Klischograph '81

English edition

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Reproductions

All illustrations of this issue were scanned with the first Chromagraph CP 340 supplied by HELL. Electronic screening by laser beam.
Plates by Willy Berger Graphische Kunstanstalt, Stuttgart, West Germany.

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The colour monitor screen of the system permits direct checking of each working step.
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Photo: K. Kakefuda, 6 x 6 cm Kodak transparency

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The typefaces

Praxis medium
The basic typeface of this issue is Praxis medium, a member of a large typeface family. The type was electronically italicised. The face has a large body, especially in the x height, with very open detail. The distinctive shape is particularly suitable for offset and gravure printing.

Demos semibold
The headings are set in this typeface. The deliberate rounding of the corners would also permit less meticulous processing without harming this face. Both typefaces were designed by Gerard Unger to permit harmonious combination of these sanserif and old style faces.

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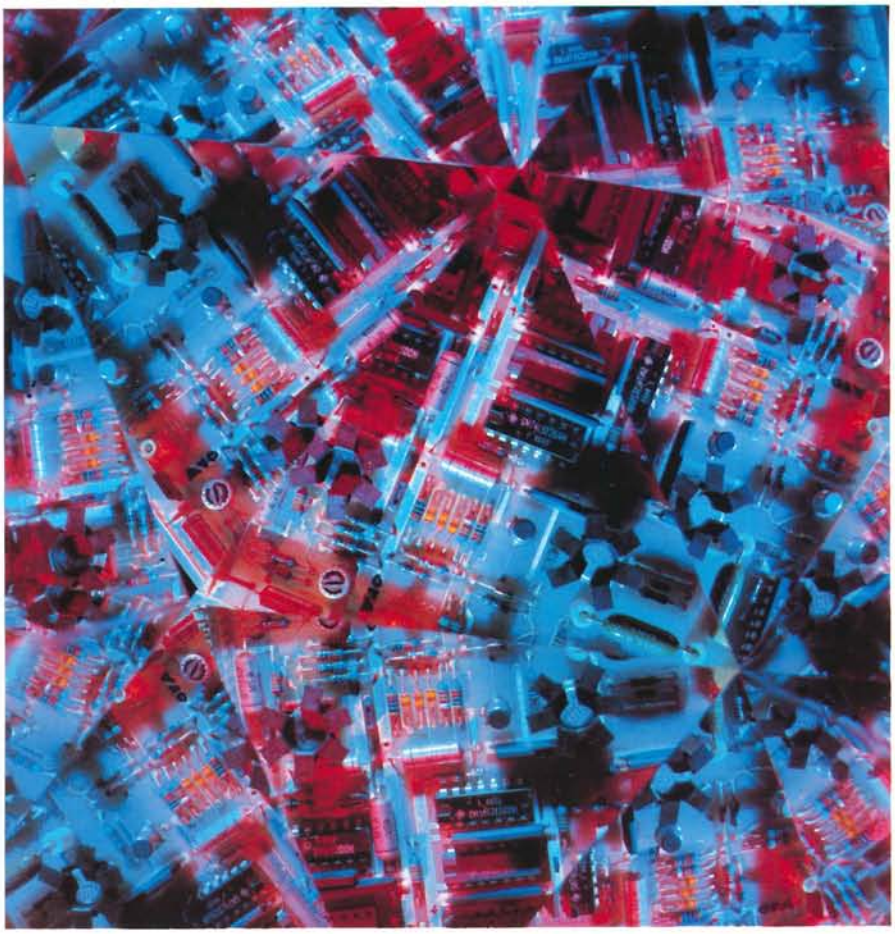
Future outlook



The management change at HELL coincided with an age of new technological approaches. Roland Fuchs and Heinz Taudt have initiated the expected developments. Both these gentlemen — familiar to many of our readers — deserve our sincere thanks for their achievements for the HELL company and its continued progress in the graphic arts industry. The job now — as expected by our partners — is to continue our successful and proven business policies.
Large-scale integrated components, microprocessors and high-efficiency memory elements with appropriate software have advanced the technology of electronic image and text processing to a degree where they provide completely new approaches to the jobs and problems of the graphic arts industry. They should permit increasingly perfect and profitable operation. If we had to sum up in a nutshell the technological aim envisaged for the printing industry, we should consider a total integration of all the separate image und text areas into a fully electronic material-saving process system. We are concerned with a third generation of process and typesetting equipment. Typical of this development is the *Chromacom System* based on many years of computer-assisted image and data processing. In this system the images scanned by the scanner are assembled to a whole page and can also be retouched electronically. A logical result for offset reproduction and of the Chromacom system is programmable proofing.
HELL realised this with the Chromaprint 4074 four-colour printing press developed for the purpose and first shown at IPEX '80: Electronics now bridges the entire sequence from the original to the proof. In gravure, electronics equally controls the operations from the original reproduction to the engraved printing cylinders. Similar ideas underlie textile printing and systems developed for processing knitting and weaving patterns. Corresponding technological developments are also found in typesetting where the self-contained and compact Digiset 200 typesetting system offers low-cost solutions especially for medium-size printing works.
Following its tradition, HELL proposes to realise these technological aims and to sponsor further developments. In the envisaged integration of text and image processing, the preparation and running of efficient operating and user software will also become increasingly important. We shall devote a large part of our efforts to this field.
The economic outlook for the growth of the graphic arts industry certainly seems encouraging. Current techniques not only appear fascinating to observers and participants but offer manufacturers and users new prospects of successful business development.

Ernst-Erich Marhencke

Focus on Chromacom

Software evolution

The Chromacom system, its purpose and operation have been described more than once. So have the shortened graphic arts production procedures, the scope of precise electronic make-up and retouching as well as material and time savings. This article therefore deals with a side that is often overlooked but of vital importance for the coming technological generation shift — for the first Chromacom systems are already running.
The basic question is: How can the Chromacom system carry out the large number of highly varied process jobs at one and the same work station?

In the first place, the Chromacom system is not a collection of traditional single machines but a computer-assisted system. This can only operate by an interaction of hardware and software. Process operators therefore have to come to grips with the idea of software — something that typesetters have already gone through.

What is software?

To recapitulate: Hardware comprises all the concrete equipment of a data processing system — including hard-wired circuits and other internal components of a machine. In fact it covers everything you can literally get hold of.
Software on the other hand comprises the *totality of the programs* that control the operation of a system. That implies something abstract, yet is a vitally important component of such a means of production. These programs break down all the operating sequences into basic individual working steps and convert them into a machine language that the computer can understand. This computer language consists exclusively of yes/no statements.
In the Chromacom system this means that all functions of electronic page make-up and retouching are made possible by the preplanned operating sequence of the software programs.

Computer systems

Before we deal in more detail with the software, let us define its significance within the computer. By the interaction of hardware and software, computer systems cope with complex process operations by a large number of basically simple calculation steps. However, they can operate economically only if these calculations are fast enough. The choice of the correct size of a computer and the memory units associated with it is therefore vitally important. This has to match the projected use, including peak loads.
Computer systems basically consist of three groups linked by the software:
— Data input
— Data processing
— Data output
The Chromacom system, too, is a computer system incorporating other functions. The input comes from the scanning optical system of the scanner. The scanned image signals are digitised so that they become capable of being read and processed by a computer. Processing takes place by the computer and the equipment controlled by instructions from that com-


Chromacom

puter. However, this does not go on completely on its own. The operator at the work station — the Combiskop in the case of the Chromacom system — has to interact with the system by entering appropriate operating instructions.
Each input instruction acts in a specific way on the software and triggers preset chains of automatic running calculations.
To carry out software program steps and instructions, data constantly have to be stored in intermediate memories during operation — after all, we cannot afford to lose data. The system incorporates data memories for this purpose in the data flow from input to output — memories that act as intermediate data files. The data for the individual processing steps are called up from these files and stored again at a different point in a different sequence.
Once the data are processed, the final stage is data output. In the Chromacom system that is the exposure of the complete colour set at the recording side of the system-compatible Chromagraph scanner. During film recording, the stored and ordered digital signals are reconverted from computer language into signals that control the exposure unit of the recording section.
The actual operations within a computer therefore constantly involve the software. We defined it in the beginning as the totality of all programs. Strictly speaking, however, running such a system involves two types of program.

The operating system programs

The operating system (OS) programs control the underlying system functions. No data processing unit can work without an OS. It complements the engineering components of the data processing unit and is essential to utilize its scope. The OS programs are supplied by the manufacturer with the computer.
The elements of an OS program are matched to the specific features of the system hardware. In a modular system, such as the Chromacom that permits different system variations, the program composition is also adapted to these different combinations. That affects for instance the amount of space needed for a working file and in turn the operating convenience and efficiency of the system.

User programs

Apart from the OS programs the user of a computer is particularly interested in the user programs. They are application-specific and determine the practical versatility of a system.
Like OS programs, user programs or application programs again consist of combinations of different sub-programs. Such program packages make the different operating modes and functions possible in the Chromacom system, too.
Whether you want to produce cutouts of image details, create and colour outline frames or use retouching facilities — all these functions are part of the user programs. Needless to say, HELL makes sure that a program package supplied can always be extended by improved or newly developed program components.
Program replacement and extension are straightforward. This only involves exchanging the data carriers with the program information, i. e. the magnetic disc stacks or floppy discs. Subsequent system improvements usually need no hardware conversion.

Software maintenance

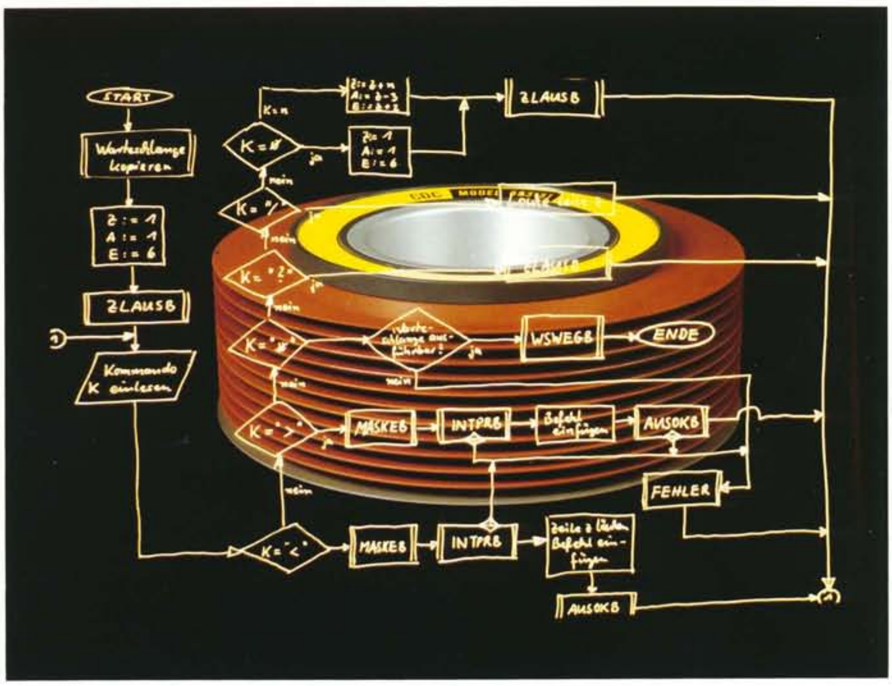
Like hardware, software needs constant maintenance to keep a system operative and up-to-date.
HELL or its agents therefore undertake to offer customers the latest developments in user software and to keep this constantly up-to-date. The detailed obligations are defined in a separate software transfer contract.
Trained customer service teams are available all the time to look after our system hardware and software. They are based on our works and on our world-wide network of servicing stations.

In conclusion

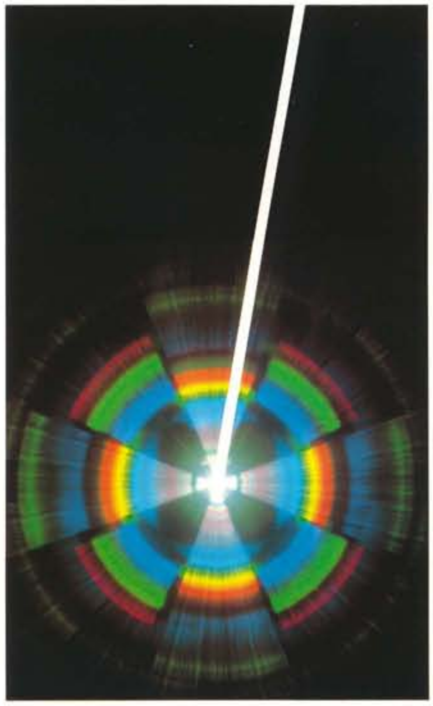
In computer-assisted systems, software is as important as hardware. For neither can operate without the other. According to estimates the current software development will soon bring the sales value of software programs to the same level as that of hardware equipment.
It is also important to note that no system can operate without human interaction and control, i. e. without the human operator's dialogue with the system. The system software simplifies many complex operating sequences for the user and facilitates convenient handling. It also monitors operation and by reasonableness checks, largely eliminates faulty inputs.
Periodic software and hardware maintenance is essential to ensure constant operational readyness and smooth functioning of a system and hence to keep it profitable for the user.

