engineering services

- MECHANICAL LABORATORY
- ELECTRONIC STANDARDS LABORATORY
- SERVICE OPERATIONS
- PROCESS LABORATORY
- PRODUCTION TEST EQUIPMENT
- ENGINEERING STANDARDS
- PUBLICATIONS
- RELEASE SECTION

know your company's...

FACILITIES

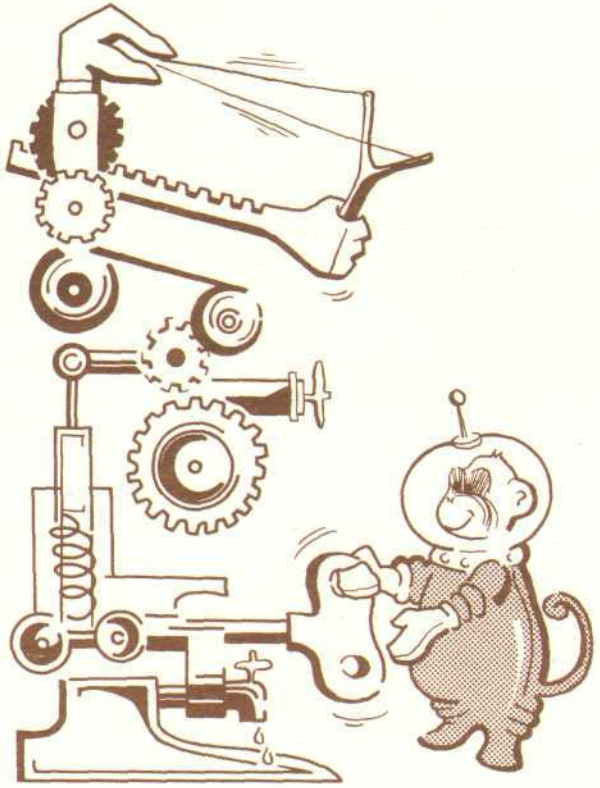
CAPABILITIES

SCOPE

This brochure has been prepared in an attempt to bring to your attention the engineering services which are available to you at Librascope. These Service Groups have been set up to function as highly specialized groups in their respective fields, thus allowing you to devote more time to the important tasks of design, development, and fabrication which result in end products of high quality at a reduced cost.

By availing yourself of the talents of these groups, you will not only be assured of the most up to date information on materials, processes, specifications, and methods of documentation, but you will also be profiting by the experiences of these groups on past jobs.

Galen S. Mannan



Mechanical Laboratory

The Mechanical Laboratory provides a unique, customized assistance to design groups in the fabrication of experimental mechanical and electromechanical components and in the construction of experimental models, and mechanical and electromechanical breadboards.

The lab is well equipped, both in experienced personnel and in machine tools, to handle this assignment. Much of the equipment is by nature of high precision quality for use in specialized applications.

The lab's principle contributions to the design engineering effort are. . .

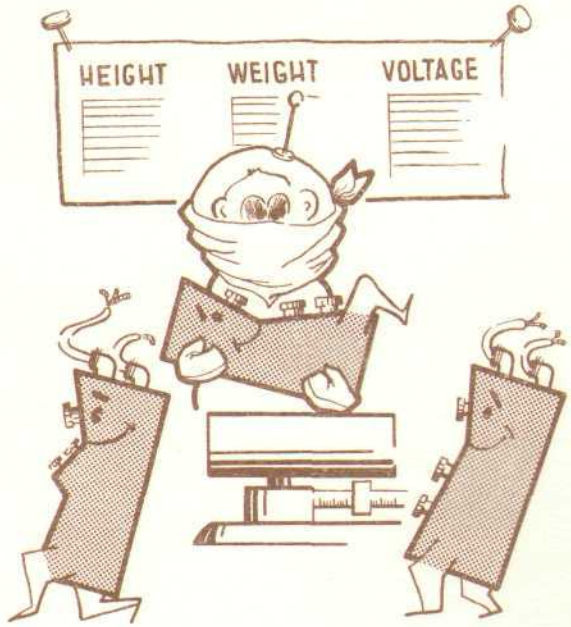
. . Exploring the feasibility of ideas (presented in rough-sketch form by engineering personnel)

. . Fabricating and testing experimental mechanical and electromechanical components for design groups

. . Suggesting improved methods of doing a job

. . Construction of mechanical and electromechanical breadboards

. . Developing more economical methods of fabricating components



Electronic Standards Laboratory

The Electronic Standards Laboratory maintains and calibrates all test equipment and standard measuring devices. The use of properly certified test equipment is a requirement of all military contracts for assembly line testing and for the final checkout and acceptance.

