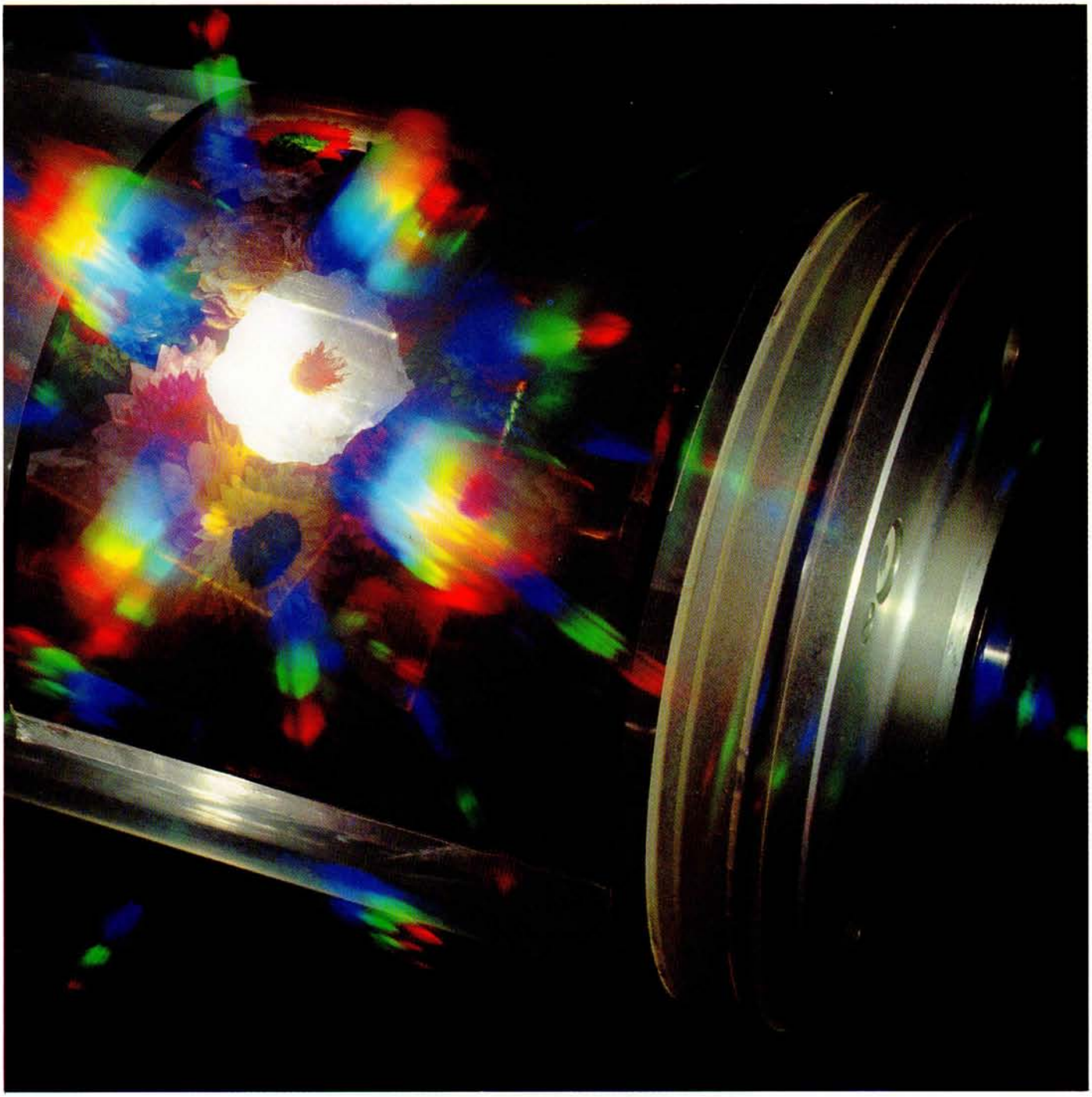
HELL

Process technology

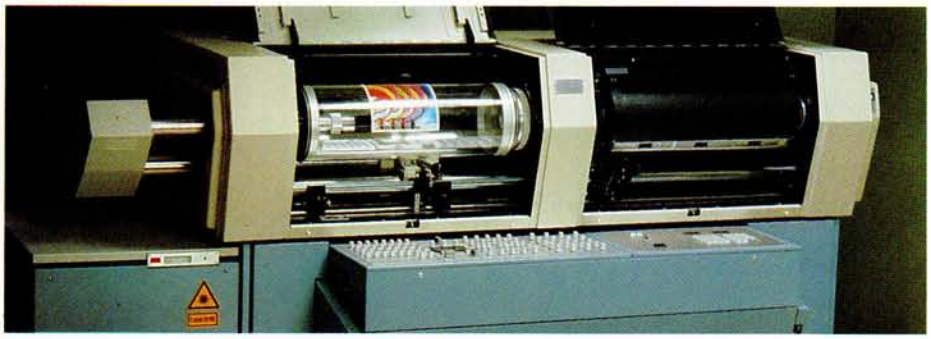
The Chromagraph® 299 L and 299 colour scanners for perfect reproductions

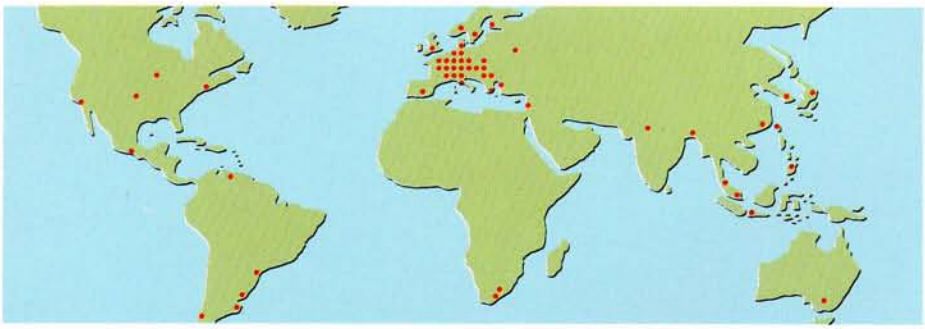


HELL's superior package – Engineering – training – maintenance

HELL scanners are by now the standard by which process users judge precision, reliability and good servicing. That applies equally to the two compact Chromagraph models 299 L and Chromagraph 299.

But high-level and high-quality engineering products are only as good as their handling and maintenance. HELL looks after both with special provisions.