Hans-Peter Schauenburg

Program logic sequences and data storage on magnetic discs control the Chromacom system.



A laser for the Chromagraph 299



HELL studio operators and specialists from Europe, the USA, Asia and South America recently met in Kiel for a seminar — the first of its kind since the world-wide establishment of HELL studios in 1979. Interestingly the timing coincided with the fact that the first laser extensions to the Chromagraph 299 were about to be delivered. The meeting of the HELL studio chiefs further aimed to provide a consistent information level for the experts who conduct demonstrations and training courses throughout the world. That way there will be efficient technical personnel to back up the successful practical application of the Chromagraph 299 L.
Once evaluated, the findings of the seminar will also benefit future users of the Chromagraph 299 L and provide additional information to a wider circle of specialised users interested in electronic reproduction.

An important point for the future user is an economic fact: The significantly higher light intensity of the new laser source will allow a wider use of lower-cost films for direct screening with the Chromagraph 299 L. We can expect a larger number of film types to be suitable for the Chromagraph 299. However, scanner use for optimum quality and maximum economy also calls for a certain readiness of industrial standardisation.
In the course of the seminar we found that the laser light source yields remarkably good results with comparatively inexpensive materials of line film characteristics which can replace expensive lith films. This may also surprise film manufacturers. Particularly surprising was how well some of these films performed.

From the Chromagraph 299 to the 299 L

The original version, which of course remains available, of the Chromagraph 299 uses a tungsten lamp light source. The restricted light output of this requires faster films. These so-called scanner lith films are however comparatively expensive. That is one of the reasons why HELL provided the laser exposure unit as an extension to the Chromagraph 299 — for easy installation in current and future scanners of this model.
This unit is a small additional cabinet set up alongside the scanner, with a light guide cable to the recording head. Apart from points of detail, this unit does not affect the operation, functions and settings of the Chromagraph 299. The supplementary cabinet contains a high-power argon laser light source. As the light emission of the laser is in the blue spectral band, the unit can use blue-sensitive films. These are then processed by red darkroom safelighting.

Higher light intensity — slower films

With the introduction of the appreciably more powerful laser light source for the Chromagraph 299 L the basic requirements of film materials become much easier to fulfil: Less specialised films can now be used, of a normal camera speed range. This and the light intensity provided by the laser increases the available processing latitude and thus permits more certain operation in a range of optimum dot formation.
The use of the laser light source significantly increases the recording speed. This becomes:
- For continuous-tone jobs around 10 seconds/cm (at 150 lines/cm or 375 lines/inch) or in proportion according to the line resolution;
- For halftone jobs between 6.5 seconds/cm (at 100 lines/cm or 250 lines/inch) and 9.0 seconds/cm (at 135 lines/cm or 340 lines/inch)

The considerable interest shown by the graphic arts industry proves that the development of the Chromagraph 299 with additional laser exposure unit meets a real need for a large number of potential customers.

Rudolf Clement

A sizable scanner for many sizes

Printing sizes cover an immense range — A 5, A 4, A 3, A 2, B, C, every imaginable magazine format, double page spreads with bleed, various sizes of mail order catalogue formats, calendars, single or double-sheet posters with overlap for big display points. No single process unit in the world can with equal efficiency cover every format. So sooner or later equipment manufacturers — of process cameras and scanners — as well as investment projects of the graphic arts industry have to face the problem of selecting an ideal recording format. This article presents a review and help in making a decision. It shows the wide applications of the new CP 340 with the Chromacom electronic make-up and retouching system.

Arguments for a scanner of superior scope

With scanners the selection of the recording size is especially important. For exposure time (also referred to as recording time) depends largely on the size of the recording drum. The recording resolution, in terms of recording lines per cm feed, is usually determined by the operating mode — continuous-tone or halftone. The circumferential speed of the recording drum on the other hand is limited by the rate of the signal sequence, the light source intensity and the speed of the available film emulsion. Other characteristics and performance being equal, it makes an appreciable difference whether a scanner can record a given format only horizontally or also upright. This question becomes even more important when a scanner permits multiple recording — as more and more now do — and can simultaneously (i. e. on one circumferential line) record two or even four colours of a reproduction. The practical and hence economic benefit for the user depends significantly on the judicious choice of the recording drum size. However, to preserve reasonably short recording times for smaller and medium formats, drum sizes tend not to be very large. Occasionally, scanner salesmen therefore had to face customers' objections that the scanner output format was inadequate to cover all jobs liable to crop up.

The Jumbo scanner . . .

HELL engineers took good note of this objection. They developed the Chromagraph CP 340 with a 128.5 × 112 cm (50.6 × 44.1 inch) recording format — larger than the A 0 format and in fact larger than anything known so far. This new Chromagraph is not only a true Jumbo model; it is also a high-performance scanner which produces continuous-tone or halftone colour separations at will, with electronic correction, electronic screening and laser recording. Needless to say it handles reflection and transparency copy, with positive and negative recording modes, right-reading or laterally reversed. But above all, the "Jumbo" tag refers to the giant copy format: this model has a scanning drum to take originals up to 65 × 65 cm (25.6 × 25.6 inches).

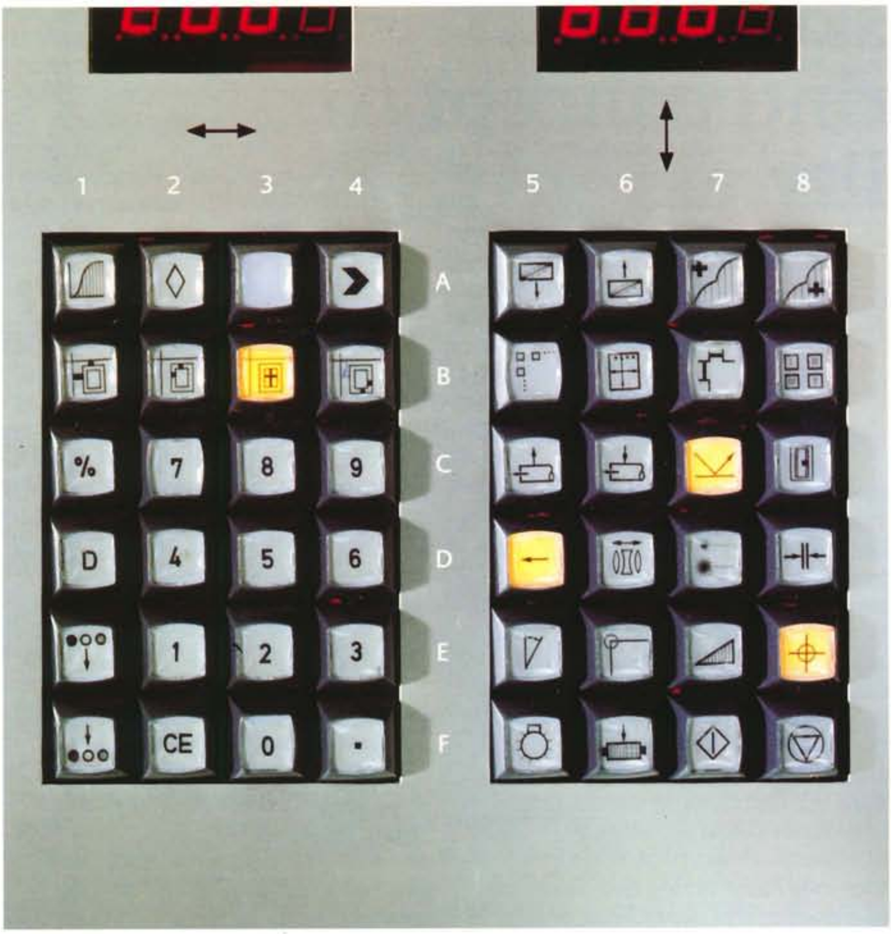
The recording speed with continuous-tone or 60 lines/cm halftones is around 18 seconds/cm feed. Scanning the largest original takes 34 minutes; with 34 lines/cm (85 lines/inch) screening, the recording time drops to 11.6 minutes.

. . . of universal range

The Chromagraph CP 340 incorporates a multicolour system — a single scanning cycle can simultaneously record four continuous-tone colour separations as halftones one below the other. Several A 4 size colour sets can also be recorded next to each other to fill up the full film width. Also a pair of A 2 size separations may each be recorded below and next to one another on one film. Operators appreciate the advantages of this procedure — it only requires a single processing sequence. And with its repeat function the CP 340 can also expose up to 64 multiples of a colour set if required.

80 line/cm halftones by push button selection — without contact screen

The immense scale range from 25 % to 1950 % permits single-step reproduction of a 6 × 7 cm transparency to a 112 × 128.5 cm poster. Elec-



Simple settings on the operating keyboard

A 1 Film linearisation (including ER)
A 2 Zoom and film exposure settings
A 4 Instruction transfer to computer
A 5 Standard gradation input
A 6 Standard gradation selection
A 7 Highlight recording density
A 8 Shadow recording density

B 1 Location on film
B 2 Left/top border widths
B 3 Image format
B 4 Right/bottom border widths
B 5 Multicolour/repeat
B 6 Film size
B 7 Distance between separations
B 8 Colour sequence in multicolour mode

C 1 Scale
C 2 — C 4 Decimal keys
C 5 Scanning vacuum
C 6 Recording vacuum
C 7 Scanning illumination
C 8 Floppy disc data interchange

D 1 Surround density
D 2 — D 4 Decimal keys
D 5 Scanning direction
D 6 Zoom setting
D 7 Film exposure
D 8 Scanning feed

E 1 Storage of colour triplet
E 2 — E 4 Decimal keys
E 5 Screen angle
E 6 Image start
E 7 Linearisation and check wedge
E 8 Register mark

F 1 Recall colour triplet
F 2 Clear key
F 3, F 4 Decimal keys
F 5 Scanning light
F 6 Line resolution/screen ruling
F 7 Start
F 8 Stop

tronic screening — proved more than a thousandfold already in the Chromagraph DC 300 — is of vital importance to this scanner, for manipulating preangled contact screen sets of this size (even if such expensive screens were available from manufacturers) is hardly practical.
The Chromagraph CP 340 however offers all usual screen rulings from 30 to 80 lines/cm (75 to 200 lines/inch) by push-button operation and lens changing. The function control and screen programs are stored on diskettes. These can also store a series of standard gradations to be called up by push-button selection.

Familiar operation

All operating controls are clearly laid out in functional groups on the computer. The functions themselves largely match those of the Chromagraph DC 300. Most operators will therefore be quickly at home with the CP 340, too. A microprocessor controls all machine functions for which parameters are conveniently and reliably set via a keyboard. The large size of the CP 340 permits the use of film in rolls, though sheet film is also usable for smaller formats. The rollfilm is unreeled from a light-tight feed container, punched and mounted on the recording drum. The film is then drawn down by vacuum and the film end further taped down on the recording drum.

The costing aspect

Is not the large recording drum size liable to impair productivity with normal original sizes? The objective answer is that with quadruple recording the CP 340 matches the high-speed DC 300 in recording time even on smaller formats. Its primary additional advantage is that it copes with larger sizes beyond 40 × 50 cm or 16 × 20 inches, for double-spread pages in periodicals, catalogues, supplements, newspapers, large calendars and posters. Traditional photomechanical reproduction of such jobs used to involve many expensive intermediate steps all subject to noticeable quality loss.
As the Chromacom electronically makes up and retouches complete pages and temporarily stores them on magnetic discs, the CP 340 is particularly valuable as a large-size film recorder (recording several final colour sets on one film). For it is prepared for integration in the Chromacom system.

Dieter Pantaenius

The Chromaskop — from pioneering concept to practical reality

The Chromaskop, first supplied in 1978, was an important advance to optimum scanner utilization. Novel in the Chromaskop was the use of television monitoring in electronic reproduction. By running two Chromaskop colour computers, users could organise even more efficiently Chromagraph scanner operation. The aim at the same time was improved quality and maximum productivity.
The first field trials with the new Chromaskop technology brought up ideas which were translated into engineering, and incorporated by conversion kits into units already supplied. Latest user experience shows that the pioneering concept of the Chromaskop has now become established in practice.

