation System.

OPTICA b/c

FILTERS



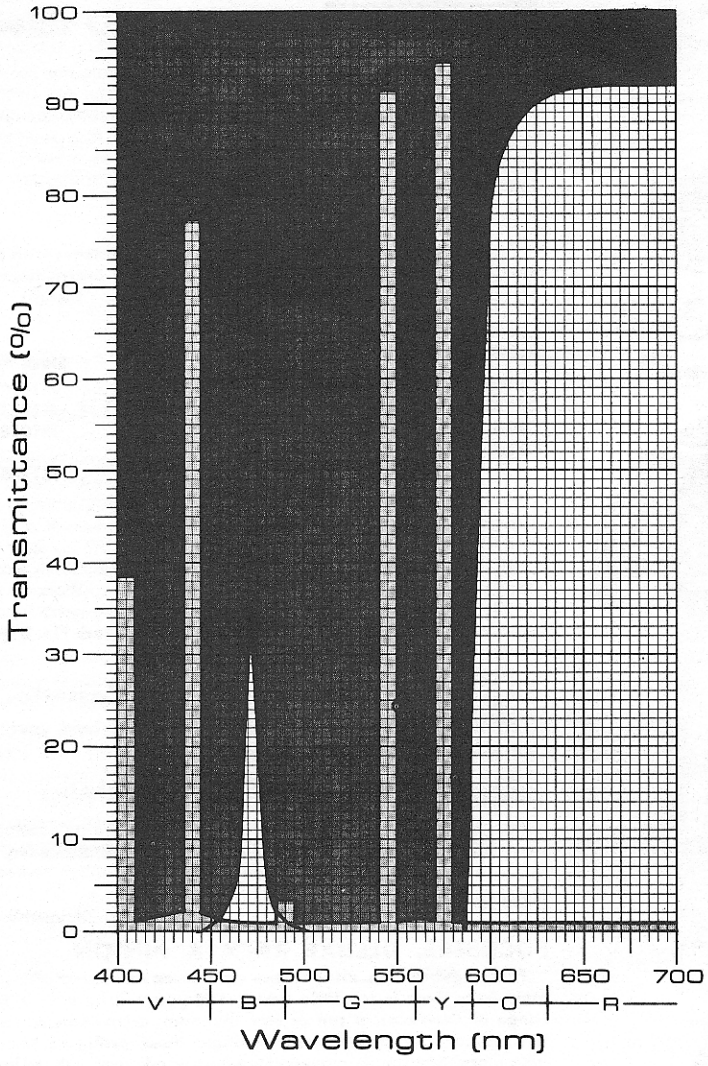
NON-COLORED FILTERS

Color filters change the overall color balance of any object in the field of view, but if this must be avoided, then a different type of filter must be used. Neutral density filters of the highest quality uniformly reduce the brightness of an object without changing its color. The Polarizing filter likewise produces a neutral density effect but also adds some selective brightness control, glare control, increased color saturation, etc. The Variable Density Polarizing System provides all the advantages of the Polarizing filter plus a continuous, variable density **color** system when one of the color band-pass filters is added to it. If you wish to view or photograph the sun through your telescope, the safest, economical method we know of is the Solar Observation System. It safely eliminates tremendous quantities of unwanted heat from the telescope, reduces undesirable UV and IR radiation, and decreases the light to a comfortable intensity. Filters also enable the astrophotographer to embark into the world of the invisible—the ultraviolet and infrared sections of the spectrum. Though invisible to the human eye, by using filters radiation in these wavelengths can be captured on film to produce fascinating and instructive photographs.

SPECIAL ADVANTAGES

Filters provide special advantages which are often the simplest, most economical answers to serious problems. **Double Stars**: Would you believe that a simple, high efficiency, OPTICA b/c Polarizing filter can make a world of difference in splitting close double stars? This has been attested by many of our customers. **Irradiation:** The solution for the perplexing difficulty of irradiation can be complicated until you simply add the appropriate neutral density filter or V.D.P.S. **Sky Brightness:** Sky fogging is a recurring plague of the astrophotographer, but a polarizing filter, or proper color filter will help to reduce or even eliminate it. **City Lights**: Have you ever threatened to use a BB gun on those troublesome city street lights? Well, we can't sell you a gun, but we have something almost as good, and it won't incur your neighbor's wrath. By knowing what kind of street lights you have in your area, you can select a filter which blocks the wavelengths the lights emit. Presto! You have created a window to peer right by the problematical light without difficulty.

We cannot overemphasize the importance of filters and their use in all types of visual and photographic observations. The full potential of any telescope simply cannot be realized without them. For extended information concerning the "why" and "how" of filter use, consult the book **FILTERS FOR OBSERVATION AND ASTROPHOTOGRAPHY, Second Edition.** OPTICA b/c offers the largest selection ever of quality astronomical filters for the growing demand by thousands of satisfied users.



The transmission curves of the medium red band-pass filter and the blue interference filter are shown overlaid against the emission spectrum of a typical clear mercury city light. The dark shaded area denotes visible radiation not transmitted by the filters. The light shaded area indicates the emission spectrum of the mercury light. The clear area represents the radiation transmitted by the two filters. Notice that either filter eliminates the most detrimental emissions from the light.

This graph is taken from the book **Astro Filters For Observation and Astrophotography, 2nd Edition,** available from OPTICA b/c.