A specialised HELL Information and Training system (HIT) assures expert operation. This three-part audiovisual instruction course, covering colour theory and handling, is part of the setting-up service supplied with the 299 L and 299 scanners.
To cover expert maintenance, HELL – as the world's largest scanner manufacturer – has an extensive world-wide agency network for constant servicing of all HELL products.



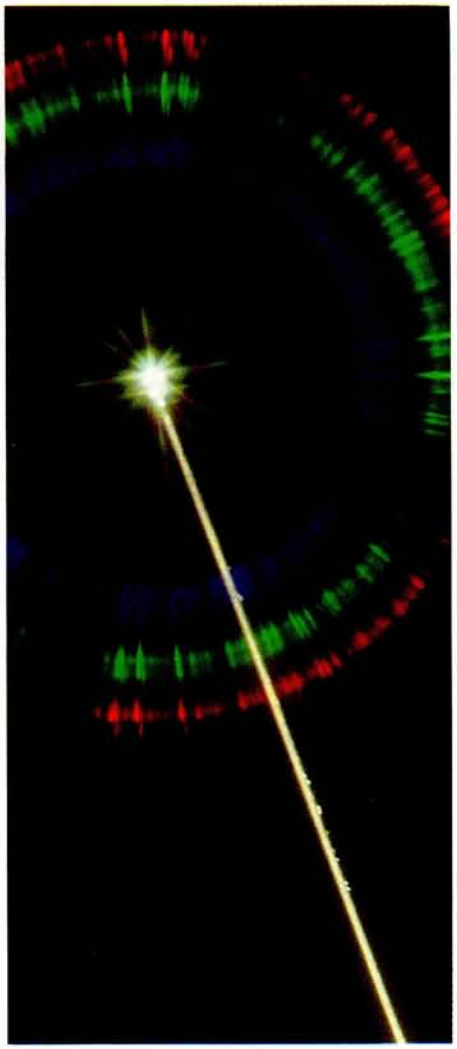


Forward planning for electronic reproduction

In the current climate of rapid change today's investment must not become obsolete tomorrow. HELL therefore runs a consistent model policy to keep new and old customers equally up-to-date. One example is the way in which laser technology converts the model 299 scanner into the 299 L – by adding to existing equipment without making it obsolete.