The Librascope Standards Laboratory is officially designated by the Bureau of Naval Weapons as a secondary standards laboratory. The laboratory's reference standards are periodically checked by the Navy Western Primary Standards Laboratory at Pomona and are certified by the Navy as secondary standards.

These reference standards are used to calibrate working standards in both Librascope facilities and the facilities of our subcontractors. Librascope's laboratory is now recognized as one of the best equipped standards laboratories on the West Coast and currently carries a 91.2 rating with the Navy Primary Standards Laboratory in Pomona.

The Electronic Standards Laboratory performs the following services. . .

. . Calibrates and certifies all working standards and test equipment

. . Provides a test equipment loan pool (if an instrument cannot be immediatley repaired, a substitute instrument is usually available)

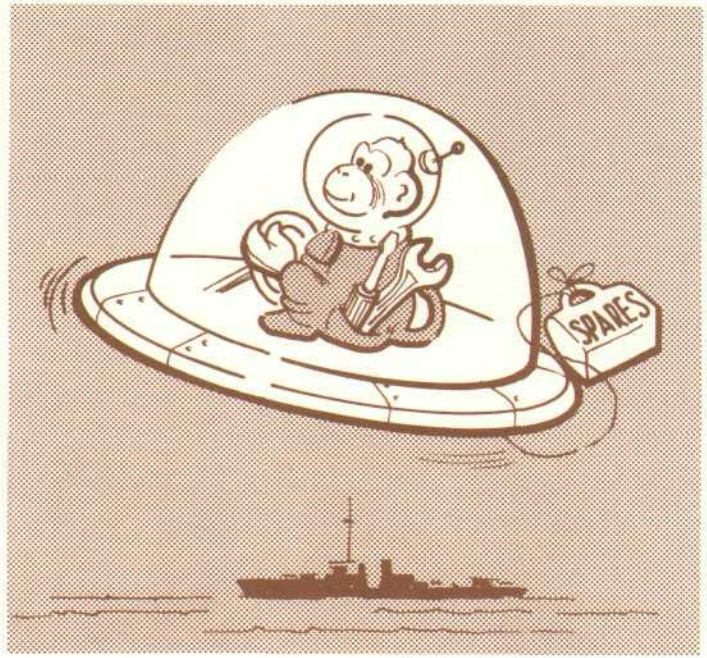
. . Provides incoming inspection and calibration of new test equipment (either outside-purchased or Librascope-built)

. . Repairs test equipment

. . Maintains an inventory and location record of test equipment

. . Maintains calibration and repair records

. . Coordinates the purchase of new test equipment



Service Operations

Service Operations, composed of six highly specialized groups having related interests, provides important initial and continuing product support to our customers and their equipment. These groups: Material Support (Spares Analysis and Material and Record Analysis), Field Service, Technical Training, Packaging Engineering, Audio-Visual Services, and Customer Services, through continuous interchange of information, effort, and ability, provide an effective support organization.

Service Operations must work very closely with almost every area in the company to assure that up-to-date information on equipment modifications, design changes, and changes in delivery schedules is always available. By accomplishing this, Service Operations is able to render maximum product support.

Spares Analysis Group

A practical workable logistics system is vital to the support of complex equipments and systems, both military and commercial. The Spares Analysis Group performs an important function in this area by handling repair parts and tools provisioning requirements for equipment designed and manufactured by Librascope.

Technical provisioning documentation is, in most cases, unique to the particular order or customer and must be patterned to suit individual procurement and logistics systems. The Spares Analysis Group is therefore prepared to accord complete coverage of all the types of technical provisioning currently employed.

In addition to the responsibility for the initial provisioning action and preparation of technical documentation, the Spares Analysis Group is also responsible for the release of

engineering information to manufacturing and for the maintenance of this information to assure inclusion of subsequent design or customer required changes as they occur.

Field Service

Field Service provides installation and maintenance assistance at the customer's facility. Field Service engineers are placed on a resident basis at the customer's activity when considered advisable during the checkout phase of prototype equipment or advisable because of the variety or number of equipments at the activity.

A continuous feedback of data on instruments and components by engineers in the field provides a very important service to the technical groups at Librascope. The group also assists Publications in the documenting of equipment by checking operation and maintenance manuals under actual conditions of equipment use or repair.