Miscellaneous



Cable Release

For vibrationless astrophotos, metal clad, 10" long, locking type for time exposures. **Stock No. CR-010.**



Cases

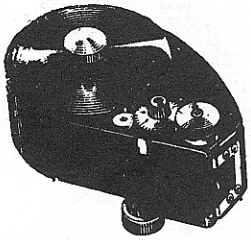
ACCESSORY CASE

Protect accessories against shock, dust, and scratches with an OPTICA b/c molded, lightweight attache case. It's easy and inexpensive—outline items on foam pad and cut out with knife. **Stock No. CA-001**



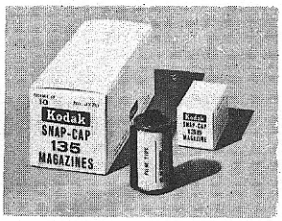
Cleaning Supplies

	Stock No.
OPTICAL CLEANING FLUID (FOR LENSES).....	M1029
OPTICAL CLEANING BRUSH	M1027
OPTICAL CLEANING TISSUE, Packet 4"x6".....	M1028
OPTICAL CLEANING DETERGENT (FOR MIRRORS, etc.).....	M1100



DAYLIGHT BULK FILM LOADER

SAVE $$$$. Buy your film in bulk and load your own cassettes in broad daylight! It's easy! It's fun! Professional type, Watson loader. Scratch proof: nothing to touch film while loading. Automatic frame counter. Accepts all 35mm cartridges. 100 foot capacity. **Stock No. DBFL-1.**



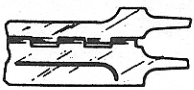
35mm SNAP-CAP MAGAZINES (Cassettes)

These cartridges or magazines allow you to load your own bulk film; reusable. **Stock No. SCM-35**

35mm Tongue Cutting Template

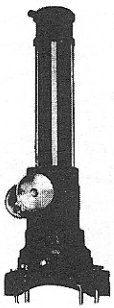
For those who load their own 35mm film. Cut a professional looking, no tear, leader tongue with this sturdy metal template. **Stock No. . . TCT-35**

Focusers



FOCUSERS, DELUXE RACK & PINION

Focusing travel is vital to the proper operation of the telescope. With most units there is too little travel, and you will be unable to utilize a full range of eyepieces, a sun or star diagonal, astro-camera, etc. The OPTICA b/c deluxe rack and pinions eliminate these problems because they provide more than ample movement. All have microsmooth (helical type) gears, adjusting screws for tension control, a knurled set-screw to lock the eyepiece, and 360° rotatable base for adjusting to any position. Black wrinkle finish, chrome focusing tube, and satin black, standard length eyepiece holder. When ordering, specify for: refractor, reflector, catadioptric, or cassegrainian-type telescope.



Height Above Tube		Focusing	
Minimum	Maximum	Travel	Stock No.
4 11/16"	7 13/16"	3⅛"	RP-062
5½"	10 3/16"	4 11/16"	RP-082

Another advantage of these focusers is that the eyepiece holder screws into the chrome tube, making it possible to purchase three additional holders (1¼" shorty, 24.5mm standard, or 24.5mm shorty) for European size eyepieces and other accessories.

IT'S NEW: Another interesting and highly functional item is the new camera bracket that clamps directly onto the OPTICA b/c rack and pinion, eliminating the need for drilling holes in your tube.

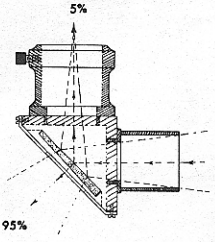
OPTICA b/c, 4100 MacArthur Blvd., Oakland, California 94619 U.S.A.

System, Solar Observation



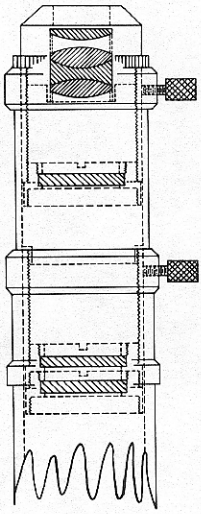
Avoid the problems encountered with many methods of observing the sun. Eliminate serious eye and equipment damage — 95% of the heat and light is ejected by the sun diagonal. The supplied filters produce seven different levels of transmission for the just right image intensity. Resolving power is retained. System accepts OPTICA b/c: filters, Variable Density Polarizing System, Astrophotography Systems, etc.

	For 24.5mm eyepiece tubes	For 1¼" eyepiece tubes
	Stock No.	Stock No.
Solar Observation System	SOSO-2	SOSO-1



System, Variable Density Polarizing

A unique system that improves many aspects of astrophotography. Increases contrast, color saturation, atmospheric penetration and dark sky effect. In addition by simply turning your eyepiece you have a continuous control of intensity with reduction to more than 380 times. This system can be combined with OPTICA b/c filters, astrophotography systems, diagonals etc. System include: Unity Adapter, two special high efficiency polarizing filters and instructions. A large number of outstanding astronomers around the world recommend its use.

