

GEORGIA INSTITUTE OF TECHNOLOGY  
Engineering Experiment Station

PROJECT INITIATION

Date: January 23, 1968

Project Title: **Current Register of Scientific, Engineering & Management Manpower**

Project No.: **B-298-005**

Project Director: **F. J. Clarke**

Sponsor: **Regents of the University System of Georgia under Dept. of Commerce**

Effective . . . **11-1-67** . . . . . Estimated to run until: . . . **10-31-68** . . . . .

Type Agreement: . . **Letter** . . . . . Amount: \$ **7,000.00** . . . . .

**Reports: As required**

**Contact Person: M. Dale Henson**  
**State Technical Services Department**  
**Regents of the University System of Georgia**  
**244 Washington St., S. W.**  
**Atlanta, Ga. 30334**

Assigned to . . . **IDD** . . . . . Division

COPIES TO:

- |  |  |
|--|--|
| <input type="checkbox"/> Project Director            | <input type="checkbox"/> Photographic Laboratory         |
| <input type="checkbox"/> Director                    | <input type="checkbox"/> Research Security Officer       |
| <input type="checkbox"/> Associate Director          | <input type="checkbox"/> Accounting                      |
| <input type="checkbox"/> Assistant Director(s)       | <input type="checkbox"/> Purchasing                      |
| <input type="checkbox"/> Division Chiefs             | <input type="checkbox"/> Report Section                  |
| <input type="checkbox"/> Branch Head                 | <input checked="" type="checkbox"/> Library              |
| <input type="checkbox"/> General Office Services     | <input type="checkbox"/> Rich Electronic Computer Center |
| <input type="checkbox"/> Engineering Design Services | <input type="checkbox"/> _____                           |



GEORGIA INSTITUTE OF TECHNOLOGY  
Engineering Experiment Station

PROJECT INITIATION

Date: January 30, 1969

Project Title: **Technical Information Transfer Services for Georgia Business and Industry**  
Project No.: **B-298-007**  
Project Director: **Frank J. Clarke**  
Sponsor: **Regents of the University System of Georgia (OTS), U. S. Dept. of Commerce**  
Effective . . . . . **July 1, 1968** . . . . . Estimated to run until: . . . **June 30, 1970** . . . . .  
Type Agreement: . . . **Letter dated 1-9-69** . . . . . Amount: \$ . . . **84,000** . . . . .

Reports: **As required**

Contact Person: **Mr. Harold G. Hale, Jr.**  
**Director, State Technical Services Program**  
**728 Hartford Building**  
**100 Edgewood Avenue, N. E.**  
**Atlanta, Ga. 30303**

Assigned to . . . . . **IDD** . . . . . Division

COPIES TO:

- |  |  |
|--|--|
| <input type="checkbox"/> Project Director            | <input type="checkbox"/> Photographic Laboratory         |
| <input type="checkbox"/> Director                    | <input type="checkbox"/> Research Security Officer       |
| <input type="checkbox"/> Associate Director          | <input type="checkbox"/> Accounting                      |
| <input type="checkbox"/> Assistant Director(s)       | <input type="checkbox"/> Purchasing                      |
| <input type="checkbox"/> Division Chiefs             | <input type="checkbox"/> Report Section                  |
| <input type="checkbox"/> Branch Head                 | <input checked="" type="checkbox"/> Library              |
| <input type="checkbox"/> General Office Services     | <input type="checkbox"/> Rich Electronic Computer Center |
| <input type="checkbox"/> Engineering Design Services | <input type="checkbox"/> _____                           |



GEORGIA INSTITUTE OF TECHNOLOGY  
Engineering Experiment Station

PROJECT INITIATION

Date: July 19, 1968

Project Title: **The Georgia State Technical Services Program**

Project No.: **B-346**

Project Director: **Frank J. Clarke**

Sponsor: **Board of Regents, University System of Georgia**

Effective **7-1-68** . . . . . Estimated to run until: **6-30-69** . . . . .

**Special Institutional Grant**

Type Agreement: **(Letter OSTIS 5-30-68)** . . . . . Amount: \$ **31,952 \*** . . . . .

**Reports: As necessary**

**Contact Person: Harold G. Hale, Jr.**  
**Director, State Technical Services Program**  
**728 Hartford Building**  
**100 Edgewood Avenue, N. E.**  
**Atlanta, Georgia 30303**

**\* For direct charges only, no overhead provided.**

Assigned to . . . . **I.D.D.** . . . . Division

COPIES TO:

- |  |  |
|--|--|
| <input type="checkbox"/> Project Director            | <input type="checkbox"/> Photographic Laboratory         |
| <input type="checkbox"/> Director                    | <input type="checkbox"/> Research Security Officer       |
| <input type="checkbox"/> Associate Director          | <input type="checkbox"/> Accounting                      |
| <input type="checkbox"/> Assistant Director(s)       | <input type="checkbox"/> Purchasing                      |
| <input type="checkbox"/> Division Chiefs             | <input type="checkbox"/> Report Section                  |
| <input type="checkbox"/> Branch Head                 | <input checked="" type="checkbox"/> Library              |
| <input type="checkbox"/> General Office Services     | <input type="checkbox"/> Rich Electronic Computer Center |
| <input type="checkbox"/> Engineering Design Services | <input type="checkbox"/> _____                           |





ENGINEERING EXPERIMENT STATION

GEORGIA INSTITUTE OF TECHNOLOGY

Industrial Development Division

1132 W. Peachtree Street  
Atlanta, Georgia 30309  
873-2931 Area Code 404

January 10, 1969

Mr. Harold G. Hale, Director  
Office of Technical Services  
728 Hartford Building  
100 Edgewood Avenue  
Atlanta, Georgia

Dear Harold:

Enclosed are copies of our somewhat overdue quarterly progress reports for STS Projects One and Six as well as our project in support of ATAC. These reports cover the first quarter of this fiscal year; Frank had included work prior to July 1, 1968, in his last annual report. We will submit the next quarterly progress report covering the period October - December 1968, shortly and this will bring us up to date on these progress reports for the Executive Committee.

Sincerely,

R. E. Stiemke  
STS Campus Coordinator

Enclosures

cc: Mr. R. E. Stiemke  
Mr. R. W. Hammond  
Mr. F. J. Clarke  
Research Reports Office, ORA (2) -

*Reports:*  
*B-298-002, B-298-005, B-340*



GEORGIA TECHNICAL SERVICES PROGRAM, FISCAL YEAR 1968

PROJECT NUMBER 1

(GEORGIA TECH PROJECT B-298-005)

CURRENT REGISTER OF SCIENTIFIC, ENGINEERING AND MANAGEMENT MANPOWER

QUARTERLY REPORT FOR THE PERIOD JULY 1, 1968-SEPTEMBER 30, 1968

B. Summary

This is a continuing project which is intended to provide the means by which the competences in the subject fields can be ascertained, recorded and later matched and retrieved as needed. The program utilizes facilities at the Rich Electronic Computer Center. The data base is held at the Industrial Development Division to which inquiries are customarily referred for servicing.

C. Program Progress

The original objectives of the project to create listings of the competences of the faculties at Georgia Tech, Savannah State, University of Georgia, Georgia State, Emory and West Georgia college have been accomplished. Copies of both the alphabetical and specialty listings for their faculties have been furnished to each institution as well as to other interested organizations.

D. Examples of Specific Benefits to Users

The Register has been used as a basis for determining the availability of specialists in biotechnology in the Atlanta area. It was observed that although many scientists and engineers had applicable capabilities they did not recognize themselves as belonging to this interdisciplinary field.

F. Future Plans

This project has been proposed for continuation under the FY 1969 Georgia STS program. This would involve the surveying of capabilities at additional institutions for inclusion in the Register as well as the updating of some institutions already included.



GEORGIA TECHNICAL SERVICES PROGRAM, FISCAL YEAR 1968

PROJECT NUMBER 6

(GEORGIA TECH PROJECT B-298-002 and B-346)

TECHNICAL INFORMATION TRANSFER SERVICES

FOR GEORGIA BUSINESS AND INDUSTRY

QUARTERLY REPORT FOR THE PERIOD JULY 1, 1968 - SEPTEMBER 30, 1968

B. Summary

This project is intended to provide a channel of direct access to scientific and technological information and service for interested business and industry throughout the state. It has been active since the inception of the STS program in Georgia in 1966. During this quarter 142 company interest profiles were added to the 1248 already on record. Technical information and/or assistance was furnished to 172 companies.

Emphasis was placed on followup of earlier contacts to determine whether information furnished by STS had helped the companies. In general, it was found that some effect had been made, but specific instances of benefits expressed in dollars saved or made were difficult to obtain. It appears that work in depth with the company over a period would be necessary before the company would connect the results obtained and the source of the help which made it possible. Other programs which offer services over several weeks to a specific firm have found it easier to establish the cause and effect relationship.

To improve the utilization of STS generated information one field office was given sufficient time to permit its engineer to go into greater depth. This approach, although expensive, was successful. See Armstrong Cork Company case in paragraph D for details.

Another field office was asked to contact trust officers of banks to determine how STS could assist them in the management of businesses left in trust. This offer was warmly received and may be a good source of information transfer results. The same field office engineer also approached professional societies in his city and offered STS help to consultants and other professionals. The results of this aren't yet known.

Locally, the project director spoke to three groups about the STS program. After each talk there were inquiries which STS serviced. Similar talks are being presented by field service personnel. These talks seem to reach a different population of users.



Project 10 (Professor Tate) at the University of Georgia obtained and distributed some information on the use of urethane foam systems. This preliminary work has been used in conjunction with that done under the Special Merit project on mobile homes. For details please see Project B-343 quarterly reports. Details on other uses for urethane are given in paragraph D. It is mentioned here to stress the interplay among projects.

### C. Program Progress

The computer-based system for matching company interest profiles with incoming technical literature has been fully implemented and the programs used to create it are resident in the IDD. It is now possible to create industrial profiles by relating the information interests of all companies making the same product. Collection of data is by four digit SIC, but it is also possible to relate problems to each other by a three digit problem designator so that common problems can be ascertained. Only data on firms which expressed information interests have been loaded into the computer. Information on other firms is offline but the IDD Data Handling System has the capability of handling the records on all firms when funding permits.

The specific items mentioned in the 1968 Program have been completed.

### Project Activities

Specific activities of unusual interest were:

- a. The project director attended the Battelle-OSTS Seminar on the transfer of technology at ARAC. During this conference contact was established with representatives of several other state STS programs. As a result, information and assistance have since been furnished to Nevada, New York, Oklahoma, North Carolina and New Hampshire. The contact with Rensselaer Tech was particularly useful since their technique for technology transfer via a monthly newsletter complement that was used by Georgia Tech in personal contact with firms.
- b. Through OSTS the National Referral Service of the Library of Congress asked that a search be made among Georgia information sources for additions to the national file. Over a three month period Georgia Tech canvassed all recognized sources and received many affirmative responses. It is not yet known how many of these sources will be added to the Southeastern area list now being prepared by NRS. This search was conducted without specific separate funding.
- c. Work in metropolitan areas was stressed during this period. Industry in these areas is significantly different to that in the less developed parts of the state. Results of this concentration were mixed. In Augusta and Savannah there was little interest in



the STS program, while in Columbus and Macon several valuable contacts were made. It is obvious that special emphasis must be placed on work in these cities if results are to be obtained. This matter has been discussed with ATAC so that mutual referrals can be obtained.

- d. Chemical Abstracts has established a data base at University of Georgia which has potentially great importance to Georgia industry. It is already useful to the faculty, but it required expansion along industrial lines before it can be used directly by many companies.

These points were discussed in detail with representatives of Chemical Abstracts during their visit to this campus. In addition, Dr. McGee of the Chemical Engineering faculty attended a seminar on the use of the data base at University of Georgia.

- e. Dalton Junior College has proved to be a most useful means of information transfer. Three instances will show the breadth of the work done with its Center for Public Service. These are housing through Urban America, labor through the Carpet Layers Institute and need for textbooks for the tufting industry. During this period the Tufting Management degree program was under discussion. The project director assisted in this evaluation by bringing together the views of Southern Tech and junior college.
- f. It was determined that a major problem in the mobile home industry is lack of inventory control and an adequate cost accounting system. Both of these needs will be filled as a result of two studies funded under this project.
- g. It was also found that many Georgia firms were unaware of the capabilities of the industrial coordinators at the area vocational technical schools. Part of the funding under this project was spent to develop a capability to answer questions concerning this system.
- h. Georgia Tech has never been able to provide coverage under the STS program to the area immediately to the south of Atlanta. This area, centered around Griffin and Jackson, is a hub for rapidly expanding industry. Under the supplementary state funding for this project. An industrial agent has been offering the services of the STS in this area. Several industrial firms have asked for assistance from STS as a result of this work.

D. Examples of Specific Benefits to Users

- a. The brick industry's problems occupied a great deal of STS time and



there are results to show for the effort. First, the compression brick made from sand and lime at Tunison Brick Company has stirred considerable interest in other states. Texas STS was particularly anxious to obtain details on the process. The work on this project was widely publicized. Second, innovative uses of brick in housing were also studied. It appears that half bricks foamed into panels may be one answer for low cost use of bricks. This process was developed by Chattahoochee Brick Company and has been offered to industry. Vinyl bricks and other non-clay bricks have been discussed with other Georgia brick manufacturers. Third, this industry still excites more interest than many others as a new business venture. STS has worked on the technology of brick manufacturing in an attempt to increase the utilization of Georgia clay deposits as well as to provide brick structures at a lower cost.

- b. Earlier reports have mentioned that there seems little likelihood that very large companies can be assisted to any extent from the limited STS effort presently funded. This generalization still holds but work with Armstrong Cork Company of Macon seems to show what can be done if the information interest can be narrowed and worked on in depth. This company wanted to study the feasibility of simulating certain complex operations so that the effect of variables on these operations could be predicted in advance. The cycle time of these operations preclude changing each variable and studying its effect independently. This question was studied by STS personnel and the local engineer of Armstrong was furnished a number of articles which seemed to contain a solution. But, in addition, the local Georgia Tech STS engineer also spent time becoming familiar with the subject. In this way he and the Armstrong engineer were able to discuss the problem and put two brains to work on it. Work is continuing.
- c. Innovations in tufting and predictions as to the future of the industry also occupied a great amount of STS time during this period. The tufting industry is changing rapidly and as it does, it attracts many outside interests. These include people seeking information on new backing materials, better yarns, more economical manufacturing techniques, better personnel practices and some very broad economic considerations which show the interplay between the industry and the area in which it is concentrated. Georgia Tech STS has maintained contact with the industry through an engineer who has spent half of his time in Northwest Georgia where the industry is concentrated. The result is a detailed summary of the technology used in the industry and its operations which can be used by several groups including development agencies. This material, read in conjunction with other recent studies on the economic conditions in the area would be most helpful to newcomers to the industry and as a guideline to existing firms who wish to check their performance against others.



- d. The increased use of irrigation and the larger size of Georgia farms has led to the development of several systems of providing water to the crops. STS has been working with three of these systems, each of which has possibilities. Perma Pipe Company is developing an underground system, Rainbow Irrigation is working with surface systems and J. J. Jones has suggested an overhead system which is designed to clear machinery working on the crop. Both plastic and metal piping are being considered. Due to STS efforts each of these firms knows of the others' work, so cooperation is possible. Both the School of Agricultural Engineering and the Cooperative Extension Service at the University of Georgia have assisted in this work.
- e. A large poultry processor was interested in secondary products which would extend his present line. Information was obtained from the **School of Poultry Science**, the Cooperative Extension Service, University of Georgia and Cornell University. There is an excellent chance that the firm will expand based on the information which was furnished. The company does not wish to reveal its identity.
- f. Aviation Electronics, Inc., a small but technically sophisticated firm in Atlanta, asked for a conference on its technical problems. These turned out to be lack of training arrangements for technician, insufficient funding and limited range of work. There was sufficient work, but it did not utilize the capabilities of the firm at its highest level. First, this was improved by arranging for MA4 training program which will bring 25 technicians to the company for training and subsequent jobs. Second, two sources of funding were found for the company so that it now has a choice of sources. Third, an entirely new control device was designed by the president of the company as a result of a STS inquiry for help in this device. The new design, although much more expensive, is virtually foolproof and will greatly decrease the down-time on the barn heaters on which the control will be used. Other uses for this device are being sought.
- g. The Carpet and Rug Insitutute of Dalton, Georgia stated that it was concerned by the inability of the industry to locate sufficient carpet layers in the Southeast. Working with Dalton Junior College, STS at Georgia Tech determined that there was a pilot program in being in the Bronx, New York which could be transferred to Atlanta. Attempts were made to expedite the move of this school to the city, but these have been unsuccessful thus far. However, the U. S. Department of Labor is now thoroughly aware of the complexity of the carpet laying problem as it faces the industry and some action is expected.
- h. H. B. Fuller Company of Atlanta has started a wholly new venture in the manufacture of engineered houses. Samples of the houses were erected in Kirkwood Section of the city where they sold easily. Improved versions incorporating suggested changes offered by STS at Georgia Tech are now in production. This company is one of the very few offering fully approved housing at a low cost. The company is now working with STS on several other locations for its products.



F. Future Plans

The changing interests of Georgia industry are now more readily apparent as a result of the earlier work under this project. The proposed FY 1968-69 program will stress work in depth with a selected number of industry groups but will also be prepared to handle specific technical information requests as at present. Information interests revealed through the extensive field work done under sponsorship of the Economic Development Administration will continue to be handled by STS. The computer-based data system will continue to be used to match company interest profiles with incoming technical literature.



GEORGIA TECHNICAL SERVICES PROGRAM, FISCAL YEAR 1968

ATAC SPECIAL MERIT PROJECT

( GEORGIA TECH PROJECT B-340)

QUARTERLY REPORT FOR PERIOD JULY 1, 1968 - SEPTEMBER 30, 1968

B. Summary

The untimely death of Mr. Fred P. Madeo, so soon after his embarking on this project brought the project to a halt insofar as Georgia Tech was concerned. Mr. Hale conferred with Georgia Tech representatives in an effort to find another qualified individual to take Mr. Madeo's place. Based on the experience gained during the early stages of this project Mr. Hale decided that an engineer would be required to carryout the prescribed duties of project director.

C. Program Progress

Was confined to contacts and brief assistance efforts to Messers Hale, Quarterman and Kunze.

Mr. Madeo designed the ATAC brochure shortly before he died.

D. Examples of Specific Benefit to Users

During his brief time with Georgia Tech, Mr. Madeo worked with the Warren Company and Oxford Chemical Company. Both of these technology transfers appear to have been successful.

F. Future Plans

As soon as an engineer is engaged an attempt will be made to makeup the time lost on this project.

Meanwhile, information on companies which seem to be ready for the ATAC program will be passed to Mr. Hale for action.



GEORGIA TECHNICAL SERVICES PROGRAM, FISCAL YEAR 1969-70  
PROJECT NUMBER SIX

Technical Information Transfer Services for  
Georgia Business and Industry  
(Georgia Tech Projects B-298-007 and B-346)

Quarterly Report for the Period July 1, 1969 - September 30, 1969

Summary of Quarter's Activities

During the quarter ending September 30, 1969, the main thrust under Project Six continues to be on general technology transfer to both business and industry in the state. Staff members of the Field Services Group continued to stress information transfer with particular emphasis on the effective utilization of the transferred information. In many cases, this required direct technical assistance by staff members in order to help the companies implement improvements and changes stimulated by the information provided. Of the 137 companies visited during the quarter, 98 were companies that had been visited previously. The Quarterly Report for the April 1 - June 30, 1969, period indicated this trend. . . "some of these transfers were at the request of companies that have benefited by the service and are now coming back for additional assistance." As a result of these visits, requests were generated and specific information was subsequently delivered to 68 companies. At the same time, over 200 man-hours of technical assistance was provided to 28 companies during this reporting period.

As a result of formalizing the Housing Resources Program last quarter, the staff at Georgia Tech was able to assist the City of Atlanta in the preparation of a site development proposal for Operation Breakthrough. This proposal will be coordinated with others on new building systems so that the optimum use of the available sites will result.

The information on available technology for low-cost housing was discussed with State Technical Services personnel at North Carolina State University and at Memphis State University. It appears feasible, to our staff, to develop a very low cost home by using the technology of the mobile home industry modified to meet building codes presently enforced by the smaller cities of Georgia. A pilot study in one town showed that a major improvement in housing availability would result from this approach. During this quarter, technology for the creation of modular homes as contrasted with mobile homes was further stressed.



The Atlanta Housing Authority requested and obtained assistance from STS personnel on the design of a mobile home which would meet local codes and yet be suitable for relocatable housing. This is the second generation of this type of housing in which members of the Georgia Tech STS staff have participated in the design phase. Recent studies of the reaction of clients to this type of housing show that the concept is sound and will preserve the neighborhood. This information, together with that on the use of innovations to improve the availability of housing, was given to the Construction and Design Panel of the Mayor's Housing Resources Committee. As a direct result of this information transferal, plastic piping has been accepted as an alternative to metallic pipe for home drain, waste, and vent applications. The information was provided by the Perma Pipe Company of Stone Mountain, as active STS participant. At a later date, the information was also presented to the Atlanta Plumbing Advisory Board.

As a result of some of the research carried out during this period, a list of sources of statistical information on housing was prepared. This list has been published as a 65-page booklet entitled Index of Statistical Data on the Housing Industry, and it has been mailed to over 107 companies, architects, engineers, and bankers, as well as most of the municipal associations of Georgia. Copies of this publication have been furnished to the State Director and to the Directors of OSTs for their use (copy attached as Appendix I).

#### Program Progress

The 1969-1970 project has continued as proposed with the full implementation of the activities indicated in the previous quarterly report. General transfer of technology to business and industry continues to be the main objective.

The volume of interest and activity in housing technology is growing steadily. The industry is expanding rapidly in Georgia and there are many individuals who are seeking information about its prospects. In addition, the communities urgently need help on their housing problems.

#### Project Activities of Special Interest

a. During the report period, three more issues of the Metalworking Bulletin were published and distributed. Acceptance of the bulletin has been gratifying. To date, more than 60 metalworking companies in the state have requested continuation of the service.



b. The Field Service Group canvassed the mobile home industry in Georgia to determine its present structure and future plans, so that information and technical assistance for it could be planned. There are over 60 mobile home plants at present as compared with 25 in July 1968. The management of these plants is inexperienced in many cases and unable to utilize the advanced manufacturing techniques employed by older companies. Through the STS program of information and technical assistance, it is hoped to close this gap during the coming year.

c. Closely related to the growth of the mobile home industry is the slowdown in conventional construction in the state. Through the STS program, attempts have been made to have individuals and communities consider the mobile home industry as one alternative in providing low-cost housing. Three communities have been chosen for detailed study of the factors involved in producing fixed housing rather than mobile homes in some Georgia plants.

d. Study of the inhibitions holding back housing in Georgia showed that zoning and code restrictions were two contributing factors. Both of these topics were studied and recommendations made to the Housing Resources Committee of the City of Atlanta on ways to increase the acceptance of innovative ideas in housing.

e. The work done on precast and prestressed concrete building systems mentioned in the previous quarterly report was used to assist in the preparation of the Operation Breakthrough proposals in Atlanta. One of these proposals may be the answer to ways of providing low-income housing that is durable and attractive.

f. Selective scanning of trade and research publication in each industry has been continued. This activity continues to provide the awareness for the STS program. This task is carried out through the existing facilities at the Georgia Tech Library.

#### Examples of Specific Benefits to Users

a. The Monticello Bobbin Company of Monticello, Georgia, a manufacturer of hard maple bobbins for the textile industry, requested information on how to utilize its scrap hardwood. In investigating possible uses for scrap hardwood, it came to the attention of the field engineer that a firm in south Georgia used hardwood maple chips for the manufacture of oil filters. The company manufacturing oil filters had been getting its maple chips from New England. As a



result of getting these two companies together, the company manufacturing oil filters now has a closer, cheaper source of its raw material, and the Monticello Bobbin Company has an outlet for scrap which otherwise would have been burned.

b. Dexter Axle of Georgia, Inc., located in Monticello, Georgia, is a manufacturer of axles used on mobile homes. This firm had been having weld failures where the wheel spindle was welded to the axle tube. A field engineer visited this firm and observed the welding operations and the equipment. As a result of this visit, several suggestions were made to improve the welding operation and also recommendations were made to institute a quality control program. The information provided this company should help it reduce its field failures.

c. General Tire and Rubber Company of Barnesville, Georgia, is a manufacturer of tire fabric. This firm had a problem disposing of its waste tire fabric. It was disposing of this waste by burning, which contributed to air pollution in the area. This company requested information from the field engineer on possible ways to utilize its scrap. The field engineer arranged a visit by a representative of the Engineering Experiment Station of Georgia Tech and, as a result of this visit, plans are now being made to reclaim this scrap material.

d. Cagle's Inc., Fisheries Division, Lumber City, Georgia, a producer of catfish, was furnished with information on assistance in determining the most practical method of coating the interiors of concrete tanks. These concrete tanks were used to raise catfish. This company had a problem in that the rough surface of the tank would abrade the skin of the catfish to the point of killing them. Several coating materials were investigated and two were tested on the tank for smoothness and also toxicity. As a result of this information and assistance provided, this company will be able to save money by being able to utilize concrete tanks rather than more expensive fiberglass tanks.

e. The Sparkstone Marble Company of Douglas, Georgia, a manufacturer of synthetic marble table tops, was supplied with information on the technical aspects of synthetic marble production. It was also supplied with information on how to conduct product research and evaluation. This information aided the company in working out many of its production problems and, as a result, two additional employees have now been hired.

f. Fulghum Enterprises, Inc., of Wadley, Georgia, manufactures fork-lift trucks and tree shears. This company requested information on updating its



fabrication methods and decreasing its manufacturing costs. An engineer from Georgia Tech's Engineering Experiment Station visited this plant, made observations, and provided suggestions for improvements in several areas. The field engineer also assisted this company in laying out a new manufacturing space which it had just built. The information and assistance provided this company should help it increase employment by 15 people within the next year.

g. The Midville Tool and Die Company of Midville, Georgia, contracted to design and build a brush-making machine for a company producing artificial Christmas trees. After completing the machine for the customer, but prior to manufacture of the machine for other customers, the company requested information on brush-making processes and machines. The company was provided with information on this, as well as a list of journals in the metalworking field and several articles on metal stamping.

h. Outside Carpets, Inc., of Rome, Georgia, manufactures a vinyl backed carpet. This company requested information and assistance in the proper location of machinery and equipment in a proposed 26,000 sq. ft. expansion. A field engineer gave the company advice and assistance in preparing a layout.

i. Standard-Coosa-Thatcher Company of Rossville, Georgia, is a thread die house. This company was having trouble getting production through its plant on an existing materials handling system. As a result of information and assistance provided this company by the field engineer, it is expected that the installation of a new system will eliminate this bottleneck and will increase its production efficiency.

j. The Davis Casket Company of Americus, Georgia, is a manufacturer of metal caskets. As a result of having to leave newly painted caskets overnight to dry, this company's in-process inventory was much higher than it should have been. Information on painting systems and improved coatings was given to this company. As a result of this information, this company should reduce its in-process inventory considerably.

k. Kaiser Southern Company of Bainbridge, Georgia, is a manufacturer of agricultural fertilizers. This company requested information on a material that would withstand a highly corrosive environment used in the manufacture of fertilizer. This company was provided with information on Teflon coating and a rigid polyurethane piping. This improved piping should reduce considerably the downtime experienced by this company.



