

R. Schneider

PRODUCTION ENGINEERING SERVICES

PROPOSAL

TRUCK, PLATFORM, UTILITY,
1/2 TON, 4 x 4, M-274 SERIES
RFP-64-RE-502
MARCH, 1964



KAISER Jeep CORPORATION

AUTOMOTIVE DIVISION TOLEDO 1, OHIO

PRODUCTION ENGINEERING SERVICES

PROPOSAL

TRUCK, PLATFORM, UTILITY,
1/2 TON, 4 x 4, M-274 SERIES
RFP-64-RE-502
MARCH, 1964



KAISER Jeep CORPORATION

AUTOMOTIVE DIVISION TOLEDO 1, OHIO

CONTENTS

SECTION I . . . PRODUCT ENGINEERING SERVICES

SECTION II . . . INSPECTION ENGINEERING SERVICES

SECTION III . . . FIELD SERVICE PROVISIONING SERVICES

SECTION IV . . . MISCELLANEOUS SERVICES

**A. VEHICLE CARLOADING AND
PRESERVATION STUDY**

**B. MAINTENANCE ENGINEERING
SERVICES**

SECTION V . . . TERMS AND CONDITIONS

SECTION VI . . . KAISER Jeep CORPORATION

KAISER INDUSTRIES CORPORATION

SECTION VII . . . ESTIMATED COST

SECTION I
PRODUCT ENGINEERING SERVICES

PRODUCT ENGINEERING SERVICES

A. INTRODUCTION

B. OBJECTIVE

C. PROCEDURE

D. PROGRAM SCHEDULE

E. PRODUCT ENGINEERING

- **FACILITIES**

- **ORGANIZATION**

F. EXHIBITS

SECTION I
PRODUCT ENGINEERING SERVICES

A. INTRODUCTION

Product Engineering

The purpose of this proposal is to set forth our method of accomplishment, a planned and managed engineering program for the Truck, Platform, Utility, 1/2 ton, 4 x 4 M-274 series.

KAISER Jeep CORPORATION, under the technical supervision of the Research and Engineering Directorate, Field Service Directorate and the Quality Assurance Division of Army Tank-Automotive Center, Detroit Arsenal, Warren, Michigan, would furnish the property and services required to perform a production engineering program to support this vehicle.

Scope

The engineering program would consist of the following:

1. Studies and tests for improvements.
2. Observer services for collection, correlation and analysis of operational data.
3. Investigation and correction of reported deficiencies.
4. Preparation, maintenance, revision and distribution of drawings, engineering change requests and other material as required.

SECTION I
PRODUCT ENGINEERING SERVICES

PREVIOUS PROGRAMS COMPLETED

In the history of the development of this vehicle from its origination, KAISER Jeep CORPORATION and its predecessor companies have participated as shown by the list of contracts given below:

DA-33-019-ORD-1915	XM274 Spare Parts Test Support
DA-33-019-ORD-2184	Expanded Mule Study
DA-33-019-ORD-2217	Production, 1743 Vehicles
DA-33-019-ORD-2478	Design
DA-33-019-ORD-2489	Gauge Engineering
DA-33-019-ORD-2519	Design
DA-33-019-ORD-2536	VEA
DA-33-019-ORD-3125	Production, 705 Vehicles
DA-33-019-ORD-3453	Service
DA-33-019-ORD-37165	Parts
DA-33-019-ORD-3505	Test 4 Vehicles
DA-33-019-AMC-12(T)	P. E. C.
DA-33-019-AMC-257(T)	Prototype development, 4
DA-33-019-AMC-4051(T)	Production, 2270

SECTION I
PRODUCT ENGINEERING SERVICES

B. OBJECTIVE

1. To plan and manage an engineering program designed to provide standardization, product engineering, engineering assistance to producers, control of documentation and technical instructions, essential to the procurement and production of the M-274 series 1/2 ton, 4x4 utility vehicle. Emphasis to be on cost reduction, producibility, reliability, improvement of quality and maintainability.
2. In order to carry out this program, the following technical services are to be rendered:
 - (a) We can foresee the need for future engineering services due to changes being generated from field service experience on the M-274A2 vehicle. Historically, we have learned to expect some redesign to be required because of problems brought to light by actual user's evaluation.
 - (b) Review and modify the drawings from Contract DA-33-019-ORD-4051(T) as required by MIL-D-70327 and ORD 4-4 (OTAC) to complete technical procurement package.
 - (c) Update the drawings affected by implementation of technical data stated in Deviations and/or Technical Actions during the latter part of Contract DA-33-019-ORD-4051(T).
 - (d) Austerity concept study and merit/value analysis of the existing vehicle components to allow redesign or substitution to reduce the vehicle unit price.
 - (e) Prepare maintenance spare part kit drawings when required.
 - (f) Prepare data and sketches to allow initiation of special maintenance tool requirements.
 - (g) Prepare Bills of Material, Engineering Vehicle Releases to maintain accurate specifications in conjunction with all revised or new drawings.
 - (h) Submission of monthly progress reports defining the status of the program.

SECTION I
PRODUCT ENGINEERING SERVICES

B. OBJECTIVE—Continued

- (i) Submission of periodic technical reports of testing on new items, methods and techniques which may be applied.
- (j) Future engineering services in the form of Research and Development prototype proposals including human factor engineering as requested by Work Directive from ATAC Technical representatives.
- (k) Completion of drawings for the construction of a prototype item.
- (l) Build-up of a pilot item and its preliminary testing.
- (m) Liaison engineering as deemed necessary to facilitate testing.
- (n) Initiation of revisions required as a result of testing, including correction of drawings.

C. PROCEDURE

1. To accomplish the technical services listed in Item B and the subsequent program, the procedure outlined below will be followed:
 - (a) Studies of field reported problem areas will be conducted to arrive at a proper correction. Tests will be carried out to verify the correction. Changes will be made to the Technical Package to properly reflect the corrections.
 - (b) To insure conformance, all Ordnance drawings under Contract DA-33-019-ORD-4051(T) will have to be inspected by experienced draftsmen checkers, changed by capable draftsmen and reviewed by competent engineers in order that drawings will be in strict compliance with ATAC requirements.
 - (c) Correct drawings due to Technical Actions and/or Deviations initiated during the latter part of Contract DA-33-019-ORD-4051(T).

SECTION I
PRODUCT ENGINEERING SERVICES

C. PROCEDURE—Continued

- (d) A survey will be conducted with the guidance and direction of the Government technical representative to arrive at a more austere vehicle package. Merit/value analysis studies will be initiated and energetically pursued to get the best product value to cost relationship.
- (e) Some drawings will need to be corrected as required for maintenance spare parts kits.
- (f) Some sketches and data need to be prepared to allow initiation of maintenance tool requirements.
- (g) To initiate, review and revise engineering vehicle releases to incorporate into the program all drawing changes as required by Technical Actions and/or Deviations.

To microfilm these changes to all drawings.

- (h) To report status of program, monthly progress reports will be submitted detailing the following:
 - (1) Planned progress for the current period.
 - (2) Accomplishments for this period.
 - (3) Conclusions for this period.
 - (4) Changes on original plans recommended and approved for this period.
 - (5) Plans for next period.

This report is to be submitted in a booklet form in an explicit, concise and accurate manner for the period under consideration. A sample of this type of monthly progress report is attached. (See EXHIBIT 3, Section I.)

SECTION I
PRODUCT ENGINEERING SERVICES

C. PROCEDURE—Continued

- (i) To report the technical results of the program or any part of the program as required by direction of the Technical Representative, a comprehensive report will be submitted. This report will be prepared in accordance with Instructions for Preparation and Distribution of Technical Reports, ATAC, dated 24 May 1962.

A sample of a technical report as used by our company to document the results of a previous program is attached. (See EXHIBIT 4, Section I.) The purpose of including this is to demonstrate organizational ability.

- (j) (k) (l) The technical report will reflect areas of future engineering services for Research & Development prototype proposal, prototype build-up and preliminary testing.
- (m) (n) The monthly progress report will include the results of liaison engineering and status of revisions that will be required as the result of work completed.

- 2. To illustrate one of the many technical services to be performed when requested by a work directive, an example will be used.