Practical monitor technology

The Chromaskop is a system component that permits the process operator to view on a colour video screen a simulation of the image when printed. Moreover, he can do so already whilst adjusting the colour computer settings, i. e. during the vital reproduction stage. Users questioned thought that the colour video display raises and also stabilises the quality level.
With the Chromaskop the number of remakes drops significantly — i. e. of scans that have to be rerun and thus may upset timing and deadlines of a graphic arts department or firm. However, with the Chromaskop product quality *and* output still depend on operator ability.
Skilled operators know from experience that even with the scanner carefully calibrated for the printing inks, print gradation, printing density range and paper type, the video screen image is for physical reasons never absolutely identical with the printed result. Hard copy proofs, too, are subject to certain fluctuations. But the operator soon learns to interpret the video image correctly. Once he has got to that point, the video display becomes a valid electronic proof that instantly reflects every change in the colour computer settings. True, the video image does not provide the full information relevant to subsequent printing — for instance highlight and shadow detail. But in other much more important respects the operator aided by the video image can utilise the immense control and correction range faster, better and more reliably. User experience has shown that the Chromaskop with video monitoring can more effectively utilise the scope of the colour computer. Selective corrections in particular can become considerably more specific and differentiated, to yield top-quality scans.
A less skilled operator can use video monitoring to utilise the extended setting range of the colour computer more efficiently. And the Chromaskop is ideal for the "beginner": by being able to visualise the settings (and their changes) he will more quickly understand and master scanner techniques.

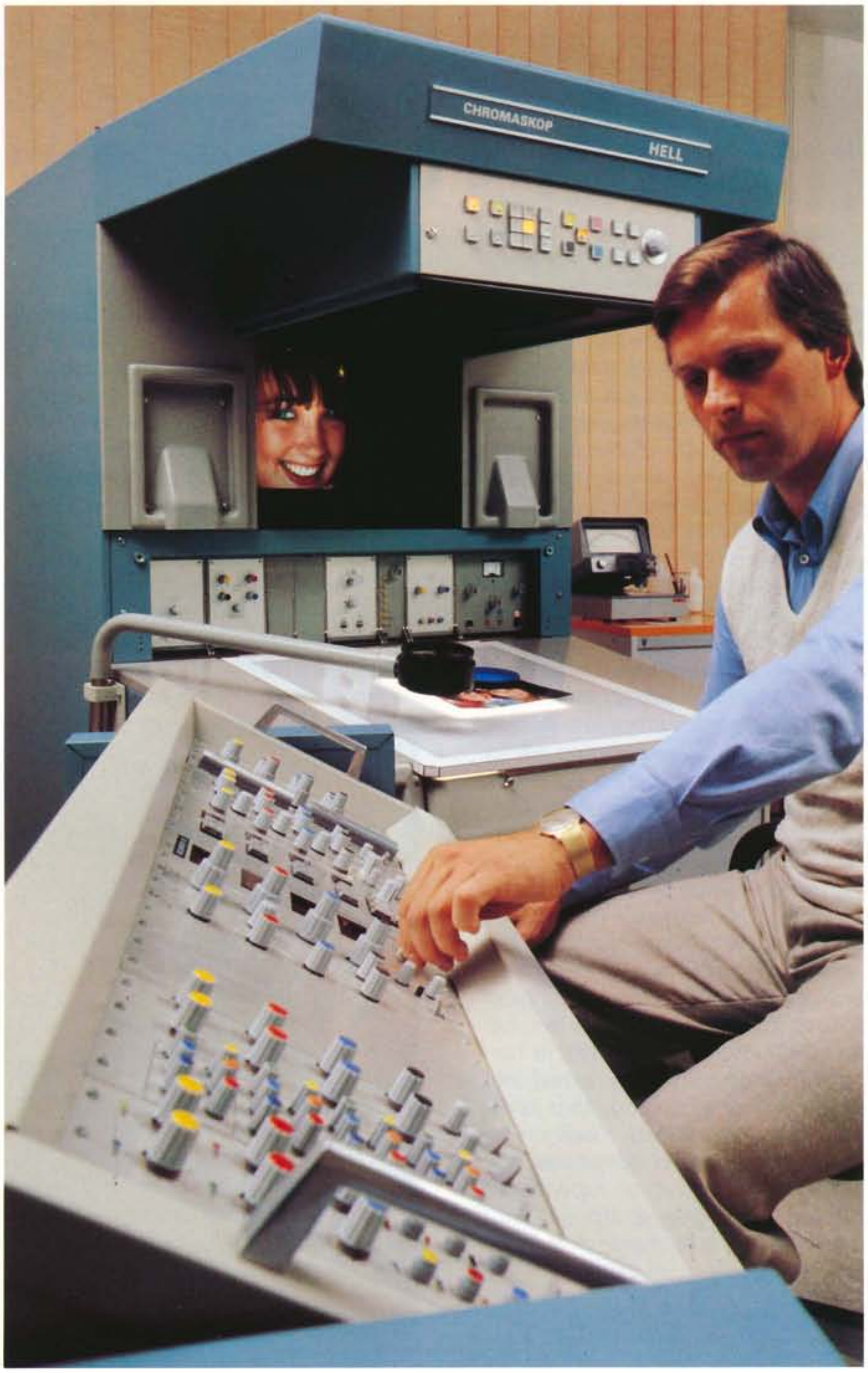
Practical productivity gains

What the Chromaskop user can achieve in terms of productivity depends of course on his equipment setup, the job structure, operator skill and the available productivity level. For example if an operator produces twenty A 4 size colour separation sets per shift with the DC 300, he can effectively increase his productivity only by using two colour computers.
A second colour computer permits alternate operation in setting up the colour computer data. While one colour computer is set up via the Chromaskop, the second colour computer feeds the recording scanner. That way setting up and recording times can largely run in parallel. In this operating mode, users achieved significant productivity gains over conventional operation. But even two DC 300 and/or CP 340 units can work with the Chromaskop via a changeover unit and two colour computers. That ideally utilises the available output potential.

Practical job preparation

Increasingly important in modern process operation is also job preparation and organisation. The Chromaskop offers a new electronic way of making scanner operation more efficient. With direct job preparation on the Chromaskop, it becomes feasible to presort originals for scanning. All colour sets capable of being reproduced with one setting are assembled and scanned one after the other without further adjustment of the colour computer. Where the proportional enlargement

Before starting a scanning cycle, colour and tone values are corrected on the Chromaskop, shown here in our demonstration studio in Kiel. Today some 40 colour video display stations are in use for setting up scanning with visual monitoring.



is the same, different originals can also be combined in assemblies. Where two colour computers are available, standard jobs can continue to be scanned via the scanner connected to one computer during job preparation on the other.

The Chromaskop — a concept for the future

Apart from direct quality and productivity improvements, the compatibility of the Chromaskop with future process techniques is an important argument for the investment. On the one hand we found that Chromaskop users appreciate the advantage of being prepared already in video monitoring for the imminent Chromacom system. On the other hand, they consider the integration of the colour video display into electronic full-page processing to be of priority importance. For while the picture page handling station of the Chromacom system permits colour and gradation correction of colour separation sets scanned and stored in random sequence, this takes up valuable time even with high-speed electronics. During that time the image processing station can be utilised more efficiently, especially for page make-up with geometric requirements, colour shading, tints and actual colour changes.
With a Chromaskop set up ahead of the whole image processing line, the process operator can deal with ideally presorted scans. The Chromaskop can thus improve the efficiency and utilisation even of electronic image processing stations.

Reiner Treichel

The laser with parchments and miniatures

The Chromagraph DC 300 and the Chromaskop in the Vatican

The Vatican library in Rome was set up over 500 years ago. Apart from about a million printed books, 8000 of them incunables dating from before 1500, it holds more than 70,000 manuscripts and illuminated books. It thus contains one of the world's largest single-copy collections. Apart from Christian codexes it includes numerous works of leading thinkers from every culture. Many of the manuscripts are ornamented with unique miniatures, beautiful illuminations and rich scenes. This spiritual treasure is open to all qualified researchers. But even with a large staff of restorers this poses a real risk of wear and tear by handling and environmental factors. The best protection for these works is most accurate possible facsimile reproduction. These objects can then be studied at many places all over the world while the originals remain safely under lock and key.

At the same time a facsimile decorated with gloriously painted illuminations is also a collector's piece and a joy for those who appreciate fine art. So a facsimile project was set up in collaboration with the Vatican Apostolic Library in Rome, the Belser-Verlag in Stuttgart and an international publishing group headed by Senator Hans Weitpert. This will make the unique book treasures, formerly accessible only to a selected few, more widely available in the form of faithful facsimile reproductions. A Belser graphic arts studio was installed right in the Vatican Apostolic Library. Latest television and laser technology thus joined up under one roof with thousand-year-old manuscripts and miniatures. The author of this report, an experienced photographer, graphic arts and printing specialist, is in charge of this graphic arts studio.

Graphic arts problems in the Vatican

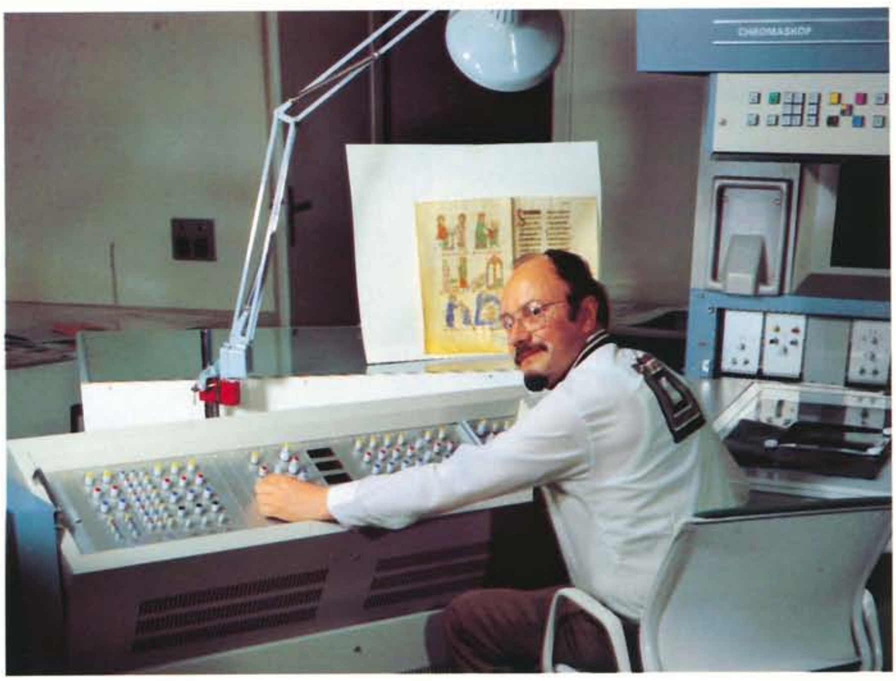
To achieve maximum fidelity we always try to reproduce directly from the original. Where security considerations make it necessary to work from large-size colour transparencies, the colour correction is set up on the Chromaskop directly from the original and not from the transparency. The choice of the method depends in the last resort on the original. Manuscripts, especially when painted only with water colours, are reasonably straightforward, though the fragility of the paper, light-fastness of the pigments etc. need special attention. But more serious reproduction problems arose when we took a closer look at parchment manuscripts. The ancient miniature painters worked, among other things, with semiprecious stones which they ground up to pigment in a mortar. These tones scintillate in innumerable hues.

Brilliant and wasteful

But the book illuminators had other tricks up their sleeves, too. They used gold, partly painted and matt, but partly also polished gold leaf. As centuries of turning pages had made this gold very brittle, bending the original round a scanner drum was here completely out of the question.

The special colour of gold

This caused us some headaches during our first trials. Gold proved very difficult to separate from black and other colours even in the Chromagraph DC 300. I then designed a special lighting arrangement for making large-size transparencies to show up the gold clearly in the transparency. As this transparency contained only dyes (and no longer metal), colour separation in the scanner posed no further major problems.



Cum domibus nitos plures preciis accipe libros.

Rupe lacus presto. Celi michi prestator esto.