1. Hi-Pals Footwear, Inc., of Darien, Georgia, produces combat boots for the military. This company has requested information and assistance in evaluating its quality control procedures. As soon as this evaluation has been completed and recommendations made, its quality costs should be decreased considerably.

m. Lark Builders, Inc., of Lyons, Georgia, produces small aluminum metal buildings. Partially as a result of earlier information and assistance given by a Georgia Tech field engineer, this company is now expanding into a new manufacturing facility. Officials of the company have requested that the Georgia Tech field engineer give them information and assistance in developing an efficient layout for their new plant. As a result of this expansion, this company should double employment.

#### Plans for the Next Quarter

The main emphasis of the project will continue to be on field services, solving of industrial problems, and information-educational services. As before, a continuing evaluation of the program will be carried out by the persons responsible for the project.

Two additional issues of the Metalworking Bulletin are planned. The interest shown in this publication warrant its continuation, subject to the availability of funds.

The Housing Resources Program plans a seminar at which the designers of building systems which are ready for use but not yet marketed would meet with potential users such as architects, engineers, contractors, and financiers.

A publication entitled Financial Considerations in the Mobile Home Industry is also planned for the coming quarter. It will contain the background and current status of the retail and wholesale financing of mobile homes, development of mobile home parks, taxation, transportation, etc.





**GEORGIA INSTITUTE OF TECHNOLOGY**  
**EXPERIMENT STATION**

Office of the Director

225 North Avenue, Northwest · Atlanta, Georgia 30332

January 20, 1970

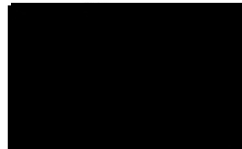


Mr. Harold Hale  
Office of Technical Services  
528 Hartford Building  
100 Edgewood Avenue, N. E.  
Atlanta, Georgia 30303

Dear Harold:

Submitted herewith is the quarterly progress report for Project Six, Georgia State Technical Services Program, covering the period October 1 - December 31, 1969.

Sincerely,



Coordinator

RLY:edh

Enclosure

cc: Mr. R. E. Stiemke  
Research Reports Office (Projects B-298-007 and B-346)



Quarterly Progress Report  
Georgia Technical Services Program  
Project Six, FY 1969-70

October 1 - December 31, 1969

During the quarter ending December 31, 1969, the Field Services group, due to, other project commitments, operated at a reduced level of activity. However, company requests for information generated by Field Services activity increased from 62 in the third quarter to 90 in the fourth quarter. Of the 104 companies visited during the quarter, 77 had been visited previously. The Field Services group responded to requests for information by delivering specific information to over 80 companies. Over 220 man-hours of Technical Assistance was provided to 26 companies during the fourth quarter.

It is anticipated that, after two student assistant openings have been filled and the field offices are again operating at normal activity levels, both company visits and information provided will increase. It is also planned that, during the first quarter of 1970, STS field coverage will be provided for the Metro Atlanta and the Northeast Georgia area.

Some examples of specific benefits to companies as a result of STS Field Services are:

A. The Columbus Iron Works of Columbus, Georgia is presently engaged in metal fabrication, including forging and metal casting. They are interested in diversifying into modular home manufacturing. This company requested information related to manufacturing, plant layout, investment and working capital requirements, and modular home marketing. As a result of our



furnishing them this information, this company is in the first stages of establishing a modular home manufacturing facility in the Columbus area.

B. O'Neill Brothers, Inc. of Pelham, Georgia is a processor of textile waste. This company requested information on the best method of separating cloth scraps from paper scraps. Information was provided this company on manufacturers of separation equipment to do the job. In addition to this, expert opinions from the faculty of the Georgia Tech School of Textile Engineering was provided the company. All this information should assist O'Neill Brothers to acquire the proper equipment for improved operation of their processes.

C. The A & W Saddle Tree Company of Dade County, Georgia, manufactures saddle trees, which, when covered with leather, form the framework of a saddle. The present method of manufacture produces a large number of scrap pieces of wood. Field Services provided this company information on various methods to utilize this scrap. Field Services is also furnishing this company with information on other materials and processes which might be used to manufacture saddle trees.

D. The Davis Core and Pad Company of Cave Springs, Georgia is a manufacturer of polystyrene foam blocks. This company requested assistance in determining a method to dry the polystyrene blocks after they are molded. Information was provided this company on a vacuum type-dryer and, as a result, the company has installed the equipment.

E. The V. E. Anderson Manufacturing Company of Rome, Georgia is an aluminum extrusion manufacturer. This company requested assistance and information to identify excessive costs in the finishing department. The Field Services engineer identified a number of possible causes and suggested a corrective course of action. This information should increase the profitability of this company.



F. Lark Homes, Inc. of Lyons, Georgia, a producer of metal buildings, was furnished a plant layout for a new production facility. The movement to the new and larger facility and the effective utilization of the area will enable the company to increase production without additional employees. The present facilities are cramped and the physical layout does not allow for effective utilization of either people or equipment. Recommendations have been made to this company for the use of relatively inexpensive material handling equipment, which they do not now use.

G. Jay-Dee Sportswear of Cobbtown, Georgia, a producer of men's and women's jackets, is presently losing business for lack of trained employees. This company has requested assistance in obtaining information concerning in-plant training programs. If satisfactory training programs can be established, the company will be able to increase production and provide employment to a number of unskilled females.

H. McAvoy Wood Products Company of Washington, Georgia manufactures chair parts for wooden chairs. This company requested information on board-foot converting tables for timber buying, as well as information and assistance on plant layout. As a result of this information and assistance provided them, this company should increase their production by at least 25%.

I. Fulghum Enterprises, Inc. of Wadley, Georgia is a manufacturer of tree harvesting equipment. This company had recently designed a new type of automatic transmission to be used in a fork lift which they manufacture. The Field Services engineer arranged for a representative from the Georgia Tech Engineering Experiment Station to evaluate their design. As a result of this evaluation, several design deficiencies were uncovered and corrected. This will enable the company to produce a much more desirable unit.

J. Chemical Specialists, Inc. of Valdosta, Georgia, produces and sells chemical cleaning products. This company requested information on methods and processes for recovering solvent from spent cleaning fluids. Field Services provided this company not only with the proper processes, but with the names of companies which manufacture equipment to do the job.



GEORGIA TECHNICAL SERVICES PROGRAM, FISCAL YEAR 1969-70  
PROJECT NUMBER SIX

Technical Information Transfer Services for  
Georgia Business and Industry

(Georgia Tech Projects B-298-007 and B-346)

Quarterly Report for the Period October 1, 1969 - December 31, 1969

Summary of Quarter's Activities

The quarter ending December 31, 1969, has been a very busy one for the portion of the STS program that provides support to the Housing Resources Program. Information has been transferred both on campus and to industry on many interesting phases of housing. This program has concentrated on larger businesses which could influence the production and supply of housing rather than attempting to work with small businesses. Earlier in the program, it was assumed that the smaller firms would enter the industry by themselves in order to support the larger ones and would be motivated by the possible benefits generated. Apparently this assumption was correct since during this quarter there have been at least 20 new firms formed in Georgia to supply some type of housing. At the beginning of the quarter, most of these new firms entered the mobile home manufacturing part of the industry. Then, as the number of manufacturers grew faster than the ability of their marketing structure to absorb their output, they started changing to modular construction.

This trend is of great importance since modular structures are quite new in the home building industry in Georgia. The STS program has been active in transferring the needed information and new techniques required in changing over to modular structures. One of the problems encountered in this change over has been in how to handle this type of home. The present organization of conventional building contractors has difficulties in handling this particular type of unit, and the mobile home dealers are limited because of the delays inherent in financing homes through conventional financing. The Housing Resources Program is working on this particular problem at this time.

The Index of Statistical Data on the Housing Industry, published last quarter, continued in demand, as an additional 58 copies were distributed



during this quarter. The 65-page booklet has been well received and at present over 150 companies, architects, engineers, and bankers have received copies of it.

Staff members of the Field Services group received requests for information from 90 companies during this quarter. Specific information was obtained in response to 80 of these inquiries. During this three-month period 104 companies were visited, 77 of which had been previously serviced. Over 200 man-hours of technical assistance were provided to 26 companies during this reporting period.

#### Program Progress

The 1969-1970 project has continued as proposed with the implementation of the activities indicated in the previous quarterly report. The main objective of this program continues to be the general transfer of technology to business and industry in the state of Georgia.

The volume of interest and activity in housing technology continues to grow as communities urgently demand help in solving their housing problems. The housing industry is expanding rapidly in Georgia and many individuals are seeking information about its prospects for the future.

During the report period, two more issues of the Metalworking Bulletin were published and distributed (copies attached as Appendix B). Over 60 metalworking companies in the state have shown an interest in this publication and have requested the continuation of the service.

#### Project Activities of Special Interest

1. In addition to the differences in marketing modular homes, there are many differences in their acceptance in the communities of Georgia. Local code and zoning boards have had little experience in classifying modular structures, so many of them have turned to Georgia Tech for advice. The U.S. Forest Service was consulted for assistance in obtaining information on codes for the communities that do not have any system of codes at present. During this research, it was found that only one city in seven and one county in five had any semblance of control over what was erected as a home in its area. At the same time, the transferring of information on provisions of

health codes was undertaken with the Georgia Department of Public Health.

2. At no expense to the STS project, the Housing Resources Program obtained the assistance of a group of architecture students at Georgia Tech in designing two highly effective modular homes suitable for many communities in Georgia. These two designs were widely publicized and a copy of the release is attached as Appendix A. At least seven existing manufacturers in this state have reviewed the ideas developed by the students. Due to the great enthusiasm shown by these companies, a small amount of STS funding was furnished to the students so they could develop diagrams of these two designs. When finished, these diagrams will be made available to all firms interested in entering the modular housing field.

3. As part of the activities for this quarter, the STS program was able to bring a financial institution into closer contact with the housing problems in the state. As a result, a major Atlanta bank has agreed to undertake the financing of the start-up of a black contractor. This person would do the site work on the placement of mobile homes in the Atlanta Model Cities project. This agreement, as well as a similar one with Beers Construction Company to train the necessary journeymen for the new firm, was well received.

4. The Housing Resources Program was also active in assisting in the submission of Operation Breakthrough proposals for the Atlanta area. Another group of Georgia Tech students, working with the program, took one of the Model Cities sites offered under Operation Breakthrough and developed three ways of building homes on it. These design concepts were well received by the committee at its annual meeting, and a prize was awarded to the students by the Atlanta Gas Light Company.

5. Other activities for this period include a presentation made to Mr. Gerardo Maldonado, Puerto Rico STS, during his visit to Atlanta. Governor Fernandez of the State of Pernambuco, Brazil, also visited the Georgia Tech campus and contacted the Housing Resources staff for information on a program of industrialized housing for Brazil.

6. Work with other colleges has been started, particularly with North Carolina State University. This institution expects to ask Governor Scott of North Carolina to define its role in housing matters, citing the program



at Georgia Tech as an example of what can be done. Similar work has been discussed with Memphis State University. This contact is particularly important since Memphis State University was selected as one of the initial cities for the Operation Breakthrough program.

7. The following five general groups represent some of the special interests shown by Georgia companies during the past quarter:

Modular Home Construction	Landmark Industries, Columbus Iron Works, Douglas Homes, Modular Concepts, Harry Buttler and Son, Sturkie and Wickham, James Wilcox Homes. (None of these firms was in the housing field prior to this quarter and a briefing by STS. Imperial Homes was a pre-cut home maker who is considering modular homes after hearing about Tech's concepts.)
Mobile Home Parks	Duke Enterprises, Tri-Vest Corporation (new ventures).
Operation Breakthrough	Macon Prestressed Concrete Co., Atlanta Gas Light Co., Jan Industries, Boise Cascade Corporation.
Use of Improved Mobile Homes as Housing	Peachtree Housing, Cullip Industries, Brigadier Industries, Armor Homes.
Innovative Housing Systems	Homeparks of America (suspended mobile homes - modulars), Jan Industries (urethane panel construction).

#### Example of Specific Benefits to Users

1. The Columbus Iron Works of Columbus, Georgia, is presently engaged in metal fabrication, including forging and metal casting. They are interested in diversifying into modular home manufacturing. This company requested information related to manufacturing, plant layout, investment and working capital requirements, and modular home marketing. As a result of Georgia Tech furnishing them this information, this company is in the first stages of establishing a modular home manufacturing facility in the Columbus area.

2. O'Neill Brothers, Inc., of Pelham, Georgia, is a processor of textile waste. This company requested information on the best method of separating cloth scraps from paper scraps. Information was provided this company on manufacturers of separation equipment to do the job. In addition to this, expert opinions from the faculty of the Georgia Tech School of Textile Engineering were provided the company. All this information should assist O'Neill Brothers to acquire the proper equipment for improved operation of their processes.

3. The A & W Saddle Tree Company of Dade County, Georgia, manufactures saddle trees, which, when covered with leather, form the framework of a saddle. The present method of manufacture produces a large number of scrap pieces of wood. Information was provided to the company on various methods to utilize this scrap. Information also is being furnished on other materials and processes which might be used to manufacture saddle trees.

4. The Davis Core and Pad Company of Cave Springs, Georgia, is a manufacturer of polystyrene foam blocks. This company requested assistance in determining a method to dry the polystyrene blocks after they are molded. Information was provided this company on a vacuum-type dryer and, as a result, the company has installed the equipment.

5. The V. E. Anderson Manufacturing Company of Rome, Georgia, is an aluminum extrusion manufacturer. This company requested assistance and information to identify excessive costs in the finishing department. The staff engineer identified a number of possible causes and suggested a corrective course of action. This information should increase the profitability of this company.

6. Lark Homes, Inc., of Lyons, Georgia, a producer of metal buildings, was furnished a plant layout for a new production facility. The movement to the new and larger facility and the effective utilization of the area will enable the company to increase production without additional employees. The present facilities are cramped and the physical layout does not allow for effective utilization of either people or equipment. Recommendations also have been made to this company for the use of relatively inexpensive material handling equipment which they do not now use.

7. Jay-Dee Sportswear of Cobbtown, Georgia, a producer of men's and women's jackets, is presently losing business for lack of trained employees.



This company has requested assistance in obtaining information concerning in-plant training programs. If satisfactory training programs can be established, the company will be able to increase production and provide employment to a number of unskilled females.

8. McAvoy Wood Products Company of Washington, Georgia, manufactures chair parts for wooden chairs. This company requested information on board-feet converting tables for timber buying, as well as information and assistance on plant layout. As a result of this information and assistance provided them, this company should increase their production by at least 25%.

9. Fulghum Enterprises, Inc., of Wadley, Georgia, is a manufacturer of tree harvesting equipment. This company had recently designed a new type of automatic transmission to be used in a fork lift which they manufacture. Arrangements were made for a representative from the Georgia Tech Engineering Experiment Station to evaluate their design and, as a result of this evaluation, several design deficiencies were uncovered and corrected. This will enable the company to produce a much more desirable unit.

10. Chemical Specialists, Inc., of Valdosta, Georgia, produces and sells chemical cleaning products. This company requested information on methods and processes for recovering solvent from spent cleaning fluids. The STS program provided this company not only with the proper processes, but with the names of companies which manufacture equipment to do the job.

#### Plans for the Next Quarter

The project will continue to provide assistance in solving industrial problems as well as information-educational services. Persons responsible for the project will continue to evaluate it during the coming quarter.

Two additional issues of the Metalworking Bulletin are planned. If time permits, a third issue may be prepared.

The Housing Resources Program will conduct a seminar at which the designers of building systems which are ready to use but not yet marketed would meet with potential users, such as architects, engineers, contractors, and financiers.

The draft of the publication entitled Financial Considerations in the Mobile Home Industry has been completed, and the publication of the study is planned for the third quarter.

GEORGIA TECHNICAL SERVICES PROGRAM, FISCAL YEAR 1969-70  
PROJECT NUMBER SIX

Technical Information Transfer Services for  
Georgia Business and Industry

(Georgia Tech Projects B-298-007 and B-346)

Quarterly Report for the Period January 1, 1970-March 31, 1970

Summary of Quarter's Activities

The Housing Resources Program, one segment of Georgia Tech's Project 6, was established to concentrate on information needs encountered during the transfer of technology to the home building industry. At the time, there seemed to be a clearly defined requirement for specialized information on housing of all kinds. The program continues to seek, obtain, and disseminate this type of information. Typical areas of interest are methods of construction, innovative designs and materials, building codes and zoning, and alternative methods of supplying housing to Georgians.

In addition to the original thrust of the program toward the transfer of technology to the home building industry in Georgia, secondary areas of interest have arisen. For example, the program did not envision assisting companies or communities in establishing mobile home parks, but several inquiries this quarter were aimed at obtaining details on how this could be accomplished. As a result of these inquiries, the program had to acquire information on this subject. Similarly, the building codes in use in other states seemed to be constraints on innovative building practices, but it was found that this was not true in Georgia. Rather, most Georgia communities do not have building codes and are only now exploring the possibility of adopting a code. The program will be able to assist these communities in choosing one of the model codes, rather than constructing an entirely new code.

Work is continuing on a comprehensive review of housing problems in Georgia. To date, material has been collected and reviewed. This is aimed at that area in which public action and private enterprise by combined effort can affect a change so Georgia can produce more quality housing to meet her needs. A production rate of 33,000 units per year is required to provide the barest necessities. The present rate is substantially below this, and even in the best years the output was only 18,000 to 20,000 units per year. One very basic fact has emerged: Georgia has a very meager supply of facts on



its housing. A data bank, with a continuing task to update and catalogue information on this subject, is desperately needed. Many national studies have been conducted and some of these facts can be converted and applied to Georgia. However, care must be exercised in superimposing the basic assumptions of a national study on a community, region, or state. What may be the correct answer in one state may not be the answer in Georgia.

The Index of Statistical Data on the Housing Industry, published during the July-September quarter, continued in some demand, as an additional 21 copies were distributed during this quarter. The 65-page booklet has been well received and at present over 170 companies, architects, engineers, and bankers have received copies of it.

Two additional issues of the Metalworking Bulletin were published and distributed (copies attached as Appendix A). The two issues came out in January and March and were circulated to over 60 metalworking companies in the state. This publication continues to be well received and many companies have shown an interest in it and have requested the continuation of this service.

Staff members of the Field Service group received requests for information from 120 companies during the quarter. Specific information was obtained in response to 99 of these inquiries. During the quarter, 140 companies were visited, 91 of which had been previously serviced. About 102 man-hours of direct technical assistance were provided to about 15 companies during this reporting period.

#### Program Progress

The 1969-1970 project has continued as proposed with the full implementation of the activities indicated in the previous quarterly report. General transfer of technology to business and industry continues to be the main objective.

The volume of interest and activity in housing technology is ever increasing. The industry continues to expand rapidly in Georgia and there are many new companies seeking information. Many communities are now becoming aware of these housing problems and they too are seeking assistance.

Program Activities of Special Interest

1. The mobile home industry has been plagued with adverse publicity, much of which is a carry-over from past practices. As the demand for low income housing continues to rise, the use of mobile homes in planned communities seem to be an alternative solution to this problem of inadequate housing. The Housing Resources Program has worked with many groups, including the Atlanta Housing Authority, Model Cities, the National Urban League, and private investors who were attempting to establish a new image for mobile homes as a source of permanent housing.

2. The techniques which are used by the manufacturers of mobile homes seem to lend themselves to other forms of housing. Following this idea, a project was sponsored by the STS program and carried out by a group of Georgia Tech architecture students. The problem was presented thus: use mobile home manufacturing techniques to create a duplex townhouse or two-family house. This concept was expressed by the students in a detailed architect model which has been retained by the program. The concept was shown on WSB-TV during a newscast while a spokesman for the students explained to the audience what they had sought to accomplish. It is apparent that they were successful in reaching others because several companies responded to the broadcast asking for details. At a later date, a news story on the same subject was released by Georgia Tech, and ten additional requests for information were received. A brochure giving additional information is being prepared and will be distributed during the following quarter.

3. The staff of the Housing Resources Program participated in the preparation of legislation on housing for Georgians for the General Assembly. Six bills were proposed and passed (two of them were later vetoed by the Governor), but the idea of a state-wide commitment to better housing was established by the action of the legislature. Mr. Ross W. Hammond, Chief of the Industrial Development Division, is presently serving as chairman of Governor Maddox's Housing Committee, which has prepared a great deal of background information on the need for public acceptance of manufactured housing.

4. This quarter an effort was devoted to convincing various manufacturers that a market for modular housing could be developed using homes



built with existing technology. Unfortunately, this swing to factory-built homes has been slowed by the pressure on mortgage funds. The trend should be greatly accelerated once the restrictions on mortgages are eased.

5. The concepts and ideas of basic modular units were presented to small builders during a seminar held on the Georgia Tech campus on March 12 and 13. Over 90 builders, developers, representatives of financial institutions, and government officials attended. The emphasis in this seminar was on outside sources of builders equity which make it possible for a small builder to undertake larger projects than his own capital would allow.

6. Counseling notes on Production Control and Inventory Control for Mobile Homes Manufacturing were prepared during the quarter. These notes outline the phases to be followed by mobile home manufacturers in establishing a more precise production control system for their operation. Presently, there are a large number of manufacturers in the state. Most have very lax control systems. It is hoped that these counseling notes will encourage them to work toward more exact controls and thereby to be more competitive in the industry.

7. Some of the companies that contacted the staff of the Housing Resources Program and benefited under the State Technical Services Program were:

Duke Enterprises	Landmark Industries - Cedartown
Tull Industries	City of Alma
National Gypsum Co.	City of Sandersville
Merry Companies - Augusta	Universal Papertech - Atlanta
Usher Supply Co. - Savannah	Keck and Wood - Gwinnett County
Space Homes - Claxton	Meyer and Barnard - Savannah
Boise Cascade - Atlanta	Peachtree Housing - Moultrie

#### Examples of Specific Benefits to Users

1. Space Homes, Inc., located in Claxton, Georgia, is a new company in the field of modular or sectional home manufacturing. This company has been provided with information concerning modular housing manufacturing techniques, FHA standards, and markets for modular homes. A new management group of this company will be provided assistance by the Housing Resources Program in

establishing modular house designs. The assistance provided this company should be of value in the continued operations and future expansion of the company.

2. King Finishing Company is a textile fabric dye house located in Dover, Georgia. This company has been sending steel roller drums into the northeastern United States for repair. Information has been supplied about the availability of suitable repair services within the state of Georgia. Utilizing repair facilities within the state will reduce the freight cost associated with the repair of this equipment plus assisting local economy.

3. Brooks Auto Parts of Douglas, Georgia, is a large distributor of automotive parts having numerous outlets throughout Georgia. The owner of Brooks Auto Parts wished to utilize computer techniques more fully in the operation of his company, as well as to determine the feasibility of establishing a computer facility for the purpose of selling computer time to other small businesses in the region. Information was provided to the owner concerning computer time-sharing as related to small business, the economics of time-sharing, computer management, etc. The owner reviewed the information and decided to become a primary stockholder and was later elected president of a newly formed corporation chartered Southeastern Computer Service Center, Inc. This corporation intends to be in full operation in Douglas by June 1, 1970. It is anticipated that additional requests will be forthcoming as the new company goes into operation.

4. U.S. Millworks, Waycross, Georgia, is presently engaged in the manufacture of wooden educational toys for children. These toys are made of maple which is not found in the southern area and thus requires expensive shipping. U.S. Millworks requested information on the feasibility of coating southern pine with some type coating that would render it similar in physical qualities to maple and suitable for childrens' toys. The raw material cost of southern pine would represent roughly one-sixth that of maple and would be utilizing an abundant local resource. Samples of the toys made of southern pine have been forwarded to the Georgia Tech Engineering Experiment Station for initial testing. Various type of coatings will be applied to the southern pine and tests run to determine suitability. Should a suitable coating be located, it is expected that numerous other applications of such a coating on southern pine would be realized.