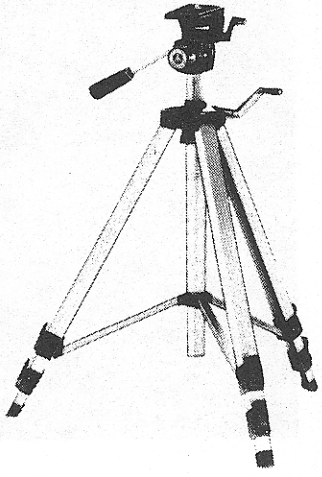


Charles F. Capen, internationally known planetary astronomer, currently at the Planetary Research Center of Lowell Observatory, has thoroughly tested the OPTICA b/c Variable Density Polarizing System and found that the filters appear colorless and function surprisingly well. Capen states, "There does not seem to be any visual problem when using this system with color filters. The system improves definition of low contrast details on Mars and I found its use a necessity when observing the bright disk during Great Yellow Storm of 1971. It also helps to control one of the greatest problems in observational planetary astronomy - Irradiation! I will highly recommend this system's use by all interested persons."

Polarizing System Complete, 24.5mm **VDPS-2**

Polarizing System Complete, 1¼" **VDPS-1**

Tripods

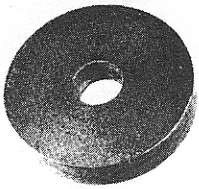


DELUXE TRIPOD for the support of: spotting and small catadioptic telescopes, cameras, binoculars and camera bracket systems; fitted with threaded tripod socket. Made of hi-strength aluminum alloy, fully adjustable pan head and three-section legs. Telescoped 25"; with geared elevator, extendable to 5' 6". The geared elevator is reversible, making it possible to support equipment from zero to 24" from the ground, providing comfort when in a prone, sitting, or kneeling position. Weight 3.1 lbs.

Stock No. TC-330

HEAVY DUTY TRIPOD incorporates all the outstanding features of No. TC-330 with these additions: extends to 6' 8", telescoped 30", supports up to 15 lbs. and holds securely. Weight 7½ lbs.

Stock No. TC-43D

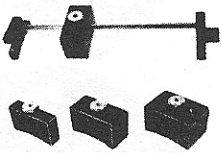


Weights

WEIGHTS, DECLINATION AXIS

Machined, setscrew lock, black crinkle finish. Fit standard 1" shaft. We bore to your specific shaft diameter free.

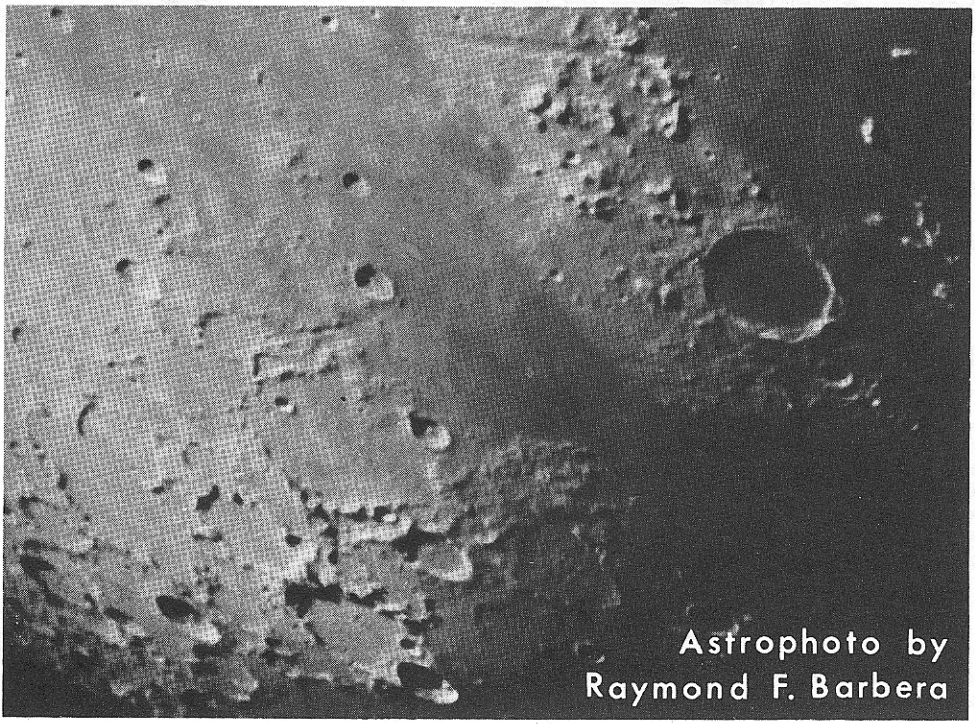
Weight	Stock No.
2 lb.	WDA-02
5 lb.	WDA-05
15 lb.	WDA-15



WEIGHTS, TELESCOPE TUBE

Versatile tube counterweight system to meet your changing requirements. If you add a camera or spectroscope, for instance, you need to rebalance your tube. Assembly includes 2 brackets, rod, nuts, and screws—ready to attach. You select the weight you want to meet your individual requirements. Brackets are machined to standard aluminum tube sizes (5", 7", 10" O.D.) and all OPTICA b/c fiberglass tube sizes. (Brackets may be machined for any other diameter tube upon request for $7.50 machining charge.) Specify tube diameter when ordering.