Encouraging, too, is HELL's continuous after-sale concern. For instance an instructor can train scanner operators directly in the customer's plant.

Forward planning for electronic reproduction with HELL is profitable – as proved repeatedly by comparative cost analyses. On the one hand, HELL's compact model ist tailored to businesses that want to switch to electronic process operation. On the other, this scanner with its comparatively large formats usefully and ideally complements high-performance scanners.
How can the expert utilize his experience for faster, superior and more economical production? HELL scanners need no electronics expertise. With the clear layout of the operating controls, the process operator, lithographer or experienced colour retoucher can quickly grasp the functions and scope of the compact scanner. Basically, the Chromagraph 299 L – like the 299 – can be largely preprogrammed for standard colour separation. That way, just a few adjustments balance the electronic system from one original to the next.
Moreover, the process operator retains full creative control. The compact Chromagraph has a range of colour correction controls to permit specific selective correction.
The colour separation is produced in its final size in a single operating cycle for all printing processes – as a halftone or continuous-tone image. That involves neither accessory equipment nor internegatives. And electronic process reproduction is faster, with minimum material consumption.



Versatile high performance

Simultaneous and keyboard operation

The Chromagraph 299 L and 299 scanners are successfully used in almost every field of process operation. They cover a 65 × 51 cm (25.6 × 20.1 inch) scanning area with a 62.5 × 51 cm (24.6 × 20.1 inch) recording format, to yield electronically masked colour separations for outstanding quality and detail definition from colour transparency or reflection copy. The scale range covers from 20 % to 1380 %. Direct enlargement in electronic reproduction ensures outstanding definition on the film. The image is recorded on commercial blue-sensitive film.

Both Chromagraph models – 299 L and 299 – are equipped for scanning colour transparencies and reflection copy.

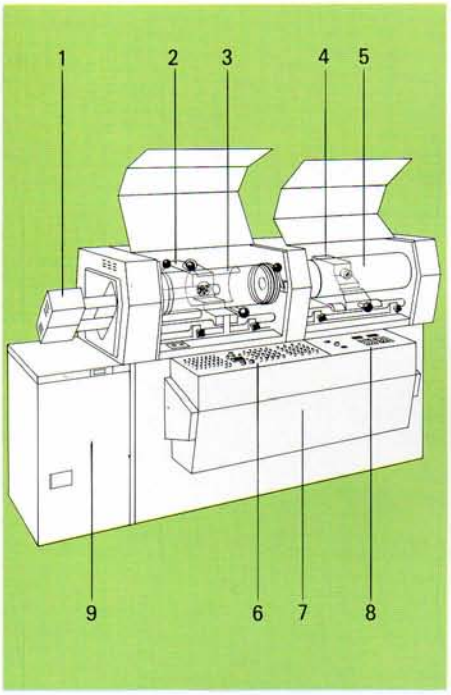
However, the output of the Chromagraph 299 L with its laser exposure unit is 40 % higher. Suitable films for exposure on the 299 L are scanner lith films and certain line film materials. The new exposure system involves no change of processing.
Ideal matching of the number of scanning lines to the screen ruling ensures outstanding image definition. The laser beam provides even better dot quality and outstanding printability.

Controls are instantly preset for straightforward scanner operation. Other instructions if required are input into the scanner by a decade keyboard of push-button keys. This therefore permits very rapid setting up.

This scanner model is deliberately kept compact for installation even in smaller darkrooms.