5. Perfection Products Company, Waynesboro, Georgia, manufacturers of gas and oil heaters, requested information on the availability of a training course for their supervisory people and a source of testing for their employees in order to optimize job assignments. A meeting with representatives from Augusta Tech and the Augusta Office of the Georgia Department of Labor was set up. Work was carried out with Augusta Tech on getting an instructor who taught a 30-hour course in Perfection's Waynesboro plant. The Department of Labor sent specialists to the plant to determine what type testing would be needed and, at present, is evaluating test programs to fill these needs.

6. Porta-Build, Inc., Washington, Georgia, manufacturers of mobile homes, requested information on mobile home parks, including any drawbacks which might be associated with their establishment. When this was furnished, the company requested assistance and information on setting up a system for inventory control. Staff representatives worked with this company's purchasing agent and inventory control man to assist in installing a satisfactory system. IDD provided information on a Kardex control system and is continuing to help this company implement a satisfactory system.

7. Circle Mills, Inc., Dallas, Georgia, a yarn producer, requested that they be helped in developing a size box that would allow them to pack eight-pound cones and, at the same time, increase the amount of weight that could be loaded on their truck. A box size was supplied and is presently being given a trial run.

8. The Heart of Georgia Planning and Development Commission of Dublin, Georgia, is engaged in a project to prove the feasibility of a floraculture co-op that is intended to provide employment to underemployed agricultural workers. They have requested and been furnished information about floraculture marketing and packaging of the product for shipment. This and other information that they have requested will help make this a successful project.

9. Albany Concrete Products Company, Albany, Georgia, is engaged in the manufacture of concrete block and prestressed structural concrete. A large volume of its business involves the use of lightweight aggregate. This aggregate presently is mined in Louisiana. The company is interested

in finding a local source of a substitute aggregate for this purpose. They have requested that Georgia Tech furnish them with information on how this aggregate can be manufactured synthetically from available area raw materials. This could result in an expansion of their present operation with the result of increased employment in the area.

10. Saucy Susan Products, Inc., presently processes peaches for food and food products. They are presently located in New York but are interested in locating a manufacturing facility in the southwest area of this state. Their process involves the tunnel drying of peaches. They have requested information on the possibility of using a vacuum drying process. Information will be furnished on this process as well as any others that look feasible. It is hoped that this information will aid this firm in establishing their expansion facility in this area.

#### Plans for the Next Quarter

Emphasis during the next quarter will be on further development of the concept that the housing supply can be readily and economically increased through the application of technology to the manufacture and erection of these structures. Sponsored work generated by the State Technical Services Program is planned in Douglas, Moultrie, and Tifton. In these three cities the program will seek to show that it can act as a catalyst in stimulating the housing market. If this work is successful it will be extrapolated to other Georgia communities.

Two additional issues of the Metalworking Bulletin are planned. If time permits, a third issue may be prepared.

To further ensure that the modular structures which would be offered to the public are well designed and executed, the program plans to sponsor a seminar on the Georgia Tech campus late in May. At this seminar, architects and engineers will be shown various approaches to modular construction. Included will be basic modular units, multiple family homes, townhouses, and single-family detached homes. The "planned unit development" (PUD) will be stressed.

As usual, the project will continue to provide assistance in solving industrial problems as well as information-education services. The project director and other responsible persons will continue to evaluate the project during the coming quarter.



GEORGIA TECHNICAL SERVICES PROGRAM, FISCAL YEAR 1969-70  
PROJECT NUMBER SIX

Technical Information Transfer Services for  
Georgia Business and Industry

(Georgia Tech Project B-346)

Quarterly Report for the Period April 1, 1970 - June 30, 1970

Summary of Quarters Activities

During the past quarter, the State Technical Services Program of Georgia Tech continued its main emphasis on the Housing Resources, Metalworking Bulletin, and Field Services activities. In addition to these, however, a series of workshops was designed to provide information on air pollution control techniques to small industries. Another departure from the traditional STS activities was the publishing of two sets of counseling notes aimed at the mobile home industry.

The Housing Resources activity received a change of direction during the quarter as William C. Ward, Jr. assumed leadership of the new Applied Technology Group at IDD.

Program Progress

The 1969-70 project has continued as previously proposed. Technology transfer to business and industry continues to be the primary objective of the program. In addition to the generalized technology transfer, a system for the acquisition and dissemination of information on all aspects of housing is being developed. This system will include a data bank containing selected items of information such as housing systems, erection techniques, components, statistics, etc. This information will be made available to business and industry, governmental agencies, public institutions, and individuals.

Program Activities of Special Interest

1. The Housing Resources Program was represented at the Southeastern Mobile/Manufactured Housing Show in Atlanta during April. A model of a modular duplex dwelling was displayed and explained to passers-by. There was considerable interest in the concepts represented by this home. The interest was greater among the public than among the dealers and manufacturers of conventional mobile homes. The public seemed to be very interested in the ideas which were presented. There were seven modular homes, ranging in price from \$12,500 to \$18,000 ready-to-live-in-on-your-lot, which were displayed by mobile home companies. None of the home

builders who had displayed their homes at the Houston Home Show came to Atlanta. This shows the dichotomy which still exists between home builders and mobile home builders. The program during the next year will address part of its effort to closing this gap.

2. The special project on the use of building codes in Georgia was completed this quarter. It showed that virtually all towns in Georgia, with over 5,000 population, had a building code. Most of the towns used the Southern Standard Building Code with few or no amendments. This indicated that families living in the urban areas of the state have the protection of a building code. This is not true, however, for persons living in the unincorporated parts of the state. Only 23 of Georgia's 159 counties have adopted building codes. This indicates that construction outside of the code requirements is still possible outside the cities of the state.

3. Three additional issues of the Metalworking Bulletin were published and distributed during this past quarter. (See Appendix 1.) These publications were distributed to over 190 companies. To date, over 75 companies have responded positively to this service and requested its continuation.

4. During the past quarter, Field Services Group received requests for information from 76 companies. In this same period, 113 responses were made to requests for information by companies and individuals. One hundred and seventy-one visits were made to 138 companies, 62 of which had not been visited previously. Over 158 manhours of direct technical assistance was provided to companies during this quarter.

5. In response to many requests for information on air pollution control technology, work was initiated toward a series of technical workshops to be held throughout the state. These workshops will be designed to provide the medium- and small-sized industries objective expert information on economic and technical considerations in choosing air pollution control equipment and processes. (See Appendix 2.)

#### Examples of Specific Benefits to Users

Imperial Homes, Inc., located in Griffin, Georgia, is an established company in the field of manufactured housing. This company was provided information concerning the modular housing market and guidance in various methods of securing additional production capacity. Management will be provided further assistance in their expansion plans. The assistance provided this company should be of value in their future expansion.



King Finishing Company, a textile fabric die house, located in Dover, Georgia, requested assistance in evaluating their water pollution control system. A field engineer arranged for a specialist in this field from the Engineering Experiment Station of Georgia Tech, to visit this company. He inspected their pollution control system and supplied the company with information which will aid in a more efficient operation of their water pollution control system. This company was also supplied with information concerning available services for monitoring the natural stream in which their treated effluent empties.

Rotary Mower Parts and Manufacturing Company, located in Glenville, Georgia, is a supplier of Rotary Mower parts. The company also assembles and sells, under its own label, a push-type rotary mower. This company is interested in entering into the manufacture of certain parts which it now purchases from other manufacturers. An analysis is underway to supply this company with data concerning the feasibility of manufacturing rotary mower blades and possibly the mower wheels. Hopefully, this analysis will indicate that this company can profitably manufacture the blades in Georgia which it is presently purchasing outside Georgia.

Look Products, Inc., located in Millen, Georgia, is a manufacturer of aluminum doors and windows. This company is producing a line of windows with painted aluminum frames. They are experiencing damage to the painted frames during shipment and are interested in obtaining a process for either encapsulating the entire window unit in plastic or using some other suitable packaging material. Information and contacts with packaging equipment manufacturers are providing through STS assistance which will enable the company to solve this problem.

Beaver Enterprises, Inc., a new plant being built in Union Point, Georgia, is a manufacturer of modular homes. A field engineer provided information and assistance on effective plant layout for the new facility. The company was also provided information on modular housing and FHA financing policies for mobile homes and modular housing. After this new company gets into operation, employment should reach 100 people.

Anchor Woodcraft Corp. of Wrens, Georgia, is a new industry which has been established to produce modular homes. This company requested information and assistance on plant layout for their new facility. This information and assistance was furnished by a field engineer, who also provided the company general information on mobile and modular home construction. This new industry will employ 35 people initially.

The Rol-O-Valve Company of Warner Robins, Georgia, is a manufacturer of plastic parts used in toilet tanks. This company has been receiving complaints from customers that the plastic parts have been failing during the assembly process. This company requested assistance from the field engineer in determining how much torque to apply to these parts. A group of these plastic parts was analyzed by a graduate student at the Engineering Experiment Station and recommendations were made to the company which will enable them to practically eliminate field complaints.

McGaw Laboratories of Milledgeville, Georgia prepares packaged intravenous solutions for medical use. This company has been experiencing difficulties with foreign material contaminating some of the bottled liquids. This foreign material has been identified as tiny bits of rubber resulting from the drilling process in the rubber stopper. A field engineer provided this company with suggestions on freezing the stopper prior to drilling in order to eliminate the bits of rubber debris. Samples of the stopper were also brought to the Engineering Experiment Station at Georgia Tech to determine if the holes could be effectively drilled by the use of lasers. Information is also being provided by Georgia Tech's Engineering Experiment Station in the electronic detection of vacuum in sealed bottles.

Arrow Mills, Inc. is a producer of small scatter rugs located in Calhoun, Georgia. This company, in discussions with a field engineer, disclosed that they were experiencing very low production efficiency and requested information or assistance in determining the cause. The field engineer, in his evaluation, determined that the light levels within the production area were extremely low. Information was supplied to this company on methods of improving lighting. Since that time, additional lights have been installed and there has been a noticeable improvement in the overall operating efficiency.



Davis Core & Pad Co., located in Cave Spring, Georgia, produces styrene foam products. This company requested information on a gluing system that would allow an operator to glue styrene blocks in position without contaminating his hands with the glue. This glue contamination problem had been causing the company to receive grievances from the production workers. Information and assistance was provided this company by the field engineer so that a system was devised to eliminate this problem.

The Spurlock Corp. of Dawson, Georgia, is a manufacturer of aluminum floating ski tow rope handles. This company was experiencing a high degree of field failure in their product. When they made corrections in their product to make the handles strong enough, it adversely affected the floatation qualities. A field engineer sent samples of their product to the Engineering Experiment Station where an evaluation was made. After the evaluation, suggestions were made to the company on methods to improve their product and eliminate the problem. These suggestions should enable the firm to arrive at an optimum design with respect to cost, strength, and buoyancy.

Greenfield Metal Products Co., Inc., of Ellaville, Georgia, is a metal fabricator. This company was interested in installing drying ovens and needed assistance in evaluating different types of heating equipment. A catalytic heater was being considered. The Engineering Experiment Station, in response to a request by a field engineer, reviewed available literature on catalytic heating equipment and presented their evaluation to the Greenfield Metal Products Co. The field engineer delivered this evaluation and discussed the particular problem with the firm. This evaluation will enable the firm to make a more intelligent decision on whether this type of heater is best for their operation.

Bowen Mobile Homes of Tifton, Georgia, requested assistance from a field engineer in evaluating a new floor design. This company desired to utilize this new design in mobile homes that they manufacture. Hopefully, by improving existing designs, they could strengthen the floor and also allow the utilization of less expensive material in the flooring. A field engineer provided advice and assistance on both floor manufacturing techniques and the importance of side wall to floor binding. Several mobile home units were constructed utilizing the improved floor design and inspection has revealed no apparent problems associated with this improved floor. The new design has allowed a materials cost saving of approximately \$50 per coach and indications are that the coaches are equal or better in quality than the old design.

#### Plans for Next Quarter

During the next quarter, emphasis will again be placed on Housing Resources, Metalworking Bulletin, and Field Services. Additional air pollution workshops will be held and, if the response indicates enough interest, a series of water pollution workshops will be planned.

Particular effort will be expanded during the next three months to devise ways to improve channels of communication among participating agencies of STS.



GEORGIA TECHNICAL SERVICES PROGRAM, FISCAL YEAR 1970-71  
PROJECT NUMBER SIX

Technical Information Transfer Services for  
Georgia Business and Industry

(Georgia Tech Project B-346)

Quarterly Report for the Period July 1, 1970 - September 30, 1970



Summary of Quarter's Activities

During the past quarter, the STS program at Georgia Tech had no appreciable changes in its previous operations. The three segments of Georgia Tech's program, Housing Resources, publication of the Metalworking Bulletin, and Field Services, continued pretty much as in the previous quarter. During this quarter, however, three air pollution control workshops were held.

Program Progress

The 1970-71 project has continued as previously proposed. The Housing Resources Program, under the directorship of William C. Ward, Jr., has continued to provide technical information and assistance to the housing industry in the state of Georgia. The main emphasis, however, of the program has continued to be in technology transfer to business and industry.

Program Activities of Special Interest

1. In the previous quarterly report, it was noted that two proposals for specific studies in the housing resources field were awaiting approval. During this past quarter, both of these proposals were funded and the studies are now underway. One of these studies, sponsored by the Coastal Plain Regional Commission, will attempt to determine the feasibility of increasing the supply of housing in the Coastal Plain region through greater acceptance of industrialized housing. The second study is sponsored by Georgia Tech and its purpose is to determine the cost-benefits of industrialized housing. While the need for these two particular studies was disclosed by STS activities, both are being funded from other sources.

2. As a result of the Housing Resources field activities, it has been disclosed in recent months that the modular home industry in Georgia has become extremely active. Many firms, such as real estate developers, construction companies, and local development corporations, as well as private developers, are moving into the industry as the monetary squeeze makes funds unavailable except in the FHA-235 program. The maximum price of housing under this program of \$18,000 makes industrialized housing a perfect choice because of price and speed of erection. It has

been disclosed that practically all conventional construction of domestic housing under \$22,000 has stopped. Also disclosed is the fact that firms who had at one time shunned the manufactured house are now turning to such producers as Knox National and Adrian for participation in FHA-235 housing programs.

3. As a result of a recent request by a county commission in Georgia for the Housing Resources program staff to define modular or industrialized housing, it was disclosed that many communities make no differentiation between mobile homes and modular or industrialized housing. This creates many problems with the zoning ordinances of various towns which, under strict interpretation, preclude the possibilities of using modular homes in residential areas. One of the goals of the housing resources program will be to define modular or industrialized housing in such a way that zoning boards throughout the state may institute some changes in permitted usage in single-family zones.

4. During the past quarter, two additional issues of the Metalworking Bulletin were published and distributed. See Appendix 1.

5. The Field Services group, during the quarter ending 9/30/70, received requests for information from 74 companies. During this same period, 112 responses were made to requests for information by companies and individuals. One hundred and eighty-eight visits were made to 170 companies, 63 of which had not been visited previously. Over 106 man-hours of direct technical assistance was provided to companies during this quarter. During the past quarter, three air pollution control workshops were held. These programs were held in the cities of Macon, Albany, and Augusta. Invitations to attend these workshops were sent to industries in each area. Attendance has been predominately by technical representatives of industries. Evaluation questionnaires were mailed out to all people attending the air pollution control workshops. The results from these questionnaires indicate that most people attending rate personal benefit to themselves as good or excellent. In addition to the first three workshops already held, four additional workshops will be held during the next two quarters.



### EXAMPLES OF SPECIFIC BENEFITS TO USERS

1. Augusta Iron and Steel Works, Inc., Augusta and Martinez, Georgia, a manufacturer of steel bridge frames, was furnished information on package waste treatment plants. The company was contemplating constructing camp-site-type waste treatment plants and needed information on the theory of treatment and some examples of similar units being manufactured. Based on information provided this company, it is now considering manufacturing this unit.
2. National Mobile Homes Corp., Thomson, Georgia, a manufacturer of mobile homes, was provided information on methods of preventing pencil line floor seams in vinyl floor coverings. Assistance was also requested in testing a roof truss which the company intended to use in their own unit. Information was provided on consulting engineering firms capable of running these stress tests. Utilization of information obtained from IDD should improve the company's product quality and lower their unit cost.
3. The Kendall Company, Augusta, Georgia, manufactures hospital supplies. They requested information on sterilization processes. Utilizing the MEDLARs information retrieval system through the ATAC program, we were able to provide them with a computer print-out bibliography of approximately 100 articles on the subject.
4. Modern Industries of America, Inc., Swainsboro, Georgia, a manufacturer of mobile homes, requested help in improving their inventory control and purchasing system. In addition to several articles on inventory control which were furnished, work was done with the purchasing agent on improving the inventory control system in the plant. Improvement has already begun and the project is continuing.
5. Bell View, Inc., Wrightsville, Georgia, a manufacturer of glass doors and windows, requested information on a specific eye safety film. This film, which shows in color the surgery required to repair an eye damaged in an industrial accident, will be shown to the employees at Bell View and hopefully will persuade them to use their safety glasses without coercion from management.
6. Enterprise Aluminum Company, Eatonton, Georgia, a producer of aluminum cookware, had difficulty determining what maximum tolerable temperature-relative humidity ratio their employees could endure while working in certain portions of their plant. Some specific information was supplied which should help the plant determine how to overcome the adverse conditions and provide a reasonable environment for their employees.
7. Rivers and Horton Homes, Eatonton, Georgia, had problems with their mobile home frames. After the coach was completed, the extreme back end of the coach drooped about one foot while in transit. An IDD staff member visited the plant and was able to point out why the droop occurred and what steps should be taken to correct the problem.
8. Rotary Mower Parts and Manufacturing Company, Glennville, Georgia, is a supplier of rotary mower parts. This company continues to be interested in starting a manufacturing plant to produce rotary mower blades. An analysis of the feasibility of manufacturing these blades is continuing for this company.



9. American Fiberglass Industries, Inc., Metter, Georgia, is a newly formed organization engaged in the manufacture of reinforced fiberglass polyester bathroom units. Information concerning the standards required by national and regional building code organizations have been supplied to this company. Assistance has been provided in securing information about employee training programs to assist this company in its start of operation.
10. Glennville Hatchery, Inc., Glennville, Georgia, is an integrated poultry operation. This company has requested assistance in obtaining information concerning the construction of a specialized conveyor system to transport new chicks through debeaking, inoculation, and packaging operations. When this conveyor system is installed, the efficiency of this operation should be greatly increased.
11. Creative Displays, Dalton, Georgia, a carpet display binder producer, has been hand assembling a special binder for one important customer at a loss. A small jig was designed to speed production of the binder with the result that the binder is now profitable enough to offer as a stock design.
12. The Aid Corporation, Clayton, Georgia, an aircraft parts manufacturer, requested help locating an engineering firm competent in water quality control. A list of firms was supplied to the company. The company has retained a firm and is now moving to comply with the Water Quality Control Board's requirements.
13. The Lewis Concrete Products Company, Rockmart, Georgia, a concrete products producer requested information on tilt up concrete construction. Cost data and a copy of construction plans for a building was supplied. The company is now considering constructing a speculative industrial building using tilt up construction.
14. Ken-Marc Southern Company, Americus, Georgia, is a newly established manufacturer of lighting fixtures and decorative items for the mobile home industry. This firm requested assistance in selecting necessary paint spray equipment. Technical information on types of paint finishes for metals and technical information on how to obtain hammertone paint finish was submitted to the firm. With the aid of this information the firm purchased equipment from one of the companies whose name was suggested and should be able to obtain the desired metal finish. This assistance and information will enable this manufacturer to become better established in this field more competitively.
15. Panorama Publishing Company, Albany, Georgia, a lithographic business, is interested in the design of a workable pulsed xenon lighting unit for the lithographic industry. Electronic specialists at Georgia Tech's Experiment Station have agreed to an appointment with Mr. Whaley Hughes of this firm to discuss the technical aspects of the design of the unit. Depending on the outcome of this meeting, there is potential for this firm as a manufacturer in Albany.
16. Georgia Gulf Sulphur Company, Bainbridge, Georgia, is a processor of agricultural chemicals. They have a process of roasting zinc scrap in the production of zinc oxide. This process has caused the problem of a condensate adhering to the interior surfaces of the cyclone and related equipment. Effort is being



made to supply this firm with technical information related to the possible alternatives for correcting their problem. Knowledgeable people in this field at the EES will assist this firm. It is hoped that our assistance will enable this firm to stay competitive.

17. Thermal Insulation Company, Albany, Georgia, is an industrial and commercial insulation contractor. This firm requested assistance on how to reduce the expense caused by wear on bandsaw blades used in their process of cutting cellular glass and calcium silicate. It was recommended that this firm use a segmented tungsten carbide coated abrasive blade for this operation. Information as to how and where the blades could be obtained were also furnished. This should result in substantial savings to this company.
18. Columbus Iron Works, Columbus, Georgia, is an established metal fabricator. They had an interest of entering the manufacture of modular housing. Information was requested on production techniques, capital requirements, and marketing related to this industry. Much information was provided over a several months period. Also, personal counsel was given to members of the company. As a result, our assistance has contributed to a recent announcement that this company has formed a new division to manufacture modular housing. They are now manufacturing prototypes and will begin construction of a \$500,000 production facility in Columbus in the spring.
19. Textile Rubber Company, Bowdon, Georgia, manufacturers of rubber and plastic tires, has been provided with basic information regarding the possibility of welding polyvinyl chloride in profile form. If the company can produce a polyvinyl chloride welded tire at a reasonable price, they will have a competitive edge in pursuing many new product lines. The EES will be submitting a proposal to do additional research into developing machinery and techniques for profile welding. This company was also provided with an analysis of the chemical constituents that went into the manufacture of defective molded wheels. The results of the chemical analysis of the rims will indicate whether new molds or new materials will be necessary.
20. Southern Forest Products, Inc., Carrollton, Georgia, manufacturers of wooden building components, requested information on various types of items, such as roof rafters, finger-jointed products, etc., that could be manufactured and used in conventionally build houses. The company is at the present time constructing an addition to its facility in Carrollton for the purposes of manufacturing roof trusses and any other items they feel there is a market for and would be profitable to manufacture.
21. Modern Fibers, Fitzgerald, Georgia, requested assistance in locating information concerning color psychology and the effects of music on worker productivity. The information was provided and, as a result, the company utilized the free color psychology consulting program of the Pittsburg Plate Glass Company. An additional request for information on management motivation resulted in the selection of a program which will be used by the company. The company was also contacted by a staff member of IDD to extend assistance to the personnel department.
22. Metek, Inc., Brunswick, Georgia, was provided assistance in a liaison capacity with two potential manufacturing customers. The first company needed assistance in locating a tooling and equipment supplier. Metek expressed interest



in the project and a proposal is forthcoming. The second company is a golf ball manufacturer who requested assistance in locating a closer source of golf ball molds. Metek was contacted and, as a result, four prototype mold cavities will be produced by a chemical milling process. If results are favorable, full production of molds is planned with Metek as manufacturer and the golf ball manufacturer as a user and distributor of the molds to other golf ball manufacturers. A projected annual sales volume of \$250,000 is anticipated under current market conditions for the golf ball molds during the first year of operation.

23. Mr. Cliff Johnson, City Manager of Douglas, Georgia, and J. B. Oliff, Soil Conservation Service, Douglas, requested information concerning the methods and equipment available for removal of fat and blood residue from water. These pollutants are being generated by a local poultry processor and the present sewage system is inadequate in controlling these waste by-products. Several manufacturers of water pollution control equipment were contacted and information on their equipment and the equipment's capacities were obtained. This material along with information detailing the best processes and methods for combating this problem were presented to both parties. Douglas has a \$750,000 EDA funded sewage program pending. This program is being delayed by the Water Quality Control Board as they are not satisfied with the present pollution control process as outlined in the program. The Water Quality Control Board has asked Douglas to submit a suitable alternative process. The information given to the city is being utilized in evaluating the various alternatives.
24. Dynamic Industries, Inc., Smyrna, Georgia, is a recently organized corporation which plans to engage in the business of manufacturing, selling, and developing modular home subdivisions and related real estate activities. Since this company was in the planning stages, they requested advise on production facilities, production systems, and economic considerations in product pricing. Staff members met with the principals of the company and provided information as requested. Continuing work with this company is expected in the future as they enter the production phase of their operation.
25. W. H. Miller Company, Wadley, Georgia, is planning to establish an industrialized housing plant. Prior to making any commitments, the firm requested information on various points of concern. This will be a continuing project as they proceed with their plans and require additional information.
26. Mobile Townes Corp., Decatur, Georgia, is a real estate development firm whose primary interest is developing mobile home parks. They requested information on various aspects of the mobile/modular housing field, and were especially interested in IDD's Market Research capabilities. Further work in this area will be studied by the company and possibly some sponsored research will be forthcoming.
27. Mr. Thomas Pitts, Atlanta, Georgia, a mobile home park developer requested information on technical details of mobile home park development. A literature search was conducted and the information transmitted to Mr. Pitts for use in developing a mobile park in South Fulton county.



28. 3 M Company, St. Paul, Minnesota, is the manufacturer of many industrial products marketed in Georgia. They are interested in penetrating the mobile home manufacturing industry. During a personal visit, Mr. John D. Brodie, Manager, Marketing & New Products Research, was advised of some of the constraints in this market and provided with additional sources of information in this area.
29. Slash Pine Area Planning & Development Commission, Waycross, Georgia, is involved in housing in their area in a number of ways. Philip D. Koos, Jr., Director of Planning, requested information on sources of housing data, particularly related to the Slash Pine area. Mr. Koos was provided with a list of sources.