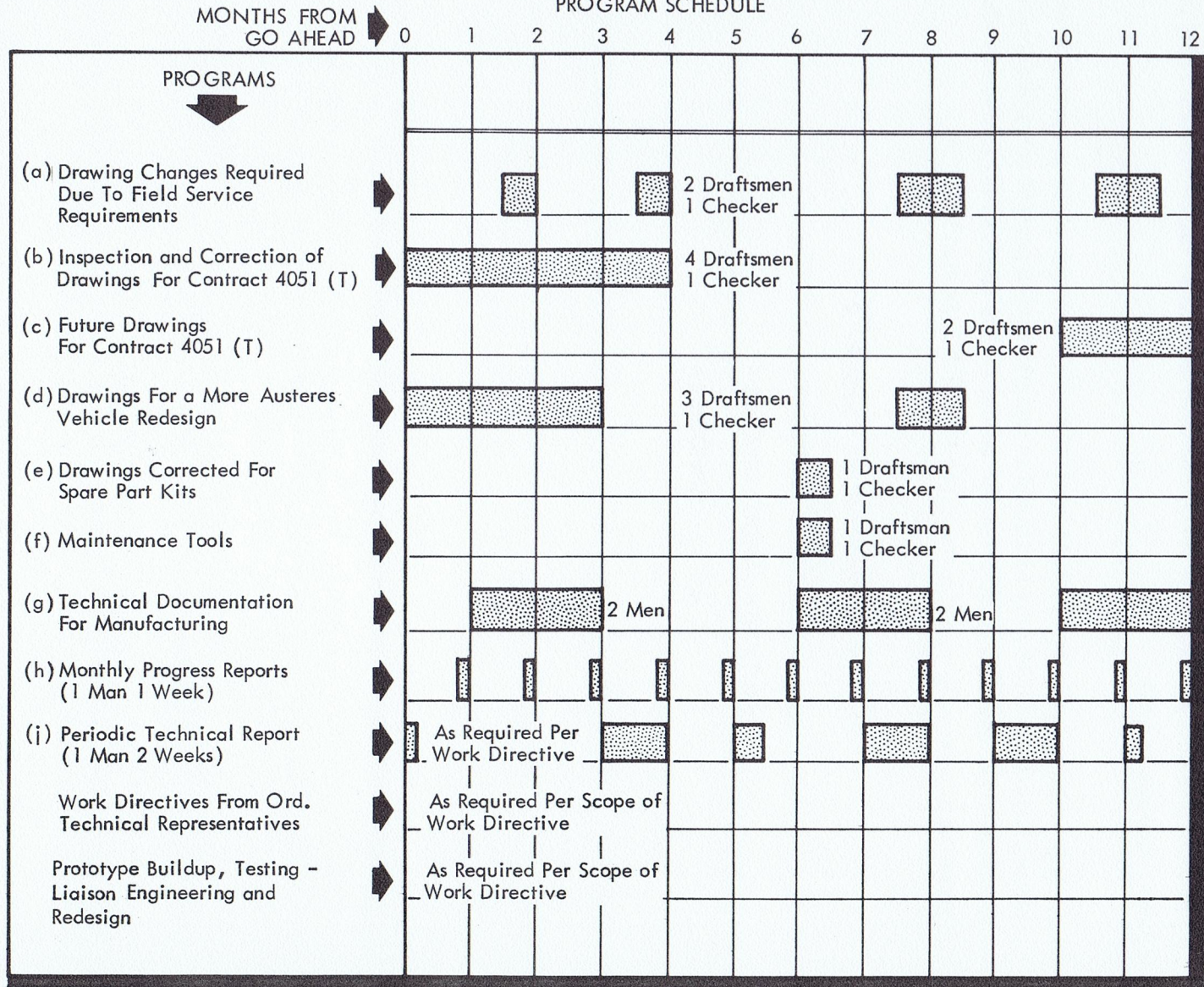
Assume test results and subsequent liaison engineering reports have shown improved performance is needed in the area of wheel bearings, KAISER Jeep CORPORATION would attack the problem in the following manner:

- (a) A preliminary layout would be made utilizing drawings and design calculations for a new wheel bearing arrangement. (See EXHIBIT 1, Section I.)
- (b) The procedure for the prototype build-up, preliminary testing, liaison engineering and redesign that may be necessary is reflected in sample reports. (See EXHIBITS 3 and 4, Section I.)

SECTION I
PRODUCT ENGINEERING SERVICES

C. PROCEDURE—Continued

3. To illustrate technical service to be performed in an anticipated major problem area, the following example is used:
 - (a) An improvement in the tie rod ball sockets allowing endurance of the present type ball sockets to be increased by the addition of an integral seal to prevent entry of abrasive material. This new type of steering ball socket seal is required for protection when operating in extremely muddy terrain (See EXHIBIT 2, Section I.)

KAISER Jeep CORPORATION
PROGRAM SCHEDULE

D. PROGRAM SCHEDULE

SECTION I
PRODUCT ENGINEERING SERVICES

**SECTION I
PRODUCT ENGINEERING SERVICES**

E. PRODUCT ENGINEERING

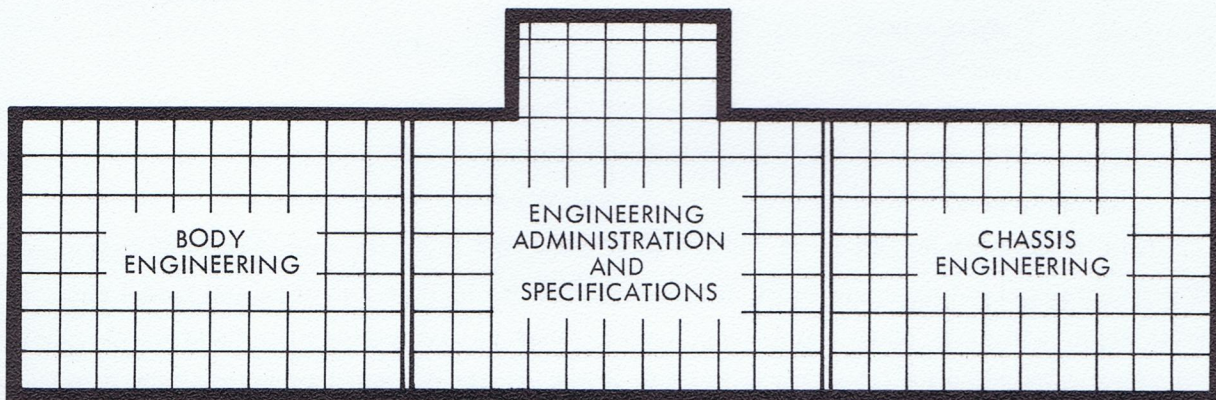
- **FACILITIES**
- **ORGANIZATIONAL STRUCTURE**
- **PERSONNEL**

**SECTION I
PRODUCT ENGINEERING SERVICES**

**E. PRODUCT ENGINEERING
FACILITIES**



Administration and Engineering building at Toledo. The entire 4th floor is devoted to Product Engineering activities as shown below.