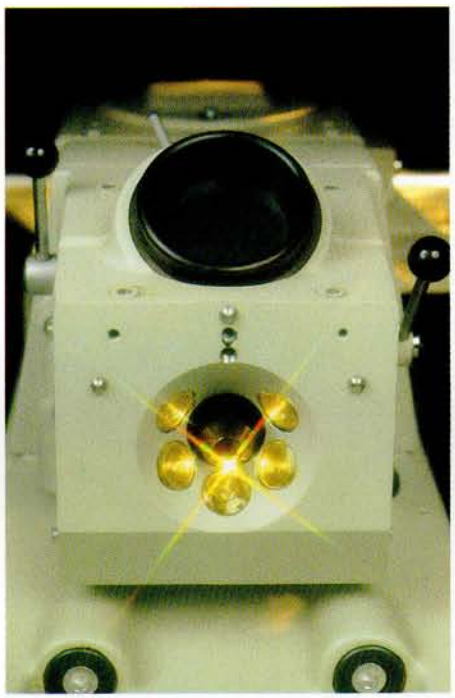
The scanner elements

1 Scanning lamp
2 Colour optical system
3 Scanning drum
4 Recording head
5 Recording drum
6 Colour computer for colour correction
7 Cabinet containing the colour computer, scale computer and machine control
8 Keyboards for machine control and scale input
9 Laser exposure unit of the Chromagraph 299 L (can be installed subsequently on the 299)



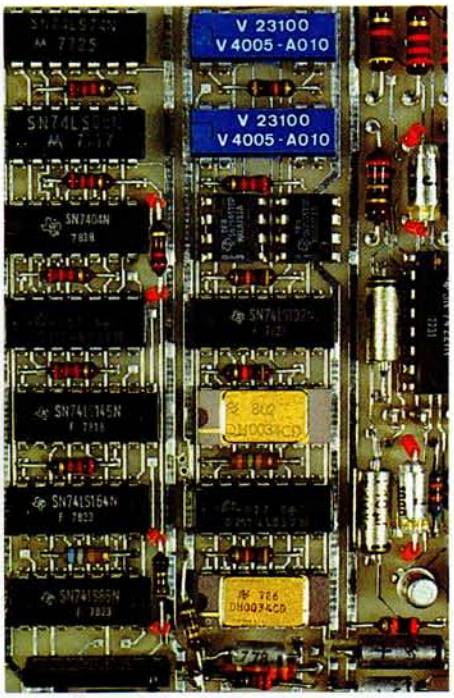
The front of the scanner carries the colour computer with all operating controls. At the top left are the scanning drum and behind it the scanning optical head. Next to it is the recording drum with recording optics head. The laser exposure unit is built into a small supplementary cabinet. The light from the laser goes to the special scanner recording head via a light guide.
A built-in transformer adapts the unit to all usual mains supplies.