# TECHNOLOGY FROM TECH

INDUSTRIAL DEVELOPMENT DIVISION  
ENGINEERING EXPERIMENT STATION  
GEORGIA INSTITUTE OF TECHNOLOGY

1132 WEST PEACHTREE STREET, N.W., ATLANTA, GEORGIA 30309

A service of the Georgia State Technical Services Program, which is designed to help industry learn about and use new technology. The program is financed jointly by the State of Georgia and the U. S. Department of Commerce.

## METALWORKING BULLETIN 14-70

### NEW FORGINGS STUDY RELEASED

Georgia is an excellent location for new forging facilities to help meet the need for forgings in the six-state Southeast, according to a report just released by Georgia Tech's Industrial Development Division (IDD).

The rapidly growing metalworking complex in Georgia and its five neighboring states consumes a much larger volume of forgings than it produces. Most of the \$46 million worth of metal forgings consumed in the Southeast in 1969 was shipped in from outside the area, the report reveals. Of nearly 400 commercial forgers in the nation, only nine are located in the region.

IDD researcher Tze I. Chiang surveyed metalworking companies in Alabama, Florida, Georgia, North Carolina, South Carolina, and Tennessee as part of the forgings study. The survey revealed that consumption of metal forgings in the area amounts to about \$46 million a year and that the anticipated annual increase in forging usage is approximately 10%. About one-fourth of the forging consumers in the area indicated that they would expand their forging usage above their normal increase if a new source of supply were located nearby. Most firms now have to go outside the region to buy forgings.

According to Dr. Chiang, "Georgia's central location in the Southeast with Atlanta as the hub of commercial, transportation, and distributing activities offers a tremendous opportunity for the development of new forging facilities to serve the region. A new forging plant locating in Georgia will enjoy such major advantages as close coordination with potential customers in the area, shorter delivery time, freight savings, lower labor cost, and wider choice in plant location."

Major end uses of forgings in the Southeast, in order of importance, are fabricated plate work (boiler shops), aircraft parts and auxiliary equipment, metal stampings, farm machinery and equipment, and motor vehicle parts and accessories.



Of the \$46 million worth of forgings purchased in the area, Georgia's share is \$8 million. Georgia firms anticipate a 17% annual growth in their consumption.

The forgings study is part of a continuing program of research on potentials for development of Georgia's metal products and metalworking industry which the Industrial Development Division is conducting at Georgia Tech.

\* \* \*

## CASTING

### N1 - CHEAP CASTINGS WITH RUBBER MOLDS

Small prototype, repair, or limited production parts can be cast quickly and accurately in ferrous, nonferrous, and precious metals by an inexpensive rubber mold investment casting technique originally developed for jewelry work.

The natural rubber molds can be made in a few hours from even the most complex metal or epoxy patterns. They are vulcanized at 300°F. The flexible molds can be kept for long periods and reused as desired to make from 1 to 5,000 wax patterns. The wax patterns are conventionally investment cast or centrifugal cast in the desired metal. Cost of the technique ranges from \$5.00 to \$30.00 for a mold, labor, and material.

This type of casting service is available to industrial users from Finelt Casting Co., which will ship prototype or limited production runs of small castings within 48 hours after receiving a model. Those who want to make their own rubber molds, wax patterns, and castings may order a compact Castmaster investment casting outfit from a sister firm, Arofine Products Co. Equipment includes a rubber vulcanizing/wax injection unit, a gas-fired burnout furnace with a 4½" x 5½" x 6" chamber, a small horizontal/vertical centrifugal casting machine, flasks, rubber molding material, and complete instructions. The entire assembly occupies only 20" x 36" bench space.

For small parts, Finelt uses a mold size which can accommodate parts up to 2" x 1" x 1½". Suggested minimum wall thickness of a part is 1/8 in. Tolerances can be held to  $\pm 0.005$  in. Larger parts require a larger mold unit and can be made to tolerances of  $\pm 0.010$  in. or better.

A casting made by the rubber mold method will be 8% to 10% smaller than the original pattern because of various shrinkage factors in each step. Finelt uses proprietary methods to allow for shrinkage. Owner Aron Finelt says, "We can work directly from a model that has been machined exactly to the finished size wanted. We can also provide castings that are deliberately oversized . . . to allow for metal removal operations that might be needed for finishing."



For precision industrial work, a centrifugal wax injection device insures complete filling of the mold under controlled centrifugal pressures. It is interesting to note that while centrifugal casting of metal is common, use of centrifugal force to get wax into a mold is unique.

("Prototypes or Production Castings - Via Rubber Molds and Wax Patterns," Precision Metal, May 1970.)

\* \* \*

## N2 - SQUEEZE CASTING COMBINES ASSETS OF CASTING AND FORGING

Squeeze casting or liquid metal forging, as it is sometimes called, is a method of casting parts with forged quality. Because castings are squeezed into precise shapes, secondary machining is sharply reduced. Essentially, the process consists of metering molten metal into a female die cavity. While the metal is solidifying, pressure is applied via the upper die.

Although squeeze casting is not widely used in this country, it was used in Scotland during the 1940's and has become a standard manufacturing technique in the Soviet Union since the early 1950's. The IIT Research Institute in Chicago is beginning a three-year research program to define the process parameters of this forming method and to make it commercially attractive. According to J. C. Benedyk, who heads the program, the squeeze casting and complementary Autoforge processes theoretically are potentially capable of severely displacing current casting, forging, and machining techniques.

The combination forging-casting approach is especially competitive when compared to hot forging. Components may be produced from both forging and casting alloys. Production time for squeeze casting steel may be only 1/100 of that for open die forging; it could be 1/10 of that for closed die forging.

Deep sections with thin walls, as well as parts with complex ribs with large linear dimensions and thin walls, can be produced by the process. Cost savings are realized from lower power requirements, shorter cycle times, and the elimination of flash waste.

Advantages over die casting include no gating system to waste metal, elimination of air entrapment problems, superior mold life, and production of heavy sections without interdendritic shrinkage.

Initially, IITRI will work with aluminum, copper-base alloys, the cast iron family, carbon and low-alloy steels, stainless and heat-resistant steels, and super-alloys. Dr. Benedyk believes the process will accommodate parts from 1/4 lb. to 100 lb., but the best potential appears to be with larger components where forged quality is desirable. Using savings from the Autoforge process as a guide,



production cost cuts of 25% to 50% may be possible in making large parts not feasible by the Autoforge process.

(B. D. Wakefield, "Squeeze Casting Has U. S. Friends," Iron Age, May 28, 1970.)

\* \* \*

## FABRICATING

### N3 - AUTOMATIC NUT ASSEMBLY VIA COILS

Many times, assembly of metal products can be simplified by preattaching nuts during the part-forming process. Now tremendous savings are possible through the automatic assembly of nuts onto sheet metal. MacLean-Fogg Lock Nut Co., Mundelein, Ill., is marketing pierce nuts produced in a continuous metal coil strip. There are 1,000 M-F Pierce Nuts on a reel.

The strip is fed into a special application tool which can be mounted into a conventional press brake or shear. The tool positions the end nut on the strip and the press drives it through the part, securing it in the same stroke. A key part of the system is a die insert that goes beneath the workpiece. The die clinches the nut and embosses the workpiece to permit flush mounting.

An idea of the cost savings involved is given by the following example based on attaching four 5/16-18 nuts to a workpiece. With conventional methods, the cost is estimated at \$74.90 per thousand. With the M-F Pierce Nut method, the estimate is \$18.40 per thousand if the nuts are multi-applied in blanking operations; applied singly in separate operations with separate part handling, the cost is estimated at \$36.20 per thousand.

The nuts can be used on any application of sheet metal up to 1/8 in. thick and on painted, plated, enameled, epoxied, or galvanized surfaces. Thread sizes currently available are 1/4-20, 5/16-18, and 3/8-16; 10-24 and 8-32 are in the offing.

Typical users of this method will be the automotive, appliance, furniture, and farm machinery industries.

("Nuts in Coils Speed Production," Iron Age, May 21, 1970.)

\* \* \*

### N4 - PUNCH-CARD CONTROL OF TIG WELDERS

A Canadian manufacturer of jet engines and aircraft parts has combined punched-card control over its welding schedule and ram-manipulator welding machines to reduce overall costs and increase control on circumferential and seam welds.

The Malton, Ontario, plant of Orenda, Ltd., of Canada has three welding machines, each with four 40-in.-diameter positioning tables in satellite positions. After the work setup has been completed, each welding head can be positioned to any of the



four stations. The operator merely pushes a button to start the automatic welding cycle. Productivity for each welding head is very high, but it also is relatively easy to change from a long-run part to a short-run item.

The welding machines are Sciaky ram-manipulator Tig (tungsten, inert-gas) units that are constructed somewhat like a radial drill. The vertical column permits 6 ft. of vertical adjustment of the cross arm, and the head-supporting carriage has 6 ft. of cross motion. The head itself can move through 8 in. of vertical travel and 6 in. of cross-slide motion.

The punched plastic card works in a special card reader at the control console for each welding machine. Hole positions control current, voltage, wire feed, and positioner rotation. Values for upslope (the current increase at the start of the welding pass), post-welding delay, and downslope welding at the end of the pass may be set by direct-readout dials. The operator can change cards in the reader quickly and adjust fixed settings on the direct-reading dials.

Most of the work done by the card-controlled ram-manipulators is circumferential seam welding on parts that range from nickel alloys to titanium. The large size of the welding machines and rotary positioning tables provide the flexibility to handle many workpieces, although the workpieces usually are moderate in size.

("Tig Control by Punch-Card," American Machinist, May 4, 1970.)

\* \* \*

## **MACHINING**

### **N5 - LATHE TRANSFER LINE TURNS CAMSHAFTS**

Long, cylindrical parts are not the easiest to machine on a lathe, particularly when multiple operations must be performed, and it's hard to machine such parts economically. Snyder Corp., Detroit, has come up with a unique transfer line, made up of lathe segments that are built onto a modular base, that accurately machines cast nodular iron auto camshafts at a rate of 125 per hour at 100% efficiency.

Lathe segments are made of a welded-steel, wing base bolted to a fabricated modular center base. This assembly is at right angles to the transfer line and serves as the lathe bed for the head and tailstock units. A one-piece, welded-steel, tunnel bridge unit spans the transfer line to serve as a mounting for hydraulic tool-slide assemblies.

The concept is adaptable for production of a variety of long, cylindrical parts in the medium and high-output ranges, but the first application is a 24-station transfer line that mills, centers, turn-faces, and chamfers five main bearings of an automotive engine camshaft. At the same time, it drills, reams, and taps holes in one end of the 20-in.-long shaft.



Turning and facing are done by five successive lathe segments. Camshafts are fed into the machine one at a time with each machining cycle. U-type locators carry the camshafts from station to station along the free-transfer bar.

At the first machining station, the part is lowered into a slide-mounted fixture, clamped, then fed axially between two stationary milling cutters that mill both ends. At the next machining station, single-spindle, slide-mounted heads advance from opposite ends of the clamped shaft to center-drill each end. One of these center holes is closely controlled because it serves as an axial part location for all future operations in the line.

The outside diameters of the three main bearings are machined in the first turning operation. This station also turns and faces the left-hand pilot diameter with tools mounted in slides in the overhead bridge.

At the next machining station, the OD's of bearings Nos. 4 and 5 are turned along with the diameter of the distributor gear. Then the line turns the thrust faces and OD chamfer of the No. 3 bearing, and turns and faces the left-hand pilot. Station No. 12 turns the thrust faces of the No. 2 bearing and its OD chamfer while the left-hand pilot is undercut and chamfered. In the final lathe operation at Station No. 14, the thrust faces and OD chamfer of the No. 1 bearing are turned.

("Transfer Line Turns for the Better," Iron Age, May 7, 1970.)

\* \* \*

#### N6 - MATERIAL HANDLING NEW FEATURE OF ABRASIVE SAW

To simplify the problem of moving large billets made of exotic metals to and from the cut-off saw and holding them during cutting, Continental Machine Tool Co., Bell Gardens, Calif., has designed a new Ulticut model that combines both an abrasive saw and a material handling system. The system's first customer predicts a 40% to 50% saving in material handling during the saw's first year of operation.

All operations are completely controlled by a single operator stationed at a centrally located control console. Steel and exotic-alloy billets weighing up to 15,000 lb. and with diameters up to 16 in. are automatically positioned, fed into the saw, measured, sawed, and fed out into the staging area. When the material is fed in, all the operator has to do is select the length of cut. A digital readout device, which measures bar length from 1/2 in. to 20 ft., is coupled to the automatic measuring mechanism.

Billets are centered automatically, relieving the operator from tedious clamping and positioning. The material is aligned by the Ulticut system and a clamping force of 20 tons holds the material rigidly in place for sawing.



Sawing is quick and easy. With 125 hp, a cutting rate of 50 sq. in. per minute is practical for almost any nickel alloy as well as titanium and steel alloys, regardless of hardness.

After cutting, the material is conveyed to a high point in line with a discharge table. With the press of a button, the material is unloaded onto the discharge table and stored until needed. As much as 70,000 lb. of material can be loaded into the storage platform. Sizes from 4 to 16 in. in diameter and up to 20 ft. in length are readily accommodated.

("Abrasive Saw System Cuts and Carries," Iron Age, May 7, 1970.)

\* \* \*

#### N7 - ECONOMY NC LATHES AVAILABLE

Small machine shop owners have been left out in the rush to numerical control -- the equipment has been too expensive. Recently, however, some NC lathes ranging in price from about \$30,000 to \$70,000 have been introduced that will enable the little man to stay competitive.

The newest economy model on the market, made by Standard-Modern Tool Co., Ltd., Toronto, Canada, uses an open-loop contouring NC package developed by Icon Corp., Cambridge, Mass. The 17-in. lathe sells for \$35,000, with optional threading capabilities somewhat extra. Another 17-in. open-loop machine is marketed by Superior Electric Co., Bristol, Conn., at \$28,000.

For those desiring closed-loop control and willing to go up into a middle price range, LeBlond Machine Tool Co., Cincinnati, has a \$57,000, 20-in. lathe with a hydraulic drive system. Although noisier than an electric drive and without infinitely variable speeds, the hydraulic drive is said to be well suited for cutting harder metals. LeBlond says that hydraulics yield a 25% saving in machine cycle time over the average chucking operation.

Slightly higher priced are the lathes offered by Lodge & Shipley Co., Cincinnati, at \$60,000, and by American Tool Works Co., Cincinnati, at \$67,000.

Some people claim that the open loop is inherently less accurate than the closed loop. But Icon president Gordon Baty says, "Open-loop systems are almost always more accurate for continuous-path contouring than a comparable closed-loop servo system. The pulse motor has far less lag or velocity error, and the error it does have is usually far more linear than that of comparable dc servos."

The Icon system is intended for a variety of machines, including vertical milling machines and small machining centers. Dr. Baty says the system's low price



and simplicity make it useful for continuous-path equipment such as welding, flame-cutting, grinding, and automatic drafting.

(T. H. Malim, "Low Costs Develop for NC Lathes," Iron Age, May 21, 1970.)

\* \* \*

#### N8 - LATHE ATTACHMENT FOR BELT GRINDING DEVELOPED

By using an abrasive belt attachment on a standard lathe, an Australian manufacturer has halved the time it formerly took to finish-grind ball yokes for large military vehicles manually. The company, Morse Chain Div. of Borg Warner (Australia), Ltd., designed and developed the device with the aid of Norton Australia Pty., Ltd., a coated abrasives manufacturer.

The ball yoke is held by its flange in the chuck of a standard VDF (West German) lathe whose toolpost has been removed so that a 1-in.-thick steel plate with a fulcrum pin could be bolted to the cross slide. Riding on this plate is another steel plate that has a tongue with a hole that fits over the fulcrum pin, a vertically mounted bracket that supports the 1-hp bench grinder motor that drives the abrasive belt at 5,000 sfpm, and a handle that the operator grips to swing the device through the grinding arc.

Prior to grinding, the operator positions the cross slide so that the fulcrum pin is directly below the center of the ball yoke in order to assure that the attachment swings through an arc that will allow the belt to grind the workpiece uniformly. The attachment is not designed for high stock removal, but it can grind up to 0.010 in. of material off the diameter of the ball yoke. While the workpiece rotates at 200 sfpm, a 1-in.-wide x 48-in.-long Resinall Metallite belt with Norton 240 aluminum oxide grit smoothes the part sufficiently to avoid abrasion of a rubber grease seal that is spring-loaded against the ball yoke's spherical surface.

(William A. Scholes, "Belt Grinding on a Lathe," American Machinist, May 4, 1970.)

\* \* \*

## FINISHING

#### N9 - FURNACES PROVIDE MAXIMUM METALLURGICAL CONTROL

The National Screw and Manufacturing Co., Mentor, Ohio, manufactures over 40,000 different headed and threaded products from more than 600 different grades and sizes of wire strip and bar. Approximately 80% of the parts must meet customers' exact specifications, which requires consistent metallurgical control of the work being processed.



To achieve complete process control, the company has installed two atmosphere-controlled, continuous heat-treating furnace lines and is in the process of adding two more. They are designed and built by Surface Combustion Div., Midland-Ross Corp., Toledo, Ohio, and each has a rated capacity to heat 2,000 lb. of work an hour. The new lines have increased production, cut material handling costs by 60%, and improved product quality and uniformity.

Equipment in each line comprises a belt-hardening furnace with oil quench tank, a belt-type transfer conveyor, a mesh-belt washer unit, a belt-type draw furnace, and a soluble oil quench tank with discharge flight conveyor.

Work to be heat treated is brought to the charge end of the hardening furnace in corrugated tote boxes. An automatic elevator lifts the box to loading level, and its contents are automatically dumped onto a vibrating loader hearth. Movement of the hearth evenly meters the parts onto the furnace's conveyor belt. Then the parts pass through the furnace in temperatures ranging from 1400° to 1650°F.

After processing, the parts drop from the end of the furnace belt into a chute which guides the work into an oil quench tank while keeping it at furnace atmosphere. An automatic discharge flight conveyor removes the parts from the quench tank and deposits them on a mesh-belt conveyor leading to the spray washer unit, where a temperature-controlled water solution is sprayed on them to remove the quenching oil.

After cleaning, parts travel through the draw furnace and fall into a discharge chute which leads to the final oil quench. When the parts have been quenched, they are deposited in a tote box and sent for further processing or packaging.

("Furnaces Belt out Better Bolts," Iron Age, May 14, 1970.)

\* \* \*

#### N10 - COMPANY SWITCHES SOLVENTS, REAPS BENEFITS

By switching from trichloroethylene to a specially inhibited grade of 1, 1, 1-trichloroethane called Chlorothene VG in its vapor degreasing operation, Catalyst Research Corp., Baltimore-based battery parts manufacturer, has halved the rejection rate for parts not meeting cleanliness standards and has improved working conditions. The use of 30% less solvent more than offsets the slightly higher cost of the new solvent.

The company operates two degreasers, one with a 104-gallon capacity and one that can hold 50 gallons of solvent. Many of the parts cleaned by the larger unit are made of "relatively active" metals; most of them are plates about 3 in. in diameter. Some are sprayed by jets of solvent for about seven minutes as they tumble in a revolving drum, though the average is five minutes. In the smaller degreaser, baskets filled with about 100 battery cases are immersed in the vapor for



30 seconds and then moved to the other half of the degreaser, where they are rinsed in solvent for 30 seconds. After a final 30-second vapor bath, they are removed.

Chlorothene VG has greatly improved operator safety and comfort. Its boiling point is 24<sup>o</sup>F lower than that of trichloroethylene, reducing the heat discomfort problem. Its fumes are much less toxic, and its odor is slight but more pleasant than is the case with trichloroethylene.

("Solvent Switch Pays Off," American Machinist, May 18, 1970.)

\* \* \*

#### N11 - AUSTEMPERING IMPROVES ELECTROPLATED RING STRENGTH

Brittle failure caused by absorption of hydrogen during the plating process is a problem in electroplating hardened high-carbon steel parts. This makes some form of stress-relieving heat treatment after plating necessary.

In extensive tensile tests, Truarc Retaining Rings Div., Waldes Kohinoor, Inc., Long Island, N. Y., found that electroplated rings which had been quenched and tempered failed by fracture at lower loads than those which had been austempered to the same hardness level. Austempering, or isothermal heat treating, at Truarc involves rapid cooling into a molten salt held between 500<sup>o</sup> and 700<sup>o</sup>F. The parts are kept in the salt for a fixed time period which depends upon the temperature and hardness desired. This method produces less thermal shock than quenching in conventional hardening since internal structural changes occur gradually. The isothermal transformation, which can be completed in about 20 minutes in a 0.75% carbon steel at a hardness level of Rockwell C48 to C52, permits an internal crystalline structure which has less micro-fissures or embrittlement sites.

Truarc also has adopted a newer, non-electrolytic process for metal deposition called mechanical plating which is designed to prevent hydrogen embrittlement.

("Austempering Alters Brittle Failure," Iron Age, May 28, 1970.)

\* \* \*

## PACKAGING

#### N12 - AUTOMATED STRAPPING SPEEDS STRIP PROCESSING LINES

With nearly every order a rush order, Rafferty-Brown Steel Co., Inc., looked for a way to speed up the strapping process to keep pace with slitting line output at its Waterbury, Conn., steel strip plant. Besides being slow, its old hand strapping methods caused operator fatigue that led to mental errors as well as job dissatisfaction.

New semiautomatic strapping equipment, supplied by Stanley Strapping Systems, a division of The Stanley Works, New Britain, Conn., has enabled R-B to double



production and reduce labor costs in banding by 50%. Counting operator break-time and production line delays, the slit coil bander can process 100 coils per hour with three straps to a coil.

The Waterbury facility operates a 12-in. and a 36-in. slitter. Conveyor lines from both merge just before the strapping station. These conveyors handle coils with face widths from 1/8 in. to 17 1/12 in. and with outside diameters ranging from 8 in. to 42 in.

At the slit coil bander, three straps are placed through the "eye" of the coils to prevent them from uncoiling. The operator merely inserts the strap into the power strapping head and depresses a switch. The strapping head tensions, seals, and shears the strap.

Depending on desired strap placement, the coils are automatically rotated 90°, 120°, or 180° on the conveyor. The length of strap needed, based on coil size, is automatically metered out by foot pedal.

Via a mechanical pickup, the coils are placed on pallets riding on a powered "merry-go-round" stacker that can hold up to 24 pallets. The rotating stacker makes it possible to keep both the variety of coil widths and the orders from different customers separated in a minimum of space. Orders are kept intact by strapping the pallets together with another Stanley unit, called a Mobile Strapping System, which is wheeled next to the stacker.

("Strapping Gets Automated Assist," Iron Age, May 14, 1970.)

\* \* \*

## ROUNDUP OF GEORGIA PLANTS

### NEW PLANTS

Easy Way Products, Inc. will move its manufacturing operation from Ponca City, Okla., to Ellijay in August. Grading began last month in the local industrial park for construction of a 12,000-sq. ft. metal building to house production of a patented Ken-Do conveyor and a Sheetrock lift which is used by builders and contractors, with manufacture of Ken-Do pontoon boats to be added later. Employment at full production will be 30 men. Don Meeks is president and Kenneth Waller, vice-president.

- - -

In May, a new Americus industry, Thronateeska Industries, Inc., formally opened its facilities for the manufacture of pickup truck campers, travel trailers, pickup covers, and utility houses. Company president is George Murray and James Carpenter is vice president and production manager. Carpenter formerly produced custom-made campers and other items in facilities at the rear of his home.

- - -



Opening in the early fall on a 5½-acre tract at Wrens with 30 to 35 initial employees will be Anchor Woodcraft Corp., a new modular and mobile home building firm. According to Charles R. Hughes of Thomson, president, the company has a contract to build 600 units for Aerospace Investors of Marietta, which is planning to develop home parks throughout the Southeast. H. Leon Mynatt will manage the plant, which will be capable of producing 10 to 15 units a day.

\* \* \*

#### PLANT EXPANSIONS

Dedication ceremonies and open house were held in June at the new \$1-million Ventline, Inc. plant at Americus, which will employ some 80 to 100 workers in production of ventilating equipment and range hoods for the mobile home industry. The Bristol, Ind.-headquartered firm is a subsidiary of Philips Industries of Dayton, Ohio, and the new facility is located adjacent to the Philips Industries of Georgia plant, which began manufacturing aluminum windows, doors, and other components for mobile homes about 5½ years ago. Denzie Wright manages both Americus operations.

- - -

Colony Cookware Corp., which began operations in Tifton last summer, has produced its 1-millionth aluminum frying pan. The plant has undergone continual growth in employment, equipment, and manufacturing lines, with some 200 employees now turning out over 300,000 items monthly. The company is introducing a premium line of aluminum cookware which will carry the Colony House name, in addition to its private label production. Plant manager is Dean Sorenson.