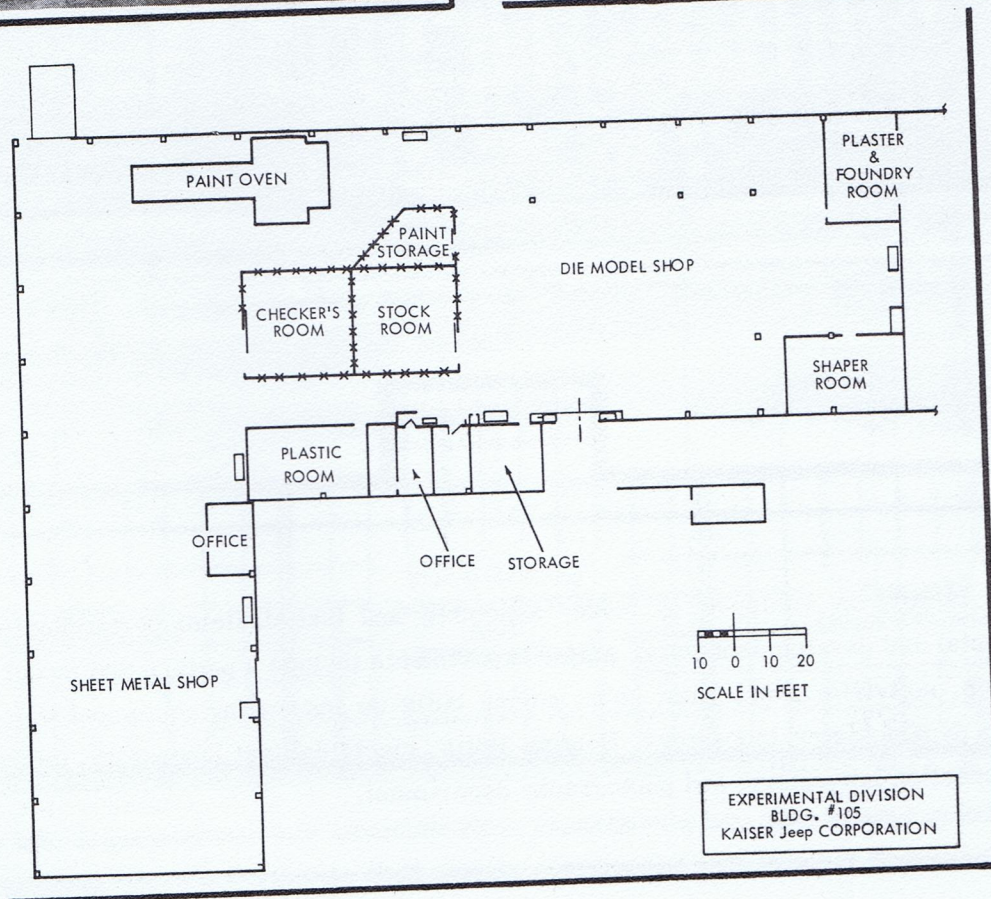
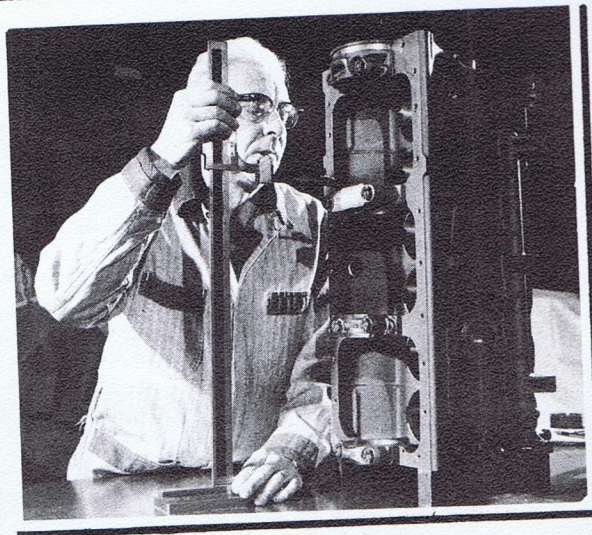
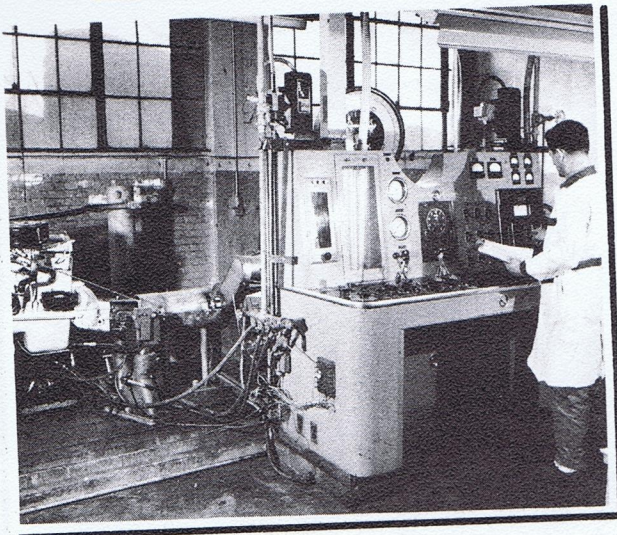


Other key organizational and administrative departments are also located in this building. This arrangement offers a Corporate Staff closely coordinated with Product Engineering.

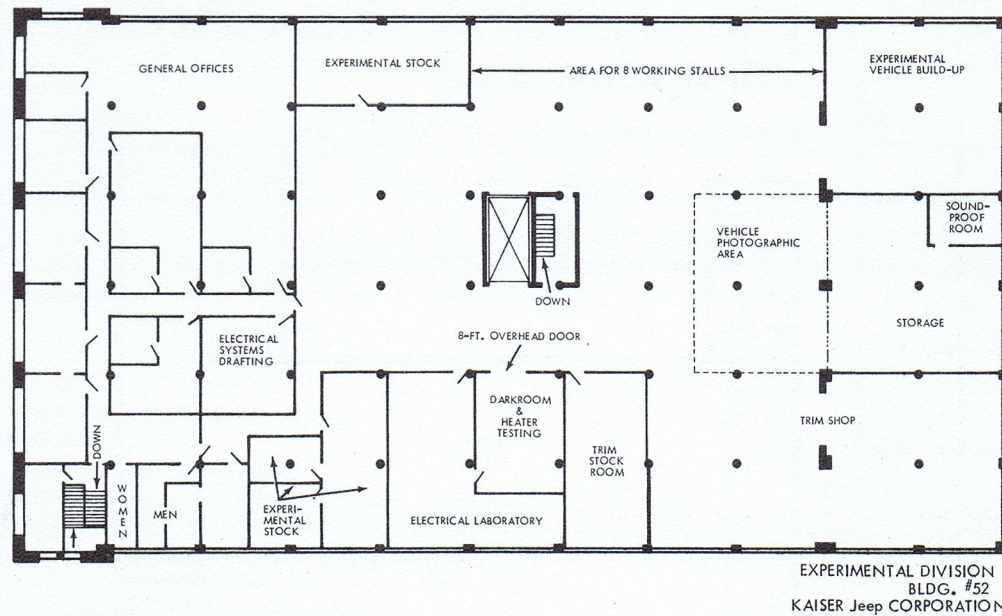
SECTION I
PRODUCT ENGINEERING SERVICES

E. PRODUCT ENGINEERING
FACILITIES

EXPERIMENTAL DIVISION, Toledo - Continued



EXPERIMENTAL DIVISION, Toledo - Continued



SECTION I PRODUCT ENGINEERING SERVICES

E. PRODUCT ENGINEERING FACILITIES

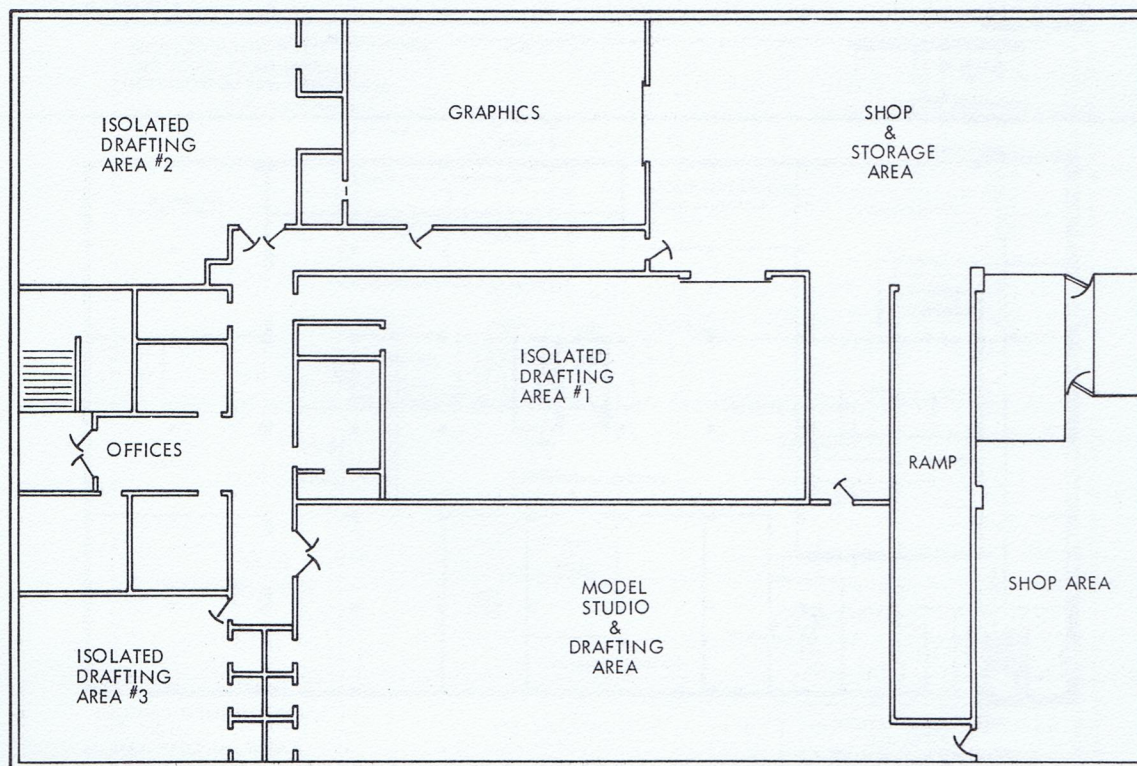
PRODUCT DEVELOPMENT DEPARTMENT - Detroit

The Product Development Department of Engineering is located in Detroit for two major reasons . . .

- 1.) to be close to the source of highly technical personnel required for advanced planning and
- 2.) to provide the degree of security and isolation important to all types of advanced design, both commercial and military.

The primary function of this department is to develop advanced concepts to the point of feasibility as to design and manufacturing possibilities which are then transmitted to Product Engineering in Toledo.

This facility is equipped with a model shop for 3-dimensional studies, a complete photo laboratory, and four completely secure and isolated drafting areas as noted in the diagram below.



SECTION I
PRODUCT ENGINEERING SERVICES

**E. PRODUCT ENGINEERING
FACILITIES**

EQUIPMENT

KAISER Jeep CORPORATION Engineering facilities are completely equipped to handle all phases of automotive design, development, and test programs.

Following is an outline of major items of equipment . . .