Scanning and exposure

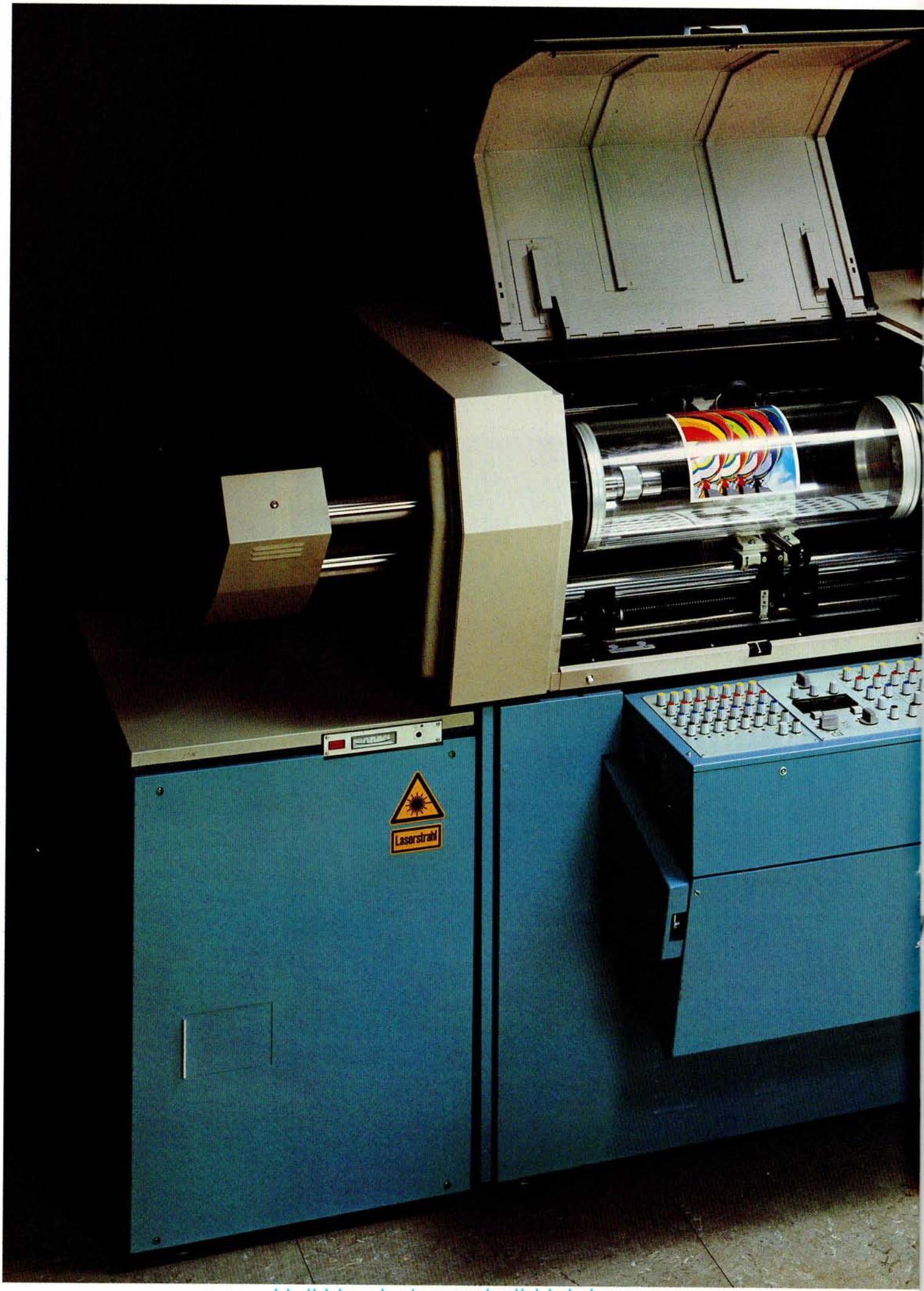


During scanning a high-intensity flicker-free tungsten-halogen lamp illuminates the original. The scanning optical head splits the light into four component beams.
Photomultipliers convert the component beam intensities into electrical signals which pass through the colour computer and then the microprocessor-controlled digital electronics system.
An ultra-stable and reliable light source is vital for exposing the colour separations. For the laser exposure HELL uses a blue-emitting laser to permit the use of blue-sensitised and orthochromatic films. This is ideal for continuous-tone separations as well as for contact-screened halftones.

Scale changes



For axial scale changes the scanning and recording heads advance at different rates. The digital electronic system controls circumferential scale changes: While the drum rotates, the image signals of a scan line are digitised and fed to an intermediate memory. A fraction of a second later these signals pass to the recording optics with a compressed or expanded time scale.

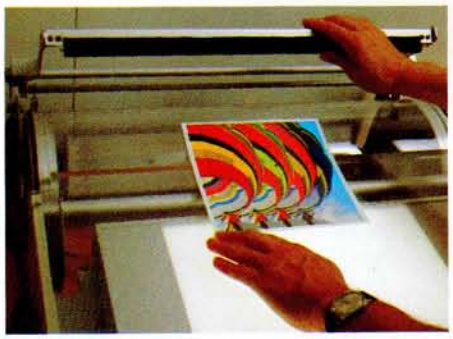


Efficiency and productivity

Apart from the additional laser exposure unit of the 299 L and the special recording head required for it, the 299 L and 299 scanners are identical.
The Chromagraph 299 is the recommended unit for a plant taking its first steps towards electronic reproduction and handling about 5 to 12 colour separation sets per shift. Here it will soon pay its way. The additional facilities are easily installed when required. The laser exposure unit makes the compact scanner more productive later on. With a 54 line/cm (135 line/inch) screen, recording then takes only 8 seconds/cm. That can increase the shift output to 19 separation sets.

Electronic reproduction with standard settings

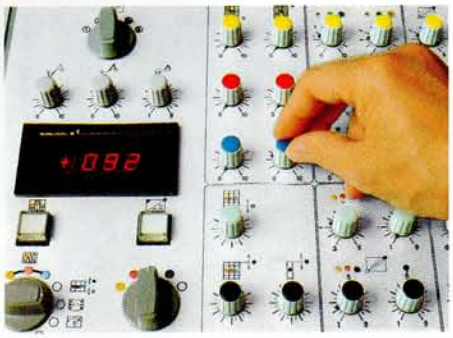
Its up-to-date design and use of microprocessors make HELL's compact scanner particularly simple and convenient in operation. Here is a typical process sequence.