The Field Service Group is composed of engineers and technicians who undergo thorough inplant training on the equipment which they will service. This training program is continuous and assures dissemination of information on new developments as well as additional data on existing equipment. Field Service engineers are also assigned to projects in the equipment design stage as advance preparation for eventual servicing responsibilities.

This group provides valuable inplant assistance to Engineering, Reliability, Publications, and Quality Control by. . .

. . . making available technical data recorded under actual field operating conditions

. . . advising engineering groups of troublesome component or design areas

. . . checking operation and maintenance manuals under equipment operating conditions

. . . assisting design groups during equipment development stages by contributing suggestions and information from field experience

Technical Training

The Technical Training Group has two primary functions: (1) to insure that the customer is capable of maintaining his own equipment, and (2) to train technical groups within the company in the maintenance of Librascope-built equipment. These functions are implemented by conducting maintenance training courses for customer groups either in their facility or ours, by preparing customer training manuals for classroom use, by training Librascope Field Service personnel in the maintenance of new equipment, and by training other Librascope groups in the theory of operation and servicing of equipment.

The group has classroom facilities complete with such training aids as mock-ups, drawings, components, circuit demonstrator boards, etc., and has at its disposal complete instruments when required for study and familiarization.

Training personnel consist of: (1) Technical Training Engineers whose job it is to work closely with Project Engineers on development jobs and to provide coordination and communication between design groups and the groups which provide documentation and equipment maintenance; (2) Instructor/Writers whose job it is to conduct training courses and to assist in preparation of customer training manuals.

The Technical Training Section serves both Librascope and the users of Librascope equipment by . . .

. . . preparation of equipment and system training manuals

. . . conducting maintenance training classes

. . . supervising the training program of the company's field service personnel

. . . coordinating the engineering and documentation efforts on a project.

Packaging Engineering

The primary function of the Packaging Engineering Group is to assure the arrival of Librascope products at their destination in usable condition. The efforts of the group to achieve this end are two-fold: (1) design of packaging that incorporates adequate shock and vibration isolation and (2) design of packaging that affords protection from climatic conditions. Both of these efforts requires the optimum in protection design as relaxation of either inevitably results in costly product damage and loss of product prestige.

Packaging Engineering has at its disposal over 500 packaging specifications compiled for the preservation, packaging, and packing for shipment of military supplies and equipment. It is the job of Packaging Engineering to determine and apply the best features of these specifications. Containers are designed for specific requirements whether it be a one-trip shipment or a ten-year storage. Insofar as is feasible, however, costs are reduced by the use of standard methods and procedures. In a continuing effort to reduce the costs and hazards of shipping, the group continually researches new materials and performs tests relative to packing, handling, storage, and preservation. These tests provide invaluable data for future reference.

It is extremely important that design groups contact the Packaging Engineering Group both in the proposal stage and early in the development stage of new equipment in order that every consideration be given to the need and design of special containers. Simple provisions for container/instrument compatibility can save a great deal in shipping costs, convenience, and safety.

Audio-Visual

The Audio-Visual Group provides Librascope with sound motion pictures (color or black and white), sound-slide films, and still color photography. The objective of the group is to supply effective visual presentations for training, new employee orientation, company advertising and promotion, and for government contracts with film requirements.

The group has facilities for complete film service from idea to screen: script writing and directing, animation, photography, and film editing. The group also maintains files of 35 mm color slides and 4" × 5" reproducible color transparencies of Librascope products, facilities, and achievements.

The Audio-Visual medium is a very specialized but effective means of communication. The group invites you to inspect its facilities and to discuss the possibility of using its services in your project.

Services which may be of interest to you are . . .

. . Slide films for presentations to customer groups

. . Films for use on the departmental or branch level

. . Slide film (color) of Librascope products, processes, achievements, facilities

. . Orientation films

. . Training films

Customer Service Group

The Customer Service Group serves Librascope customers by processing equipment returned for repair in the most expeditious manner and with the least expense. This responsibility includes the processing of small customer parts orders and the coordination of component repair programs.

A very important function of Customer Service is to expedite shipment of material and equipment in these categories:

- Follow-up shipments of equipment shipped short

- Parts, components, and equipment for back fitting

- Modification kits and similar items for product improvement

Shipping requests and/or requirements for such shipments must be channeled through Customer Service to establish necessary records, to determine the correct shipping destination, and to properly coordinate and schedule shipments to both the customer and Librascope field service personnel.