The laser dot preserves the original definition

In the course of more than eight years I have instructed many customers in the use of process cameras and HELL scanners. Needless to say, that also teaches one a lot about how to cope with problems. I am very familiar with the DC 300 and its competitors. In Australia I had occasion in a modern business — equipped with three Chromagraph DC 300 scanners — to work on a Chromaskop with the new computer. I realised then that a video display precisely calibrated for the printing inks could even better utilise additional advantages of the HELL system. This applies especially to setting tricky colour shades, as in facsimile reproduction. Practical experience has shown that I had been on the right track. The electronically exposed laser dot yields a very precise dot size and is not affected by minor processing variations: a 7 % highlight dot becomes neither 5 % nor 9 %. This is important when I have to reproduce, say 300 sheets of parchment — for even slight variations can flip the parchment shade to reddish or greenish. A fully repeatable system therefore makes for really reliable operation. The sharpness of the laser dot or the dot shape that tries to follow the copy detail is a special advantage where the artist painted very fine detail. Sometimes that appeared to have been applied with just a single hair of the brush. And with over-size originals or in other special cases it is a great help to be able still to record in continuous-tone with the DC 300, especially as my Kodak processor can process both with the same settings. A note in passing: a repeatable and reliable system also saves film and other costs.

Helped by the Chromaskop

When I work directly from an original, the latter is located on the copy desk lit by reflected light. If I have to work with a large-size intermediate transparency, the original is set up to the left of the video screen, illuminated by standard lighting. The rest of the room is in darkness and the transparency is transilluminated on the Chromaskop desk. In either case the colour correction is precisely matched to the original (and not the transparency). This is a novel approach as usually the original is a transparency. As I photograph all the transparencies for a book under precisely identical conditions, only a minimum of afterwork is needed. To compare the original with the anticipated printed result we also installed a Cromalin proofing system in the Vatican. When however the final impression is available on paper, I can set the relevant data or any slight difference between the proofing system and the printed impression in one of the three colour memories and simulate and note the printing change in the midtones. On the video display I can then recreate exactly the image produced on the printing press and if necessary correct it. Altogether, *in certain respects the Chromaskop replaces the proof.* On the video display I can nearly always check whether everything is still in order and only occasionally make a Cromalin confirmation proof.
The colour selector switch on the Chromaskop however still offers further scope. If I have stored the colour hues of, say, the standard Europe printing scale in position No. 1, I can store for instance in position 3 an alternative colour scale, possibly with a bluer cyan or a warmer magenta. By simply switching over I immediately see whether a particularly difficult hue is more easily achieved with the alternative printing inks. Such deviation from standard would not of course be acceptable in normal printing. But facsimile reproduction is a rather different case and with this small switch I can often save additional impressions with special inks. I find that too many colour impressions adversely affect image definition. Another hint: The special fine range correction controls are not only useful in adjusting special colour shades, but also in the gold separation which often still needs attention by the lithographic artist.

Acknowledgements

Whenever I came to Kiel with new ideas for testing, the staff of the HELL studio always offered ready assistance with theoretical and practical advice. I gratefully acknowledge their efforts — as the results show, they were well worth while. In general I find that brainstorming sessions among experts are more successful in solving a problem than lonely deliberation, especially as sometimes not all aspects of the problem may be known.
Through my past work in the Vatican I not only gained immense respect for the medieval miniature painters but also growing admiration for the lithographic artists who till now used to produce such facsimile reproductions in the traditional way with exceedingly laborious detail manipulation. Our system has undoubtedly greatly simplified their work. Maybe some day one or the other of them will exchange his brush for the push-buttons of a colour computer. I feel sure that a good lithographic artist usually also makes an excellent scanner operator.
An additional advantage ist that with these techniques I also use less raw material such as silver, especially as the demand for good colour reproductions is constantly growing. My work so far has shown that the above way to good facsimiles offers many advantages.

"Ora et labora"

In writing schools founded in Benedictine monasteries monks copied down the totality of human knowledge in elaborate detail work. These records helped to preserve and spread that knowledge. Italy's first printing shop was founded in a Benedictine monastery in Subiaco by a follower of Gutenberg. The graphic arts today still help in passing on this culture and knowledge. I find particularly satisfying the awareness that I am helping to preserve valuable originals and contributing to the distribution of unique works of art of Western culture that have never yet been reproduced. As graphic artists we are fulfilling a function of great beauty — Art by the grace of God.

Dieter Zieger

Notes on the two full-page illustrations to this article:
The sitting figure of St. Benedict looks almost modern in this 900-year-old book painting. From a Codex currently being reproduced in facsimile.

Many manuscripts are illuminated by unique miniature paintings. So it is not surprising that some Codexes took over 30 years to write and paint.

BEATUS VIR

qui non abiit in consilio impio
rum: et in via peccatorum non
stetit: et in cathedra pestilentie
non sedit.
Sed in lege domini voluntas eius:
et in lege eius meditabitur die ac nocte.

New approaches with electronics

Pattern processing in textile printing

There is a close link between the graphic arts and the textile industry, especially textile printing. Broadly, what both industries have in common is that they reproduce and print an original. The differences between the two activities already appear in the different terminologies. They also cover the materials on which the image is printed, the pattern processing procedure and the need for fixing the pigments. The most important aspect in which textile printing differs from paper printing is its extreme dependence on the latest word in fashion. Decisions for new collections are made at the spring and autumn fairs. Special late presentations are held for the latest fashion trends. The textile printer must thus be sufficiently flexible to meet market pressures and deadlines. That often means speeding up process operations. This article goes into more depth over the ways in which electronics can already help todays textile printer.

Where textile fabrics are to be printed, the manufacturing method (knitted and woven goods), the material (cotton, polyester etc.) and structure are important. For instance coarse-textured fabrics are often only printed with line designs. The finer the texture, the more detailed the design can be, the higher must also be the mesh number or fineness of the screen. Nowadays it is possible to print on virtually all textiles — from carpets to fine fabrics.

Long preparation for a collection
Here are some of the main working steps for the process operator.

Designers' art patterns are selected and bought.

Corrections emerging from collection discussions within the house are incorporated in artwork assemblies by design artists.

The designs are finished for reproduction in the photo engraving section — which corresponds to the lithographic artists' department — to make them suitable for printing. Some colours in the rough artwork have to be combined, need to infill, or overlap and repeat joins produced to match the printing forme size.

Finally the pattern has to be repeated along the x and y axis at the required intervals for the size of the printing forme.

Printing cylinders are prepared for gravure, electro and curved screens for rotary screen printing.

The pattern colorist allocates ink numbers, for instance of fashion colours, to the design original. Short lengths are printed on the proofing table.

At least three colour versions are bound up — the collection is ready for presentation.

One of the most interesting automation processes of recent years is applied at the important points of pattern processing by using computer assisted colour video displays. Scanners today produce the colour separations needed for different colours from the finished art work. The Chromagraph CTX 330, specially developed for the textile industry, is a complex combination of precision engineering with analog and digital electronics. It opto-electronically scans the designs and digitises them for storage in image processing systems. Finally, once the design is prepared ready for printing, the CTX 330 records the modified digital data from the correction system on to film in analog form.

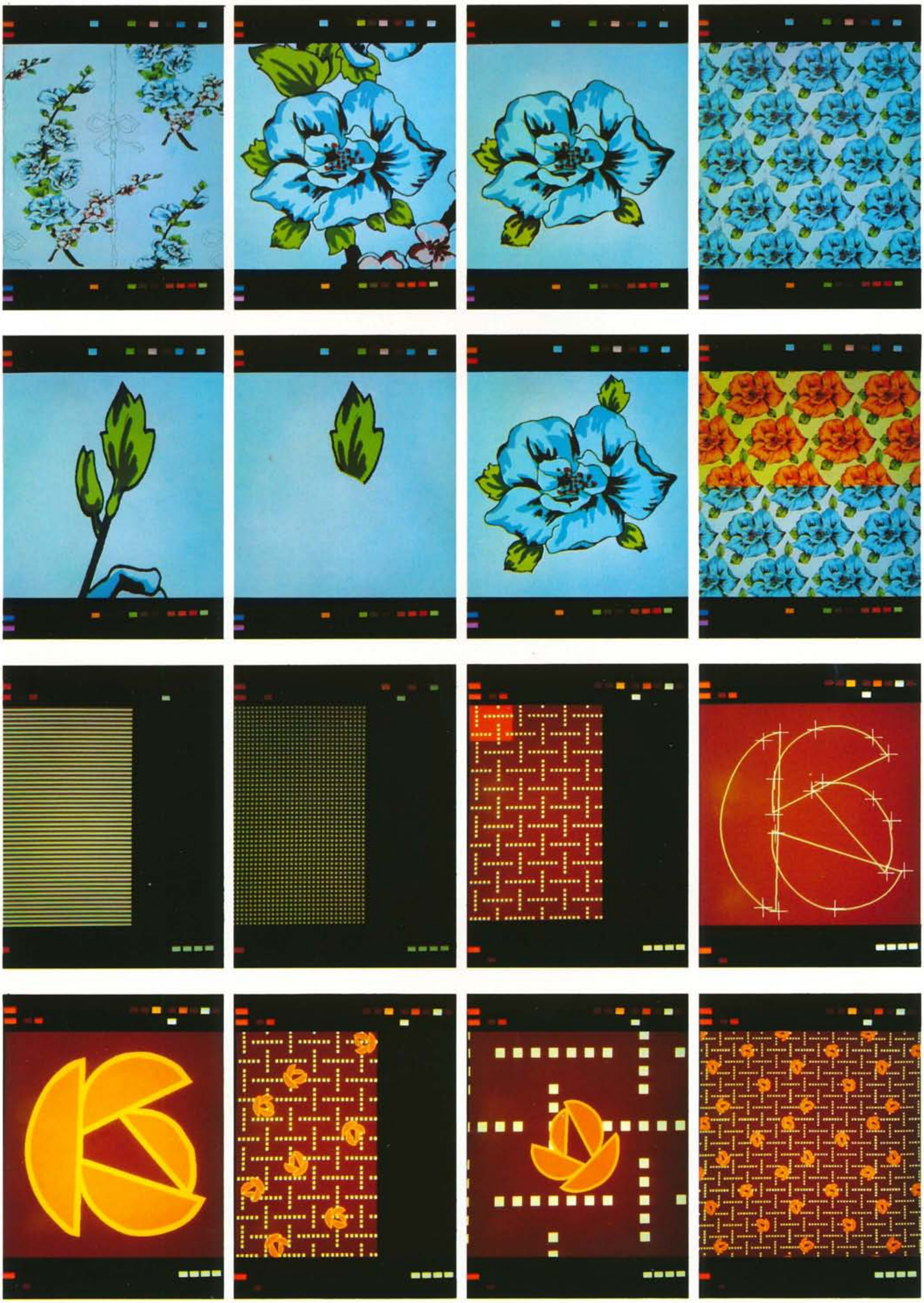
The two illustration sequences opposite show:

New design from old artwork

1. Scanned and stored original, called up on the video display screen.
2. Part enlargement for a new proposed pattern.
3. New pattern element after processing.
4. The repeat shows guttering.
5. A supplementary design element is called up.
6. It is matched to join the main subject.
7. Combination of the two part images.
8. New repeat pattern. Different colour versions are selected by push button keys.

Computer-created pattern

9. Electronically generated stripes.
10. Simple square dot pattern created by superimposed vertical stripes.
11. Background pattern formed by colour definition of intersection points. The area marked in red is automatically repeated.
12. Reference points entered define a stylised rose.
13. The rose is outlined with a selected line thickness and the body coloured.
14. The rose is located at different angles by interaction with the computer.
15. Unwanted background pattern elements are retouched out.
16. Overall view of the pattern created entirely by the computer.



The core of the automation process

Let us return to the pattern processing stage for an example of how pattern correction works on the video display. The pattern data of a colour design are entered via the CTX 330 scanner into an electronic memory system and can be recalled on the colour video display by computer control. We are here dealing with the Combiskop 508 pattern processing station which resembles a corresponding Chromacom station.
The pattern section appearing as a cut-out on the screen is developed to the required repeat pattern by repetition in the x and y directions and displayed to fill the frame. Several electronically joined repeats already give an impression of the eventual textile pattern.
The overall image on the video screen permits checking for unwanted guttering. On pressing a button the required section is shown enlarged twice or four times on the monitor, much as in the Chromacom system. The cursor — a kind of electronic stylus — can be used for every imaginable job, for instance to close or smooth outlines etc. The computer can also display innumerable different colour variations on the screen. These image data, as created and developed, are called up from the memories and recorded in the scanner on film as a colour separation. This then goes through further processing as already indicated. That closes the circle: It also proves that electronics has already managed to automate up-to-date technology in the important steps of textile forme preparation.

Dr. Klaus Jordan

We are grateful to *Manufaktur Koechlin, Baumgartner & Cie. AG* of Lörrach — the first user of the Textile Data Processing system developed by HELL — for the illustrations used in this article.

The start of pattern processing in the TDP system. At the left is the data input video terminal, at the right the video display monitor.