	Stock No.
BRACKET ASSEMBLY (less weight)	
with 12" rod	WTTA-0
with 18" rod	WTTA-1
with 24" rod	WTTA-2
1 lb. weight	WTT-01
2 lb. weight	WTT-02
3 lb. weight	WTT-03



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A-74-26

Processing Equipment



DEVELOP YOUR OWN BLACK-AND-WHITE AND COLOR SLIDE FILM

There are many good reasons for developing your own film. First of all it's easy, fun and economical. No darkroom is needed. You can also produce higher quality results than commercial labs plus develop spectroscopic and other special films for astrophotography for which commercial labs offer no processing service. For the experimenter, special techniques can be utilized to increase effective film speed, contrast, etc. On test exposures it is a good idea to know that your negatives are properly exposed within ten to twenty minutes; the alternative would be to wait one to seven days. Test exposures may be made well in advance of an event like an occultation to determine proper exposure. Then you are ready to record that event which may occur only once in a lifetime. Isn't this the best kind of insurance?

FILM DEVELOPING OUTFIT



Complete: Develop your own films without a darkroom. Includes: **Film Developing Tank and Reel, Darkroom Graduate, Changing Bag, Thermometer. Chemicals:** Developers: D-76, D-19 and Dk-50 (one gal. each) and Fixer (one gal.); also included: Hypo Clearing Agent and wetting agent. **Publications:** "How to Develop and Print Black-and-White Films" and "Basic Developing, Printing, Enlarging." To develop color slides, only the color chemicals need be added; see "Color Film Processing Kits."

Stock No. KFDO-O

TANK, DAYLIGHT DEVELOPING

This tank simplifies development of both black-and-white and color roll film. When this tank is loaded it acts as a light-tight darkroom, so that film may be developed even in bright daylight. The reel can be adjusted to accommodate film sizes from 35mm to 616. Its self-threading feature makes film loading quick and easy. A darkroom thermometer is supplied free with each tank.

Stock No. TDD-01

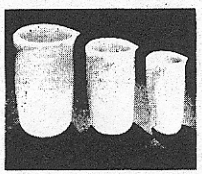


BAGS, CHANGING

Heavy duty, double-bagged, double-zippered for changing and loading film without a darkroom. Construction of light-proof material permits loading of film into a daylight tank, loading bulk film into cassettes or changing sheet film or plate holders. Take your "portable darkroom" anywhere; develop on location, 27" x 29".

Stock No. BCOO-1

GRADUATES, DARKROOM — Light



shatterproof polyethylene. Splashproof edge and dripless lip. Clearly marked cc graduations on one side, oz graduations on the other.

8-ounce	**Stock No. GD-008**
16-ounce	**Stock No. GD-016**
32-ounce	**Stock No. GD-032**



IMPROVE YOUR ASTROPHOTOGRAPHS

Unquestionably superior astrophotographs are produced by using filters. Proper filtration can heighten contrast, cut through haze and increase sharpness and detail. Improvement is remarkable; OPTICA b/c offers the largest filter selection specifically designed for astronomical observation and photography.

For faster service, include: item description, Stock No. and price.

OPTICA b/c, 4100 MacArthur Blvd., Oakland, California 94619 U.S.A.

Chemicals

MX-857 DEVELOPER

HOT STUFF!! Process our Ultra High Speed Film yourself with this incredible, new developer for only 3 minutes at 100°F and achieve an effective ASA rating of 8000! Also excellent for slower speeds down to 800 ASA, but this is **the only developer** that provides maximum speed and contrast.

Stock No. MX-857. . . . Makes one gallon

COLOR FILM DEVELOPING OUTFIT

Just what you need to develop our High Speed Color Slide film (ASA 500). Suffcient chemicals (1 pint quantities) for 4-5 35mm, 20 exposure rolls.

Stock No. CFDO-1

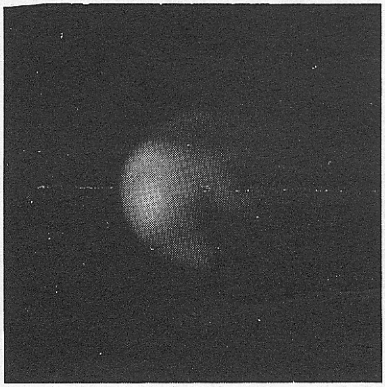
D-19 FOR SPECTROSCOPIC 103a FILM



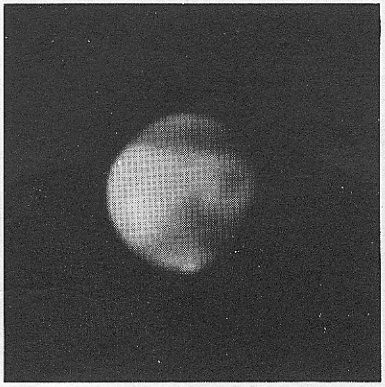
The most universally recommended developer for Spectroscopic 103a films. High developing capacity, rapid, clean-working, yields high contrast negatives. Especially valuable for scientific applications.

To Make 1 gal. ..... **Stock No. D-19-1**
To Make 5 gal. ..... **Stock No. D-19-5**

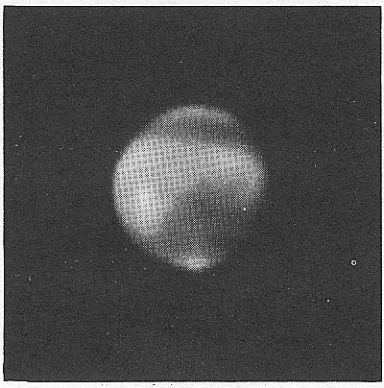
For complete selection of additional chemicals, see the current Astrophotography Catalog Price Sheet.



red light



green light



blue light

This illustration is taken from the book **Astro Filters for Observation and Astrophotography, 2nd Edition,** available from OPTICA b/c.