- Chassis Dynamometer
- Belgian Roll Dynamometer
- Six Engine Dynamometers complete with all accessories
- Complete Maintenance Shop and complete Metal Fabrication Shop
- Complete Body Engineering Shop
- Complete Paint Trim Facilities
- Off-the-Road Proving Grounds

TESTING - LABORATORY FACILITIES

Ferrous and Nonferrous Metals

- Spectrograph - ARL - Dietert
- Electrolytic Analyzer - Slomin
- Colorimeter - Bausch & Lomb Spectronic 20
- Five (5) Analytical Balances
- Four (4) Muffle Furnaces
- Carbon Train
- Sulfur Analyzer
- Four (4) Exhaust Fume Ovens with Hot Plates
- Drill Press & Milling Machines for Sampling
- Backman PH Meter
- Bureau of Standard Samples, Steel, Alloys, Cast Iron and Non-ferrous Metals
- Necessary Reagents, Chemicals, Glass Ware & Platinum Ware for Wet Chemical Analysis

Fabric

- Scott Tensile Tester
- Taber Abraser
- Weatherometer - Atlas
- R. S. Sunlamps - Westinghouse
- Flame Proof Tester
- Crockmeter A. A. T. C. C. Standard
- Wear, Twist, Flexing Tester - Willys Design
- Deep Freeze - Cold Cracking
- Wyzenbeck Tester

SECTION I
PRODUCT ENGINEERING SERVICES

E. PRODUCT ENGINEERING
FACILITIES

TESTING - LABORATORY FACILITIES - Continued

Fuel & Oil Testing

- Tag - Saybolt Thermostatic Viscosimeter
- Distillation Apparatus
- Cloud & Pour Apparatus
- Flash & Fire Apparatus
- Parr Bomb
- Color Determination Apparatus
- Specific Gravity Apparatus A. P. I.
- Grease Pentrometer
- Saponification Apparatus
- Water & Gasoline Dilution Apparatus
- Tetraethylead Determination Apparatus
- Cold Testing - Apparatus
- Water & Gasoline Dilution Apparatus
- Tetraethylead Determination Apparatus
- Cold Testing - Apparatus - Anti-Freeze
- Necessary Chemicals & Reagents for Chemical Analysis

Paints & Thinners

- Standard Viscosimeter
- Stability Wheel
- Spray Booth & Equipment
- Baking Oven with Heat Recorder
- Distillation Apparatus
- Sward Hardness Tester
- Paint Film Thickness Tester
- Cryptometer Apparatus
- Necessary Chemicals & Reagents for Analysis

Chemicals & Reagents for Production Control of the following:

- Tin Plating - Aluminum Pistons
- Copper Plating - Camshafts
- Chemical Film for Aluminum
- Iron Phosphating Units for Sheet Metal
- Zinc Phosphating Units for Sheet Metal
- Power Spray Washers
- Vapor Degreasers

SECTION I
PRODUCT ENGINEERING SERVICES

**E. PRODUCT ENGINEERING
FACILITIES**

PHYSICAL TESTING EQUIPMENT

Model or Serial No.	Name	Manufacturer
33305	Izod & Charpy Tester	Tinius Olsen Testing Machine Co.
32581	60,000# L Type Tensile Machine with Electronic Extensometer, Serial No. 32211-5	Tinius Olsen Testing Machine Co.
34071	60,000# L Type Tensile Machine with Electronic Extensometer, Serial No. 33499-2	Tinius Olsen Testing Machine Co.
32705-1	60,000# Universal Tensile Machine	Tinius Olsen Testing Machine Co.
37383	60,000 in. lb. Torsion Testing Machine	Tinius Olsen Testing Machine Co.
S. O. 49620	Baldwin-Southwark Tensile Testing Machine with Load Recorder & Stress-Strain Recorder, Serial #696	Baldwin-Southwark Co.
Model L6 #10608	Scott Tensile Testing Machine	Henry L. Scott Co.
33050	Brinell Hardness Tester 3000 Kg Load	Tinius Olsen Testing Machine Co.
Model DH2 #243	Brinell Hardness Tester 500-1000 Kg Load	Detroit Testing Machine Co.
SD-3831	B & L 20X Brinell Scope with Built-In Light	Bausch & Lomb Optical
4-JR #2975	Rockwell Hardness Tester	Wilson Mechanical Instrument Co.
4-JR #3078	Rockwell Hardness Tester	Wilson Mechanical Instrument Co.
4-JS #136	Rockwell Superficial Hardness Tester	Wilson Mechanical Instrument Co.
PB 4 #4631	Link Spring Checker	Link Engineering Co.
Type CA Size 1 #4228	Salt Spray Cabinet	Industrial Filter & Pump Manufacturing Co.

**SECTION I
PRODUCT ENGINEERING SERVICES**

**E. PRODUCT ENGINEERING
FACILITIES**

PHYSICAL TESTING EQUIPMENT - Continued

Model or Serial No.	Name	Manufacturer
Type Q 11-1005	Profilometer Amplifier-Tracer MA-4-1068 Type A Linear Pilotor Model 8 Serial #303 Type GB Tracer Serial GB2-81	Micrometrical Manu- facturing Co.
4R #181	Rockwell Hardness Tester	Wilson Mechanical Instrument Co.
35475	Brinell Hardness Tester (Hand Loaded)	Tinius Olsen Testing Machine Co.
PB-5 #43249	Link Spring Checker	Link Engineering Co.
PB-4D #43234	Link Spring Tester	Link Engineering Co.

METALLOGRAPHIC AND MACROGRAPHIC EQUIPMENT

AE-6225	B. & L. Research Metalloscope, Camera, Ocular, Objectives and Accessories	Bausch & Lomb Optical Co.
AD-8032	B. & L. Binocular Microscope	Bausch & Lomb Optical Co.
AD-7988	B. & L. Binocular Microscope	Bausch & Lomb Optical Co.
--	Multiple Unit Polishing Table	Adolph I. Buehler Co.
--	Specimen Storage Cabinet	Adolph I. Buehler Co.
--	Hand Grinder	Adolph I. Buehler Co.
--	Emery Paper Disc Grinder	Adolph I. Buehler Co.
--	Wet Power Grinder	Adolph I. Buehler Co.
--	Mounting Press	Adolph I. Buehler Co.
--	Wet Cut-Off Wheel	Adolph I. Buehler Co.
121	Mounting Press - Precision - Jarrett	Precision Scientific Co.

SECTION I
PRODUCT ENGINEERING SERVICES

E. PRODUCT ENGINEERING
FACILITIES

PHOTOGRAPHIC EQUIPMENT

Model or Serial No.	Name	Manufacturer
	8" x 10" View Camera Turner Reich Anastigmat Lens Serial 11 205151 and Adjustable Tripod	Eastman Kodak Co.
	5" x 7" Macrographic Camera 3 B. & L. Micro Tessar Lens	
G-33 #1896	4" x 5" National Enlarger	National Instrument Co.
	8" x 10" Contact Printer	Eastman Kodak Co.
	Arkay Print Dryer	Arkay Laboratories, Inc.
	High Speed Photographic Equipment with stroboscopic lights	Wollensak

NON-DESTRUCTIVE TESTING EQUIPMENT

Type KN-5 51463	Portable Magnaflux Machine	Magnaflux Corp.
Type KN-5 51473	Portable Magnaflux Machine	Magnaflux Corp.
Type KS-3	Spot Check Test. Kit Type Penetrant	Magnaflux Corp.
P-3325	Magna Gage	American Instrument Co.

SECTION I
PRODUCT ENGINEERING SERVICES

E. PRODUCT ENGINEERING
ORGANIZATIONAL STRUCTURE

The Organizational Structure of Product Engineering consists of 4 major units as outlined below . . .