Intermediate check of a copper cylinder for transfer printing, engraved by the Helio-Klischograph.

Final result of a cylinder-printed five-colour reproduction.

The new K 201 / K 202 Helio-Klischograph generation

Program-controlled operating station and microcomputer-controlled electronics

Engraving systems should be up-to-date and should also be adaptable to future ways of job handling. They must therefore be designed for software control. HELL's development team is making sure that the new engraving systems make fullest use of these possibilities. With specially tailored programs we have managed to meet the requirements on the one hand of decorative and packaging printing and on the other of magazine printing.
A strict separation between the operating station software and the microcomputer program controlling the electronic system permits rapid adaptation to different applications. This article shows how program-controlled magazine generation, forme, job and part job handling has become realised, especially by using operating flows. Supplementary programs such as location of engraving heads and scanning heads reduce setting up times.
The author shows that in the software-controlled operating sequences of the new Helio-Klischograph generation the program-controlled operating station and the control electronics microcomputer are two quite separate items.

Program-controlled operation for magazine printing

The primary starting points for the operating station software are the "magazine" and the "forme" which the operator has to set up at the operating station by computer control. The magazine comprises the fixed basic engraving parameters for the intended printed product — for instance screen, scanning cylinder circumference, number of pages on a printing cylinder. The forme contains the variable parameters for the printing forme to be engraved. The forme must contain all parameters not preset in the magazine, for instance colours, printing cylinder circumference, overlap etc. The forme is always specific to the magazine. The program integrates the magazine parameters into the forme, so that the final forme contains the complete set of engraving data. Several formes may be assigned to a magazine. If for instance a magazine is allocated "STAR" as the title, the relevant formes must all begin with the "STAR" magazine title and can then be distinguished by additional alphanumeric designations (STAR 1, STAR 2, STAR NEW). All entered data are stored on a diskette. The engraving parameters become accessible on calling up the forme designation.

Gradation and impositioning scheme (position scheme)

Two relevant criteria in setting up the magazine and formes are the gradation and impositioning scheme. Here is what we mean by them.
Gradation may be generated electronically by a program. After operating the program and entering pairs of coordinates, the computer linearely interpolates over the whole gradation range. The gradation calculated in this way is recorded on the diskette under an assigned number. The gradation can be recalled under this number at any time and allocated to any magazine or forme.
The scanned pages to be engraved in the various areas of the *impositioning scheme* are allocated to those areas (see example). Each impositioning scheme setup is stored on the diskette under its assigned number. The impositioning schemes can then be recalled under this number and allocated to a forme. The ingenious aspect of this type of allocation is that the sequence in which originals are scanned on the scanning cylinder is independent for the imposition of the engraved pages on the printing cylinder. With HDP, pages are also allocated via the impositioning scheme. For packaging and decorative printing an impositioning scheme can create up to thirty copies around the circumference.

Engraving jobs

The entire sequence of magazine and forme preparation does not have to be part of the operator's job — it can equally be part of job preparation.
The operator at the Helio-Klischograph K 201 or K 202 then works from the prepared diskettes. He calls up the forme designation of the printing forme to be engraved, enters the colour (screen angle) in the operating computer and indicates the job to be carried out. For instance magazine printing integrates the following engraving jobs:

1. GR	Scanning an original and engraving.
2. NGR	Subsequent engraving of missing pages of an already engraved printing forme.
3. PR	Engraving without scanning. A selected number of lines are engraved with a programmable density value.

Program-controlled operation for packaging and decorative printing

Here it is possible to run an engraving program consisting of several part engravings. The basic concepts are here the "job", "part job" and "execution sequence".
The *job* refers to the whole engraving process. It contains the data that remain constant from one part job to the next.
The *part job* contains the data of a partial engraving that are not preset for the job, plus certain additional parameters to fulfil the conditions of the part engraving.
It is for instance permissible and possible with the Helio-Klischograph to modify the gradation from one part engraving to the next, to select a new circumferential image stagger of the engravings or use a new position scheme.
Virtually all parameters may be changed that do not affect the screen structure.
With the *execution sequence* HELL engineers have met the requirement for engraving programs of different parameters in the axial and circumferential direction from one repeat to the next.
It is also sensible and efficient to preprogram the entire engraving sequence for a cylinder — which again is ensured by the execution sequence.
Here is an example for demonstration. The input at the operating station is printed in italics below and followed in each case by relevant explanations.

1, 2: Part job 4

Scanning between horizontal markers 1 and 2 and engraving with the parameters of part job 4.

NG, 2, 1: NG, 1, 2: Part job 1: 2

Scanning from marker 2 to 1, using the parameters of part job 1 (mirror image). Scanning from marker 1 to 2; the entire process is run through twice. The sequence is seamless in the axial direction.

VORA, M 7

The scanning head automatically runs to horizontal marker 7.

7, 4: 4, 7: Part job 2: BG, 923

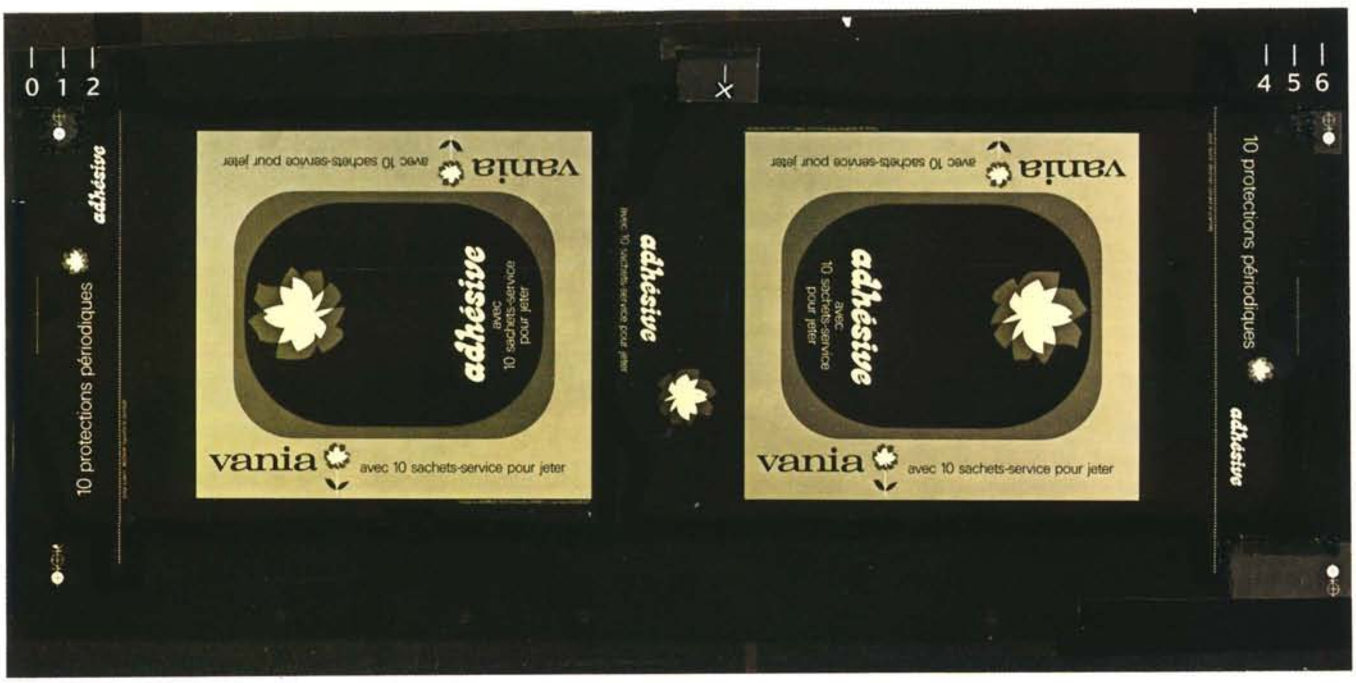
Scanning from 7 to 4 and from 4 to 7, using the parameters of part job 2, until the engraving width reaches 923 mm.
This sequence runs automatically on triggering the engraving start, when the horizontal markers are established on the scanning originals.

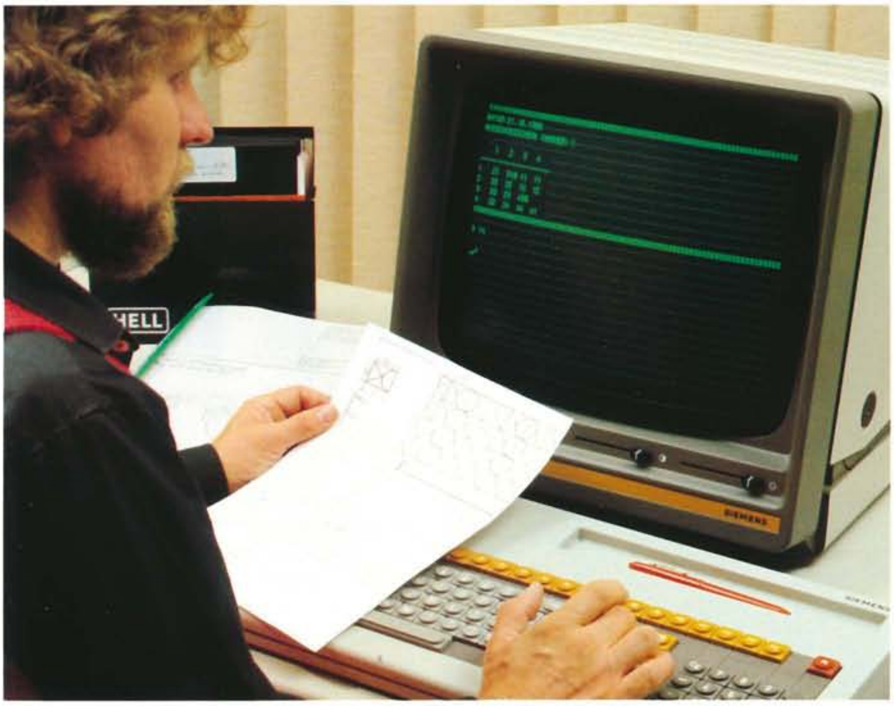
The microcomputer of the control electronics

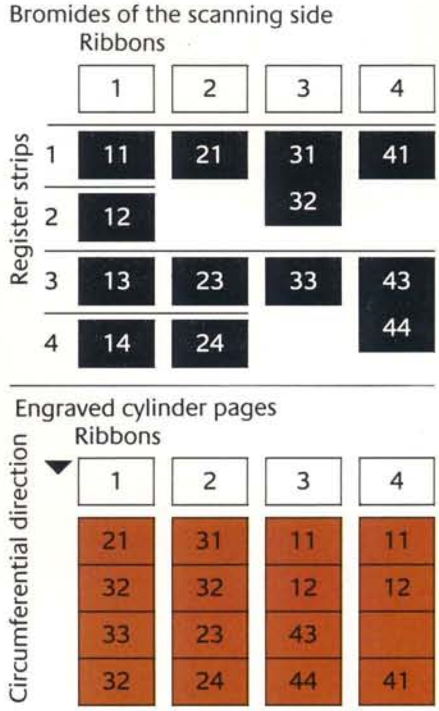
In magazine, packaging and decorative printing the parameters and information, calculated by the program and tailored to the hardware, are generally fed to the microcomputer of the control electronics.
The microcomputer takes over the data of the operating station, distributes them to the appropriate registers and stores them in its own working memory for reference whenever required. After distributing these data the machine is ready to run. The machine is operated by program-controlled keys.

Setting the horizontal markers

Horizontal markers are marking points on the scanning originals. Between these markers part engraving jobs can run with modified parameters.
The specified values are entered at the operating station, the actual values are determined on the machine. The specified values always refer to the printing cylinder. If the actual values deviate, a fine-range scale change is automatically carried out at the scanning side.
The following example illustrates how these markers may be set for packaging printing:
The scanning head is manually located at starting marker 0. On pressing the "marker" key, the equipment carriage automatically runs to marker 1. If the specified and actual values do not match, for instance if the original has undergone dimensional distortion, manual correction is possible. After the correction the actual value is stored and overrides the specified value. On pressing the "marker" key again, the equipment carriage automatically advances to marker 2.
The machine also determines previously unknown distances (for example "x"). Once the actual value of every marker is established in this way, the equipment carriage is at marker 6, i. e. the last marker. A correction program can now automatically run down







all markers based on the established actual values. Altogether up to 64 markers can be set. As described, the execution sequences are tied to the horizontal markers.

Engraving

On pressing the start key, important sections of the engraving run by program control.

Here is an example to illustrate the general scheme with a packaging and decorative printing job.

The entire engraving sequence is regarded as an engraving program. It normally consists of several part programs which automatically execute part engravings.