It is important to note that all items returned for service, including equipment returned during the engineering development phase of a contract, are the responsibility of and should be referred to the Customer Service Group.

Process Laboratory

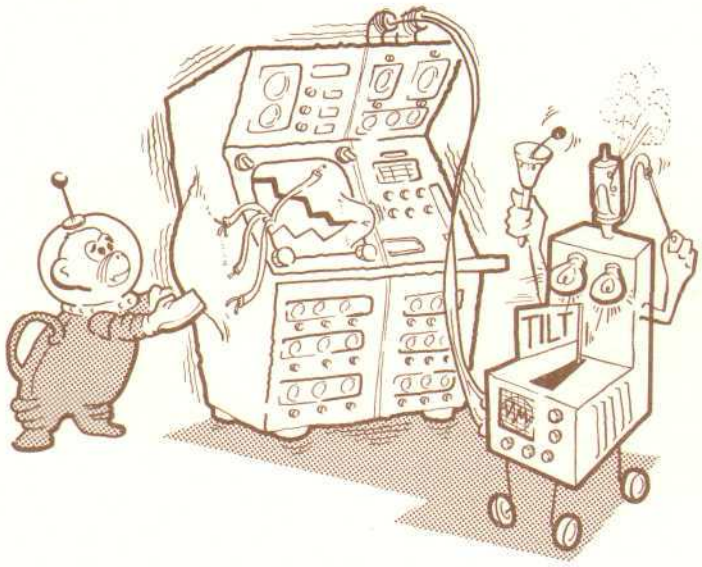
The Process Laboratory's area of interest and responsibility includes such diverse fields as chemistry, metallurgy, plastics, and photoelectronics. The Lab develops new process techniques for special applications in these fields and monitors existing techniques to assure that economical and adequate methods are used in complying with customer specifications. The Lab can be of great help to engineering personnel in evaluating specific materials and processes and, wherever possible, in pointing out more suitable materials and processes.

Workable techniques revealed in the prototype stage can in most cases be applied to production with considerable savings the result.

Much valuable work has been done by the lab and is continuing on projects such as plated-through holes on etched circuit boards; magnetic, noncontact, analog-to-digital converters; and new methods of reticle manufacture.

Services of the Process Laboratory are available to all design, development, and production groups at Librascope. Investigations will be made and technical data supplied you on problems involving . . . .

Adhesives
Metals and metal finishes
Potting compounds and techniques
Plastics, resins, ceramics
Etching techniques
Hermetic sealing
Cleaning techniques
Plating processes
Immersion deposition
Electro-chemistry
Conversion coatings
Chromates
Phosphates
Oxides
Bright dips
Descaling
Anodizing
Passivating



Production Test Equipment

The Production Test Equipment Group is responsible for the design, fabrication, and maintenance of all special test equipment required in the production of Librascope products. This group takes the design consideration from engineering, usually before the design is completed, and designs test equipment for the specific needs of the assembly line and final checkout; the group works with the Model Shop and Mechanical Lab in the fabrication of the equipment, and works with Publications in the preparation of the Engineering Specification describing the use of the equipment to obtain the desired test results.

A production test equipment standards committee establishes standards that assure conformity of test equipment design, physical placement of controls, and standardization of components. This committee works closely with the Engineering Standards section.