\* \* \*

#### ACQUISITIONS AND MERGERS

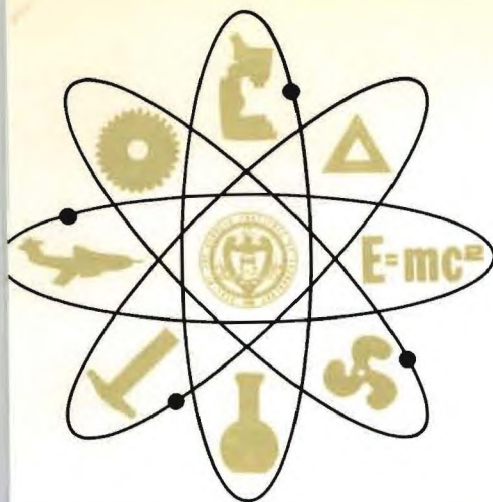
Modern Diversified Industries, Inc. of Valdosta has acquired Atlanta-based Alco Mfg. Co., a producer of pipe fittings and fabricated products for heating and air conditioning systems, and will operate it as a wholly owned subsidiary. Alco has a 20,000-sq. ft. leased plant employing 35 people at Douglasville.

- - -

Tucker Aluminum Products, which has been operating in the Moultrie Industrial Park since 1963, has been acquired by CE Building Products, Inc., a subsidiary of Combustion Engineering, Inc. headquartered in Coral Gables, Fla. The Moultrie plant manufactures aluminum doors, windows, and screens, employing 600 persons.

\* \* \*





# TECHNOLOGY FROM TECH

INDUSTRIAL DEVELOPMENT DIVISION  
ENGINEERING EXPERIMENT STATION  
GEORGIA INSTITUTE OF TECHNOLOGY

1132 WEST PEACHTREE STREET, N.W., ATLANTA, GEORGIA 30309

A service of the Georgia State Technical Services Program, which is designed to help industry learn about and use new technology. The program is financed jointly by the State of Georgia and the U. S. Department of Commerce.

## METALWORKING BULLETIN 15-70

### SCHOOLS TRAIN METALWORKING MANPOWER

Employment in Georgia's metalworking industries (SIC 34 through SIC 37) has increased by more than 40,000 persons in the last five years. The increase has expanded the need for skilled metalworking labor in the state.

In most cases, this skilled labor is available. There are state and area educational programs directed toward filling local labor requirements in the metalworking trades. Today, there are 23 vocational-technical schools in Georgia which offer courses in machine shop and metalworking skills. This summer, these schools have graduated more than 200 people in machine shop and tool and die work. In addition to these training facilities, 12 high schools in Georgia offer courses in metal fabrication or metalworking.

Georgia metalworking companies interested in expanding or completing their work forces should contact the Division of Vocational Education, Georgia State Department of Education. Each area school has an industrial coordinator who has access to available personnel lists and who can, if desired, work with individual companies to set up "tailor-made" training programs best suited to each firm's needs.

\* \* \*

## CASTING

### 01 - LOST-WAX CASTING OF HIGH-QUALITY TOOLS

End mills, drills, boring bits, and other cutting tools with exceptionally long lives, high production rates, and high precision can be made at relatively low cost using the lost-wax investment casting process. The High Alloy Div. of Amforge Inc., Azusa, Calif., uses this process to make some 150 types of large precision



cutters from a variety of high-speed steels and their own Multiloy -- composed of chromium, molybdenum, vanadium, tungsten, and cobalt.

A special mold is made from a master pattern. These molds are completed in a matter of hours rather than weeks and at much lower costs than for ordinary molds. From one basic mold, thousands of wax patterns can be made by a wax injection machine for the production of parts to tolerances of  $\pm 0.003$  in.

After removal, the wax patterns are dipped in a slurry of zircon flour mixed with a binder, coated with a zircon grain, and dried to form an exceptionally smooth coating. The dipping-coating-drying operation is repeated until a one-piece shell of sufficient strength is formed around the wax.

The wax is removed from the shell by firing the assembly in an autoclave. The wax melts away in 15 minutes and the shell is cured for 3/4 hour, compared with a 12-hour cycle for conventional casting. This rapid wax-removal process, coupled with a very low coefficient of thermal expansion for the refractory shell, prevents distortion in the form, thus providing a high degree of dimensional accuracy in the finished parts.

Next, molten metal is poured into the zircon shell and allowed to cool. After cooling, the shell is cracked off the cast. The cast is then cleaned, heat treated, ground if necessary, inspected, and shipped to the customer.

Cutting tools cast by this process have a homogeneous grain structure -- with none of the stresses or strains that occur in making tools from bar stock where the molecular structure is elongated and broken down by rolling and forming. The expensive and time-consuming precautions ordinarily taken in heat treating tools made from rolled stock or forgings are unnecessary.

Lost-wax investment casting permits utilization of as much as 95% of the original metal, while scrap losses of 20% to 60% are generated by machining ordinary tools. This saving plus the relative cheapness of the molds and high production rates results in tools that cost 20% to 30% less than those made by other methods. Lost-wax cast tools also usually can be operated at higher speeds and feeds, and tool life is as much as 60% longer.

(George DeGroat, "Casting Tools by Lost-Wax," American Machinist, July 27, 1970.)

\* \* \*

## FORMING

### 02 - ADJUSTABLE DIE MAKES PARTS IN SEVERAL SIZES

At Lightron of Cornwall, the forming die in a special dieset makes lighting fixture housings in four sizes and two styles, thus eliminating several operations



and permitting easy, rapid changeovers. This 3,000-lb. die, in use at Lightron's plant at Cornwall-on-the-Hudson, N. Y., is one of over 200 new dies developed by Charles Bank, toolroom foreman for the firm's two plants, in an intensive program of upgrading sheetmetal forming methods.

The 3,000-lb. die is built upon a special dieset made by the Producto Machine Co., Bridgeport, Conn. The similarly sized forming die and piercing die are set up on parallels in a 500-ton gap-frame Cleveland press with a 26-in. throat depth, 14-ft. bed, and 10-in. stroke. Two operators serve the two dies, and a third man removes the formed part from the end of the forming die.

The forming die can be adjusted to make housings of 1 x 4 ft., 1 x 2 ft., 2 x 2 ft., and 2 x 4 ft. -- in grid or flange models. To change the housing width, the spacer plate in the punch member and the pressure pad can be removed and another one substituted in approximately one-half hour without the chance of error.

(Rupert Le Grand, "Die Makes Family of Parts," American Machinist, July 13, 1970.)

\* \* \*

## **MACHINING**

### **03 - FLUIDIC-CONTROLLED LATHE AVAILABLE**

Just three years ago, Bardons & Oliver, Inc., Cleveland, introduced the first completely fluidic-controlled automatic turret lathe. Today, with the introduction of its new No. 5 machine, the company is more convinced than ever that fluidics is the simplest, most reliable, easiest to maintain, and least expensive means of controlling this type of machine.

Other automatic turret lathes use fluidics for only some of the machine functions, such as for turret indexing. But the new lathe relies on fluidic controls for everything except feed rate control and slide positioning, both of which are set manually.

The digital sequence control consists of three major elements -- programmer, position sensing devices, and time delays. On a program panel are six rows of function-selector switches, one row for each face of the six-station turret. Up to 16 function choices are available for each index position. Position sensing informs the logic section when one operation has been completed and the next can begin. Time delays maintain a control condition until an operation is completed.

An important feature of the new slant-bed lathe is independent hydraulics on all slides. This enables the overhead slide or cross slide to continue making chips while the turret is free to index and perform any number of operations. Tooling can be done with standard turret lathe holders or by means of special tools that slip onto a dovetail plate and secure by tightening a single bolt.



Shop personnel can be trained to maintain the fluidic controls in a one- or two-day period.

(R. A. Wilson, "Fluidic Controls Direct New ATL," Iron Age, July 30, 1970, and "New Lathe Has Fluidic Controls," American Machinist, July 27, 1970.)

\* \* \*

#### 04 - PRECISION MILL ROLLS SUPER-THIN TUBING

A precision mill for rolling super thin-walled tubing of hard-to-work metals, developed at the U.S.S.R. Research Institute of Metallurgical Machine Building, Moscow, is in use in Japan, Sweden, France, and West Germany. Mills of this design have not yet been introduced into the U. S., although sizable quantities of tubing made on HPTR mills are being imported into this country. Patent Metallurgical Systems, Inc., Washington, D. C., plans to install a mill at Richmond, Va., late this year as a demonstration or pilot plant. The company will handle sale and installation of the HPTR with full technical assistance of the Russian developers.

The Soviet mill is a roller-type, compared to the older roll-type mills generally used for thin-wall tubing. The process is similar to that for foil rolling. In Sweden, precision tubing as small as 0.24 in. in diameter with wall thickness as low as 0.003 in. is produced on the HPTR machine.

Multiple-roll mills are designed to reduce the roll diameter as the thickness of the metal being rolled decreases. Instead of using two complex rolls of changing profile, three or more small diameter rollers with constant profile are used in the new mill. Special straps back up the rollers, acting as bearings and as the formers found in roll-type mills. A thick-walled tube surrounds the straps and provides symmetric deformation under load.

The sequence of operations and the rolling process for the production of tubes are similar to those employed on the roll-type mill with end loading of tubular stock. After the tube stock is loaded on the receiving rack and lubricated, subsequent operations can be completely automated.

Production rates generally are lower than for roll-type mills, but the tubing is of higher quality. Several design factors keep the surface quality high.

Expensive work roll bearings with low service life are not used, thus eliminating a major maintenance item. Working tools can be manufactured to within  $\pm 0.0004$  in.

The instrument-making industry uses super thin-wall tubes extensively. Other customers are the chemical and food industries. Finned tubes are used in nuclear reactors because of the increased surface area provided by the fins. High-speed aircraft utilize the tubing for fuel and hydraulic lines.

("Russian Mill Rolls Super-Thin Tubes," Iron Age, July 16, 1970.)

\* \* \*



## 05 - DIAMOND WHEELS GRIND DUCTILE METALS

Diamond abrasive wheels have been used on carbides and ceramics for years, but the use of diamond and ultrahard abrasive wheels for the ductile metals is a new development. Engineers at Bay State Abrasives Div. of Avco Corp., Westboro, Mass., have come up with bonds for the newer friable diamonds and Borazon (a nickel-coated cubic boron nitride). Designed by Avco especially for grinding ductile materials, the bond is resistant to abrasion and inhibits chemical reactivity with the work-piece. Avco defines ductile metals as tool steels, stainless and high nickel alloy steels, titanium and Waspaloy.

Avco Bay State engineers admit that a diamond wheel to replace a \$3 aluminum oxide wheel might cost \$500, and they are building one with a price tag of more than \$3,000. But they point out that diamonds last much longer -- efficiencies of 100 to 300 G ratios (the ratio of stock removal to wheel wear) are not uncommon, while the G ratio with aluminum oxide is more like 1 to 5. Another significant saving is in the amount of time spent in wheel dressing. Productivity can increase enormously; when one firm switched to a diamond wheel for blind grinding a slot in M-50 steel, production increased from 50 parts a day to a part every 1½ minutes.

Even more important are labor savings and the ability to do jobs that could not be done well before. The small amount of wheel breakdown means that close dimensional control is possible without any machine compensation for wheel wear. On heat-sensitive materials, the ultrahard abrasives reduce metallurgical damage.

To a certain extent, the friable diamonds and Borazon offer latitude to the grinder. For M-2, T-15, and related high-speed tool steels, either diamond or Borazon is applicable.

J. R. Thompson, Avco senior research engineer, cautions that the newer abrasive materials are not a panacea. "Unlike regular abrasive grinding, which can be somewhat forgiving," he says, "the application of diamond wheels to grind ductile materials demands consistently precise practices for ultimate success."

(T. H. Malim, "Who Says Diamonds Are Expensive?" Iron Age, July 23, 1970.)

\* \* \*

## 06 - GUN DRILLING WITH A CONVERTED BORING MILL

Single-purpose gun drilling machines can cost \$50,000 or more. But mounting a gun drill head on a horizontal boring mill may work just as well and at one-tenth the cost. Superior Mold & Die Co., Stow, Ohio, found that for an investment of \$4,000 they could gun drill 40½-in.-deep holes with 3/8-in. diameters at the rate of 2 7/8 ipm at less than half the cost of contracting out the work.



The new equipment consists of a gun drill head and a special pump-filter system to supply high-pressure coolant, both supplied by the Ward-Riddle Co., Ravenna, Ohio. The drill head has a 3/4-in.-diameter capacity, and the pump delivers 12 gpm of coolant at 1,000 psi. Less than three months were required for the equipment to pay for itself.

Only 10 screws are needed to install the gun drill equipment, and the drill head may be removed easily to permit use of the basic boring mill. The boring mill head is raised out of the way when the drill head is in use.

In the Superior Mold operation, the concentricity and accuracy of gun drilling are essential. The company makes 1020 steel molds for plastic car mats, 81 in. long by 39 1/8 in. wide. Running the entire length of each mold are 61 water holes. Since the table travel of the boring mill is only 44 in., each water hole consists of two 40 1/2-in. holes, one drilled from each end, which makes accuracy a must. Good concentricity also is required because the wall between holes and mold cavities is only 7/32 in. thick. In addition, holes are drilled on 5/8-in. centers leaving only 1/4 in. between the outer diameters of holes.

To insure smooth operation, the Superior Mold installation has several other features. Whip guides are used to steady the 56-in. drills. Guide assemblies are positioned by horizontal bars stretching between the angle plate on which the drill head is mounted and the chip box covering the hole entrance. A carbide drill bushing, inserted snugly in the wall of the chip box next to the work face, insures quick and proper starting of each hole.

("Making a Two-in-One Machine Tool," Iron Age, July 16, 1970.)

\* \* \*

## FINISHING

### 07 - "INSTANT" SURFACE HARDENING OF LONG PARTS

A revolutionary new single-shot method of surface hardening elongated parts such as shafts and spindles is claimed to be 18 times faster than other induction hardening systems. And it uses restraining devices that provide precise control during the heat treating process, thus eliminating the need for straightening operations. It replaces the conventional continuous heating and quenching process called "scanning."

In the conventional method, an inductor surrounds the part circumferentially and heats a relatively narrow band as it moves longitudinally, followed by quenching. The single-shot method heats the entire workpiece at one time in only a few seconds. Also, the equipment has capability for built-in induction tempering.



Two types of inductors are used: (1) a multiturn solenoid that completely surrounds the area to be heated and permits heating with or without rotation; (2) a longitudinal type positioned alongside the area to be heated, with the part being rotated. The latter design frequently can be used regardless of the length of the part, while the former generally is used only on short parts that can be moved quickly enough into quenching position. For either type, the handling equipment can be automated.

Parts with diameter changes are surface hardened to a uniform depth for the entire length of the hardened area. To achieve this using the scanning process, power or scan speed had to be changed and it was difficult to get uniform hardness patterns. The new method assures uniform heat depth because both the solenoid and longitudinal inductors provide uniform air gap or coupling over the entire part length.

Scan rates used for continuous heating and quenching are usually on the order of fractions of an inch per second. In comparison, total heating time in the single-shot method may range from 5 to 10 seconds.

("Induction Hardening in a Single Shot," Tooling & Production, June 1970.)

\* \* \*

#### 08 - SPEEDY OVEN-DRYING METHOD FOR PRIMED PRODUCTS

Installation of fast-drying ovens has enabled Level Line, Inc., Lakewood, N. J., manufacturer of window frames, shutters, doors, and other products for the home building industry, to cut material-handling costs, reduce the amount of factory space tied up as drying areas, and lower the supply of stock required for inventory. Level Line formerly air-dried its products on racks after they had been sprayed with primer. Now they are primed and dried in a 5-minute cycle, using ceramic-type electric infrared ovens.

Flat products are sprayed with primer on a conveyor which then carries them into a horizontal infrared oven. The conveyor first runs through a waterfall spray booth where two guns attached to an automatic traverse prime all material on one face and all edges. Material to be primed on both sides is turned over and run through the procedure again.

An overhead conveyor running through a vertical oven dries single, twin, and triple window frames suspended on hooks. A manually operated spray booth is used to face-prime the frames.

Both ovens are zoned with variable temperature controls which can be set to suit product size and humidity conditions. The operations run at approximately 10 fpm, but the conveyor speed can be increased or decreased to control both the amount



of primer applied and the length of drying time. A maximum of about 40 sq. ft. of products per minute can be primed and dried.

("Fast-Drying Ovens Cut Priming Costs," Industrial Finishing, July 1970.)

\* \* \*

## TESTING

### 09 - VIEW INTERNAL FLAWS VIA ULTRASONICS

A safe, desk-size, nondestructive inspection system using ultrasonic holography to permit continuous viewing of the interior of metal and plastic parts and many other materials was shown for the first time by Holotron Corp., Wilmington, Del., at the ASM Materials Engineering Exposition.

Installed in a cabinet, ready for use, the system sends an ultrasonic beam through the object to be inspected. The image is made visible by illuminating the holographic detector with a laser operated at a safe, low-power level. The maximum field of view is approximately 5-in. wide, but the object tank can accommodate parts of larger-size objects which can be moved through this field for continuous inspection. Materials several inches thick can be viewed, depending on their absorption and reflection characteristics. The image can be viewed directly or photographed.

The ultrasonic imager reveals voids, flaws, or discontinuities which exist in the material, or will present a view of internal components in an assembly. The operator can switch between four operating frequencies for best balance between penetration and fineness of detail. Resolution to 0.01 in. can be obtained.

("Non-Destructive Testing with Ultrasonic Holography," Die Casting Engineer, July-August 1970.)

\* \* \*

### 010 - EARLY-DETECTION SYSTEM FOR BEARING FAILURE

Failure of ball or roller bearings can be expensive in terms of both machine damage and production downtime while the machine is being repaired. SKF (Swedish Ball Bearing Co.), Gothenburg, Sweden, has developed a new method of detecting bearing failure at an early stage which it claims should greatly alleviate these problems.

The MEPA 10A portable equipment uses a technique called shock pulse measurement to detect spalling or flaking damage in bearings. Such damage produces mechanical shocks which are of short duration and high frequency. These shocks are transmitted to the bearing housing, where they can be detected by special equipment. Special measuring nipples attached to the bearing housing transmit information to an accelerometer which determines the magnitude of the shocks at the housing. The method is claimed to be highly selective, permitting the investigation of a particular bearing



without interference by vibrations from other bearings. The equipment also is supposed to be able to sense lubricant impurities, which cause wear and shorten bearing life.

The recording meter is easy to handle, being only slightly larger than a shoe box, and can be operated by regular service personnel. As many as 300 measurements a day are possible. This early-detection system makes it easy to spot trouble before breakdowns occur and substantially increases the chances of salvaging large bearings while they are still repairable. For the immediate future, the equipment is not available for use outside Scandinavia.

("New Method of Detecting Bearing Failure," Machine Shop and Metalworking Economics, June 1970.)

\* \* \*

## ENGINEERING

### 011 - MIXER WITH NO MOVING PARTS DEVELOPED

The designer's dream of eliminating moving parts and their problems was realized by engineers at the Arthur D. Little, Inc., consulting firm when they designed a mixer with no rotating or reciprocating parts. Now refined and marketed by Kenics Corp., Danvers, Mass., the mixer is simply a tube containing a series of helical elements. The secret is that each element is joined at a  $90^{\circ}$  angle to the one before and after it, giving the appearance of a cockeyed drill bit.

The material to be blended -- gas, liquid, semisolid, emulsion, or slurry -- is pumped through a tube, splitting into two streams at the first element. At the second element, the two streams split into four. Each successive element further doubles the number of streams; with 20 elements, for example, the single original stream is divided more than one million times. The number of elements used and their size vary with the degree of mixing required and the kind and quantity of material to be handled.

In addition to division of the material into streams, blending is aided by the clockwise and counterclockwise twists of the elements. Each particle in the stream continuously moves from the center to the outer wall and back again to the center. Because the speed of the material at the outer wall differs from the speed at the center, blending is further enhanced.

There seem to be almost no limitations on the size of the tube or the mixing elements. The mixer can be made of almost any material that can be formed or molded, although stainless steel is the most common one used. And the kinds of materials which can be mixed seem to be limitless. The mixer also has been used as a more



effective heat exchanger than the conventional tube; the constant mixing action accelerates the heat transfer action.

(T. H. Malim, "A Mixer with No Moving Parts," Iron Age, July 30, 1970.)

\* \* \*

## ROUNDUP OF GEORGIA PLANTS

### NEW PLANT OPENINGS

Jackson Tubing & Conduit Co., Cedar Springs subsidiary of Magna-Tech Corp. of Opelika, Ala., began operations this year after five years of interrupted construction. The plant in June reached its production quota of one million ft. of electrical metallic tubing and 300,000 ft. of rigid conduit weekly.

- - -

Dedication ceremonies were held in June for TBR Homes, Inc., at Pelham (see Metalworking Bulletin 9-70). The mobile home manufacturer employs 120 people in a 51,000-sq. ft. plant.

\* \* \*

### PLANT EXPANSIONS

Southwire Co. has revealed preliminary plans to construct a \$30-million copper refining plant at Carrollton which would employ 500 to 600 people. Full details on the proposed operation, which would represent the only copper refining operation in the South, have not yet been released. Southwire, a principal producer of copper and aluminum wire, also has an aluminum reduction plant in association with National Steel Co. at Hawesville, Ky.

- - -

Southern States, Inc., subsidiary of Gulton Industries of Metuchen, N. J., has started the first of three phases of plant modernization at Hampton. This phase involves redesign of the foundry division and installation of mechanized equipment. During the second phase, slated to begin in December, the building size will be increased. The modernization program will permit the company, which employs 500 in the manufacture of high-voltage electrical equipment and textile machinery, to produce castings formerly purchased outside. No significant employment change is anticipated.

- - -

Deep South Mobile Homes of Georgia, Inc., which began operations last December in a tobacco warehouse at Pearson (see Metalworking Bulletin 10-70), has moved into its new 30,000-sq. ft. permanent quarters, where it is turning out six 70-ft. mobile homes a week. Monroe McKinnon is plant superintendent.

- - -



Construction has begun on a 60,000-sq. ft. manufacturing facility for B. M. F. Co., a division of Elixir Industries, which currently is making doors for mobile homes and recreational vehicles in a leased building at Douglas. Upon occupancy of the new unit in October, B. M. F. also will produce Elixir's Alum-A-Form line of exterior siding and paneling for the same market.

\* \* \*

#### ACQUISITION

Truelove Homes, Inc., which began operations at Pearson in the spring of 1969 (see Metalworking Bulletin 4-69), was bought out by a Florida-based firm and now operates as Bradford Homes, Inc., in the former Farmers Tobacco Warehouse.

\* \* \*



ANNUAL REPORT

PROJECT SIX



Georgia State Technical Services Program

Technical Information Transfer Services for  
Georgia Business and Industry

(Georgia Tech Projects B-346-001, -002 and -003)

by

Ben E. James, Jr.

Georgia Tech Industrial Development Division

August 18, 1970



The purpose of Project Six, which was funded as part of the 1969-1970 Georgia State Technical Services Program, was to provide Georgia business and industry with scientific, technological, and management information. Georgia Tech's thrust in implementing this program has been in three directions -- field services, technical information bulletins, and housing resources.

The field services program is designed to strengthen existing industry by providing technical and management service and information to companies who do not have the advantages of large technical staff or of up-to-date technical and management libraries. This method of industrial improvement is implemented by field representatives in seven field offices strategically located throughout the state.

The technical information bulletins consist, at present, of the publication of the Metalworking Bulletin. This bulletin is composed of condensations of articles on new ideas and practices in metalworking culled from metal trade journals and a round up of new and expanded metalworking plants in Georgia.

The objectives of the housing resources program are to increase the availability of adequate housing in the southeastern region consistent with the housing needs and to improve the quality of housing in the region while maintaining development and construction costs at a minimal level. This program has endeavored to achieve these objectives through the provision of information, service, and research relating to existing and new technology to governmental and private organizations concerned with the provision of adequate housing in the region.



During the past fiscal year, an additional 10 issues of the Metalworking Bulletin were published. These issues were distributed to over 190 companies within the state of Georgia. Also published during the year, were two technical papers aimed at the mobile home industry. These papers were on inventory control and production control. As part of the housing resources program, an index of statistical data on the housing industry was published. This publication has been distributed to over 150 companies, architects, engineers, and financial institutions.

During the past year, a study was completed on the use of building codes throughout the state of Georgia. This study indicated that while virtually all towns in Georgia with a population of over 5,000 had building codes, only 23 of Georgia's 159 counties had adopted similar codes.

During the latter part of the fiscal year, in response to many requests for information on air pollution control technology, a series of air pollution control workshops was initiated. These workshops will provide medium and small industries information on economic and technical considerations in meeting the air quality standards in the state of Georgia.

The field services program during the past year, continued to serve Georgia business and industry with individual attention and information. During this period, over 684 companies were contacted, with the result that 482 of these companies were visited by field engineers. Three hundred and forty-eight of these companies visited made specific requests for information ranging from a single question to several complex questions or a request for technical assistance. During this same period, over 693 manhours of direct technical assistance was provided to Georgia companies.



Toward the end of the fiscal year, three of the participating institutions in the Georgia State Technical Services Program -- Georgia State University, the University of Georgia, and Georgia Institute of Technology -- began a series of joint meetings in order to improve lines of communications between the participating institutions. These joint meetings were also designed to develop means of measuring the effectiveness of the programs of the various schools. The Georgia Institute of Technology's State Technical Services Program is expected to continue its same emphasis during the 1970-1971 fiscal year.



## THE GEORGIA TECH NEWS BUREAU

LINDA TERRELL, SCIENCE NEWS EDITOR

Phone • (404) 876-2898

Atlanta, Georgia 30332

November 11, 1969  
FOR IMMEDIATE RELEASE

ATLANTA, GA. -- It looks for all the world like any group of townhouses suitable for Southern families, but actually the model designed by four Georgia Tech architecture students is not a conventional one, but a hybrid structure constructed from six mobile home units.