At the beginning of the engraving the control electronics holds the data of the first part engraving. Once this is engraved, the microcomputer calls up the data for the next part engraving from the process computer of the operating station while the cylinder is rotating and the stylus moves above the copper surface. When this engraving section is completed, data are again called up for the next part engraving. This process is repeated until the cylinder is completely engraved. A termination instruction then concludes the engraving program.

The normal process runs automatically. It is however possible to program at the operating station an interruption at the end of any part engraving. In this case manual operation is possible between two part engravings.

Software-controlled execution

The *horizontal feed* of the scanning and engraving base carrier is controlled by step motors. Two frequency computers control these motors and receive their instructions from the overriding microcomputer. The *slow rotation gear* is also program-controlled. It rotates the scanning and engraving cylinder in fine increments for reproducible calibration procedures and cell measurements.

To reduce setting up times for the positioning of ribbon distance of the engraving and scanning units, programs have been designed for rapid setting of the exact ribbon intervals of the system. The operator enters the interval at the operating station. On pressing a key the systems automatically advance by this distance. Further operating modes are controlled by the microcomputer program.

Vignette engraving, scale variation, seamless engraving and engraving cut-off at cylinder edge are examples of the wide range of possible operations.

This flexibility and operating convenience of the Helio-Klischograph would not be possible without software control. The HDP capability of the system, i. e. data processing from external data sources, would not be realisable without software.

Dieter Herforth

The illustrations show how the impositioning scheme (left) links up with the mounted bromides (top) and the engraving sequence. A symbol in this impositioning scheme signals that the original is a double-page spread. Double pages are electronically split up into one upper double page (31, 43) and one lower page (32, 44). They can also be imposed electronically with a single page to a new double page spread (33/32) when this is necessary for the impositioning scheme. An empty space in the impositioning scheme indicates that no engraving takes place at this point. Such a page can be inserted later by subsequent engraving.

DOSY
A proved program system for the Digiset 200 T

The author of this article is in charge of the typesetting and process programming division of our company. He is familiar with graphic arts industry problems and solutions, ranging from the use of the first HELL hot typesetting programs through all subsequent systems up to the latest Digiset models.
HELL is now making digital typesetting possible even in medium-size printing works, using smaller compact recording units in the form of the Digiset 20 T digital CRT typesetters. To make the advantages of these exposure units fully accessible to new users, HELL supplies not only typesetters but a complete efficient production system for them. That production system is based on the long established DOSY typesetting program. With its efficient hardware this offers important advantages for all system users. The article illustrates how a setting program becomes a system.

The new Digiset 200 T system

Let us look at the criteria of the 200 T production system by which a system would be selected. Noteworthy for medium-size printing works is the fact that the new typesetting system draws on more than 16 years of experience in typesetting programming and in the production of digital typefaces. Today many typesetting instructions or parameters of such instructions are commonplace. But a comparative performance test made by the user before deciding on a system is sure to show up the significant advantages of the 200 T system.
There used to be much discussion over individual instructions. The HELL system includes all the necessary make-up instructions. More important than ever is the question of how easily such a typographic language can be learned and how easily it can be remembered in terms of the user's own language. This is where the Digiset 200 T system offers a vital advantage. It adopts the proved DOSY programming language of the Digiset 400 T system in its full performance range and operation. Users are increasingly calling for that, too — or at least they should when dealing with suppliers of small and compatible larger systems. The customer here benefits through:

- consistent training and instruction,
- and hence easy familiarisation of new staff with this system. (Retraining staff to a new system is getting increasingly more difficult).

In developing the smaller systems, HELL took care not to introduce deviations incompatible with the larger systems.

What degree of convenience or automation can the user expect?

Let us start with daily system operation. A typesetting system is switched on at the beginning of a shift and must then be available ready for operation. It must automatically and without additional controls match the working rhythm of the user. Thus new text should be automatically entered without entering operating instructions and all texts to be output should be equally automatically exposed by the system. This also applies when for instance system components are subject to idle times due to material replacement or maintenance. We are referring strictly to system components — the system as a whole must never stop. Convenience in our view starts by providing the user with a viable program system adapted to the essential working sequence.

High priority for video display terminals

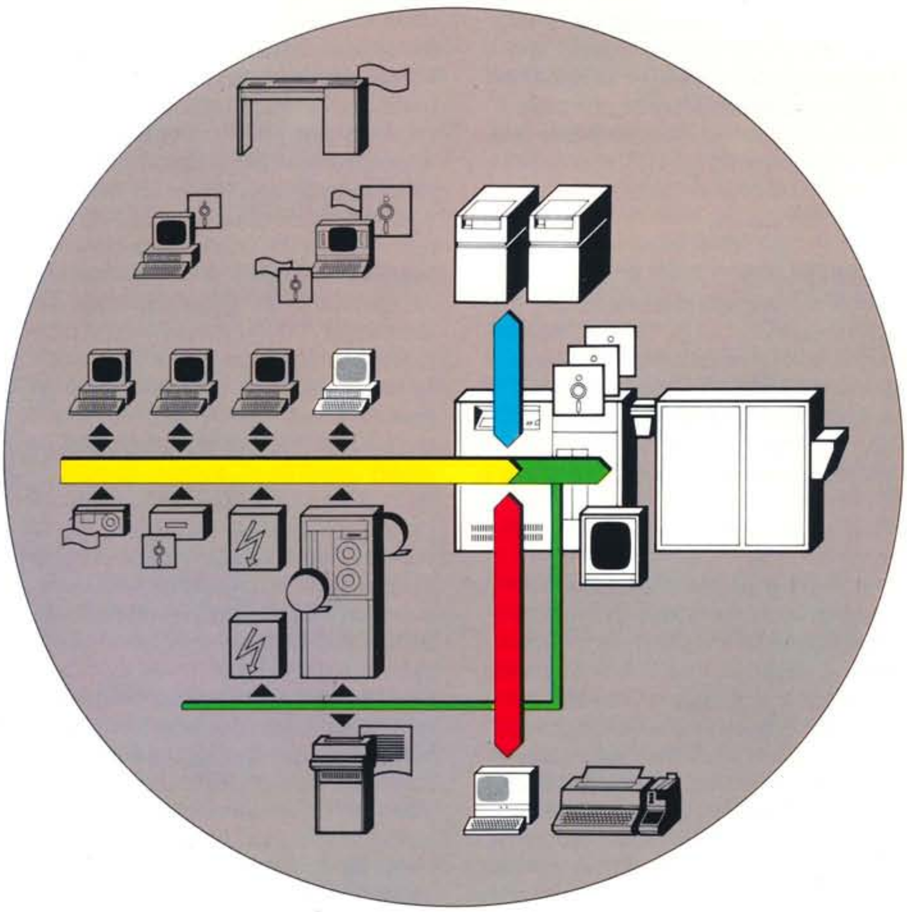
A modern typesetting system depends on interactive operation. Hence a video display terminal (VDT) must have the top priority in the system. All other jobs must not rest but run at lower priority simultaneously with current events.

What does this mean in practice? The user generally has a timing scheme to meet in-plant requirements. This implies that all advertisement texts in the system have to be sorted and exposed at a given point in time. The user then instructs the system via the video display terminal to proceed to sorted output. But while the classified advertisements are sorted and exposed, new texts can be input simultaneously off-line or other texts input and corrected via VDTs. This simultaneous processing is of course a feature of the 200 T system. But the idea of work sharing goes further still. As already mentioned, VDT operation has the highest priority, as here an operator usually sits in front of a VDT screen and waits for the system to respond. When required, a text unit defined by being called up on the VDT is thus processed with priority, but at a lower level an off-line text unit already in the system continues to be prepared. As far as the user is concerned, two different texts are thus being processed simultaneously.

Text organisation advantages

Text storage and direct access to text data is equally important in a typesetting system for a medium-size printer. Within the total system the user needs a convenient data management system. The overall organisation here ensures that texts can be corrected page by page. In bigger jobs each page counts as a single text, for during initial processing the program has set up so-called page setup points that permit revision of just one page. Such program automation can save a lot of time, especially with longer text units (text setting of books), as the correction of a work can be distributed among several video display terminals.

But text organisation considerations start earlier, namely with job preparation and collection when classifications (job number, object identification, classification code) are selected for the text to be entered. A text keying supplied with the 200 T system with up to 20 digits permits systematic organisation even of complex management needs. Other possibilities include duplicate storage of a text (selected by the user) or an automatic logging function on discs or magnetic tape.



Text unit access and setting up video display masks

With the aid of the 20-digit identification key the user has direct access to any text unit or part thereof. If he does not know the exact identification or wants to review all texts of a given classification, he can call up a contents list on the VDT screen and select the required text unit from that. To provide a best video display mask for any given case, the user has available a program for individual setting up of video display masks.

For text input and correction HELL uses video display terminals with typefaces that can be loaded into them and go far beyond the usual keyboard. These video terminals may be connected on-line to the system 200 T or used off-line with floppy discs. This provides the full advantages of convenient text input and correction via a video display screen. Up to 255 different characters can be displayed with any one video terminal font. The program system manages up to 10 different fonts for the video display terminal. This permits adaptation to different jobs (for instance Cyrillic or Russian characters, mathematical jobs etc.). As a matrix output printer can also be connected to each VDT or the system 200 T, it is possible to keep a complete log of the entered and corrected texts, indexes etc.

Basic system and extension

In the last section we covered the overall system; let us here briefly note the composition of the basic system and further extension scope. The main point is that the user has a modular equipment and production system with which he can tailor the hardware to his specific requirements. This basic equipment must at any time be capable of extension without requiring replacement of system components. The HELL system makes sure that when hardware and programs are acquired, the overall system remains adapted to the performance requirements of the user.

Basic setup and possible extensions of the 200 T system. The overall system configuration can be individually matched to user requirements and extended at any time.

The basic concept of the system must allow for potential extension and backup requirements. Thus it may be necessary to decide in a given case whether standing type and production text data are to be stored in small disc stores of 2 × 16 MB (megabytes) or whether one should from the outset use 80 MB disc stores whose capacity may not be utilised at first — but which offer organisational and extension advantages. Sometimes the decision is made on the grounds that a friendly neighbouring printer uses the larger disc store and the data carriers can then permit direct backup in case of a plant breakdown. As already mentioned, HELL has paid special attention to clear program development. Thus the user of a 200 T system has the full backup possibility with a Digiset 400 T system. The program systems differ only in their recording scope.

Modular system advantages

For the user, a modular structure means that additions to the system involve no essential organisational changes in operation. The hardware or programs available at the time when the system is to be extended are all retained in the overall concept and in the functions. Stored standing type data continue to be fully usable without reorganising. Hence any conversion is straightforward. HELL has carefully planned the overall concept to ensure this. It also benefits customers who start CRT typesetting with the Digiset 200 T system.

Modular organisation

The basic outfit of the Digiset system includes the hardware and software for convenient video display-assisted CRT typesetting production. This basic outfit already offers the user all typographic instructions and organisation statements to enter, correct and expose texts. The program also takes over obvious functions such as font and logotype management. But this is obvious only in a 200 T or 400 T system, for these include many program features to facilitate practical operation. Fonts and logotypes are brought into the overall system and managed there by service routines forming part of the system. This stores not only the shape of the character but also the relative width of the character for line justification.

The user can also complement the standard character store of a font. Such single characters are automatically inserted by a program in existing fonts and managed there. Character modifications are also possible, for instance to produce exponents from index numerals; so is variation of the first and second side bearing of characters. But that is not all: A quality feature of the HELL typefaces is that up to five size ranges are used in storing a typeface design to ensure an aesthetically satisfactory typeface image. Here program automation allows the user to lay down the transition point (sizes of Digiset typefaces overlap in the various size ranges) as a system parameter so that the program then automatically selects the most suitable typeface size range.

Program automation is even more efficient when point sizes are to be changed within a text or even within a line. The program automatically determines the separation from the previous line from the descender size of the largest point size in this line and the ascender height of the largest point size of the current line. Any leading or film transport is allowed for in addition. That relieves the user of all calculation in determining the required line distance and keying the appropriate feed instructions.

Preparing instruction chains and user formats

In keying in texts, these functions permit specially brief designation to trigger frequent or extended character sequences. With efficient job planning this can establish a logical structure for certain jobs where changes to allow for different setting instructions involve merely interchanging an instruction chain.

Linking texts

When big text volumes are to be covered, these can be split up for keying at several input units and then linked up for overall processing and output. This provides an elegant solution for text input with more manageable text volumes even for big works.