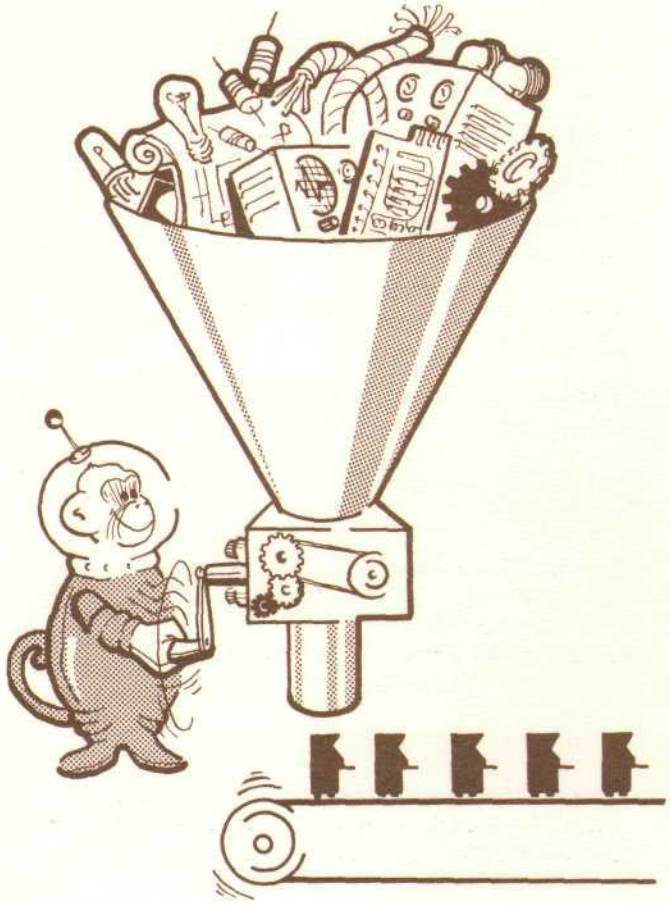
Special test equipment is a necessary item in the fulfillment of a production contract and upon the completion of the contract becomes the property of the customer. For this reason the Production Test Equipment Group should be consulted by the responsible design group during the planning phase of new work so that adequate lead time is given for the budgeting and scheduling of test equipment.

The Production Test Equipment Group should be consulted when . . . .

. . planning and scheduling new work

. . engineering revisions to Librascope products require modification of existing test equipment

. . quoting on new work



Engineering Standards

The basic objective of Engineering Standards at Librascope is to promote and coordinate efforts through standardization to decrease costs and elevate quality. Specifically, this is accomplished by (1) achieving maximum uniformity of items of supply and engineering practices, (2) insuring the minimum feasible variety of items and practices, and (3) effecting optimum interchangeability of parts and components.

Standards are everyone's business and must reflect the creative thinking of all technical groups within the company. In general, standards result from cooperative participation with the Standards Group, of design and drafting, production engineering, manufacturing, purchasing, tooling, processing, reliability and quality control. Standards undergo continuous review and updating by the Group to keep current with the state of the art.

Basic standards which have been developed and are now in use are . . .

STANDARD ENGINEERING PRACTICE manual . .

provides design standards with primary consideration given to efficient production

designs for economy of manufacture and procurement while continuing to reflect optimum functional requirements

DRAFTING STANDARDS manual . .

provides standards for every phase of drawing activity to insure conformity to design criteria and applicable government documentation

PREFERRED ELECTRONIC PARTS CATALOG, HARDWARE CATALOG AND BULK MATERIAL CATALOG . .

provide item standardization of parts, components, and materials through descriptions of items and/or reproductions of actual drawings

WIREMAN'S WORKMANSHIP manual . .

provides a compilation of techniques and information prepared to aid manufacturing personnel in the interpretation of information on drawings and in the correct assembly procedures necessary to maintain high quality products.

It is the specific responsibility of the Standards Group to . .

. . Determine the need for and provide Librascope and GPE corporate standards

. . Participate in the GPE standardization program

. . Direct the documentation of all purchased components

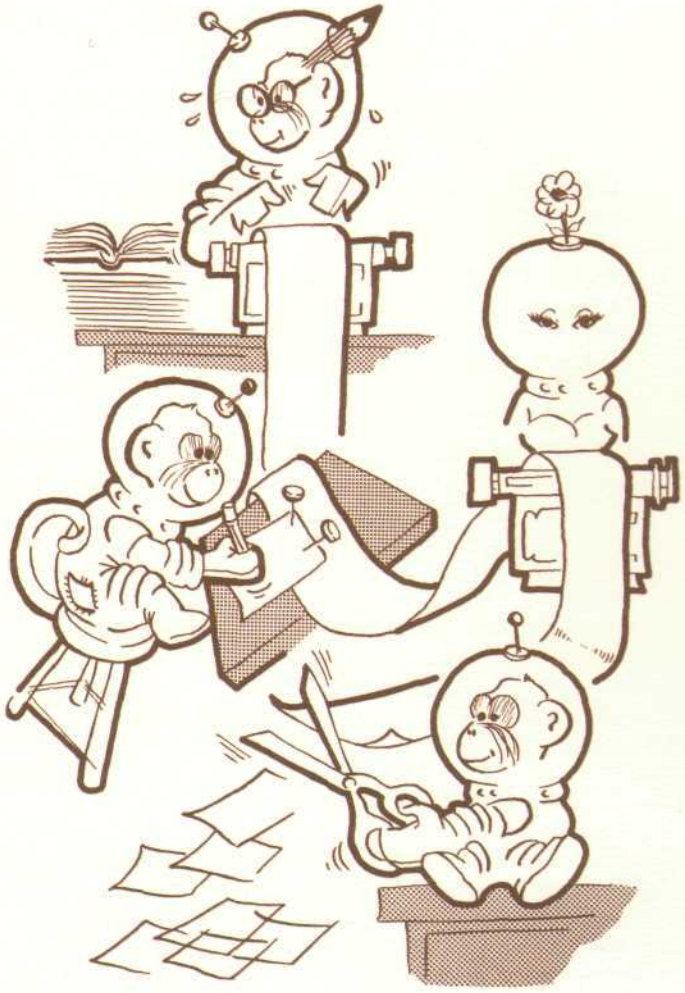
. . Interpret military and industrial standards and specs