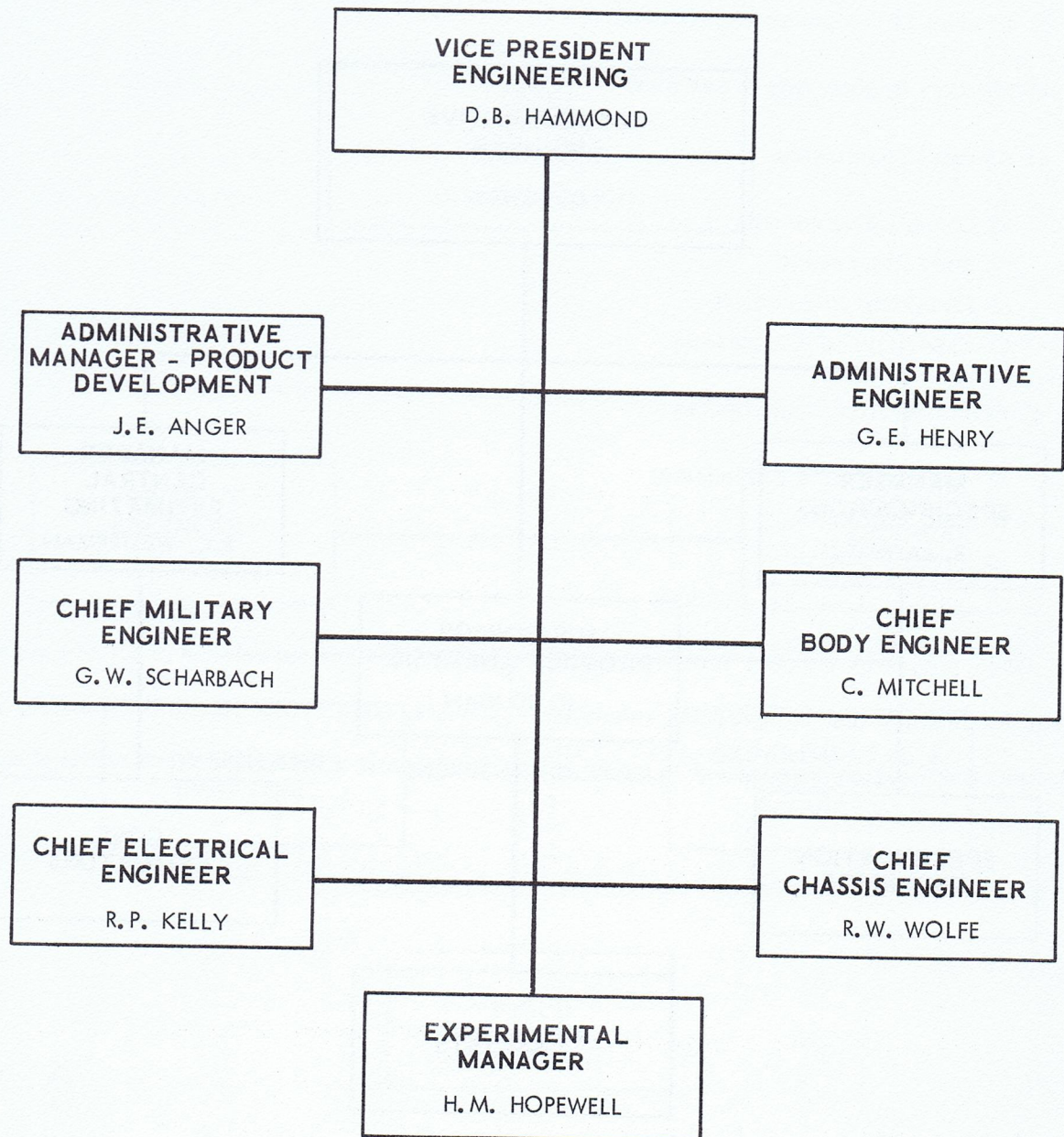
- 1) Product Development Department
- 2) Military Engineering Department
- 3) Design Departments
 - a) Chassis Engineering
 - b) Body Engineering
 - c) Electrical Engineering
 - d) Experimental Engineering
- 4) Administrative Departments
 - a) Administrative Engineering
 - b) Cost Estimating
 - c) Product Analysis
 - d) Specifications and Records

This structure coupled with the wealth of background and experience of all key personnel, both in military and commercial automotive concepts, adds to the inherent flexibility of our Product Engineering Department to carry out its functions in a straightforward efficient manner.