Program modules for all applications

This most important feature of the program concept allows the user to carry out different program functions without having to plan a job sequence by external organisation (for instance separating book and newspaper typesetting). Such a program approach was abandoned earlier on and today — where memories of a typesetting computer are cheaper than programs — we already have proof that this was the right choice. Most newspaper composing departments also have to handle commercial tasks on the side. It no longer makes sense — and indeed never did — to separate such texts in terms of organisation and correct them for instance with different programs. HELL deliberately does not offer standard program packages for specific applications, but offers a wide range of program modules. From these the user can assemble the program he needs to run all his jobs and functions simultaneously. After all, while running text advertisements are being sorted and output, it should be feasible to correct the text of a book at the video display terminal and at the same time make up another text unit into pages. Such operations are possible with the HELL programs of the 200 T system.

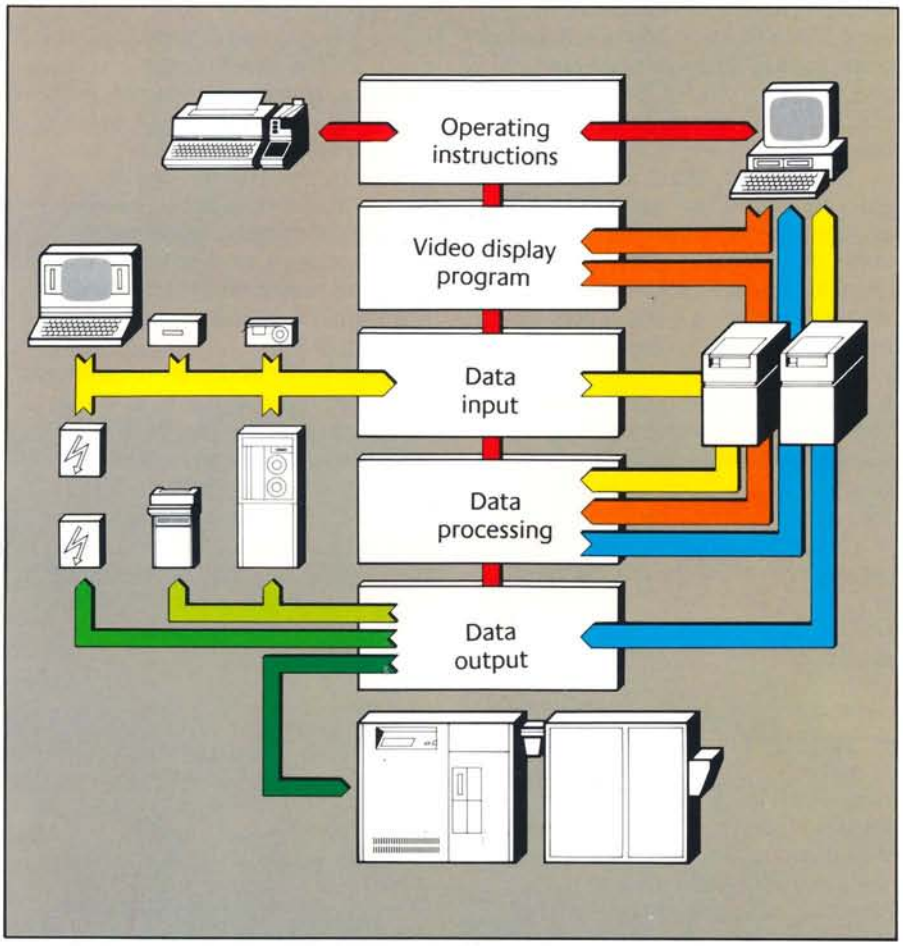
Further development of existing program modules

Needless to say, the software development is constantly continuing, to meet customer requirements. We are particularly concerned with consistent development. Our users benefit from the principle of a disc-based basic program built up through many years of experience — and from the inclusion of the interfaces needed for current realisable, and future possible, developments.

Newspaper and book text make-up

These jobs and functions are described in extensive specifications so that we can here only briefly refer to the most important ones. Newspaper make-up involves programs for article make-up, editorial page make-up, make-up of running text advertisements and make-up of display advertisements. Articles are made up as a function of the format. In other words, most articles are related to a house style that specifies the form of the article (e. g. number and depth of columns) and the arrangement of the article elements (main head, author, opening, text). A standard also specifies the permissible leading between such text components by an automatic program system. Only manipulation of leading is permissible, most users reject text adjustment by automatic point size selection.

Made up articles can be assembled to a whole page for combined exposure. The make-up logic of editorial pages here differs from the rules for classified advertisements and display advertising pages. Program components for body text setting are available to create running heads and folios.



Simultaneous operation, as shown here, is possible by processing at the same time video display texts and off-line texts. Yet this still leaves sufficient time to control the output unit and to process operating instructions.

Footnotes are also processed in make-up — they are numbered serially on each page, set on the same page and made up with ist. Make-up problems with orphans and widows are taken care of automatically.

Make-up help with hardware
The result of the make-up can be displayed at any time on the Digiskop which acts as a window into the typesetter. Further, the company works at an interactive make-up station where make-up problems are dealt with quickly and easily.

Including subsystems
So-called subsystems are liable to appear more and more frequently in the future. One was already mentioned in the last section: The make-up station and editing system.
The make-up station (with its own computer and store for texts of several pages) permits interactive make-up controlled via a video display. The editing system with integrated wire service system is used within the editorial department and permits on-line handling of wire services, and the input and editing of editorial texts. Text handling and identification of setting techniques is here matched to the requirements of the editorial department. It offers the editor an organisational aid that also carries out the setting program alongside. On calling for spacing, the editor sees the exact amount of text (number of lines or mm depth) and thus has early make-up data. Equally he can check the status of his articles and feature sections with the aid of contents registers. With advertisements (classified advertisement input) the main problems are management, reasonableness and credit checks in collaboration with the sales department. A special subsystem here again deals with input and management.
Such subsystems must be able to work with the production system to which they are allocated. Sometimes such systems may not be in the same place but at a different location, linked by direct coupling with the computer or over larger distances with remote data transfer. The small system provides every scope for such link-ups in terms of hardware as well as software extensions. The setup can always be coupled with another production system or another recording unit, e. g. a further printing location or back-up.

Dieter Röttgermann

Digital music setting

Over the last 10 years the Satz-Rechen-Zentrum Hartmann + Heenemann KG (Hartmann & Heenemann KG Typesetting Computer Centre; henceforth refered to as TCC) has developed from a regional composition plant to a service centre for data processing and Digiset CTR typesetting. Its customers include publishing houses, printers and public and scientific institutes throughout Western Europe. Unique in the printing field is the possibility of mathematical equation setting at the TCC for which Siemens/HELL developed the software. Meanwhile this Berlin firm has a further surprise. The author of this article, a mathematical graduate, shareholder in the firm and responsible for software system development, describes Digiset music setting.

Data processing at TTC started modestly with a Siemens 304 process computer used as a typesetting computer and a Photon 713 for the typeset output. This was soon replaced by a Digiset 50 T 21 and later by a Digiset 40 T 2. Currently the firm has an efficient Siemens 7.541 data processing system (working store of 2 megabyte, about 900 megabytes disc storage capacity, remote data transmission, BS 2000 operating system) with which the TCC is ready to cope with future jobs, too.
It became apparent already in early years that the software supplied by the computer manufacturer was inadequate to deal with complex setting jobs such as music. The TCC therefore started developing its own modular setting system. At the original planning stage a number of interfaces were envisaged to allow object-dependent data manipulation during typeset processing by connecting special program modules. This could for instance generate running heads from the text data or extracts from registers with page references. Music setting by the Digiset is one example among many that demonstrate the efficiency of the program system used at TCC.
Music notation differs from written recording of spoken texts in a number of special ways. The musical significance is indicated by a two-dimensional arrangement of note symbols in a system of lines. The horizontal separations of the note symbols express musical shades for which the store of note symbols of different length is not adequate.
In addition, music notation uses a wide range of symbols whose shape is determined by their position and surroundings, for instance arches, bars or ligatures.
Computer processing of music texts needed the development of a code to permit translation of music texts into a form capable of machine reading. Such a code must permit the unambiguous re-creation of the original music image — at any rate uniquely in terms of the significant musical characteristics of the original note text.

The reproduction of music texts entered and stored in musical notation called for the development of complex software. These programs not only had to provide ad hoc generation of symbols that depend on their surroundings; to achieve a visually satisfactory note display it also needed a wealth of complex layout rules.
These problems were solved in the course of several years by Dr. Norbert Böker-Heil of the State Music Research Institute of the Prussian Cultural Foundation in Berlin. A plotter (a computer-controlled drawing machine) was at first used to output the music text. With this, the German Musical Historical Archive in Kassel and the State Music Research Institute of the Prussian Cultural Foundation in Berlin could start a musical history documentation of "Das Tenorlied — mehrstimmige Lieder in deutschen Quellen 1450—1580" (Tenor songs — lieder for several voices from German sources of 1450 to 1580). This aimed not only to cover the verbal sources (bibliographic data, authors, original lyrics) but also the musical data.
The technical scope of the Digiset — its ability to reproduce any digitally stored information — offers a way of producing direct film originals for printing the catalogue. This eliminated the previous roundabout way of reproducing notes drawn by the plotter and assembling pages manually.
The problems involved were solved by close collaboration between the TCC and Dr. Böker-Heil. Thus the programs had to be set up allowing for the high resolution and organising scope of the Digiset. Certain symbols (e. g. note heads and keys, interval signs etc.) were specially digitised for Digiset reproduction. The TCC typesetting program system was extended by instructions for positioning symbols in Digiset units (image line and screen steps) and to permit dynamic management of those ad hoc note symbols that depended on their context. To prevent interference of successive music lines, it was necessary to monitor not only the relative width but also the body height of the note symbols.

1706 = 99911

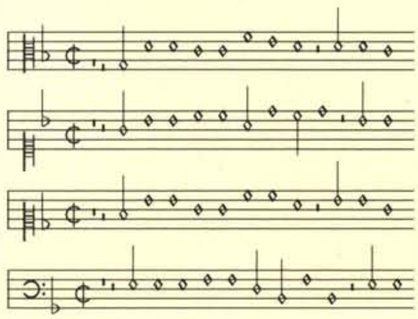
5007 = 99912

The services of the Hartmann & Heenemann KG Typesetting Computer Centre cover — broadly — consultation, system analysis and programming; initial collection of large data volumes and taking over data stores; storage and administration of text data; multiple utilisation of stored data (partial extracts, sorting, index generation); tabular computation (mathematical tables, tax tables); setting up, maintaining and evaluating data banks; typographic text processing (including automatic page make-up with running heads, footnotes etc.); Digiset CRT typesetting; microfilm production (by Digiset or Dicom); provision of replacement data carriers; printing and mailing.

The illustrations here show what has been achieved so far. This is however still a long way from utilising this process for commercial music setting. Thus a conductor or musician must be able to take in a whole page of a score at a glance. This is only possible by using input and correction procedures in which the note compositor can control the layout of a music page interactively with the computer. The necessary engineering elements — graphic terminals of high resolution such as the Digiskop — already exist. But it will still take appreciable development to create an efficient software permitting convenient dialogue.

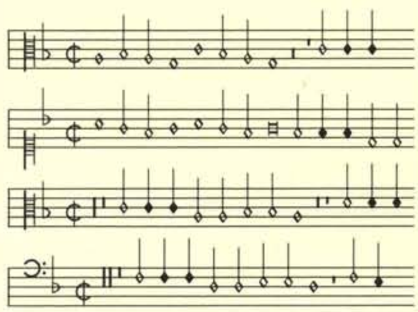
Helge Blischke

25.54 Ludwig Senfl
Sjch hat ein newe sach auffdrat ja; Nr. XLVIII
T–S–A–B:

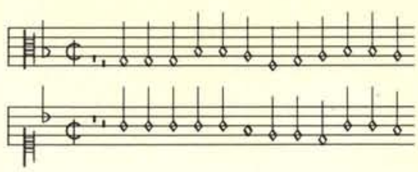


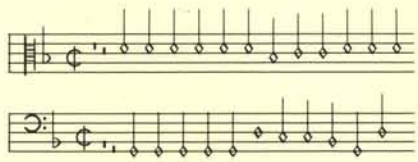
25.55 Anonym
Es warb ein schoener juengling ueber; Nr. XLIX
T–S–A–B:

25.56 Anonym
Es was einmal ein stoltzer knab der; Nr. L
T–S–A–B:



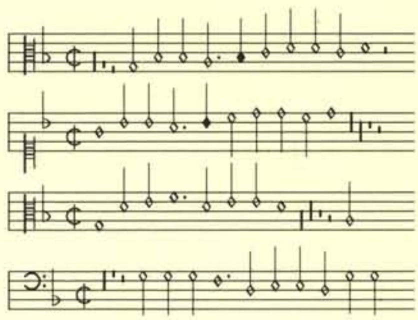
25.57 G. For. [Georg Forster]
Der heylig herr sant matheis der; Nr. LI
T–S–A–B:



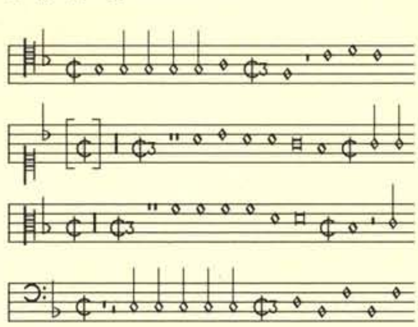


25.58 Ludo. Senfl
Ejn meydlein zu dem brunnen gieng; Nr. LII
T–S–A–B.

25.59 Anonym
Jch bit dich meydlein hab mich hold (S); Nr. LIII
T–S–A–B:



25.60 Georg Vogelhuber
Was trag ich auff der hende ein; Nr. LIIII
U = Ein gleszlein (IN)
T–S–A–B:



25.61 Anonym
1. p. Vjtrum nostrum gloriosum eo; Nr. LV
Mehrstg. Satz ab 'eo gratissimum'
T–S–A–B:

Examples of music typesetting from the music manuscript catalogue (left). Experimental edition in conjunction with a computer project for series A/II of the Répertoire International des Sources Musicales (International musical source directory).