Publications, Astrophotography

APPLIED INFRARED PHOTOGRAPHY, 88 pp
A technical, highly-informative publication. Demonstrates usefulness of infrared photography in multitude of areas. Includes technical film data, etc. 8½" X 11" **Stock No. PA-001**

ASTROFILTERS FOR OBSERVATION & ASTROPHOTOGRAPHY 102pp
New, greatly expanded Second Edition, written by experts: Steeg, Capen, Carvalho, and Barbera. This publication is written in terms the amateur will understand and is the most compresive on the subject. Professionals and amateurs alike use and recommend filters, and you too will marvel at the increase in detail visible with proper filters. This guide rigorously covers the why and how of filters and helps you select the proper one for your telescope needs. Contents include: controlling object intensity, reducing fogging, eliminate glare, penetrate the atmosphere, improve the dark sky effect, resolve more double stars, observe in restricted areas of the spectrum, eliminate irradiation, reduce the detrimental effects of chromatic aberration, counteract city lights, plus a wealth of other practical information. Contains solid reference data and is profusely illustrated with photos, diagrams, and filter curve charts. You'll prize this valuable book — a must for every amateur. **Stock No. PA-002**

ASTRONOMICAL PHOTOGRAPHY AT THE TELESCOPE, Rackham, 280pp 58 illustrations
In this new, updated, 3rd edition Dr. Rackham has produced the most complete book ever written for the amateur astrophotographer. The Photographic Journal states: "Recommended to all amateur astronomers who are considering venturing into photography." **Stock No. PA-003**

ASTROPHOTOGRAPHY, INFORMATION PAMPHLETS, 44pp
"Adapter Systems," "Solar Eclipse," "Astrofilters," "Lunar Eclipse," "Astrophotography" **Stock No. PA-004**

COLOR FILMS, 40 pp
Valuable data on color films; processing, filters, storage and care, etc. ..... **Stock No. PA-005**

FILMS FOR THE AMATEUR
(Color and Black & White), 64 pp
Brand new edition, easy to read format. Now, both color and black & white film data in one volume. **Stock No. PA-006**

FILTERS FOR BLACK & WHITE AND COLOR PICTURES, 44 pp
A helpful guide to filters in all areas of photography; includes polascreens; basic theories used and explained **Stock No. PA-007**

FILTERS FOR SCIENTIFIC AND TECHNICAL USE, 88 pp
Complete data guide to technical filter usage; covers Photometry, Microscopy, Color Photography, Absorption Curves; indispensable for the discerning amateur. 8½" X 11" **Stock No. PA-008**

Also see the "Publications and AVA Catalog" which lists over 300 astronomical books, maps, charts, etc.

INFRARED FILMS, 16 pp. 8½ x 11"
Brief discussions of the most often asked questions about infrared photography. Includes detailed descriptions of infrared-sensitive films — both black & white and color. New technical data; an excellent source book. **Stock No. PA-009**

OUTER SPACE PHOTOGRAPHY FOR THE AMATEUR, Paul
Fast becoming a classic in the field, new revised edition, a must for every amateur astrophotographer; non-techincal language, over 131 superb photos produced by amateurs. **Stock No. PA-010**

PHOTOGRAPHY THROUGH MONOCULARS, BINOCULARS AND TELESCOPES, 128 pp
Multiply the usefulness of your camera; Exciting possibilities are examined in detail, covers all kinds of cameras, film, filters, etc.; special chapter on Astronomical photography. **Stock No. PA-011**

PLATES AND FILMS FOR SCIENCE AND INDUSTRY, 42 pp
An absolute must for the serious astrophotographer; complete data on Sensitometry, Spectral Sensitivity, Processing, Filters. **Stock No. PA-012**