SECTION I
PRODUCT ENGINEERING SERVICES

E. PRODUCT ENGINEERING
ORGANIZATIONAL STRUCTURE

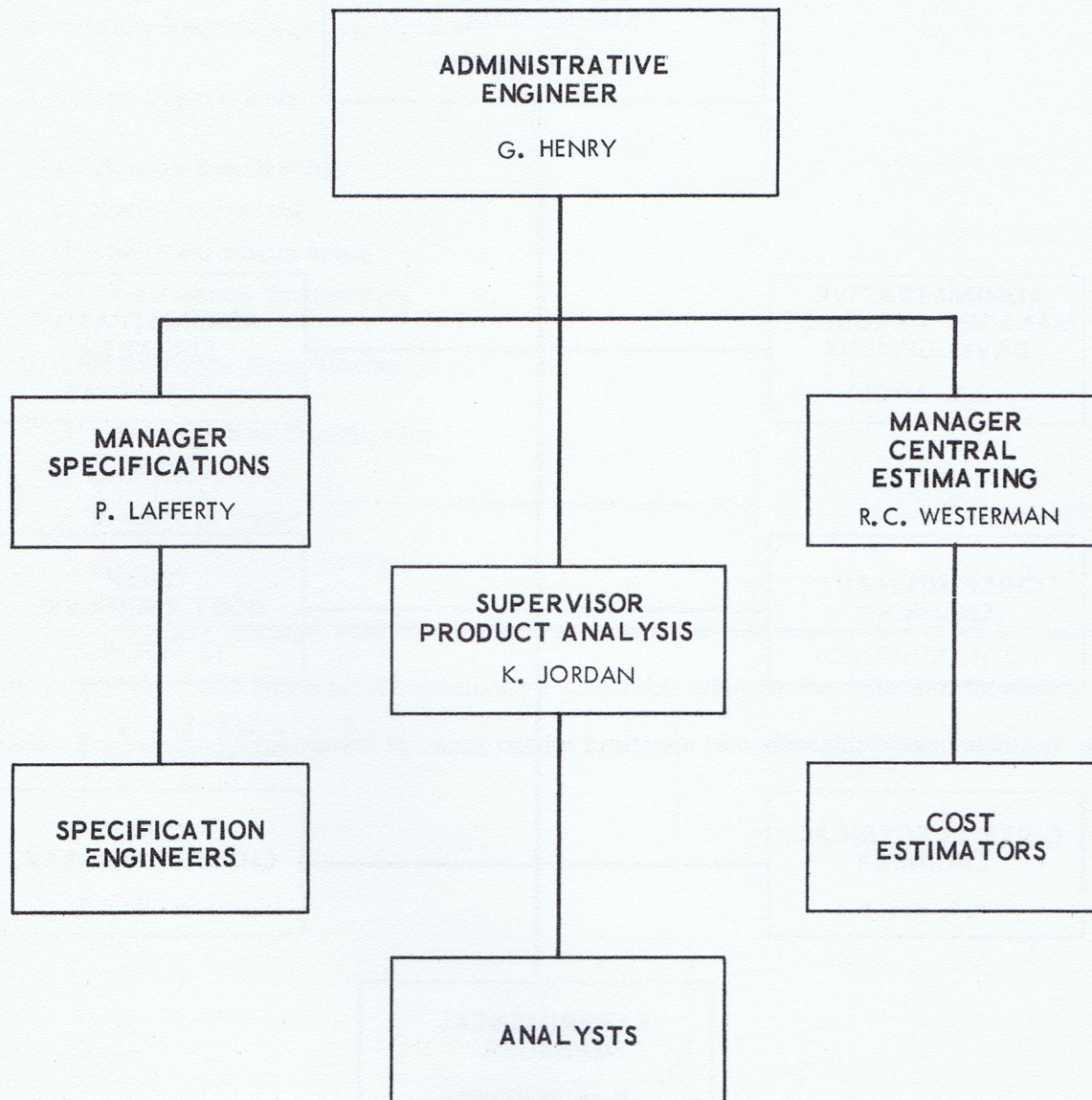
ORGANIZATION PRODUCT ENGINEERING
PRODUCT ENGINEERING DIVISION



SECTION I
PRODUCT ENGINEERING SERVICES

E. PRODUCT ENGINEERING
ORGANIZATIONAL STRUCTURE

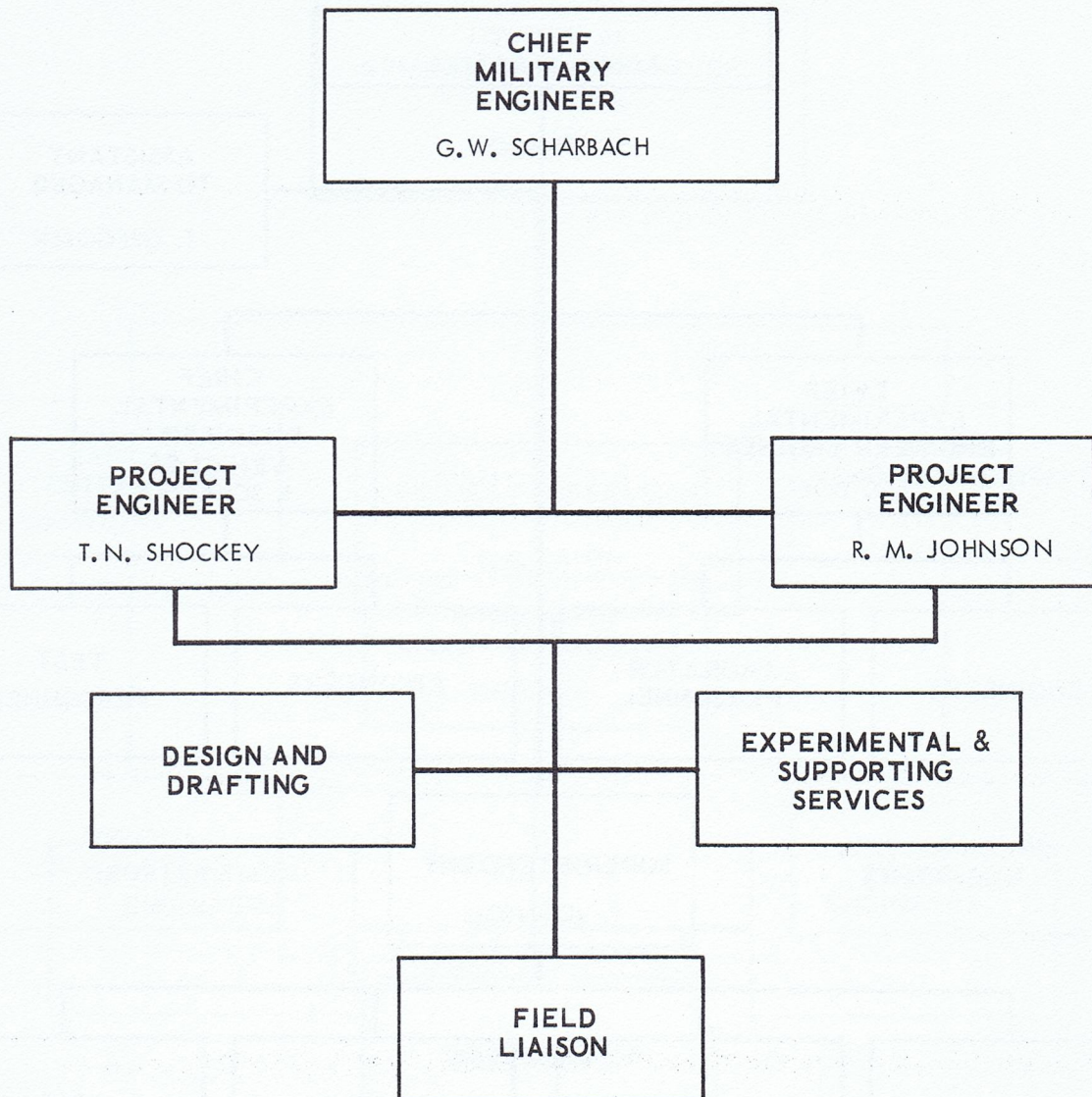
ADMINISTRATIVE ENGINEERING



SECTION I
PRODUCT ENGINEERING SERVICES

E. PRODUCT ENGINEERING
ORGANIZATIONAL STRUCTURE

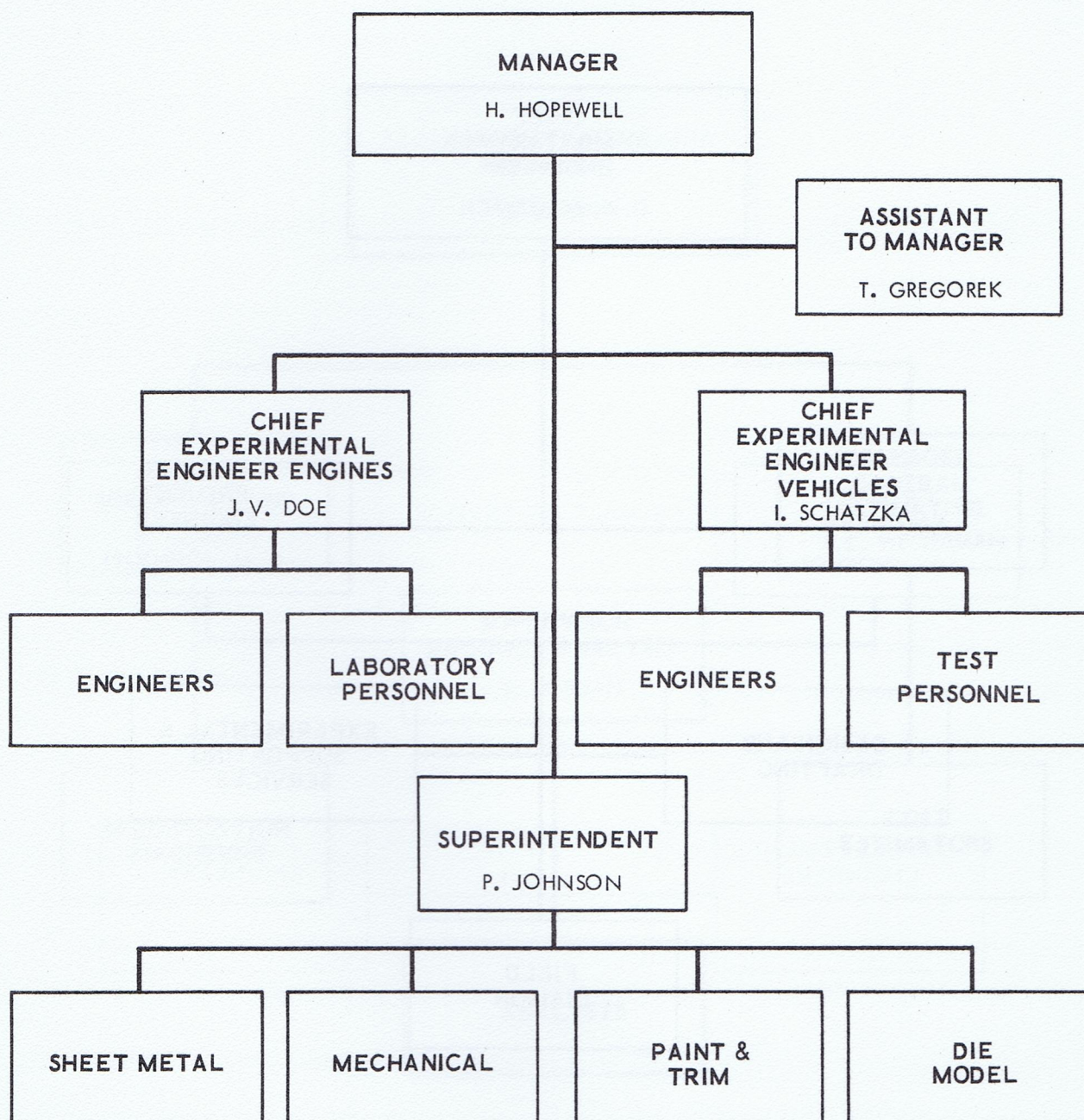
ORGANIZATION PRODUCT ENGINEERING