The impetus for constructing the unusual building came from Professor Joseph Smith who gave the students the assignment in an architecture class. He, in turn, was responding to a request from Georgia Tech's Housing Resources Program which wanted creative designs to use mobile homes as housing. Frank Clarke of the Industrial Development Division wanted to see what could be done to provide attractive homes at lower costs through the use of industrialized housing.

Clarke's interest stemmed from another project in the Housing Resources Program. Since July, 1968 this project of the State Technical Services Program has sought new ideas and techniques in other industries which are of value to the mobile home industry. In the process, they have learned a great deal about mobile homes and housing in general--a fact which prompted the Tech student's involvement.

Clarke comments, "In South Georgia, for example, there is an extreme housing shortage and many of the small towns have limited means of coping with the problem. Mobile homes could be used to fill the need, but they are not accepted as housing in many communities. So, it is necessary to find out what it will take to make these units more acceptable, both to the people who would use them and to the town itself. Then,

(more)



we would need to know whether mobile home manufacturers could build the homes that are acceptable."

The four Tech students who got the assignment to come up with a creative design using mobile homes turned first to a Tech fifth-year architecture student's thesis in which the same technique was applied in the Atlanta Model Cities area to produce high-rise and low-rise structures. Next, the students visited a plant which produces mobile homes to get an inside look at a mobile home in the making.

When summer quarter was over, the four students had completed their model--a two-story duplex called a "modular" or "industrialized" townhouse. They had worked out plans which would enable the two-story home to be built in the factory and then transported to the home site and erected.

Each duplex town house consists of six modules which are stacked two high next to each other. Two dwelling units are formed with a common unit between them containing the hall, stair, heating and plumbing for both homes. Each dwelling unit has a dining room, living room, kitchen, and half bath downstairs and three bedrooms and bath upstairs.

Professor Smith indicated that only minor modifications from regular mobile home construction techniques were necessary in the units. Students concentrated on such points as improved insulation, non-metallic siding, a pitched roof and porches to give the home a conventional appearance.

"The important point," Smith said, "is that these buildings can be mass-produced in a factory under tight cost control--which means that the price is lower." Although the phrase "low-price housing" immediately implies that the market for industrialized housing will be in lower income groups, the Tech professor thinks that the future market will come from

(more).



middle and upper income groups. "What you are after," he says, "is a better built building for your money."

He also points out that many mobile home plants produce about one unit per hour. Using six units per two dwelling units (though this represents only one of many possible designs), the individual units can be completed in one day, after which shipping and on-site erection could be accomplished in approximately two weeks. If the idea should catch on, Smith says, "A need for a middle group to handle the erection process would probably arise."

Frank Clarke, of Tech's idea-selling Industrial Development Division, also adds that if it can be demonstrated that these units can be used to fill a need in Georgia, then the same production techniques used here can provide housing suitable for the rest of the Southeast, or areas with similar climates.

# # #



# INDEX OF STATISTICAL DATA ON THE HOUSING INDUSTRY

Prepared with the support of  
THE GEORGIA STATE TECHNICAL SERVICES PROGRAM

by Amy Collins  
INDUSTRIAL DEVELOPMENT DIVISION



Project B-346



Engineering Experiment Station  
GEORGIA INSTITUTE OF TECHNOLOGY  
Atlanta, Georgia



Project B-346

INDEX OF STATISTICAL DATA  
ON THE HOUSING INDUSTRY

Prepared with the support of  
The Georgia State Technical Services Program

by  
Amy Collins

Industrial Development Division  
Engineering Experiment Station  
GEORGIA INSTITUTE OF TECHNOLOGY  
July 1969



## Table of Contents

	<u>Page</u>
Foreword	i
INTRODUCTION	1
INDEX	3
U. S. GOVERNMENT PUBLICATIONS OF MAJOR INTEREST TO USERS OF HOUSING STATISTICS	51



## Foreword

This index is a comprehensive listing of sources of information and data on many aspects of the housing industry. It should be extremely useful to organizations involved directly or indirectly with supplying housing needs, particularly housing authorities, manufacturers supplying the housing industry, construction concerns, and local, state, and Federal agencies concerned with housing.

The index is one of a series of publications and studies planned under the Housing Resources Program of the Industrial Development Division at the Georgia Institute of Technology. The Housing Resources Program is a broad program of housing technology research and information dissemination funded from various sources. This particular compilation was made possible through funding from the Georgia State Technical Services Program.

As always, comments or suggestions on this report from the reader are invited.

Ross W. Hammond, Chief  
Industrial Development Division  
GEORGIA INSTITUTE OF TECHNOLOGY

## INTRODUCTION

Many people are concerned with the problem of providing adequate housing for the increasing population of the U. S., and the volume of material poured out on this subject is extensive. This index gives the reader some of the basic sources of statistical data on various aspects of the housing industry. Many of these sources are publications that appear at regular intervals, and although the data presented therein may be modified in future issues, the periodicals should continue to contain a similar type of reference material.

Emphasis has been placed on current data, but most statistical publications either give comparable figures for earlier years or indicate the availability of past data.

It was found that there was much duplication of the same material -- perhaps summarized or presented in a different form. This was especially true of data compiled by government departments, where the information was of interest to other departments and organizations, and published by them in relation to their own work. In some cases this has led to more than one reference to the same material, but as far as was feasible only the publications giving the greatest statistical detail have been quoted.

Many items relate to the construction industry as a whole, either because the information is relevant to all types of building, including housing, or because data specifically attributable to housing are not available.

Some magazine articles of a more general nature, published within the last few years, have been included, not only for their statistical references, but also to indicate the magazines themselves as a source of future material.

To avoid undue repetition, various letters, symbols, and abbreviations have been used throughout the index. Where data are available for areas smaller than the U. S., the following letters indicate the extent of the breakdown.

A	United States
B	Regions of the U. S.
C	States
D	Combined Standard Metropolitan Statistical Areas
E	Individual Standard Metropolitan Statistical Areas
F	Counties
G	Urban Places
H	Urban/Rural



The addition of an asterisk (\*) indicates that data by race are available. In the smaller areas, this information is usually limited to those places with a significant number of nonwhite residents.

Some government publications are referred to repeatedly in the index, and for convenience, these publications are listed in a separate section, with a brief summary of the type of information to be found in each. The following abbreviations in the index (indicating the government department responsible for the publication) show the items summarized:

BDSA	Business and Defense Services Administration
BLS	Bureau of Labor Statistics
Cen	Bureau of the Census
HUD	Department of Housing and Urban Development
OBE	Office of Business Economics

The index includes references to current data available within the state of Georgia. Non-Georgians will find similar publications available in their own states. Any reader needing information on small areas should contact local organizations, such as planning and development agencies, business schools of any universities in the area, or chambers of commerce, that are likely to have, or know of, relevant studies and reports.

Technological developments are causing major changes in housing, and as statistics are compiled on new aspects of the industry, this index will become more and more incomplete. It is hoped, however, that it will remain useful, since the publications to which the reader's attention is directed are likely to add any new statistics to their series.

## INDEX

### Age of Structure (Year Built)

A\*, B\*, C\*, D\* (inside/outside),  
E\*, F, G\* (population 2,500 or  
more), H

Census tracts\*

Inventory change, 1950-59

Mortgage status

Rural nonfarm/farm for economic  
subregions

Senior citizen in household\*

### Census of Housing (Gen)

### Aging, Housing for

Aging, U. S. Department of  
Health, Education and Welfare

### Air Conditioning

A\*, B\*, C\*, D\* (inside/outside),  
E\*, F, G\* (population 25,000 or  
more), H\*

Rural nonfarm/farm for economic  
subregions

### Census of Housing (Gen)

### Alterations and Repairs Expenditure

A, B

Farm/nonfarm

Size of property

Type of work

### Construction Reports, Series C50 (Gen)

### Amortization Tables (see Tables)

### Apartments

"Apartments in Community Plan-  
ning," Urban Land, January 1966

"Challenge of Rising Land  
Costs," Urban Land, June 1968

"Garden Apartment Development:  
A Municipal Cost-Revenue Anal-  
ysis," Urban Land, September  
1964

### Apartments, Prefabricated, Costs and Financing

"A Fast Way for Homebuilders  
to Move into Rental Markets,"  
House and Home, March 1968



Apartments, Tenant Survey

"Apartment Communities: A Survey of Who Rents and Why," Technical Bulletin 61, Urban Land Institute, 1968

"The Tenant Point of View: A Survey of Garden Apartment Resident Attitudes," Owens-Corning Fiberglas Corp.

"What Grabs the Typical Apartment Tenant," House and Home, November 1968

Apartments, Zoning of

"How to Explode the Myths of Apartment Zoning," House and Home, April 1968

Appraisal of Census Statistics

"Measuring the Quality of Housing," U. S. Department of Commerce, Bureau of the Census, 1967

Asphalt Products Shipments  
(thousands of squares)

Construction Review (BDSA)

Insulated brick siding

Prepared roofing

Saturated felts

Siding

Automobiles Available

Census of Housing (Cen)

A\*, B\*, C\*, D\* (inside/outside),  
E\*, F, G\* (population 25,000 or  
more), H\*

Census tracts

Rural nonfarm/farm for economic  
subregions

Basements

Census of Housing (Cen)

A, B, C, D (inside/outside), E,  
F, G (population 10,000 or more),  
H

Census tracts

Bathrooms

A\*, B\*, C\*, D\* (inside/outside),  
E\*, F, G\* (population 2,500 or  
more), H\*

Census tracts

Inventory change, 1950-59

Special reports for local housing  
authorities (139 localities) --  
occupied substandard housing\*

Census of Housing (Cen)

Bedrooms, Number of

A\*, B\*, C\*, D\* (inside/outside),  
E, F (inside SMSA's), G (popula-  
tion 10,000 or more)

Rural nonfarm/farm by economic  
subregions

Census of Housing (Cen)

Bibliographies

Business Periodicals Index,  
The H. W. Wilson Company

Housing and Planning Refer-  
ences (HUD)

Marketing Information Guide  
(BDSA)

Readers' Guide to Periodical  
Literature, The H. W. Wilson  
Company

Bids, Government Request for  
(see U. S. Government)

Builders, Top Companies, 1967  
(sales of over \$10 million)

Dollar volume

Location

"Here Come the Giants," Profes-  
sional Builder, August 1968

Building Cost Indexes (F. W. Dodge)

U. S. and 21 cities

Architectural Record



Building Permits (13,000 permit-  
issuing places)

A, B

Number of units, A, B, C, E (40)

Private, by units in structure

Public, by contracts awarded

Valuation, A, B

Building Permits, Local

Construction Review (BDSA)

Check with local offices of  
Building Inspector or Home  
Builders Association

Buying Intentions

Housing & Urban Development  
Trends (HUD)

Campus Housing

"Campus Planning," Urban Land,  
December 1966

Capital Expenditures

A, C, E (selected)

Census of Construction (Cen)

Census of Construction, 1967

(Cen)

To be published in 1969-70

Census Cross-Tabulations

S. J. Tesauro & Co.

Special cross-tabulations of  
data from 1960 Censuses of Pop-  
ulation and Housing

A\*, C\*, E\*, F\*

Census Statistics and Methods,  
an Appraisal

"Measuring the Quality of  
Housing," U. S. Department of  
Commerce, Bureau of the Census,  
1967

Cities, Urban Places (see individual  
subjects marked G)

City, Building the American  
(see also low-income housing)

"Building the American City,"  
National Commission on Urban  
Problems

Clay Construction Products, Production and Shipments

Construction Review (BDSA)

Brick, common and face (millions of bricks)

Floor and wall tile, glazed and unglazed (thousands of square feet)

Hollow facing tile (millions of brick equivalents)

Structural clay tile (thousands of tons)

Vitrified clay sewer pipe (thousands of tons)

Clay Construction Products (see also Current Industrial Reports)

Cluster Development

"Challenge of Rising Land Costs," Urban Land, June 1968

Color (see also individual subjects marked\*)

Color of Household Head

Census of Housing (Cen)

A\*, B\*, C\*, D\* (inside/outside), E\*, F\*, G\* (population 1,000 or more), H

Census tracts\*

City blocks\*

Inventory change, 1950-59\*

Mortgage status\*

Senior citizen in household\*

Special reports for local housing authorities (139 localities) -- occupied substandard housing\*

Community Builders Handbook

Urban Land Institute

Reference manual on builders' procedures



Condition and Plumbing

A\*, B\*, C\*, D\* (inside/outside),  
E\*, F, G\* (population 1,000 or  
more), H\*

Census tracts\*

City blocks

Inventory change, 1950-59

Mortgage status (condition only)

Rural nonfarm/farm for economic  
subregions

Senior citizen in household\*

Special reports for local housing  
authorities (139 locations) --  
occupied substandard housing\*

Condominiums

Census of Housing (Cen)

"Real Estate Condominium, Its  
Tax Problems and Implications,"  
Appraisal Journal, October 1967

Condominiums, Market Analysis

"Condominiums: They're Spread-  
ing Faster Than You Think,"  
Practical Builder, May 1966

Construction Contracts, Floor Space

Dodge Construction Contract  
Statistics Service

Construction Contracts, Value

A, C

Dodge Construction Contract  
Statistics Service

Construction Machinery (see Current  
Industrial Reports)

Construction Outlook for 1969, by  
Type

F. W. Dodge

Architectural Record  
Regional, January 1969  
National, November 1968

Construction Put in Place, Value

Private (current and constant dollars)

Residential nonfarm

New housing units

Nonhousekeeping

Farm construction

Public -- residential (current and constant dollars)

Ownership (current dollars)

Federal

State and local

Construction Review (BDSA)

Construction Statistics

"Construction Statistics 1915-1964, A Supplement to Construction Review" (BDSA)

Consumer Price Index

A, G (selected)

Monthly Labor Review (BLS)

Contract Terms (Years), First-Mortgage Loans

New single-family homes

Existing single-family homes

Savings and Home Financing Source Book, Federal Home Loan Bank Board

Contracts, Government (see U. S. Government)

Cooking Fuel

A, B, C, D (inside/outside), E, F, G (population 50,000 or more), H

Rural nonfarm/farm for economic subregions

Census of Housing (Cen)

Cost Book for Georgia (estimating costs for building a new dwelling)

Atlanta Area Chapter No. 8, Society of Real Estate Appraisers, May 1965



Cost Indexes, Construction

Department of Commerce -- composite  
cost index

American Appraisal Co.

Associated General Contractors

E. H. Boeckh and Associates

Residences

Apartments, hotels, and office  
buildings

Engineering News-Record

Building

Construction

Bureau of Public Roads -- highway

Geo. A. Fuller Co.

Turner Construction Co.

Economic Research Service -- farm  
housing

Bureau of the Census -- new one-  
family houses

Construction Review (BDSA)

Cost of Living

"Income and Levels of Living,"  
Monthly Labor Review, March  
1968

"New Budget for a Retired  
Couple," Monthly Labor Review,  
June 1968

Cost of Living Comparisons: Con-  
ventional House, Mobile Home, Apartment

Mobile Home/Travel Trailer  
Dealer, November 5, 1968

Cost of New Nonfarm Housing Units  
Started (Average)

Construction Review (BDSA)

Privately owned/publicly owned

Costs

"Automated Specification Pro-  
cesses Save Time, Reduce Er-  
ror," Architectural Record,  
January 1968

"How to Build Moderate-Cost  
Home Communities in Under Ten  
Months," Urban Land, January  
1969

Costs (continued)	"Understanding Cost Trends, Prelude to Estimating," <u>Architectural Record</u> , May 1969
Costs, Air Conditioning	"Gas Heats and Cools Tennessee Apartment Building," <u>Air Conditioning, Heating, and Ventilating</u> , May 1967
	"Engineering Economics Call for Induction Air Conditioning System," <u>Power</u> , March 1965
Costs and Financing of Mobile Home Parks	"Mobile Home Parks as an Investment," Trailer Coach Association, 1960
Costs, Apartment Building	"Plastic Design Cuts Cost of Prototype Highrise," <u>Engineering News-Record</u> , July 20, 1967
Costs, Apartment Buildings, Dormitories (plus many commercial buildings)	<u>Costs and Trends of Current Building Construction</u> , F. W. Dodge Company (semiannual)
Costs, Building	"Dodge Construction Pricing and Scheduling Manual," McGraw-Hill Information Systems Company
	"New Measures of Price Changes in Construction," <u>Construction Review</u> , October 1968
Costs, Building Construction	<u>Building Construction Cost Data</u> , Robert Snow Means Company, Inc. (annual)
Costs, Building Service Systems	<u>Air Conditioning, Heating and Ventilating</u> , June 1967, January 1966, May, June, September, October, December 1965
Costs, Heating and Air Conditioning	"Thermal Design of Buildings," by Tyler Stewart Rogers (John Wiley & Sons, Inc., N. Y.)
Costs, Housing Construction (see also Low-Income Housing)	"Building the American City," Report of the National Commission on Urban Problems



Costs, Management and Maintenance  
of Common Property

"Homes Association Handbook,"  
Technical Bulletin 50, Urban  
Land Institute, 1964

Costs, Multistory

"Staggered Wall Beams for  
Multistory Buildings," Civil  
Engineering, August 1968

"Quarterly Cost Roundups,"  
Engineering News-Record

Costs, Patio or Garden-court House

"The Patio House," Technical  
Bulletin 45, Urban Land Insti-  
tute, 1963

Counties (see individual subjects  
marked F)

Current Industrial Reports

(Cen)

Sales, production, and related  
items for

Hardwood plywood

Series No. MA-24F (annual)

Softwood plywood

Series No. MA-24H (annual)

Lumber production and mill  
stocks

Series No. MA-24T (annual)

Clay construction products

Series No. M32D (monthly)

Flat glass

Series No. M32A (quarterly)

Plumbing fixtures

Series No. M34E (quarterly)

Heating and cooking equipment

Series No. M34N (monthly)

Construction machinery

Series No. M35D (quarterly)

Fans, blowers, and unit heaters

Series No. M35H (quarterly)

Electric housewares and fans

Series No. MA36E (annual)

Electric lighting fixtures

Series No. MA36L (annual)

Dryers, Clothes

Census of Housing (Cen)

A\*, B\*, C\*, D\* (inside/outside),  
E\*, F, G\* (population 50,000 or  
more), H\*

Rural nonfarm/farm for economic  
subregions

Elderly, Housing for (see National  
Commission on Urban Problems)

Electric Housewares and Fans (see  
Current Industrial Reports)

Electric Lighting Fixtures (see  
Current Industrial Reports)

Electrical Appliances, Homes with  
(see also individual items)

Elevator in Structure

G (population 50,000 or more)

Senior citizen in household\*

Employment

Employment, Contract Construction

Total payroll employees, by  
type of contractor:

Construction workers, by type  
of contractor:

Gross hours and earnings by type  
of contractor:

All special trade contractors

General building contractors

Special trade contractors

All special trade contractors

Plumbing, heating, and air  
conditioning

Painting, paperhanging, and  
decorating

Electrical work

Masonry, plastering, stone,  
and tile work

Roofing and sheet metal work

Indexes of aggregate weekly con-  
struction man-hours

Employment, Construction Industry

A, C, E (selected)

Establishments, Construction Industry

A, C, E (selected)

Merchandising Week, Billboard  
Publications, Inc., January  
issues

Census of Housing (Cen)

"Construction Manpower: Supply  
and Flexibility," Monthly Labor  
Review, April 1968

"Reducing Skill Shortages in  
Construction," Monthly Labor  
Review, February 1969

Construction Review (BDSA) and  
Monthly Labor Review (BLS)

Census of Construction (Cen)

Census of Construction (Cen)



Expenditure on Household Operation

Survey of Current Business  
(OBE) and

Survey of Consumer Expenditures  
in 1960-61 (BLS)

Factory-produced Housing (see Low-cost Housing, Mobile Homes, Modular Housing)

Facts for Marketers

Regional reports on 100 metropolitan areas giving selected economic data, including housing characteristics

Business and Defense Services Administration, 1966

Fans, Blowers, and Unit Heaters (see Current Industrial Reports)

Federal Construction, Contract Awards  
Value of residential buildings

Construction Review (BDSA)

Federal Housing Administration

Accounts and finance statements

Characteristics of insuring operations, A, C, E

Insured home loans  
By type of lender  
By purpose of loan

Insured one-family homes, characteristics, A

Programs, A

Programs, A, C

Statistical Yearbook (HUD)

FHA Homes (accompanies annual report)

Savings and Home Financing Source Book, Federal Home Loan Bank Board

Construction Review (BDSA), February 1968

Housing and Urban Development Trends (HUD) (monthly)

Statistical Yearbook (HUD)

Federal National Mortgage Association  
Programs, A, C

Statistical Yearbook (HUD)

Fees and Charges, First-Mortgage Loans  
New single-family homes  
Existing single-family homes

Savings and House Financing Source Book, Federal Home Loan Bank Board

Finance (see also Mortgage)

"Housing Production and Finance," Federal Reserve Bulletin, March 1969

Financing (see Costs, Mobile Homes, Mortgages)

Fire Losses (Buildings) by Cause

Fire Journal, September issues, National Fire Protection Association

Flat Glass (see Current Industrial Reports)

Foreclosures, Nonfarm Real Estate

Savings and Home Financing Source Book, Federal Home Loan Bank Board

Freezers, Home Food

Census of Housing (Gen)

A\*, B\*, C\*, D\* (inside/outside), E\*, F, G\* (population 50,000 or more), H\*

Rural nonfarm/farm for economic subregions

Future Housing Demand

"Components of Future Housing Demand," Economic Research Seminar of the National Housing Center Council and The American University Real Estate Program, 1967

Mobile homes

Mortgage funds

Population

Removals from inventory

Second homes

Single and multi-unit

Vacant homes

Government Expenditure (State and Local) on Housing and Redevelopment

Housing and Urban Development Trends (HUD)

Gypsum Products Shipments (millions of square feet)

Construction Review (BDSA)

Board

Lath

Hardwood Plywood (see Current Industrial Reports)

Heating and Cooking Equipment (see Current Industrial Reports)



Heating Equipment

A\*, B\*, C\*, D\* (inside/outside),  
E, F, G (population 2,500 or  
more), H\*

Census tracts

Rural nonfarm/farm for economic  
subregions

Gas water heaters

Shipments

Stocks

Cast-iron connectors and radiators  
(thousands of square feet)

Shipments

Stocks

Furnaces

Warm air (all types and fuels)

Shipments

Stocks

Floor and Wall

Shipments

Stocks

Residential oil burners, sold  
separately -- shipments

Census of Housing (Cen)

Construction Review (BDSA)

Heating Fuel

A, B, C, D (inside/outside), E,  
F, G (population 50,000 or  
more), H

Rural nonfarm/farm for economic  
subregions

Census of Housing (Cen)

Home Ownership (see National Commis-  
sion on Urban Problems)

Houseboats

Boating Industry, August 1967

Households, Estimates

A\*, B, C

Current Population Reports,  
Series P-20, P-25 (Cen)

Households, Projection to 1985

Current Population Reports,  
Series P-25, No. 360 (Cen)

Housing and Population Estimates

Methods and Procedures

"Estimating Housing and Popula-  
tion Data," Atlanta Region  
Metropolitan Planning Commis-  
sion, March 1969

Housing and Urban Development Act  
of 1968

Analysis of

Housing Assistance Administration  
Programs

A, C

Housing Authorized by Building Permits  
and Public Contracts

3,600 individual places

A, B, C, D (inside/outside), E  
(101 selected areas)

Number of units by type of struc-  
ture

Value by type of structure

Housing Characteristics (see also  
individual subjects)

A, B, and local areas

Reports on selected housing char-  
acteristics

Housing Codes (see National Commission  
on Urban Problems)

Housing Construction Statistics, 1889-  
1964

Compilation of historical statistics

Housing Economics (see National Commis-  
sion on Urban Problems)

Housing Starts

A, B, D (inside/outside)

Construction cost

Farm/nonfarm

In permit-issuing places

Privately owned/publicly owned

Units in structure

Report of the Committee on  
Banking and Currency, U. S.  
Senate

Urban Land, October 1968

Statistical Yearbook (HUD)

Construction Reports, Series  
C40 (Cen)

Construction Reports, Series  
C42 (Cen)

Current Housing Reports, Series  
121 (Cen)

(Cen)

Construction Reports, Series  
C20 (Cen)



Housing Starts, Publicly Owned

All public programs

Federally owned

Total

Military

Other

State and locally owned

Total

Federally aided (PHA)

Total

New York City Housing Authority

New York City Housing Authority  
(excluding Federally aided)

All other

Construction Review (BDSA)

Housing Surplus Reports

Places with population 50,000 or  
more -- by type (new or existing,  
for sale or rent, and minority  
housing)

Housing and Home Finance  
Agency (unpublished)

Housing Surveys, Parts 1 and 2

Occupants of new housing units

Mobile homes

Housing Surveys, Department of  
Housing and Urban Development,  
1969

Improvements and Maintenance Expendi-  
ture (see Alterations and Repairs)

Income and Residential Area

"Where the Rich and the Poor  
People Live," Technical Bulletin  
55, Urban Land Institute

Income, Contract Construction as  
Source of

A, C

Survey of Current Business  
(OBE)

Income, Current Estimates

A, C, E, F, G

"Survey of Buying Power,"  
Sales Management (annual) and

"Market Guide," Editor and  
Publisher (annual)

Income in Metropolitan Areas

Survey of Current Business  
(OBE)

Income of Households

Rural nonfarm/farm for economic subregions

Special reports for local housing authorities (139 locations) -- occupied substandard housing\*

With senior citizens\*

Income of Households

Census of Housing (Cen)

Census of Population (Cen)

Current Population Reports, Series P-60 (Cen)