Mounting the original
The original is mounted on the scanning drum. With continuous scanner operation this step is carried out off the unit by fitting an interchangeable scanning drum on the mounting unit and there mounting the original to be scanned.

Selecting modes and functions
A decade keyboard and further function keys are provided to feed in the required operating instructions:
- Image format in feed and circumferential direction
- Scale of reproduction
- Right-reading or laterally reversed reproduction
- Background density or cut-out
- Positive or negative recording
- Resolution or screen ruling
- Reflection or transparency copy scanning

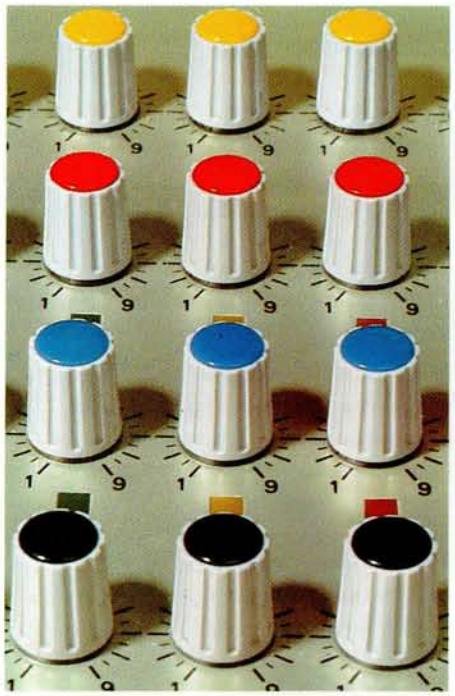
Calibration for original highlight and shadow density
After selecting the required density range of the colour separations, the first printable density step is now matched to "white" with the appropriate control. That compresses the usually much higher density range of the colour transparency to the reproducible density range. It goes without saying with these scanners that colour balance is fully maintained throughout.



Correcting colour casts
Eliminating a colour cast in the copy is supremely easy: appropriate controls instantly correct any unwanted colour deviation.
That prepares the Chromagraph for a standard operating cycle. The film – with a contact screen if necessary – is drawn down on the recording drum by vacuum, the cover closed over the recording drum and the scanner starts to run.

The Chromagraph 299 L and 299 go much further, still

The standard process settings are frequently inadequate for poor originals. Here this Chromagraph offers the process operator extended electronic retouching scope.



Selective colour correction
Measurements of colour proportions at representative image points establish whether colour correction is set for optimum reproduction.
The measuring unit immediately tells the operator the exact densities or dot sizes to be expected in the four separation colours.
If a change is needed, it is sufficient to reset the appropriate control in the main colour correction range. Where one of the six basic colours is to be modified without affecting the other white or black values, 24 selective correction controls are available for plus and minus correction. A further ten controls cover selective correction of skin and dark brown tones.

Tone value correction
Every printing process involves some tone scale modification. This again is easily and precisely controlled with the Chromagraph 299 L and 299: Highlight and shadow detail can be enhanced or taken back in the four colour separations.
A special control is provided in each separation channel for the important midtones. Two further controls set the degree of gradation enhancement and cutoff point for the brightest highlights.
This way the operator can precisely match the values of the original copy as well as customer requirements.
With reflection copy or transparencies of extreme tone distortion (over- or underexposure), electronic tone correction provides excellent scope for selective visual improvement of the reproduction.