. . Maintain record files by category of purchased and fabricated parts

. . Assign all drawing numbers, titles, and security classification

. . Prepare item descriptions

. . Disseminate information pertaining to new standards and indoctrinate personnel in the use of published standards



Publications

Librascope Publications offers twelve years' experience in the preparation of military documentation. The section is staffed by competent specialists familiar with current military specifications applicable to publication preparation and production. Complete writing (and ghost writing), technical illustrating, industrial art, book make-up and production, photographic and library services are available to any Librascope group with a need in these areas.

Writing

Engineering writers and editors prepare technical documentation in the varied forms required by Librascope's many customers: operation and maintenance manuals, illustrated parts catalogs, military specifications, acceptance test documents, and test reports.

In addition to material prepared as requirements of military and commercial contracts, the writing section provides the following services to Librascope technical groups . . .

. . Assistance with proposal preparation

. . Assistance with or preparation of engineering reports

. .Professional writing service from rough manuscript or engineer's notes

. .Editorial service on manuscript copy

. .Departmental brochures

Art Services

The Art Service Group combines artistic talent with technical know-how to provide all forms of art from idea sketch through design and layout to the final useable art product.

The Art Group is staffed with air brush and commercial artists (some with studio and ad agency background) experienced in the production of pen and ink drawings, line and wash drawings, cartoons, full tone renderings (black and white), full tone airbrush renderings, color renderings (water color or tempera), and color airbrush renderings, and with technical illustrators highly qualified to prepare wiring schematics, perspective and isometric drawings, exploded views, block diagrams, and airbrush photo retouching.

The following art services are available to you upon request . . .

. .Master layouts for identification plates, dials and decals

. .Posters, flip charts, organization charts, pictorial presentations, package design

. .Illustrations for proposals, proposal covers, reports, brochures

. .Art work for Precisioneers, Librascope hobby and recreation clubs, Librazette, and other company-sponsored organizations

. .Training aid transparencies

Production

The Production Group offers complete book, manual, proposal, and brochure make-up and reproduction service. Production personnel includes (1) editors experienced in proofing typeset galleys, planning attractive layouts, preparing final book make-up, (2) reproduction typists who prepare justified and/or nonjustified typesetting on IBM Proportional Spacing Typewriters, and (3) persons experienced in working with vendors in the graphic arts field.

Copies and repro material of all data handled by Production are kept on file and cataloged by a cross reference card index. When negatives and plates are a requirement of the job, these are stored for possible future use. In addition an indexed photo file (8 x 10 prints) of all

pictures taken by the photo lab is kept current. Your use of these files is invited.

The Production Group provides . . .

. . Typing of your rough draft material (including proofreading and punctuation checking)

. . Typesetting (or IBM typing), book make-up, and printing service from your copy

. . Stock printed photos (8-1/2 x 11) of important Librascope products for insertion in proposals or for use in stimulating customer interest

. . Covers for proposals or reports

. . Transcript typing from steno tapes

Photographic Laboratory

The Photo Lab serves Librascope's needs in black and white photography from the taking of pictures to the production of photocopies in any required size and quantity. The lab provides photographs for instruction manuals, photographs for record, sale, and educational purposes, Librazette photography, high-speed photography used in equipment operation analysis, and photographic coverage of Librascope instruments.

For record purposes, the Photo Lab maintains a negative file of all pictures taken and furnishes record prints of these pictures for the photo file in Publications Production Group.

The following Photo Lab services are available to you . . .