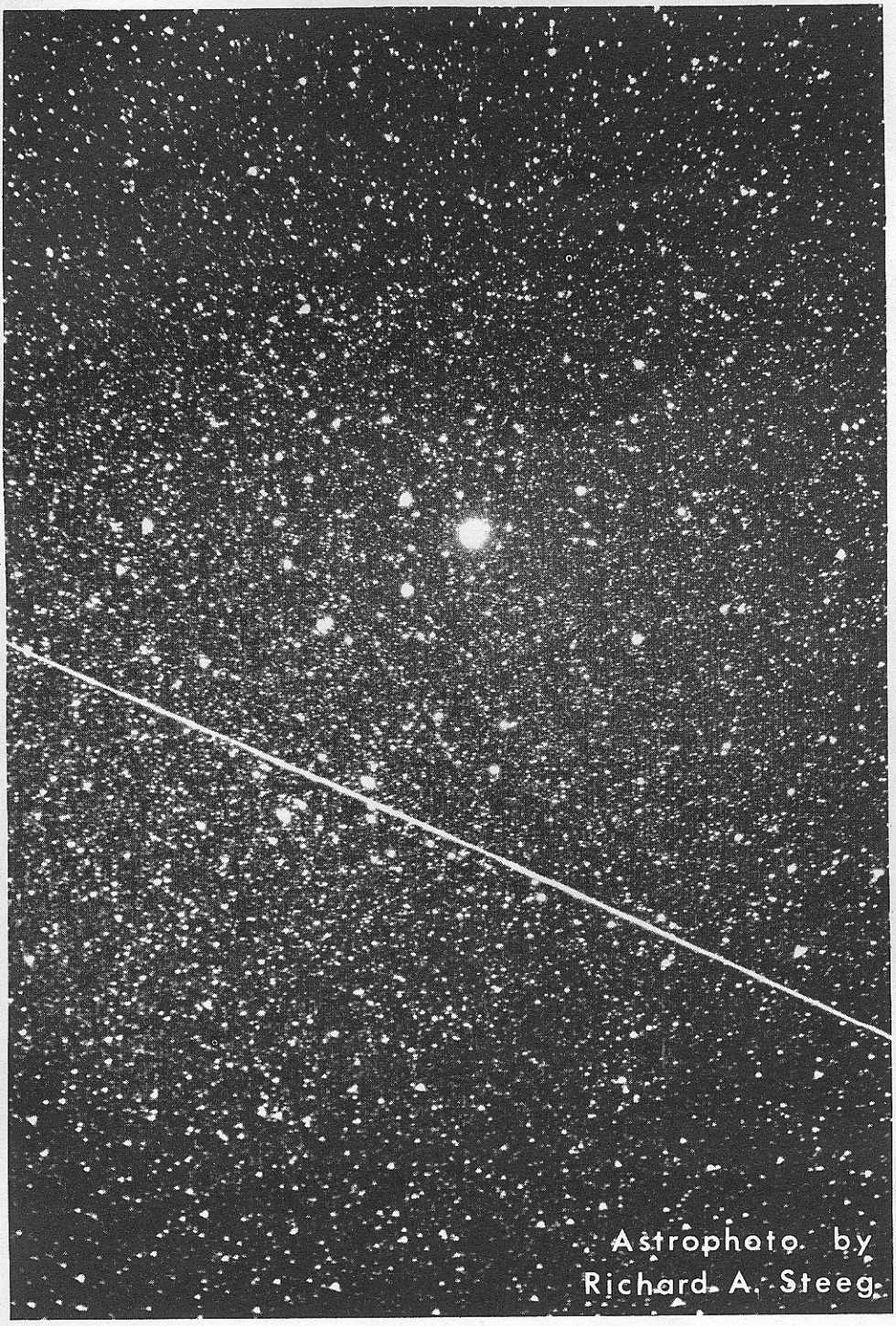
PROFESSIONAL BLACK & WHITE FILMS 8½" X 11"
32 full size pages jam-packed with important information, tips, exposure guides, processing data, curves, etc. on many of the popular B & W films for astrophotography. A very worthwhile aid for the discerning photographer. **Stock No. PA-013**

SKYSHOOTING, Mayall, 174 pp
Excellent source-book on amateur astrophotography; covers all major areas; jammed with photos and information on telescopes, cameras, mounts, lenses, darkroom techniques, films, plates, record-keeping, etc. **Stock No. PA-014**

SPECTROSCOPIC FILM — 103a-?
Written expressly for the Spectroscopic 103a-E, 103a-F and 103a-O emulsions supplied by OPTICA b/c. Jam-packed with useful data, sensitivity graph, filter charts, processing information and a question/answer section. **Even includes ASA speed information available nowhere else!**
6 pp ..... **Stock No. PA-015**

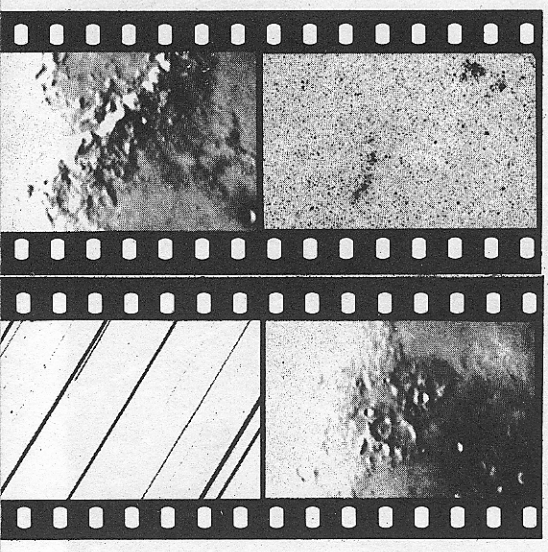
STARGAZING WITH TELESCOPE AND CAMERA, Keene, 128 pp
Designed to stimulate everyone's interest in observation and astrophotography. Helpful hints to beginners as well as experienced amateurs. Offers suggestions on equipment, manufacturers, etc. **Stock No. PA-016**

ULTRAVIOLET & FLUORESCENCE PHOTOGRAPHY, 32 pp
A detailed introduction to both areas of photography. Specific techniques and applications are illustrated for both. A useful Appendix is included for further research. 8½" X 11" **Stock No. PA-017**



OPTICA b/c, 4100 MacArthur Blvd., Oakland, California 94619 U.S.A.