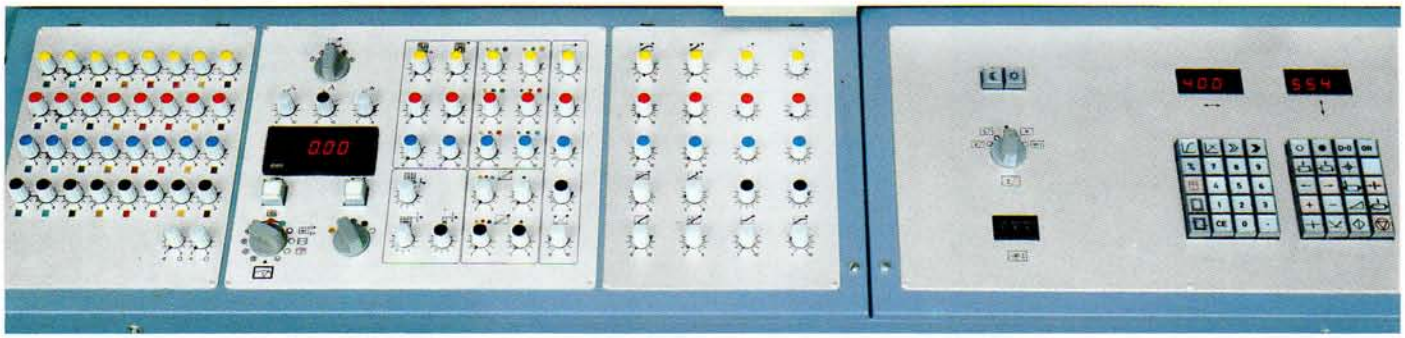
Undercolour removal and the black printer separation
Undercolour removal is primarily used in printing with multi-colour rotary printers or four-colour sheet-fed machines.
Undercolour removal avoids excessive colour in neutral black tones by reducing the three primary colours there and replacing them by more black.
The operator sets the undercolour removal cutoff point. A stepless adjustment then selects the degree of undercolour removal in every separation channel.
The colour computer of the scanner automatically computes the black proportion. The controls easily and precisely select any black printer level from a light skeleton black to full black detail.

Enhancing detail contrast (electronic unsharp masking)
The impression of sharpness in an image can be enhanced by increasing detail contrast. This effect is achieved by a separate photomultiplier and an additional surround field aperture.
Controls can vary the contrast separately for highlight and shadow tone ranges to match the characteristics of an original.
With a further stepless control the operator can also select the cutoff point for detail contrast enhancement.

All in all, HELL's compact scanners can cover corrections that go far beyond the scope of photomechanical colour masking.

Analog technology for the colour computer

Digital technology for machine functions



The colour computer contains the controls the operator needs for colour correction, tone value correction, undercolour removal and detail contrast enhancement. It is designed as an analog colour computer, for selective matching – as required for the wide range of originals and correction scope in a colour computer – is only feasible with analog operation. That way every change produced by any one adjustment can be read off directly.

Before recording a colour separation set based on the colour computer's standard program, values required for individual reproduction are measured and the appropriate controls adjusted. The separations are set with the aid of the precision measuring unit that indicates density values or dot percentages. The controls are clearly grouped and thus permit rapid setting up.

In addition to the basic correction, selective controls permit specific adjustments. This covers extensive electronic colour retouching, particularly needed with poor originals.

The signals processed by the colour computer pass to the scale computer. According to the scale programmed there, the signals then proceed with an extended or compressed time scale.

The heart of the digital electronic system in the Chromagraph 299 L is a microprocessor. This central unit of a microcomputer system combines all necessary functions.

The following functions are easily and instantly programmed by a push-button keyboard:

- Scale adjustment
- Automatic film linearisation
- Input of recording line resolution
- Image frame location
- Surround density
- Register marks
- Control grey scale
- Recording mode
- Scanning direction

Technical data of the Chromagraph 299 L and 299

Scale of reproduction	Adjustable from 20% to 1380%		
Colour computer	Four-channel system with IC operation amplifiers and selective colour correction		
Scanning resolution	According to reproduction scale		
Interchangeable scanning drums – Drum – Drum	 For maximum copy size 65 × 51 cm (25.6 × 20.1 inches) For maximum copy size 25 × 20 cm (9.8 × 7.9 inches)		
Originals	Reflection and transparency copy		
Recording drum	For maximum recording format 62.5 × 51 cm (24.6 × 20.1 inches)		
Recording head of 299 L Recording head of 299	Single laser recording head for continuous-tone and halftone Single head for continuous-tone and halftone		
Colour separations	For continuous-tone and halftone, right-reading or laterally reversed, positive or negative		
Film material	Commercial continuous-tone or lith films		
Register system	HELL 5-pin system		
Recording resolutions and times	Continuous-tone 299 L and 299	Halftone 299	Halftone 299 L
106 lines: 7.1 sec./cm			×
136 lines: 9.1 sec./cm			×
150 lines: 10 sec./cm	×	×	(×)
200 lines: 13.3 sec./cm	×	×	(×)
300 lines: 20 sec./cm		×	(×)
Film material (recommended)	Continuous-tone	Lith	Lith/line