. . Photos of Librascope equipment in varying stages of development and assembly

. . Photography of damaged equipment (shipping damage, careless handling, equipment rejects)

. . Photography of new or unique processes for record or training purposes

. . Photographic reproductions of etched circuitry

. . Metal plates for equipment identification

. . Cronaflex or screened film positives for inexpensive blueprint reproduction

Engineering Library

The Library with its ten-year accumulation of technical data is an important engineering tool. Its stacks contain books, periodicals, reports and specifications carefully selected for their research value in Librascope's varied fields of interest.

Each month several hundred trade and technical journals are received, circulated, catalogued and bound. New books are received and catalogued daily. Weekly trips are made to large local libraries for information needed on a one-time basis.

You may telephone or come in person to the Engineering Library for information or requests pertinent to your projects. The Library maintains a charge-out service and most of the material in the Library will be loaned upon request. Information which is available from ASTIA (Armed Services Technical Information Agency) will be researched for you upon inquiry to the librarian.

The following library facilities and services are available to you . . .

. . Abstracts on current periodical articles

. . New books of value in your field, purchased upon request

. . Trade directories

. . Vendor catalogs

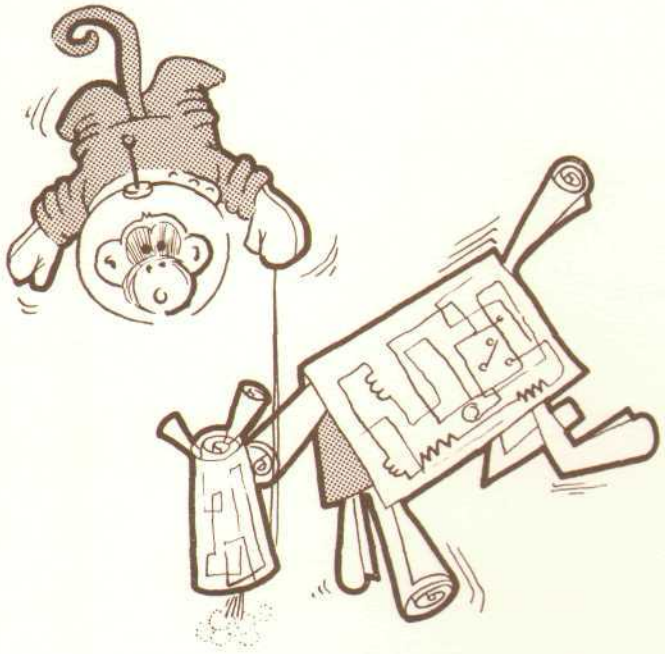
. . Specifications (commercial and military)

. . All types of reports

. . Information available in large local libraries

. . Circulating technical periodicals

. . Technical books for research and reference use



Release Section

The Release Section is responsible for the compilation of assembly parts lists from engineering drawings; and for the release, reproduction, and controlled distribution of drawings. These responsibilities are divided between three groups: Parts Listing, Blueprint Control, Reproduction.

Parts Listing

The Parts Listing Group compiles assembly parts lists from engineering drawings, maintains a master card parts file, and releases through Blueprint Control the completed and verified lists to manufacturing. Engineering Change Orders (EO's) are screened and the change information is incorporated in the master card file. The Parts Listing Group also prepares Lists of Drawings (LD's) and Numerical Index Lists when required by the customer.

Blueprint Control

The Blueprint Control Group maintains control over all released drawings. This includes standard distribution, maintenance of file copies, copy charge-out, the recording and distribution of Engineering Change Orders (EO's), and the processing and forwarding of revision directives or requests for change to the customer when required by the customer.

Reproduction

The Reproduction Group provides all engineering reproduction (drawings and other material) and the reproduction of all engineering information furnished to manufacturing;

maintains and controls all engineering drawing originals; procures from outside sources reproductions of material when the reproduction process is of a type not available at Librascope. The Reproduction facility has a capability of 1,000,000 square feet of blueline copy per month.

Services which the Release Section furnishes are . . .

- . . blueline copy
- . . brownline (reproducible) copy
- . . charge-out of engineering drawing file copies
- . . monitor standard distribution of engineering information released to manufacturing in accordance with standard procedures
- . . procure reproducibles, xerox copy, offset printing, microfilm, and film negatives from outside vendors
- . . provide, on request, information concerning multi-usage of common parts on all jobs

LIBRASCOPE DIVISION
GENERAL PRECISION, INC.

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