MILITARY ENGINEERING GROUP



SECTION I
PRODUCT ENGINEERING SERVICES

E. PRODUCT ENGINEERING
ORGANIZATIONAL STRUCTURE

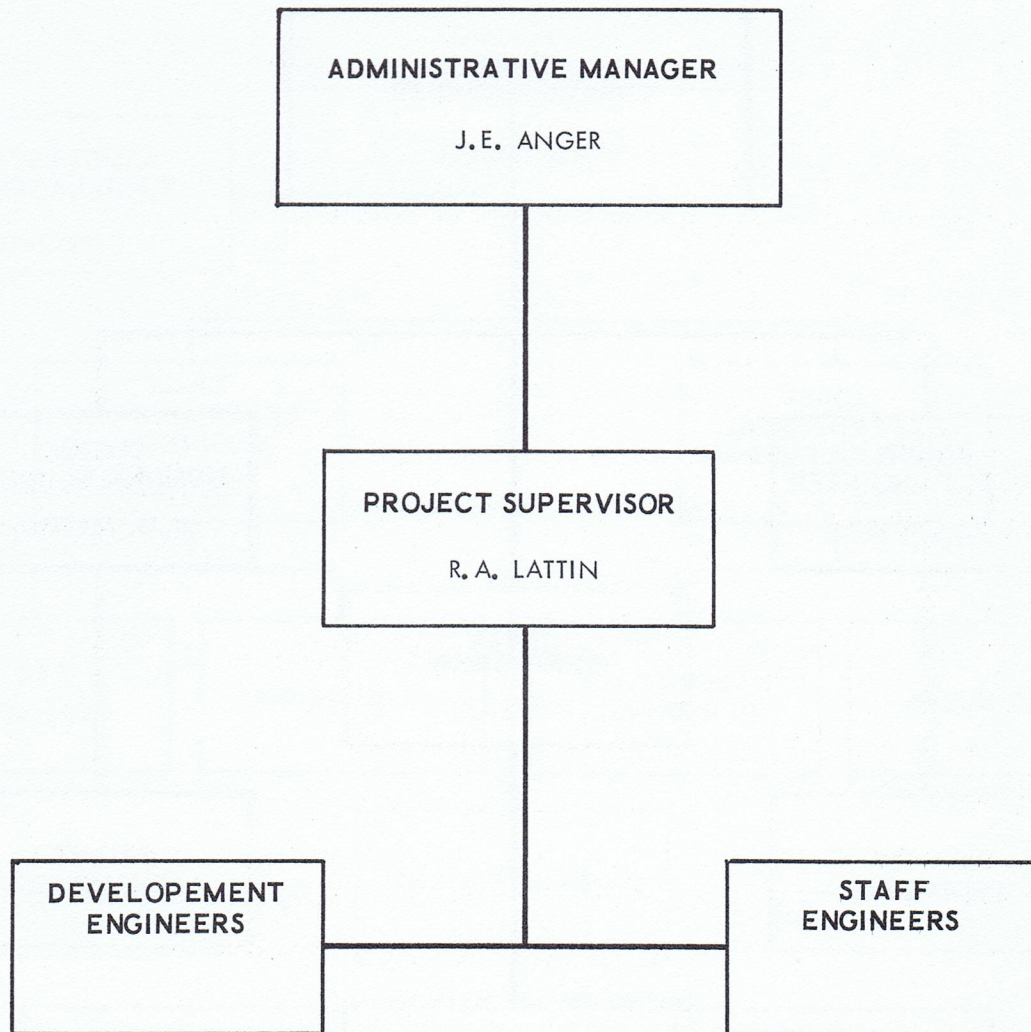
RESEARCH AND EXPERIMENTAL
ENGINEERING



SECTION I
PRODUCT ENGINEERING SERVICES

E. PRODUCT ENGINEERING
ORGANIZATIONAL STRUCTURE

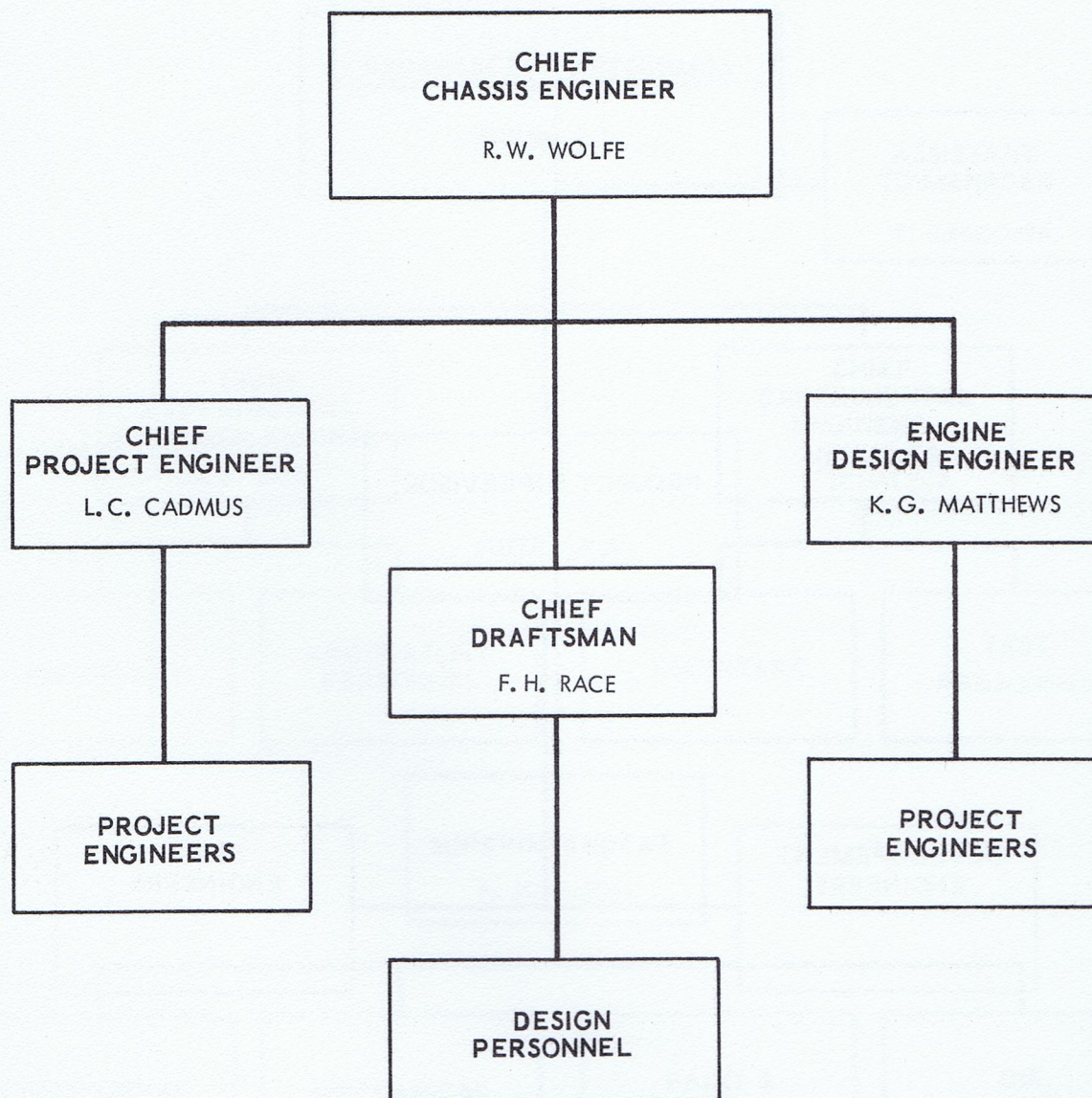
ORGANIZATION PRODUCT ENGINEERING
ADVANCED PRODUCT DEVELOPEMENT



SECTION I
PRODUCT ENGINEERING SERVICES

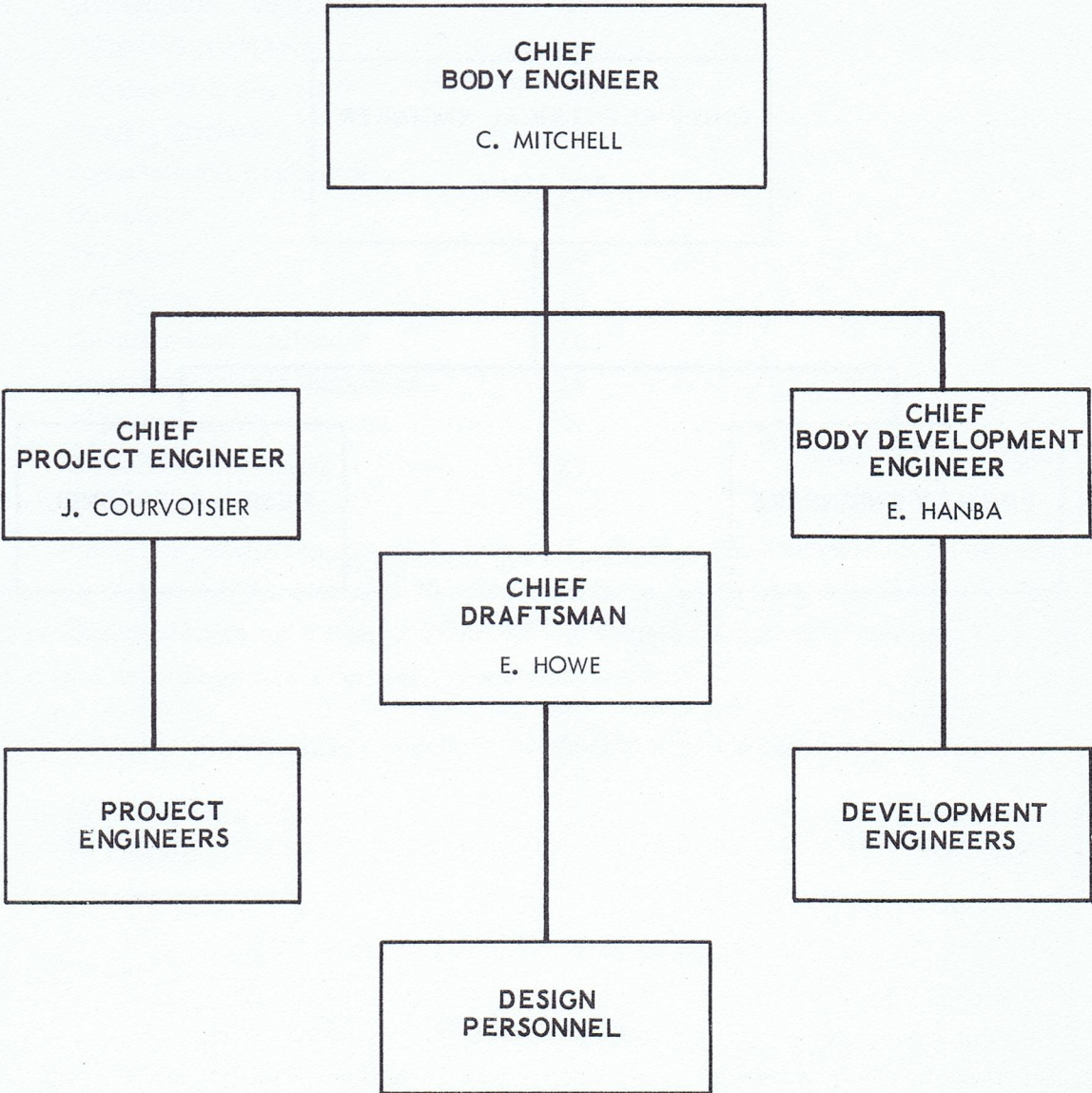
E. PRODUCT ENGINEERING
ORGANIZATIONAL STRUCTURE