Dimensions, weight and supply data for the scanner and laser exposure unit

1. Scanner

Width (Transparency arm extended)	2 110 mm (83.1 inches) 2 750 mm (108.3 inches)
Depth	1 110 mm (43.7 inches)
Height	1 320 mm (52.0 inches)
Weight	890 kg (1962 lbs)
Power supply	3-phase AC
Supply voltage	220/380 volts (others to order)
Supply frequency	50 or 60 Hz (please state with order)
Permissible supply voltage fluctuation	±10%
Power consumption	Approx. 2 kVA

2. Laser exposure unit

Width	550 mm (21.7 inches)
Depth	700 mm (27.6 inches)
Height	800 mm (31.5 inches)
Weight	100 kg (220 lbs)
Power supply	As for scanner
Power consumption	Approx. 2 kVA

Modifications reserved

HELL

About ourselves
Products with a high reputation which readily find a world-wide market – this briefly shows the standing of this company. However, HELL is more: The name HELL stands for innovation, inventiveness, and modern technology.

Our inventiveness has sparked off a revolution in the fields of communication, process and typesetting technology. Our technology is backed by the commitment of 2000 employees who ensure continuous development. In our laboratories, production facilities and plants, we pursue sophisticated research, development, and production programs.

HELL machines and systems are employed primarily by the graphic arts and textile industries. Wherever quality, reliability, and time are major assets.

Our representatives and service offices are within your reach – throughout the world.

Process technology
World-wide, HELL offers the graphic arts industry the largest range of products available for electronic reproduction and gravure forme preparation.

Chromaskop
These colour display units allow visual colour and tonal value corrections to be made prior to the scanning process. The adjustments performed on the Chromaskop are automatically transferred to the scanner.

Chromagraph scanner
These scanners are renowned for high-quality colour separations:
Chromagraph 299 compact scanner
Chromagraph 299 L with laser light
DC 300 high-performance scanner with electronic screening, laser light, and multicolor facility
CN 320 scanner for black/white work
CTX 330 textile scanner and
CP 340 poster scanner.

Process systems
With these systems it is possible to carry out image and text processing as well as electronic full-page make-up and retouching. With the new "Combiskop" station and the compatible Chromagraph scanners, HELL has developed with the Chromacom system a superior, future-oriented configuration.

Forme preparation
Helio-Klischograph engraving units reduce and systematize the processing stages in the preparation of gravure cylinders. Furthermore, electronic engraving warrants for the reproducibility of the forme preparation process. It can be expanded consecutively to the integrated EDP-controlled process and forme preparation system HDP.

Typesetting technology
Digiset CRT-typesetting machines operate electronically with digitally stored fonts and a cathode ray tube. If needed, digitized symbols, logos, line drawings and screened images can also be set. Digiset systems are equipped with a powerful computer which together with the recording unit is accomodated in a compact housing. The Digiset 200 system was developed for medium-sized companies while the Digiset 400 systems were made for high-performance applications. Video display terminals for text acquisition, typesetting computers, on-line video display terminals for text editing and correction as well as large peripheral disk stores are characteristic of the enormous capabilities of these systems for font, image, and copy management.
The service and typesetting programs are included in the Digiset-oriented, time-tried DOSY software package.

Textile technology
Special Chromagraph scanners produce colour separations for multicoloured textile and transfer printing. Pattern processing and forme preparation for fabric printing can be automated with the TDP 500 textile data processing system.
Patro systems convert point paper designs and sketches into Jacquard data for weaving and into control data for knitting. They record textile pattern data, deal with monitoring and corrections as well as electronic processing. Registat units check and optoelectronically register the quality of material webs.

Communication technology
A wide equipment range offers the opportunity to transmit and receive photographs, documents, drawings, morse or weather charts. Hellfax and facsimile transmission systems are ideal for applications which require fast and reliable data exchange via international cable and radio links. Identograph systems engrave identification data such as photos, signatures, etc. on forgery-proof, hard-wearing plastic ID cards.

Dr.-Ing. Rudolf Hell GmbH
P.O. Box 6229
D-2300 Kiel 14
Telephone: (0431) 20011
Telex: 0292858
Telefax Gr. 2: (0431) 2001447

1389 (R-2e-8103) Printed in West Germany