All music setting examples are published by kind permission of Dr. Norbert Böker-Heil.

Section of a Digiset-set page from the three-volume work "Das Tenorlied" (Tenor songs). The songs were recorded in contemporary notation.

Extended Digiset typeface range

The last supplement of the HELL typeface catalogue contains 34 new typeface designs. These include new developments such as *Edison, Praxis, Napoleon* and *Monanti* and newly adopted licensed faces such as *Aldus, Palatino, Trump-Mediäval, Clarendon, Century Schoolbook* and *Blizzard.*
Many further interesting typefaces are in preparation, including *Rockwell* which is in constant demand and the popular ITC faces *Souvenir* in *American Typewriter.*
We are making a special effort to develop completely new typefaces that are best suited to phototypesetting. Dutch typeface designer Gerard Unger has added to his *Demos* an italic face and is adding to his *Praxis* sanserif face three further weights. *Praxis* is matching *Demos* for a major family. This for the first time makes it possible to produce harmonically matched sanserif and antique combinations with all their implications.
While *Demos* has already been presented in "Klischograph" and was also used to set the 1/79 edition, we shall here take a closer look at the related *Praxis* typeface. In its structure and conception it largely resembles *Demos* with a high x-height, rounded corners and oval shapes but is very open for a narrow body. The line thickness varies slightly similar to *Demos* and creates a pleasant pattern. In designing the shape, special attention was paid to the structure of the scanning cathode ray. *Praxis* as a typeface is widely compatible with *Demos,* and therefore very suitable for periodicals, lexica and handbooks. *Praxis* on its own or together with *Demos* is also useful for many tasks in the display field. To complement the existing medium and bold weights we now have light, semibold and extra bold. With the electronic scope of creating condensed and italic faces — also tested and allowed for in the design — we thus get a wide selection of typographic styles. Thus a periodical can display a harmonious appearance with a single large typeface family, yet offer sufficient variation in presentation.
Napoleon is a completely different style, a modern slab-serif face. While previous designs of this kind such as *Rockwell* or *Memphis* have circular curves and serifs of almost the same thickness as the basic strokes, the shape of *Napoleon* is condensed and the serifs noticeable lighter. The slightly squarish appearance deliberately matches the characteristics of a cathode ray and provides a consistent shape in all widths. Apart from the standard light, medium, semibold and bold, the face also includes a condensed bold, outline and Cyrillic.
A similar "technical" typeface is *Monanti.* It was developed to permit data stored on magnetic tape to be set by the DRUDI program with the Digiset rather than on high-speed printers. This is economically justified by better legibility and paper saving. The roman *Monanti* typeface of constant relative width in medium and semibold offers an image that could be balanced almost as successfully as a normal face. This was achieved by a larger x-height and very open and broad lower-case shapes. The face is well completed, especially with numerals and offers better legibility than *Olympia* which is frequently still used with the DRUDI program.

Peter Käpernick

Napoleon mager
ABCDEFGHIJKLMNOPQRSTUVWXYZ
abcdefghijklmnopqrstuvwxyz

Napoleon normal
ABCDEFGHIJKLMNOPQRSTUVWXYZ
abcdefghijklmnopqrstuvwxyz

Napoleon halbfett
ABCDEFGHIJKLMNOPQRSTUVWXY
abcdefghijklmnopqrstuvwxyz

Napoleon fett
ABCDEFGHIJKLMNOPQRSTUVWX
abcdefghijklmnopqrstuvwxyz

Napoleon schmalfett
ABCDEFGHIJKLMNOPQRSTUVWXYZ
abcdefghijklmnopqrstuvwxyz

Monanti normal
ABCDEFGHI JKLMNOPQRSTUVWXY
abcdefghijklmnopqrstuvwxy

Monanti halbfett
ABCDEFGHI JKLMNOPQRSTUVWXY
abcdefghijklmnopqrstuvwxy

Palatino mager
ABCDEFGHIJKLMNOPQRSTUVWXYZ
abcdefghijklmnopqrstuvwxyz

Palatino halbfett
ABCDEFGHIJKLMNOPQRSTUVWXY
abcdefghijklmnopqrstuvwxyz

Palatino kursiv
ABCDEFGHIJKLMNOPQRSTUVWXYZ
abcdefghijklmnopqrstuvwxyz

Rockwell mager
ABCDEFGHIJKLMNOPQRSTUVWXYZ
abcdefghijklmnopqrstuvwxyz

Rockwell normal
ABCDEFGHIJKLMNOPQRSTUVWXY
abcdefghijklmnopqrstuvwxyz

Rockwell halbfett
ABCDEFGHIJKLMNOPQRSTUVW
abcdefghijklmnopqrstuvwxyz

Japan

Modern graphic arts technology

The Japanese have a highly developed perceptivity and are said to greatly value graphic arts. They have a good eye for quality and printing precision. As an industrial nation, Japan employs most advanced technology yet likes to hold on to old customs and working techniques. In that sense the graphic arts industry of this country appears somewhat unique: Its technology is highly developed, yet some aspects seem rather traditional. Nowhere else are there so many firms using electronic reproduction processes. And nowhere else is the amount of manual effort as high as in Japan.

High quality requirements

The reproduction of a typical Japanese subject, for instance a Chirashi, or the production of a newspaper supplement requires considerable process work if conventional procedures are used. As this work caused by the special requirements is appreciable higher than in Europe, it is hardly surprising that the Japanese enthusiastically welcomed electronics in graphic arts techniques and are likely to push it in the future. The record is held by Dainippon Printing with more than 20 Chromagraph DC 300 units and 9 Helio-Klischograph engravers for gravure cylinders. Toppan has more than 14 Chromagraph DC 300 and 12 Helio-Klischograph units which are said to engrave 150 to 200 cylinders per day. These two giant firms thus have an annual sales volume of $ 1400 million to 1900 million with a total (between them) of 19,000 workers. If we note that the entire annual sales value of the Japanese printing industry is about $ 11,000 million, we get an idea of how big these two giants are.

Excellent printing quality

The larger printing works are often surrounded by smaller ones to form printing groupings. Smaller orders are frequently passed to the smaller printers and binders where much of the work is still done manually. In a way that may seem most unusual for our ideas, a periodical may use a number of different printing processes. The title pages mostly by offset; colour pages by offset or rotogravure; and reading article by rotary letterpress. The rapid growth of web-offset is conspicuous. High class catalogues of automobiles, electric manufactures, etc. are printed by web-offset today.

Technology from Kiel in Tokyo

Anywhere in the world and especially among the critical Japanese, new processes need practical demonstration before they are accepted. Some time ago we therefore opened a representative studio in Tokyo in conjunction with Überseehandel AG, Zürich who distribute our process products in Japan.
Here customers can test in detail and operate by themselves the various Chromagraph scanners and peripheral units such as the Chromaskop. Apart from demonstrations this studio is of course also used to instruct customers' staff in machine operation. For the introduction of new technologies this is at least as important as demonstrating new machines and systems. As there are now over 1000 HELL scanners in operation, in Japan as elsewhere the age of 'total systems' is drawing closer. This applies above all to the Chromacom system with electronic page make-up and retouching. The most recent appreciable rises in film cost are tending to accelerate the introduction of such total systems which can save printers much film consumption.

The Japanese avidly read newspapers

Modern phototypesetting systems have found and are finding an excellent market in Japan. The most obvious reason for that is that the numerous and complex Japanese characters are particularly suitable for handling by CRT typesetters.
As in Europe, there is a demand in Japan for typical supermarket advertisements. We intend to deal with processing of such advertisements in page make-up. We have demonstrated processing of such 'streamer' advertisements (on newspaper edge) at the International Graphic Arts Show (IGAS) in Tokyo.
Japanese newspaper publishers are large firms and can relatively easily raise the investment needed for up-to-date technologies such as computer control and CRT typesetting. There are also many regional newspapers with editions of 400,000 to 600,000 — usually twice a day. An example is the "Chunichi Newspaper" in Nagoya where several of our Digiset units look after day-to-day composition.
Another large field in the Japanese graphic arts industry is printing wood textures. Wood, plastics, metal etc. are widely used in interior construction and furniture production but are wanted with wood texture patterns. These are applied either as printed paper or sheeting or by transfer printing. This is no doubt a big market for the Helio-Klischograph. Large quantities of wood pattern wallpaper are said to be exported to the USA and Europe.
Despite the traditional outlook of the Japanese, this industrial field has over the last 10 years undergone a great change. The indications are that modern graphic arts technology is finding fast growing acceptance in the land of the rising sun.

Dr. Klaus Jordan

The living past

Recently one of our scanner instructors again had occasion to visit Japan. He enthusiastically showed us pictures brought back from there, two of which we reproduce on the front and back pages of this issue. Then we got reports of the graphic arts industry in Japan. So we decided to finish this issue with a further Japanese subject, which also carries on our "With the camera through the museums" feature. Our representative at Kaigai Tsusho in Japan helped us with this.

As the land of the rising sun Japan has always attracted a great deal of interest — largely probably because we managed to maintain our own culture for such a long time. Our country finally became open to Western influence in the 19th century.
Our religion is a prime example of our cultural inertia. For centuries we offered divine worship to innumerable natural forces. Later this worship extended to our ancestors, gradually developing into Shintoism, symbolised by Shinto shrines. Let me first briefly introduce these shrines.
Important aspects of our religion are the love of our country and our ancestors. In the shrines we worship, among others, the emperor, our tutelary spirits and the ancestors of the family. There are over 79,000 Shinto shrines in Japan and they are usually located in places where we originally worshipped the gods. They have certain specific architectural elements such as the hall of worship and the famous red Torii or archways. The style varies but is always essentially Japanese.
The Shimogamo shrine in Kyoto regularly shows a special attraction: A robing ceremony carried out according to old rites used nearly 900 years ago in the upper social circles, especially the Imperial court. The centre of the ceremony is a very valuable exhibit from the museum, the so called "juni hitoe" or many-layered dress. Several lined multi-layered kimonos are followed by the "karaginu" a kimono of heavy brocade or silk, and eventually by the accessories. The precious fabrics scintillate in all colours, from plum red through blue, green and yellow to white. You can really get a full impression of this textile display only by watching the ceremony itself.
Other signs of the fully dressed court lady include the artistic centre-parted hairstyle, a trailing train which formerly used to indicate the social rank of the wearer and the hand-held fan made of slats of cypress wood.
The court lady dressed up in this fashion — and this brings us back to the beginning, namely the Shinto cult — dances an "ohchonomai", a dance mainly based on religious celebrations performed at the old Imperial court.
What from your Western cultural viewpoint may appear as a mere ancient building and museumpiece, is alive in Japan and is part of our continuing culture and worship.

Y. Yamaguchi

Top left: By current Japanese standards, the shrines are very spacious in their layout. They are frequently located along rivers.

Top right: Japanese lady in a valuable ceremonial dress. This "juni hitoe" revives the old Japanese cultural heritage.

Right: Throughout Japan, lanterns are supposed to scare away evil spirits. This giant lantern is located at the entrance gate of the Senso temple, famous among the faithful and tourists alike.


金龍山
雷門
松下電器
仲見世
仲見世


名
物
豆
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