A-74-30



OPTICAL EQUIPMENT AND SUPPLIES SINCE 1939

OPTICA b%

ASTROPHOTOGRAPHY CATALOGUE NO. A-74 PRICE LIST

#A-74-C -- EFFECTIVE APRIL 1975

PAGE No.	STOCK No.	PRICE	PRICE (24.5mm)	PRICE (1 1/4")
3	APS1-2		Discontinued	
	APS1-1			Discontinued
	APS2-2		145.90	
	APS2-1			146.90
	APS3-2		215.75	
	APS3-1			219.75
	APS4-2		386.55	
	APS4-1			389.55
	APS5-2		498.10	
	APS5-1			501.10
5	CQC-01			Discontinued
7	BATM-1	$19.50	Without sun screen	
	BARP-1	22.50	For machining larger (not smaller) than 2 3/8" up to 2 7/8" add $9.95	
	BATC-4	46.95		
	BATC-6	49.95		
8	BA-060	36.70		
	ABL-60	Discontinued		
	AP-506	Discontinued		
9	TEA-14	4.95 (3/8" extension, not 1/4")		
	TEA-10	11.50		
	TEA-20	12.50		
	TEA-30	13.50		
10	CCL-02		4.50*	
	CCL-01			4.50*
	CCB-02		7.95**	
	CCB-01			7.95**
	CST-02		7.95	
	CST-01			8.95
	CDT-02		26.95	
	CDT-01			29.95
11	PFM-02		15.90**	
	PFM-01			16.90**
	ECM-02		31.45*	
	ECM-01			34.45*
12	EPM-02		34.90**	
	EPM-01			37.90**
	AM-002		39.40**	
	AM-001			42.40**
13	CCS-01	46.20*		
	CMS-01	24.95		
	CMS-02	32.90**		
	CMC-01	39.95		
	CMC-02	47.90**		
	QCS-04			Discontinued

*See Price Variations - Next Page
** " " " " "
** " " " " "

*PRICE VARIATIONS - CAMERA LENS COUPLERS

To save our customers money we have balanced each method to the most popular camera lens sizes available today. When extra machining is required for smaller or larger sizes, there is an additional charge as follows: smaller-$7.50; larger-$9.75; extra large-$11.25. These prices are applicable to the Eyepiece Camera Method and the All Methods Unit only. The exceptions are rare, and should your camera fall into one of these categories, you will have the option of sending the additional amount or receiving a total refund.

**PRICE VARIATIONS - CAMERA BODY COUPLERS

The prices as listed for each method are applicable to the vast majority of cameras in use today, such as the following: Argus Cosina STL, Cavalier, Contax D, DA & S, Exa, Exakta, Fujica, Fujicarex, GAF L-47, Hanimex Nova 1B, Hexcon, Kalimar, Mamiya, Mamiya CWP, Mamiya Sekor 500 TL, 500 DTL, 1000 DTL, Minolta SR all models, Minolta SRT-100, SRT-101, SRT-102, Mirax, Olympus FTL, Pentacon, Penta, Pentaflex Pentax, Petri Penta, Praktica, Praktiflex, Ricoh Singlex TLS, Topcon Super D, Topcon Super D 100, Tower 32 B, Yashica Pentamatic, all models, Yashica TL-Super, Zenit B&E. This is a partial list of the cameras adaptable at the regular price.

There are some exceptions due to the complexity and/or size of the camera body couplers necessitating a price adjustment. Add to the listed price of the Prime Focus Method, the Eyepiece Projection Method, and the All Methods Unit as follows:

ADD $5.00: Argus SLR, Canon (Rangefinder Screw-mount), Konica Auto Reflex, Konica F, FP, & FS, Leica (Rangefinder Screw-mount), Miranda (all models), Nikon F, FT, Nikkorex, Nikkormat, Petri FT, Petriflex V, VI, Sears TLS, Sears SL II, Soligor 66 2 1/4 x 2 1/4, Yashica Pentamatic.

ADD $10.80: Alpa, "C" Mount 16mm, Canonflex (all Models), Canon FX, TL, QL, & Pellix, Contarex, Edixa Reflex, Leicaflex, Mamiya/Sekor, Olympus Pen F, Olympus OM-One, Praktina.

ADD $23.50: Icarex, Miranda Sensorex, Retina (Kodak)

ADD $49.95: Hasselblad, Pentacon Six, Rolleiflex SL-66

ADD $59.95: Bronica

NOTE: After reading these paragraphs on "Price Variations", if the astrophotography coupler method you wish to purchase costs more than the price listed with the stock number, add the appropriate amount.

PRICE EXAMPLE

1. For Instance: You own a Minolta SR with a 45mm, f/2.8 Rokkor lens. The listed price would be applicable as all criteria are average; there would be no extra charge.

2. For Instance: Your camera is a Nikkorex Auto 35 with a 48mm f/2 lens. The lens coupler is standard, and therefore there would be no extra charge for the Eyepiece Camera Method. However, the body coupler is more complicated than normal, and you would add $5.00 to the price of the Prime Focus Method, the Eyepiece Projection Method or the All Methods Unit.

So that we may serve you more efficiently, please include all pertinent information: Camera make and model, lens manufacturer, lens name, focal length and maximum lens opening (smallest f/stop number).

PAGE No.	STOCK No.	PRICE
15	HC-135	$1.70
	HCER-135	1.65
	HDC-135	4.45
	HS-135	2.05
	HS-417-135	18.30
	HSCS-135	3.65
	HIE-135	1.50
	HIE-421-135	18.55
16	IE-135	3.20
	E35-36	6.95Ø
	F35-36	6.95Ø
	035-36	6.95Ø
	5-35-A	27.80Ø
	UHS -135	22.25
	SCM-35	.35 each
		10 for $3.00

Ø Includes AIRMAIL for U.S.A.

PAGE NO.	STOCK NO.	PRICE
	O-135-125	50.43Ø
	F-135-125	50.43Ø
	E-135-125	50.43Ø
17	E35-36	6.95Ø
	F35-36	6.95Ø
	O35-36	6.95Ø
	5-35-A	27.80Ø

Ø Includes AIRMAIL for U.S.A.