Survey of Consumer Expenditures in 1960-61 (BLS)

Survey of Current Business (OBE)

Income, Projections (see Projections)

Income Tax (see National Commission on Urban Problems)

Indexes, Consumer and Wholesale Prices

Monthly Labor Review (BLS)

Survey of Current Business (OBE)

Indexes of Output of Construction Materials

Construction Review (BDSA)

All materials

Asphalt products

Clay construction products

Gypsum products

Heating equipment

Iron and steel products

Lumber and wood products

Millwork

Paint, varnish, and lacquer

Plumbing fixtures

Portland cement



Indexes of Wholesale Prices of Materials  
Used in Construction

Construction Review (BDSA) and  
Housing and Urban Development  
Trends (HUD)

All construction materials

Builders' hardware

Building paper and board

Group index

Hardboard

Insulation board

Concrete ingredients

Group index

Portland cement

Sand, gravel, and crushed stone

Concrete products

Group index

Building block

Concrete pipe

Ready-mixed concrete

Flat glass

Plate

Window

Gypsum products

Group index

Lath

Plaster, base coat

Wallboard

Heating equipment

Group index

Steam and hot water

Warm air furnaces

Water heaters, domestic

Millwork

Group index

General millwork

Prefabricated structural mem-  
bers

Other nonmetallic minerals

Group index

Asbestos cement shingles

Insulation materials

Plumbing fixtures and brass  
fittings

Group index

Brass fittings

Enameled iron fixtures

Vitreous china fixtures

Plywood

Group index

Softwood

Indexes of Wholesale Prices of Materials  
Used in Construction (continued)

- Prepared asphalt roofing
- Prepared paint
- Selected fabricated structural metal products
  - Aluminum siding, noninsulated
  - Metal doors, sash and trim
  - Steel for buildings
- Selected finished steel products
  - Galvanized sheets, carbon
  - Reinforcing bars
  - Structural shapes
  - Wire nails, 8d common
- Selected floor coverings
  - Asphalt floor tile
  - Vinyl floor covering
- Selected hardwood lumber
- Selected nonferrous metal products
  - Building wire, type THW
  - Copper water tubing, straight lengths
  - Nonmetallic sheathed cable
- Softwood lumber
  - Douglas fir
  - Southern pine
  - Other
- Structural clay products
  - Group index
  - Building brick
  - Clay sewer pipe
  - Clay tile

Industrial Outlook

Includes construction and building materials data for coming year

U. S. Industrial Outlook (BDSA)  
(annual)

Input-Output

"Construction Activity in the 1958 Input-Output Study," Survey of Current Business (OBE), May 1965

"Transactions Table of the 1958 Input-Output Study and Revised Direct and Total Requirements Data," Survey of Current Business (OBE), September 1965



Input-Output (continued)

"Construction and the Industrial Structure," Construction Review (BDSA), January 1965

Insulation Costs

"Money-Saving Insulation Is a Cover-all," Engineering News-Record, September 26, 1968

Interest Rates, First-Mortgage Loans

New single-family homes

Existing single-family homes

Savings and Home Financing Source Book, Federal Home Loan Bank Board

Interest Tables (see Tables)

Inventory of Housing

Census of Housing (Cen)

A\*, B\*, C\*, D\* (inside/outside),  
E, F, G (population 1,000 or  
more), H\*

Census tracts\* (for 180 tracted  
areas)

Change, 1950-59

City blocks\* (all urban places  
of 50,000 population or more,  
plus selected smaller localities)

Mortgage status\*

Rural nonfarm/farm for economic  
subregions

Senior citizen in household\*

Special reports for local housing  
authorities (139 localities) --  
occupied substandard housing\*

Inventory Change, Components, 1950-59

Census of Housing (Cen)

A, B, D, E (17 selected)

Conversion

Demolition

Merger

New construction

Iron and Steel Products

Construction Review (Cen)

Cast-iron pipe and fittings --  
shipments

Pressure

Soil

Iron and Steel Products (continued)

Fabricated structural steel

Shipments

Bookings

Backlog

Rigid steel conduit -- domestic  
sales billed

Selected steel mill products --  
shipments

Concrete reinforcing bars

Galvanized sheets

Line pipe

Nails

Piling

Rails

Labor and Material Requirements for  
College Housing Construction

Bulletin No. 1441 (BLS), 1965

Labor and Material Requirements for  
Private One-Family House Construction

Bulletin No. 1404 (BLS), 1964

Labor and Material Requirements for  
Public Housing Construction

Bulletin No. 1402 (BLS), 1964

Land Use (see also National Commission  
on Urban Problems)

"Challenge of Rising Land  
Costs," Urban Land, June 1968

Land Use in 106 Large Cities

G (with a 1960 population of  
100,000 or more)

Includes acreage for privately  
owned and publicly owned housing

Three Land Research Studies,  
Research Report No. 12, The  
National Commission on Urban  
Problems

Land Use Intensity (see National Com-  
mission on Urban Problems)

Land Use Intensity Ratios

"Applying Land Use Intensity  
to Public Regulation," Urban  
Land, April 1967

"The Defense Department's Con-  
tribution to Land Planning,"  
Urban Land, January 1967

Land Use, Planned Communities

New Zoning Landmarks in Planned  
Unit Developments, Technical  
Bulletin 62, Urban Land Insti-  
tute, 1968



Loan to Price (Percent), First-Mortgage  
Loans

New single-family homes  
Existing single-family homes

Loans (Residential) Underwritten by  
FHA and VA

Local Housing Market Analyses

Selected areas (available only to  
other government agencies)  
Supply and demand analyses

Low-Cost Housing (see also Mobile  
Homes)

Low-Income Housing (see also National  
Commission on Urban Problems)

Low-Rent Housing (see National Commis-  
sion on Urban Problems)

Lumber Production and Mill Stocks (see  
Current Industrial Reports)

Savings and Home Financing  
Source Book, Federal Home Loan  
Bank Board

Federal Reserve Bulletin

Federal Housing Administration  
(unpublished)

"Lowering the Cost of Housing,"  
Progressive Architecture, June  
1968

"Instant Housing," Plastics  
World, February 1966

"Home Ownership for Low-Income  
Families," Philadelphia Housing  
Association

"How to Build Moderate-Cost  
Home Communities in Under Ten  
Months," Urban Land, January  
1969

"New Technology in Low-Income  
Housing," Civil Engineering,  
January 1968

"Showdown at the Austin Oaks  
Corral," House and Home, March  
1969

Lumber and Wood Products

Hardboard (tons) -- production  
Hardwood flooring (board feet) --  
production, shipments, stocks  
Insulating board (tons) -- pro-  
duction  
Softwood lumber (board feet) --  
production, shipments, stocks  
Softwood plywood (square feet) --  
production

Luxury Housing Market

Machinery and Equipment Rental, Pay-  
ments

A, C, E (selected)

Maintenance and Improvements Expendi-  
ture (see Alterations and Repairs)

Markets, Housing

G (selected cities)

Materials, Components and Supplies,  
Payments

A, C, E (selected)

Metal Doors Industry, Profile

Metropolitan Areas (see also National  
Commission on Urban Problems)

Construction Review (BDSA)

"The Luxury Market," Prac-  
tical Builder, November 1966

Census of Construction (Cen)

"Systematic Approach to Hous-  
ing Market Analysis," Appraisal  
Journal, October 1967

"Housing Markets, Selected Ref-  
erences" (HUD)

"Hit the Road," House and Home,  
annual report

Census of Construction (Cen)

Construction Review (BDSA),  
July 1968

"Economic Dimensions of Major  
Metropolitan Areas, Population,  
Housing, Employment, and Income,"  
National Industrial Conference  
Board

"Jobs, People and Land," Univer-  
sity of California (Berkeley),  
Center for Real Estate and Urban  
Economics



Metropolitan Areas, Population to 1985	"Metropolitan Populations to 1985, Trial Projections," Rand Corp., 1964
Metropolitan Development Programs A, C	<u>Statistical Yearbook</u> (HUD)
Millwork Products, shipments (units) Exterior frames Hardwood doors Ponderosa pine doors Sash	<u>Construction Review</u> (BDSA)
Mobile Home and Recreational Vehicle Industries	<u>Mobile Home/Travel Trailer Dealer Magazine</u> , August 1967
Mobile Home Highway Movement Handbook (regulations)	Mobile Homes Manufacturers Association (annual)
Mobile Home Industry Report Production, sales, financing	Mobile Homes Manufacturers Association (annual)
Mobile Home Market Report	Judy-Berner Publishing Company (three times a year)
Mobile Home Parks Financing	"A Comprehensive Approach to Mobile Home Park Financing," Mobile Homes Manufacturers Association, 1964
Mobile Home Parks, Investment in	"The Investment Potential of Mobile Home Parks," Trailer Coach Association
Mobile Home Parks, Profit Potential	<u>Professional Builder</u> , March 1969
Mobile Home Parks, Survey	Trailer Topics Publishing Company, 1963
Mobile Home Parks, Taxation	"Another Look at Mobile Home Parks and Municipal Fiscal Problems," Trailer Coach Association

Mobile Home Parks, Taxation (continued)

"Sociological and Taxation Factors of Mobile Home Parks and Their Residents," Trailer Coach Association

Mobile Homes (see also Modular Housing)

"The Evolution of the House Trailer," Urban Land, March 1967

"The Mobile Home," Urban Land, July-August 1966

"Recreational Vehicle Industry Facts and Trends," Recreational Vehicle Institute, 1968

"The Mobile Home Is the 20th Century Brick," Architectural Record, April 1968

Mobile Homes and the General Housing Supply

Florida Planning and Development, June 1965

Mobile Homes and Travel Trailers (development of the industry)

Construction Review (BDSA)

Mobile Homes, Bibliography

Small Business Administration, August 1965

Mobile Homes, Consumer Survey, 1963

Mobile Homes Journal

Mobile Homes, Costs

"Mobile Homes Take on New Forms for Low-Cost Housing," Engineering News-Record, April 25, 1968

Mobile Homes, Dealer Accounting Manual

Mobile Homes Manufacturers Association

Mobile Homes, Financing

"Comprehensive Approach to Mobile Home Financing," Mobile Homes Manufacturers Association

Mobile Home Financing -- A Builder's Lesson in Simplicity," House and Home, August 1967

"The Changing Emphasis on Mobile Home Financing," Monthly Review, Federal Reserve Bank of Atlanta, May 1967



Mobile Homes, Financing (continued)	"What to Expect in Mobile Home Financing," Mobile Homes Manufacturers Association
Mobile Homes, Georgia	"Mobile Homes: A Growing Georgia Industry," Georgia Department of Industry and Trade, 1969
Mobile Homes, Manufacturers' Shipments (Units)	<u>Construction Review</u> (BDSA)
Mobile Homes, Market Study	<u>Mobile Home/Recreational Dealer Magazine</u> , January 1969
Mobile Homes, Shipments Received by States (Monthly)	<u>M &amp; R Housing Merchandiser</u>
Mobile Homes, Standards for Electrical, Heating, and Plumbing Installations	Mobile Homes Manufacturers Association, 1963
Mobile Homes, the Industry in the U. S. and Georgia	"The New Mobile Home Industry," <u>Atlanta Economic Review</u> , School of Business Administration, Georgia State College, February-March 1967
Modular Housing (see also Low-Cost Housing, Low-Income Housing, Mobile Homes)	<p>"Building with Boxes," <u>Architectural Forum</u>, April 1968</p> <p>"House of Many Parts," <u>Architectural Forum</u>, November 1967</p> <p>"Instant Housing," <u>Journal of Housing</u>, October 1968</p> <p><u>The New Building Block</u>, Research Report No. 8, Center for Housing and Environmental Studies, Cornell University, 1968</p> <p>"A Precast System for Low-Cost Urban Housing," <u>House and Home</u>, June 1967</p> <p>"Stack-up Housing: What Are Its Chances?" <u>House and Home</u>, April 1968</p> <p>"Stack-up Boxes Invade the Middle Income Rental Market," <u>House and Home</u>, October 1968</p>

Modular Housing, Production and Sales Reports

"Market Forecasts for Factory-Built Housing," Elrick and Lavidge, Inc., Chicago (monthly, commencing mid-1969)

Mortgage Activity

Federal Reserve Bulletin

Mortgage Debt, 1-4 Family Nonfarm Homes by Type of Lender

Savings and Home Financing Source Book, Federal Home Loan Bank Board; Federal Reserve Bulletin

Mortgage Loans Held by Insured Savings Associations

Savings and Home Financing Source Book, Federal Home Loan Bank Board

A, C, E (40 largest)

Mortgage Loans (Nonfarm) Held by Life Insurance Companies by Type of Property

Savings and Home Financing Source Book, Federal Home Loan Bank Board

1-4 family

Multifamily

Mortgage Financing

"Regional Differences in Mortgage Financing Costs," Journal of Finance, March 1966

Mortgage Market Quotations

House and Home

Mortgage Status, Homeowner Properties

Census of Housing (Cen)

A\*, B\*, D\* (inside), E\* (17 selected)

Mortgage Status, Rental and Vacant Properties

Census of Housing (Cen)

1 dwelling unit properties

1-4 dwelling unit properties

5-49 dwelling unit properties

50 or more dwelling unit properties

Mortgage Terms

Federal Reserve Bulletin

New and existing homes

Multifamily Housing, Military

"The Defense Department's Contribution to Land Planning," Urban Land, January 1967



Multifamily Residences, Low-Rise  
(less than 5 stories)

Report on research program

"Builder Practices," Bureau of  
Building Marketing Research

National Commission on Urban Problems

For details see pages 32 and 33

New Housing under Government Mortgage  
Insurance Programs

Construction Review (BDSA)

Number of dwelling units

FHA

Applications received

First inspection (starts)

Mortgages insured

VA

Appraisal requests

First inspection (starts)

Loans guaranteed

FHA and VA -- number of starts as  
percent of private nonfarm starts

Open Space (see Land Use)

Open Space Communities

"Open Space Communities in  
the Market Place," Technical  
Bulletin No. 57, Urban Land  
Institute, December 1966

Owner-Occupied Housing

Census of Housing (Cen)

A\*, B\*, C\*, D\* (inside/outside),  
E\*, F, G\* (population 1,000 or  
more), H\*

Census tracts\*

City blocks (places of 50,000 popu-  
lation or more, plus selected  
smaller localities)

Inventory change, 1950-59

Mortgage status\*

Rural nonfarm/farm for economic  
subregions

Senior citizen in household\*

Special reports for local housing  
authorities (139 localities) --  
occupied substandard housing\*

Paint, Varnish, and Lacquer, Production  
for Trade Sales (gallons)

Construction Review (BDSA)

Payrolls, Construction Industry  
A, C, E (selected)

Census of Construction (Cen)

Persons

Census of Housing (Cen)

A\*, B\*, C\*, D\* (inside/outside),  
E\*, F, G\* (population 2,500 or  
more), H\*

Census tracts\*

Inventory change, 1950-59

Rural nonfarm/farm for economic  
subregions

Senior citizen in household\*

Persons per Room

Census of Housing (Cen)

A\*, B\*, C\*, D\* (inside/outside),  
E\*, F, G\* (population 1,000 or  
more), H\*

Census tracts\*

City blocks (1.01 or more persons  
per room)

Rural nonfarm/farm for economic  
subregions

Senior citizen in household\*

Special reports for local housing  
authorities (139 localities) --  
occupied substandard housing\*

Plastic Plumbing

"Plastic Plumbing Makes New  
Strides in Housing Markets,"  
House and Home, May 1968

Plumbing Fixtures (see also Current  
Industrial Reports)

Plumbing Fixtures: Production, Shipments,  
Stocks

Construction Review (BDSA)

Bathtubs, total, cast iron, steel

Flush tanks, vitreous china

Kitchen sinks, total, cast iron,  
steel

Laundry trays



## NATIONAL COMMISSION ON URBAN PROBLEMS

### Publications

#### Final Report

Building the American City. Recommends Federal, state, local action on production of low-income housing, reducing housing costs, cooperative housing, economic and racial segregation, building code reform, modern building methods, housing codes, revenue sharing, income tax and property tax changes, restrictive building practices, and land-use management for the urban fringe and central cities.

#### Hearings

##### Hearings Before the National Commission on Urban Problems.

Vol. 1 -- Baltimore, New Haven, Boston, Pittsburgh. Rehabilitation, urban renewal, property taxation, land values.

Vol. 2 -- Los Angeles, San Francisco. Land-use regulation, building codes, technology, governing urban areas, low-income housing, inner city problems.

Vol. 3 -- Denver, Atlanta, Houston, Fort Worth-Arlington-Dallas, Miami. Public housing, zoning, building and housing codes, urban finance, local consolidation.

Vol. 4 -- New York, Philadelphia. Ghetto problems, integration, cooperative housing, small parks, renewal, jobs, social services.

Vol. 5 -- Detroit, St. Louis, East St. Louis (Ill.), Washington (D. C.). Local taxes, cooperatives, technology, building codes, urban environment, inner city and suburban development, poverty.

#### Research Reports

No. 1 -- Impact of the Property Tax (on urban land use, housing, and local government finance).

No. 2 -- Problems of Zoning and Land-Use Regulation.

No. 3 -- The Challenge of America's Metropolitan Population Outlook -- 1960 to 1985.

- No. 4 -- The Large Poor Family -- A Housing Gap.
- No. 5 -- The Federal Income Tax in Relation to Housing.
- No. 6 -- Local Land and Building Regulation (survey of agencies, personnel, salaries, building code restrictions, etc.).
- No. 7 -- Housing America's Low- and Moderate-Income Families (review of Federal housing programs).
- No. 8 -- More Than Shelter (study of social needs and programs in public housing).
- No. 9 -- Housing Conditions in Urban Poverty Areas (survey based on Census statistics).
- No. 10 -- Urban Housing Needs Through the 1980's: Analysis and Projection.
- No. 11 -- Zoning Controversies in the Suburbs: Three Case Studies (examines disputes over increased density, residential versus industrial, and unconventional development).
- No. 12 -- Three Land Research Studies, including Trends in the Value of Real Estate and Land, 1956 to 1966, Land Use in 106 Large Cities, and Estimating California Land Values from Independent Statistical Indicators.
- No. 13 -- U. S. Land Prices -- Directions and Dynamics.
- No. 14 -- Legal Remedies for Housing Code Violations.
- No. 15 -- Alternatives to Urban Sprawl: Legal Guidelines for Governmental Action.
- No. 16 -- How the Many Costs of Housing Fit Together.
- No. 17 -- New Approaches to Housing Code Administration.
- No. 18 -- Fragmentation in Land-Use Planning and Control.
- Additional reports are in preparation for publication.



Plumbing Fixtures: Production, Shipments,  
Stocks (continued)

Lavatories, total, cast iron, steel,  
vitreous china

Shower stalls, including receptors

Sinks, service, wash, with laundry  
tray combination

Urinals, total

Water closet bowls, vitreous china,  
total, reverse trap, syphon jet,  
washdown

Population

Population and Housing, Current Esti-  
mates in Georgia

Atlanta SMSA, by census tract and  
by white and nonwhite

Population and Housing, Special Cross-  
Tabulation of 1960 Census Data

A\*, C\*, E\*, F\*

Population Characteristics

Population, Current Estimates

A\*, B, C, D\*, E, F

A, C, E, F, G

Population, Current Estimates and  
Projections (check also with local  
planning agencies for studies of  
their areas)

Population, Current Estimates, Georgia  
Counties

All counties and selected cities  
by white and nonwhite

Census of Population (Cen)

Atlanta Region Metropolitan  
Planning Commission

S. J. Tesauro & Co.

Current Population Reports,  
Series P-20 (Cen)

Current Population Reports,  
Series P-20, P-25 (Cen)

"Market Guide," Editor and  
Publisher (annual) and

"Survey of Buying Power,"  
Sales Management (annual)

Georgia Department of Public  
Health

Population in Housing Units	<u>Census of Housing</u> (Cen)
A, B, C, D (inside/outside), E, F, G (population 1,000 or more), H	
City blocks (places of 50,000 pop- ulation or more, plus selected smaller localities)	
Senior citizen in household*	
Population, Projections (see Projections)	
Population, Special Censuses	<u>Current Population Reports</u> , Series P-28 (Cen)
Population, Technical Studies	<u>Current Population Reports</u> , Series P-23 (Cen)
Portable Housing	"Instant Housing," <u>Plastics</u> <u>World</u> , February 1966
Portland Cement, Destination of Shipments (thousands of barrels)	<u>Construction Review</u> (BDSA)
A, B, and foreign	
Poverty Areas (based on 1960 Census data)	<u>Housing Conditions in Urban</u> <u>Poverty Areas</u> , Research Report No. 9, The National Commission on Urban Problems, 1968
D	
Poverty Areas, Metropolitan	"Poverty Areas in the 100 Largest Metropolitan Areas," U. S. Bureau of the Census, November 1967
Prefabrication (see also Modular Housing)	"The State of the Art of Pre- fabrication in the Construction Industry," Battelle Memorial Institute, 1968  Review of above report, <u>House</u> <u>and Home</u> , June 1968
Prefabrication, Prospects to 1975	<u>Construction Review</u> (BDSA), August 1968
Prices, Housing, and Race (see Race and Housing Prices)	



Private Housing Units Started A, B, D (inside/outside) By units in structure Farm/nonfarm	<u>Construction Review</u> (BDSA)
Projections, Construction, 2000	"Construction in an Expanding Economy, 1960-2000," <u>Construction Review</u> (BDSA), September 1961
Projections, Construction, by Type, 1975, 1980	"F. W. Dodge Weighs Strength in 1980 Construction Market Outlook," <u>Architectural Record</u> , March 1969
Projections, Households, 1985	<u>Current Population Reports</u> , Series P-25, No. 360 (Cen)
Projections, Housing, 1975	"Housing Facts and Trends," Research Department, <u>House and Home</u> , 1965
Projections, Housing, 1976	"Homebuilding's Happy Future," <u>Business Week</u> , May 6, 1967
Projections, Housing, 2000	"Housing in the Year 2000," American Institute of Planners
Projections, Housing in First Half of Seventies	"That Coming Boom in Housing," <u>Fortune</u> , May 1967
Projections, Housing Industry, 1975	<u>What Kind of Future for Housing</u> , Morgan Guaranty Survey, July 1967
Projections of Housing Needs (see also Low-Income Housing, Future Housing Demand)	
Projections, Major Urban Regions, 1970, 1980, 2000, Land Area, Population, and Population Density	"Future Growth of Major U. S. Urban Regions," <u>Urban Land</u> , February 1967
Projections, Population (see also National Commission on Urban Problems)	"Jobs, People and Land," University of California (Berkeley), Center for Real Estate and Urban Economics <u>Current Population Reports</u> , Series P-25 (Cen)
A*, B, C	

Projections, Population, 1976 and 2000	Outdoor Recreation Resources Review Commission, 1962
Projections, Population, 1985	"Metropolitan Populations to 1985, Trial Projections, 1964," Rand Corp.
Projections, Population, Employment, Income, 1975	"Economic and Demographic Projections for 224 Metropolitan Areas," National Planning Association, 1967
Projections, Population in Georgia Counties, 1970, 1975	"Georgia County Data Book, Projection Supplement," Bureau of Business and Economic Research, University of Georgia, 1964
Projections, Population in Georgia Counties, 1975, 1980, 2000, 2015, 2020	Georgia Social Sciences Advisory Committee
Projections, Population in Georgia Counties Bibb County, census tracts, 1985	"Land Use and Population, 1965-1985: Macon-Bibb County, Georgia," Macon-Bibb County Planning and Zoning Commission, 1968
Projections, Population in Georgia Counties Seven counties, 1970, 1975, 1980, 1985	Lower Chattahoochee Valley Area Planning and Development Commission, 1968
Projections, Population in Georgia Counties, 1970, 1975, by Age, Race, and Sex	"Population Projections for Georgia Counties, 1970 and 1975, by Age, Race, and Sex," Department of Sociology and Anthropology, University of Georgia, 1967
Projections, Population in Georgia Counties Nine counties, 1970, 1980	"Population: Slash Pine Area, Georgia," Slash Pine Area Planning and Development Commission, 1968
Projections, Prefabrication (Prospects to 1975)	<u>Construction Review</u> (BDSA), August 1968
Projections, Roofing, 1970	<u>American Roofer and Building Improvement Contractor</u> , 1967
Property Taxes (see also Low-Income Housing)	"Do Single Family Homes Pay Their Way?" Research Monograph No. 15, Urban Land Institute, 1968



Property Taxes (continued)

"The Property Tax and the Spatial Pattern of Growth within Urban Areas," Research Monograph No. 16, Urban Land Institute, 1968

Public Housing (see Low-Income Housing and National Commission on Urban Problems)

Public Housing Units Started

A, B, D (inside/outside)

By units in structure

Construction Review (BDSA)

Purchase Price, First-Mortgage Loans

New single-family homes

Existing single-family homes

Savings and Home Financing Source Book, Federal Home Loan Bank Board

Quality of Housing, 1960-1966

A\*, D\*

"Social and Economic Conditions of Negroes in the United States," Bureau of Labor Statistics and Bureau of the Census, October 1967

Race (see also individual subjects marked \*)

Census of Housing (Cen)

Age of dwelling unit

Air conditioning

Automobiles available

Bathrooms

Bedrooms

Census tracts

City blocks

Condition and plumbing

Dryers, clothes

Freezers, home food

Heating equipment

Income of households with senior citizens

Inventory of housing

Mortgage status

Owner-occupied housing

Persons in household

Race (continued)

Persons per room

Quality of housing

"Social & Economic Conditions  
of Negroes in the United  
States" (BLS/Cen)

Radio sets

Census of Housing (Cen)

Renter-occupied housing

Rooms, number of

Rural nonfarm/farm for economic  
subregions

Senior citizens

Television sets

Toilet facilities

Trailers

Units in structure

Value of housing

Washing machines

Water supply

Year moved into unit

Race and Housing Prices

"Racial Composition and Home  
Price Changes," Journal of the  
American Institute of Planners,  
September 1968

"Integrated Housing and Value,"  
Appraisal Journal, January 1967

Race and Real Estate

"Appraisal of Integrated Real  
Estate," Real Estate Appraiser,  
September-October 1968

Race Relations (see National Commis-  
sion on Urban Problems)

Radio Sets

Census of Housing (Cen)

A\*, B\*, C\*, D\* (inside/outside),  
E\*, F, G\* (population 50,000 or  
more), H\*

Rural nonfarm/farm for economic  
subregions



Receipts, Construction Industry

A, C, E (selected)

Location of work

Maintenance and repair

New construction

Ownership (public/private)

Type of work

Census of Construction (Cen)

Regions of the U. S. (see individual subjects marked B)

Rehabilitation (see National Commission on Urban Problems)

Relocated Families

Summary of a Bureau of the Census survey of families recently displaced from urban renewal sites

"The Housing of Relocated Families," Housing and Home Finance Agency, 1965

Relocation (see National Commission on Urban Problems)

Remodeling, Study of Homeowners' Projects, Type, Costs, Products Used

"An In-Depth Study of the Changes Homeowners Make to Their Homes," Bureau of Building Marketing Research, 1967

Renewal Areas (see National Commission on Urban Problems)

Renewal Assistance Administration Programs

A, C

Statistical Yearbook (HUD)

Rent, Contract

A, B, C, D (inside/outside), E, F, G (population 2,500 or more), H

Census tracts

City blocks

Inventory change, 1950-59

Census of Housing (Cen)

Rent, Contract (continued)

Special reports for local housing  
authorities (139 localities) --  
occupied substandard housing\*

Rent, Gross

Census of Housing (Cen)

A\*, B\*, C\*, D\* (inside/outside), E,  
F, G (population 1,000 or more), H\*

Census tracts\*

Inventory change, 1950-59

Senior citizen in household\*

Special reports for local housing  
authorities (139 localities) --  
occupied substandard housing\*

Rent, Median

Census of Housing (Cen)

Rural nonfarm/farm for economic  
subregions

Rental Property, Mortgage Status (see  
Mortgage Status)

Renter-Occupied Housing

Census of Housing (Cen)

A\*, B\*, C\*, D\* (inside/outside),  
E\*, F, G\* (population 1,000 or  
more), H\*

Census tracts\*

City blocks (places of 50,000 pop-  
ulation or more, plus selected  
smaller localities)

Inventory change, 1950-59

Rural nonfarm/farm for economic  
subregions

Senior citizen in household\*

Special reports for local housing  
authorities (139 localities) --  
occupied substandard housing\*

Residential Building Construction Contracts

A, B, C, E (by county)

Dodge Construction Statistics

Floor space

Number

Value



Residential Building Construction Contracts (continued)

U. S. (excluding Alaska and Hawaii)

Value reported by F. W. Dodge Co.