PAGE NO.	STOCK NO.	PRICE
18-22	For complete information and prices on the OPTICA b/c filters available, consult the current Telescopes and Accessories Catalog & Price List.	

SHEET FILM (25 SHEETS PER PKG)	ASA	4x5"
High Speed Infrared		6.93
Plus X Pan	125	5.56
Royal Pan	400	5.56
Royal X Pan	1250	6.93
Super XX	200	5.56
Tri-X Ortho	320	5.56
Tri-X Pan	320	5.56
High Definition Color	16	26.13
Spectroscopic Film (Min. Order--72 pkgs)		24.36

PLATES	ASA	4x5"
Tri-X Pan, Type B 36 plates/pkg. Minimum: 12 pkgs	250	$22.44
Spectroscopic 36 plates/pkg. (Specify emulsion number & type) Minimum: 1 pkg.		63.36

OTHER SPECTROSCOPIC EMULSIONS AND SIZES

Be sure to consult the sections: SHEET FILM AND PLATES in the catalog for the spectroscopic emulsions available.

A number of other sizes are also available on special order, such as long rolls from 16mm to 70mm in width, and plates up to 8" x 10". Minimum order requirements normally mean an investment over $100.00. If seriously interested, write for quotation.

ORDERING INFORMATION

All foreign orders must include $5.00 per order for export (see front of catalog for ORDERS FROM FOREIGN COUNTRIES). In addition, all foreign orders for films and plates will be shipped airmail: For each 20 exp. or 36 exp. roll--add $2.35; for each box of 4x5" sheet film--add $2.80; for each bulk roll of 35mm x 125' film--add $5.32; for each box of 4x5" plates--add $7.42. The prices for spectroscopic plates, sheet film, and roll film all include airmail shipping for the U.S.A.

PAGE No.	STOCK No.	PRICE	PRICE (24.5mm)	PRICE (1 1/4")
18	PA-002	$4.95		
	QFC-03			Discontinued
23	CR-010	1.95		
	CA-001	29.88		
	M-1029	1.37		
	M-1027	1.71		
	M-1028	.40		
	M-1100	1.37		
	DBFL-1	17.95		
	SCM-35	.35 each or ten for $3.00		
	TCT-35	2.48		
	RP-062			45.12
	RP-082			62.66
24	SOSO-2		36.65	
	SOSO-1			46.23
	VDPS-2		34.47	
	VDPS-1			42.42
	TC-330	63.95		
	TC-43D	89.95		

PAGE NO.	STOCK NO.	PRICE
25	WDA-02	8.00Ø
	WDA-05	12.00Ø
	WDA-15	28.00Ø
	WTTA-0	17.80ØØ
	WTTA-1	18.04ØØ
	WTTA-2	18.27ØØ
	WTT-01	5.70
	WTT-02	7.40
	WTT-03	9.40
27	KFDO-0	36.29
	TDD-01	6.97
	BCOO-1	13.95
	GD-008	2.20
	GD-016	2.70
	GD-032	3.30

Ø Remember to specify O.D. tube diameter. For standard 5", 7" and 10" (aluminum) and all OPTICA b/c fiberglass tubes--same price as above. For other sizes--add $9.95 for machining.

ØØ Boring larger than 1"---Free
Boring smaller than 1"--$9.95

PAGE No.	STOCK No.	PRICE
28	MX-857	12.67
	CFDO-1	4.84
	D-19-1	1.98
	D-19-5	8.36
29	PA-001	$2.50
	PA-002	4.95
	PA-003	17.50
	PA-004	.95
	PA-005	3.00
	PA-006	1.90
	PA-007	1.45
	PA-008	2.50
	PA-009	1.50
	PA-010	Out of Print
	PA-011	3.25
	PA-012	3.00
	PA-013	2.00
	PA-014	3.25
	PA-015	.50
	PA-016	4.45
	PA-017	1.50

ADDITIONAL CHEMICALS			
	1 qt	½ gal	1 gal
FILM DEVELOPER			
Kodak Microdol X	1.43		2.75
Kodak D-76	.94	1.10	1.71
Kodak DK-50			1.16
PAPER DEVELOPER			
Kodak Dektol	.99	1.16	1.76
FIXING BATHS			
Kodak Fixer (powder)	.61	.77	1.16

THIS PRICE LIST SUPERSEDES ALL OTHER PRICE LISTS OR CATALOGS OF LOWER NUMBER. PRICES ARE SUBJECT TO CHANGE WITHOUT NOTICE. PLEASE ORDER BY ITEM, STOCK NO., SIZE AND PRICE.

PHOTOGRAPHY COUPLERS

OPTICA b/c manufactures custom photographic couplers for off-brand terrestrial (spotting) telescopes. Average price -- about $50.00. Send complete camera and telescope information for quotation.

CELESTRON OWNERS

The complete line of OPTICA b/c Astrophotography Systems and Camera-to-Telescope Couplers offer increased photographic potential with any Celestron Pacific telescope.

For example:

1. Afocal photography is possible
2. Filters can be used for prime focus photography
3. Filters can be used for negative projection
4. Extension tubes can be used to vary the magnification in the Eyepiece Projection Method.

Instantly interchangeable photographic methods give you the most versatility for your money.