Construction Review (BDSA)

Residential Construction and Mortgage Markets, First Half 1968

Survey of Current Business  
(OBE), July 1968

Residential Finance (see Mortgage Status)

Residential Upkeep and Improvement Spending

Construction Review (BDSA),  
October 1968

Roofing, Market Study, 1966-67

Projections to 1970

American Roofer and Building  
Improvement Contractor

Rooms, Number of

Census of Housing (Cen)

A\*, B\*, C\*, D\* (inside/outside),  
E\*, F, G\* (population 1,000 or  
more), H\*

Average number by city block

Census tracts\*

Inventory change, 1950-59

Mortgage status

Rural nonfarm/farm for economic  
subregions

Special reports for local housing  
authorities (139 localities) --  
occupied substandard housing\*

Rural Housing

Census of Housing (Cen)

Characteristics of rural farm and  
rural nonfarm

A, B (121 economic subregions)

Rural/Urban (see individual subjects  
marked H)

Sales of New Nonfarm Private One-Family Homes

Number of homes, A, B

Type of financing, A

Sales price, A, B

Construction Reports, Series  
C25 (Cen)

Seasonality of Construction Work

"Seasonality and Construction,"  
Monthly Labor Review (BLS),  
September 1967

Senior Citizens in Household (see also individual subjects)

Census of Housing (Cen)

Age of dwelling unit, A\*, D\*,  
nonfarm

Condition and plumbing, A\*, D\*,  
nonfarm

Elevator in structure

Household composition, A\*, C,  
D\* (inside/outside), E (largest  
in each state)

Income of households, A\*, C, D\*,  
nonfarm\*, E (largest in each  
state)

Income of senior citizen, A\*, D\*  
nonfarm\*

Inventory of housing

Owner-occupied housing

Persons in household

Persons per room, D\*, nonfarm\*

Renter-occupied housing, D\*,  
nonfarm

Trailers

Units in structure, A\*, D\*,  
nonfarm\*

Value of owner-occupied units,  
D\*, nonfarm\*

Year moved into unit



Sewage Disposal

F

G (population 2,500 to 50,000)

Rural nonfarm/farm for economic  
subregions

Siding, Residential, Market Study,  
1967

Softwood Plywood (see Current Indus-  
trial Reports)

Source of Water

F

G (population 2,500 to 50,000)

Rural nonfarm/farm for economic  
subregions

Standard Metropolitan Statistical Areas  
(see individual subjects marked D for  
combined SMSA data, marked E for indi-  
vidual SMSA data)

Standards for Fire Prevention and Fire  
Protection in Trailer Coaches and  
Trailer Parks

States (see individual subjects marked  
C)

Statistical Abstract

Annual summary of statistics on  
the social, political, and eco-  
nomic organization of the U. S.

Subcontractors, Payments to

A, C, E (selected)

Tables, Amortization and Interest

Census of Housing (Cen)

Specialized Study No. 48,  
Predicasts, Inc.

Census of Housing (Cen)

National Fire Protection Asso-  
ciation

Statistical Abstract of the  
United States (Cen)

Census of Construction (Cen)

"Tables of Investment Analysis,"  
University of California (Berke-  
ley), Center for Real Estate  
and Urban Economics

Tax Incentives (see National Commission on Urban Problems)

Taxes (see also Low-Income Housing)

Taxes, Property

"Property Tax Relief for Low-Income Families," Advisory Commission on Intergovernmental Relations

Technical Studies and Experimental Housing Projects (list)

U. S. Department of Housing and Urban Development (semiannual)

Telephone Available

Census of Housing (Cen)

A, B, C, D (inside/outside), E, F, G (population 50,000 or more), H

Rural nonfarm/farm for economic subregions

Television Sets

Census of Housing (Cen)

A\*, B\*, C\*, D\* (inside/outside), E\*, F, G\* (population 50,000 or more), H\*

Rural nonfarm/farm for economic subregions

Temporary Housing (see National Commission on Urban Problems)

Toilet Facilities

Census of Housing (Cen)

A\*, B\*, C\*, D\* (inside/outside), E\*, F, G\* (population 2,500 or more), H\*

Special reports for local housing authorities (139 localities) -- occupied substandard housing\*

Trade Associations and Professional Societies Directory

Construction Review (BDSA), December 1968



Trailers

A\*, B\*, C\*, D\* (inside/outside),  
E\*, F, G\* (population 10,000 or  
more), H\*

Senior citizen in household\*

Census of Housing (Cen)

Travel Trailers

Manufacturers' shipments (units)

Construction Review (BDSA)

Turnkey (see National Commission on  
Urban Problems)

Unions, Contract Construction

Number and membership

"Directory of National and  
International Labor Unions in  
the United States," Bureau of  
Labor Statistics

U. S. Government

Contracts awarded

Proposals for procurement of  
products and services

Requests for bids

Commerce Business Daily, Of-  
fice of Field Services

Units in Structure

A\*, B\*, C\*, D\* (inside/outside),  
E\*, F, G\* (population 2,500 or  
more), H\*

Census tracts\*

Inventory change, 1950-59

Senior citizen in household\*

Census of Housing (Cen)

Urban Places (see individual subjects  
marked G)

Urban Planning Assistance Programs  
(see Renewal Assistance Administration  
Programs)

Urban Renewal Programs (see Renewal Assis-  
tance Administration Programs)

Urban/Rural (see individual subjects  
marked H)

Vacancies, Annual Survey in FHA Rental  
Projects

Federal Housing Administration  
(published in press releases)

Vacancy Rates

Current Housing Reports,  
Series H-111 (Cen)

A, B, D (inside/outside)  
Available occupied/vacant  
For sale/rent  
Year-round/seasonal

Vacant, Available for Sale or Rent

Census of Housing (Cen)

A, B, C, D (inside/outside), E,  
F, G (population 1,000 or more),  
H  
Census tracts  
Inventory change, 1950-59  
Rural nonfarm for economic sub-  
regions

Vacant Property, Mortgage Status (see  
Mortgage Status)

Value

Census of Housing (Cen)

A\*, B\*, C\*, D\* (inside/outside),  
E\*, F, G\* (population 1,000 or  
more), H\*  
Census tracts\*  
City blocks  
Inventory change, 1950-59  
Mortgage status  
Rural nonfarm for economic sub-  
regions  
Senior citizen in household\*

Value of New Construction Put in Place

Construction Reports, Series  
C30 (Cen)

A  
Current and constant dollars  
Federal/state and local  
Nonfarm/farm  
Private/public



Value of New Houses

"Factors Affecting the Purchase Value of New Houses," Survey of Current Business (OBE), August 1966

Value of Real Estate, Trends 1956-66  
(see Low-Income Housing)

VA Home Loans

By type of lender and purpose of loan

Savings and Home Financing Source Book, Federal Home Loan Bank Board

Wage Rates, Union

Bricklayers

Building laborers

Carpenters

Electricians

Painters

Plasterers

Plumbers

Construction Review (BDSA)

Wages

"Workers' Wages in Construction and Maintenance," Monthly Labor Review (BLS), January 1968

Wages and Hours (Union)

By trades and by selected cities

Bureau of Labor Statistics, Annual Bulletin

Wage Scales (Union) and Employer Fund Contributions

G (100 cities)

Construction Review (BDSA)

Washing Machines (Clothes)

A\*, B\*, C\*, D\* (inside/outside), E\*, F, G\* (population 50,000 or more), H\*

Rural nonfarm/farm for economic subregions

Census of Housing (Cen)

Water Heating Fuel

A, B, C, D (inside/outside), E, F, G (population 50,000 or more), H

Census of Housing (Cen)

Water Supply

A\*, B\*, C\*, D\* (inside/outside),  
E\*, F, G\* (population 2,500 or  
more), H\*

Special reports for local housing  
authorities (139 localities) --  
occupied substandard housing\*

Census of Housing (Cen)

Weather, Influence on Housing Starts

Construction Review (BDSA),  
August 1968

Work Stoppages

Construction Review (BDSA),  
March 1968

Work Stoppages, Contract Construction

Monthly Labor Review (BLS),  
June or July issues

Year Built (see Age of Structure)

Year Moved into Unit

A\*, B\*, C\*, D\* (inside/outside), E,  
F, G (population 2,500 or more), H\*

Census tracts

Rural nonfarm-farm for economic sub-  
regions

Senior citizen in household

Census of Housing (Cen)

Zoning Ordinances (see National Commis-  
sion on Urban Problems)



## U. S. GOVERNMENT PUBLICATIONS OF MAJOR INTEREST TO USERS OF HOUSING STATISTICS

BDSA

BUSINESS AND DEFENSE SERVICES ADMINISTRATION

### Construction Review

Published monthly. Brings together all the major statistical series compiled by the Federal government as well as selected series from private sources in the field of construction. These include:

New construction outlays	Union wages
Housing starts	Materials output
Building permits	Employment
Contract awards	Hours of work
Cost indexes	Weekly earnings
Materials price indexes	

Regular feature articles include the annual outlook for new construction activity, a review of the year in construction, and other analytical articles.

### Marketing Information Guide

Published monthly. Annotated bibliography of newly released government and private publications concerned with the sale or purchase of products and business or personal services. Usually includes a section on construction.

### U. S. Industrial Outlook

Published annually. Provides data covering production, sales, shipments, employment, foreign trade, technology, etc., for key industries, and projects expected activities in the coming year.

Monthly Labor Review

Published monthly. Articles on industrial relations, labor problems, and labor economics. Summaries of major BLS studies. Includes section on current labor statistics.

Bulletins

Publication irregular. Reports on the regular continuing studies of the Bureau and also the results of special investigations.

Survey of Consumer Expenditures

A series of statistical reports summarizing the results of a nationwide survey in 1960-61 of expenditures and income of families living in urban and rural areas, cross-classified by family characteristics. Includes selected urban places and SMSA's as well as summaries on a national and regional basis.



1967 Census of Business -- Construction Industry

The results of this census of the construction industry have not yet been published. Details of the contents of the reports and the expected dates of publication are as follows:

## Advance Reports

Series BC67(A)-CI.      Industry Report (July-August 1969)

Data by kind of business (SIC industry) on the number of construction establishments; receipts; employment; payrolls; payments to subcontractors; payments for materials, components, and supplies; payments for the rental of machinery and equipment; and capital expenditures during the year. In addition, more detailed data on construction receipts are shown relating to new construction as compared with maintenance and repair work, ownership (public vs. private) of construction, location of work, and type of work (single-family houses, industrial buildings, streets and roads, etc.).

Series BC67(A)-CA.      Area Report (July-August 1969)

Industry data for items listed above are shown separately for selected standard metropolitan statistical areas, states, the District of Columbia, and for the United States.

## Final Reports

Series BC67-CI.      Industry Report (September 1969-March 1970)

Data shown in the advance report plus additional detailed tables. Supersedes advance report, Series BC67(A)-CI.

Series BC67-CA.      Area Report (January-June 1970)

Data shown in the advance report plus additional detailed tables. Supersedes advance report, Series BC67(A)-CA.

Series BC67-CS.      Special Reports (July-December 1970)

Selected data for industry and area by size of establishment and data on specialization by primary types of construction.

All final reports listed above will subsequently be assembled and reissued in a cloth binding as Volume IX, Construction Industry, 1967 Census of Business.

Construction Industry in Puerto Rico (September 1969)

A separate report presenting data on the construction industry in Puerto Rico.

Current Construction Reports

Series C20      Housing Starts (published monthly)

Presents data on total number of new housing units started by private and public ownership. Starts are shown by location (metropolitan and nonmetropolitan areas), by number of housing units in structure (one unit, two units, three and four units, and five units or more), by geographic regions (Northeast, North Central, South, and West). Seasonally adjusted annual rates are shown for private starts for U. S. and regions, as well as for units authorized by building permits. Monthly statistics are given on units authorized but not started. Also provided are quarterly statistics showing distributions of apartment houses (structures with five housing units or more) by number of housing units and floors in structures and number of bedrooms in units.

Series C25      Sales of New One-Family Homes (published monthly)

Presents data on the number of new one-family homes sold and available for sale, and seasonally adjusted annual rate of sales. Series C25 also includes median sales price of homes sold and median asking price of homes for sale. Quarterly reports provide additional data by region and types of financing. Annual summary report contains additional information on financing and selected characteristics of homes sold, and all other one-family homes which are not built for sale, i.e., floor area, number of bedrooms and bathrooms, appliances, etc.

Series C30      Value of New Construction Put in Place (published monthly)

Presents data on the value of new construction put in place, by ownership (public and private) and by type (residential, nonresidential, public utility, military, etc.). Seasonally adjusted annual rates in current and in 1957-59 dollars also are shown.



Series C40      Housing Authorized in Individual Permit-Issuing Places (published monthly)

Presents data on the number of new housing units in single- and multiple-family structures authorized by local building permits, by individual permit-issuing place. The report also presents data on new housing units in public housing projects for which construction contracts were awarded, by place.

Series C42      Housing Authorized in Individual Permit-Issuing Places: Summary Statistics (published monthly)

Presents data on the number and recorded valuation of new housing units authorized by building permits and by public housing contracts awarded in permit-issuing places. Data are given by census regions, divisions, states, and selected central cities and standard metropolitan statistical areas, and by number of housing units in structure.

Series C50      Expenditures on Residential Additions, Alterations, Maintenance and Repairs and Replacements (published quarterly)

Presents data on expenditures for upkeep and improvement by residential property owners. Expenditures are shown by type of work, size of property, nonfarm/farm status, and geographic region (Northeast, North Central, South, and West). Also, expenditures by owner occupants of one-housing-unit properties are listed by demographic and property characteristics. (Annual Report to be issued in two parts.)

#### Housing Construction Statistics, 1889-1964

A comprehensive compilation of historical statistics on housing starts and housing authorized by building permits presented in 26 statistical series, each of which begins with data for 1964 and goes back in time as far as meaningful figures are available -- in some cases as far back as 1889. Statistics in this volume constitute an historical supplement to the monthly data issued by the Bureau of the Census in three of its Current Construction Reports series -- Housing Starts, Housing Authorized in Individual Permit-Issuing Places, and Housing Authorized in Permit-Issuing Places, Summary Statistics.

## Current Housing Reports

Series H-111    Housing Vacancies (published quarterly)

Presents data on rental vacancy rates and homeowner vacancy rates for the United States, each of the four geographic regions, and inside and outside standard metropolitan statistical areas. Percentage distributions are presented for rental and homeowner vacancies by the following housing characteristics: number of rooms, number of bedrooms, number of housing units in structure, duration of vacancy, plumbing facilities, monthly rent, sale price asked, and year structure built.

Series 121        Housing Characteristics (publication irregular)

Presents data for the United States, geographic regions, or local areas, on one or more selected housing characteristics. (Publications in this series include 13 reports on television ownership and a special study of housing characteristics classified by the 1959 income of occupants.)

## 1960 Census of Housing

Third decennial Census of Housing. Comprises:

Volume I (Series HC(1) reports). States and Small Areas. Information about all subjects covered in the April 1960 enumeration, with a separate report for the United States by regions and geographic divisions, each of the 50 states, the District of Columbia, Puerto Rico, Guam, and the Virgin Islands of the United States. In the state reports, information is shown for the state; each standard metropolitan statistical area and its constituent parts; each urbanized area, place of 1,000 inhabitants or more, and county; and the rural-farm and rural-nonfarm parts of each county. The volume covers occupancy characteristics, structural characteristics, condition and plumbing facilities, equipment and fuels, and financial characteristics. The subjects are grouped as follows: color, persons, persons per room, tenure, year moved into unit, vacancy status, and duration of vacancy; basement, bedrooms, elevator in structure, rooms, units in structure, and year structure built; bathing facilities, bathrooms, condition, sewage disposal, source of water, toilet facilities, and water supply; air conditioning, automobiles available, clothes dryer, clothes washing machine, cooking fuel, heating equipment, heating fuel, home food



freezer, radio sets, telephone available, television sets, and water heating fuel; contract rent, gross rent, and value.

Volume II (Series HC(2) reports). Metropolitan Housing. Cross-tabulations of housing and household characteristics, with a separate report for the United States by geographic divisions, and for each of the 192 standard metropolitan statistical areas of 100,000 inhabitants or more in the United States and Puerto Rico. Separate statistics for each of the 134 places of 100,000 inhabitants or more are included in the metropolitan area reports.

Volume III (Series HC(3) reports). City Blocks. Separate reports for cities and other urban places having 50,000 inhabitants or more prior to and at the time of the 1960 Census, and for a number of smaller localities which arranged for block statistics. Data for a limited number of characteristics are presented by blocks. Statistics for 466 cities and localities in the United States and Puerto Rico are published in 420 separate reports.

Volume IV (Series HC(4) reports). Components of Inventory Change. Information on the source of the 1959 inventory and the disposition of the 1950 and 1956 inventories. Data are provided for components of change, such as new construction, conversion, merger, demolition, and other additions and losses. Part 1 of the volume contains the 1950 to 1959 comparison, with a separate report for the United States by regions and each of 17 selected metropolitan areas (15 standard metropolitan statistical areas, defined as of June 8, 1959, and two standard consolidated areas). Part 1 is published in two sets of reports for each area. Part 1A presents basic 1950 and 1959 data, with emphasis on the counts and characteristics of the components of change; Part 1B presents additional information on characteristics of the inventory, including characteristics of the present and previous residences of recent movers. Part 2 contains the 1957 to 1959 comparison, with a separate report for conterminous United States by regions, and separate reports for nine of the selected areas (standard metropolitan areas defined for the 1956 inventory).

Volume V. Residential Finance. Information on financing of residential property, including characteristics of mortgages, properties, and homeowners. Part 1 of the volume is a report on homeowner properties for the United States by regions and each of 17 selected metropolitan areas (15 standard metropolitan statistical areas, defined as of June 8, 1959, and two standard consolidated

areas). Part 2 is a report on rental and vacant properties for the United States.

Volume VI. Rural Housing. Cross-tabulations of housing and household characteristics of rural-farm and rural-nonfarm housing units for the United States and each of the 121 economic subregions.

Volume VII. Housing of Senior Citizens. Cross-tabulations of housing and household characteristics of units occupied by persons 60 years old and over, for the United States, each of the 50 states and the District of Columbia, and selected standard metropolitan statistical areas.

Series PHC(1) reports. Census Tracts. Separate reports for 180 tracted areas in the United States and Puerto Rico. The reports contain information, by census tracts, on both housing and population subjects. (This series is the same as the tract reports included in the publication program for the 1960 Census of Population.)

Series HC(S1) reports. Special Reports for Local Housing Authorities. Separate reports for 139 localities in the United States. The program was requested by, and planned in cooperation with, the Public Housing Administration. The reports contain data on both owner- and renter-occupied housing units defined as substandard by Public Housing Administration criteria, with emphasis on gross rent, size of family, and income of renter families.

#### 1960 Census of Population

Eighteenth decennial Census of Population. Comprises:

##### Vol. I. Characteristics of the Population

- A. Number of Inhabitants
- B. General Population Characteristics
- C. General Social and Economic Characteristics
- D. Detailed Characteristics

Vol. II. Subject Reports (33). Cross-relationships of selected population characteristics.

Vol. III. Selected Area Reports (5). Selected population characteristics by state economic areas and by size of place.

Census Tract Reports. Information on population and housing for each of 180 tracted areas.



Current Population Reports (based on a monthly nationwide sample survey)

Series P-20     Population Characteristics

Current national and, in some cases, regional data on geographic residence and mobility, fertility, education, school enrollment, marital status, and numbers and characteristics of households and families.

Series P-23     Technical Studies

Infrequent reports on methods, concepts, or specialized data.

Series P-25     Population Estimates

Presents monthly estimates of the total population; annual midyear estimates for the states, by broad age groups, and for the United States, by age, color, and sex; and annual estimates of the components of population change. It includes projections of the future population.

Series P-27     Farm Population

Provides data on the size and selected characteristics of the farm population. It is issued jointly with the Economic Research Service, U. S. Department of Agriculture.

Series P-28     Special Censuses

Gives results of population censuses taken at the request and expense of city and other local governments. (Subscription to Current Population Reports includes quarterly and annual summaries only. Detailed reports on individual areas may be ordered separately from the Bureau.)

Series P-60     Consumer Income

Contains information on the proportions of families and persons at various income levels. It also includes data on the relationship of income to age, sex, color, family size, education, occupation, work experience, and other characteristics.

Series P-65     Consumer Buying Indicators

Presents information on the proportion of households intending to purchase automobiles, houses, and household equipment within a particular period of time.

### Current Industrial Reports

Presents data on sales, production, and related items for specified products or industries. Reports of special interest to the construction industry include:

#### Series

MA-24F	Hardwood Plywood (published annually)
MA-24H	Softwood Plywood (published annually)
MA-24T	Lumber Production and Mill Stocks (published annually)
M32A	Flat Glass (published quarterly)
M32D	Clay Construction Products (published monthly)
M34E	Plumbing Fixtures (published quarterly)
M34N	Heating and Cooking Equipment (published monthly)
M35D	Construction Machinery (published quarterly)
M35H	Fans, Blowers, and Unit Heaters (published quarterly)
MA-36E	Electric Housewares and Fans (published annually)
MA-36L	Electric Lighting Fixtures (published annually)

#### Statistical Abstract

Published annually. Standard summary of statistics on the social, political, and economic organization of the U. S. Includes data from many statistical publications, both governmental and private.



Statistical Yearbook

First published in 1966; contains statistical tables previously submitted by the Department (and its predecessor, the Housing and Home Finance Agency) as part of its Annual Report to the Congress. It includes:

- General statistics on housing and urban development
- Federal Housing Administration programs
- FHA accounts and finance statements
- Federal National Mortgage Association programs
- Housing assistance programs
- Metropolitan development programs
- Renewal assistance programs
- Advisory committees

Housing and Urban Development Trends

Published monthly. Information on housing production and financing, as well as program activities of the Department.

Housing and Planning References

Published every two months. A selection of publications and articles on housing and planning received during the two-month period by the library of the Department of Housing and Urban Development.

Survey of Current Business

Published monthly. Presents detailed articles on important economic developments, and reports on trends in production, sales, inventories, incomes, prices, etc. A statistical section includes some 2,500 business series -- economic indicators on national income, international transactions, retail and wholesale sales, and manufacturers' orders and inventories; and industry data on production, prices, and shipments in a wide variety of fields, such as chemicals, foodstuffs, metals, leather, paper, printing, textiles, and construction.

Special supplementary reports include Business Statistics (biennial) and other publications (irregular) such as National Income and Personal Income by States.