CHASSIS ENGINEERING



E. PRODUCT ENGINEERING
ORGANIZATIONAL STRUCTURE

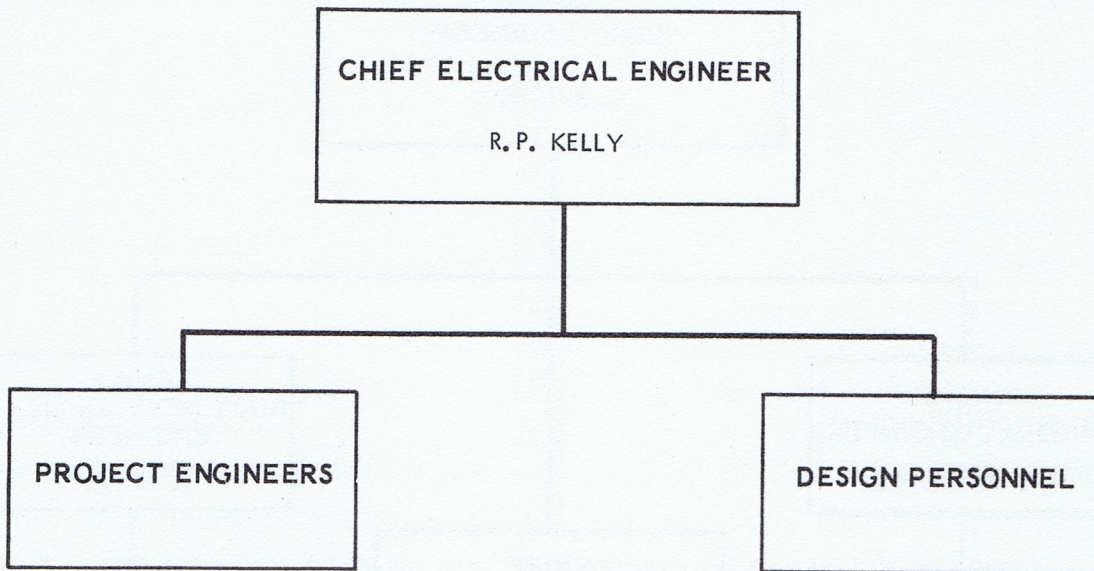
BODY ENGINEERING



SECTION I
PRODUCT ENGINEERING SERVICES

E. PRODUCT ENGINEERING
ORGANIZATIONAL STRUCTURE

ELECTRICAL ENGINEERING



SECTION I
PRODUCT ENGINEERING SERVICES

E. PRODUCT ENGINEERING
PERSONNEL

TECHNICAL STAFF

Each member of this group qualifies, by virtue of education and job experience, to perform all assigned technical duties pertaining to specific phases of automotive development:

Management - Supervision	20
Project Supervisors	4
Development Engineers	6
Project Engineers	20
Experimental Engineers	14
Designers	25
Checkers	10
Draftsmen	38
Specifications Engineers	10
Cost Development Engineers	12
Experimental Technicians	54
Supporting Personnel	35

To enable the evaluation of skills, technical experience and educational background of our engineers, Personnel Achievement Records have been prepared and follow this section. This staff is experienced in all areas of research and vehicle product development. They are qualified to lead and administer a complete development program.

The following consultants are regularly retained to augment the technical staff:

H.C. McCaslin
M. Ordorica
J.H. Nourse

SECTION I
PRODUCT ENGINEERING SERVICES

M-274 A2 P. E. C.

Percentage of Time Available of Directly Assigned Personnel

Title	Available Percentage
Chief Military Engineer	50%
Military Project Engineer	100%
Military Project Engineer	60%
Chief Chassis Engineer	20%
Chief Body Engineer	20%
Chief Electrical Engineer	20%
Chief Chassis Project Engineer	20%
Chassis Project Engineer	20%
Chassis Project Engineer	20%
Chassis Project Engineer	20%
Chief Chassis Draftsman	20%
Engine Design Supervisor	20%
Engine Development Supervisor	20%
Chief Experimental Engineer	20%
Engine Project Engineer	20%
Chassis Project Engineer	20%
Chassis Project Engineer	20%
Design Engineer	30%
Design Engineer	40%
Chief Body Project Engineer	20%
Chief Body Draftsman	20%

SECTION I
PRODUCT ENGINEERING SERVICES

E. PRODUCT ENGINEERING
PERSONNEL

PERSONAL ACHIEVEMENT RECORDS

Vice President Engineering

Member - AUSA
AOA
SAE - Technical Board

PROFESSIONAL EXPERIENCE

17 Years Airplane Research, Development, Design, Engineering and
Manufacture. Administration and Management.

19 Years Automotive Research, Development, Design and Engineering.
Engineering Administration.

EDUCATIONAL BACKGROUND

Aeronautical Engineering, University of Michigan (Graduate)

Administrative Manager
Product Development

Member AUSA

PROFESSIONAL EXPERIENCE

3 Years Production Engineering - Aircraft

8 Years Drafting - Automotive Development

3 Years Supervisor - Product Analysis - Automotive Engineering

7 Years Administrative Manager - Product Development - Automotive
Engineering

EDUCATIONAL BACKGROUND

Architecture and Design, University of Michigan

Project Engineer, Senior, Body Division

PROFESSIONAL EXPERIENCE

2 Years Designed bodies for passenger vehicles.

SECTION I
PRODUCT ENGINEERING SERVICES

**E. PRODUCT ENGINEERING
PERSONNEL**

2 Years	Detail drafting of body sheet metal for passenger and commercial vehicles.
8 Years	Design layout of body sheet metal for armored cars, tanks, passenger and commercial vehicles.
12 Years	Design of body sheet metal, mechanical parts, rubber and plastic parts. Experimented and tested prototype vehicles. Control Supervisor in aircraft industry and Group Leader in buzz bomb hull program.

EDUCATIONAL BACKGROUND

Special Courses: Body sheet metal construction and design layout.

Schools Attended: University of Toledo
Andrew F. Johnson Institute
Valencourt Institute

Junior Project Engineer, Experimental Engineering

PROFESSIONAL EXPERIENCE

4 Years	Supervised processing of cell testing turbine engines, and trailer mounted turbine air compressors.
1 Year	Supervised chemical, physical, and dimensional testing of beryllium and beryllium oxide products.
3 Years	Supervised evaluation of vehicle components including vehicle performance, physical and dimensional testing. Tested, developed, and evaluated commercial vehicle components.

EDUCATIONAL BACKGROUND

Schools Attended: General Motors Institute
University of Toledo
University of Southern Mississippi
Bowling Green State University

Experimental Engineer, Experimental Engineering

SECTION I
PRODUCT ENGINEERING SERVICES

E. PRODUCT ENGINEERING
PERSONNEL

PROFESSIONAL EXPERIENCE

4 Years	Apprenticeship in making of tools and dies.
9 Years	Journeyman Tool and Die Maker
10 Years	Tool Room Supervisor Plastic and Steel Automotive parts
5 Years	Supervisor of building of special manufacturing machines for glass and steel automotive parts.
3 Years	Scheduling and parts procurement for experimental vehicles.

EDUCATIONAL BACKGROUND

Special Courses: Engineering Drawing

Chief Project Engineer, Chassis Engineering

PROFESSIONAL EXPERIENCE

1-1/2 Years	Tool Designer in automotive and military equipment manufacturing. Developed working drawings of jigs, fixtures and special tools.
3-1/2 Years	Supervised technical information and disseminated to field personnel concerning aircraft maintenance equipment and procedures.
1 Year	Supervised design layout and detail drawings for automotive tooling.
6 Years	Design layout of chassis components for all types of proposed vehicle concepts.
4 Years	Designed and developed materials and specifications for working components and assemblies.
6 Years	Supervised vehicle frames, axles, suspensions, brakes, wheels and tires, in regard to production design, development and testing procedures; also liaison with personnel involved with production, tooling, purchasing, and quality control.

EDUCATIONAL BACKGROUND

Special Courses: Mechanical Engineering (Graduate)
Maintenance Engineering (Graduate)

SECTION I
PRODUCT ENGINEERING SERVICES

**E. PRODUCT ENGINEERING
PERSONNEL**

Schools Attended: Yale University
University of Toledo

Chief Project Engineer, Body Engineering

PROFESSIONAL EXPERIENCE

22 Years	Design, layout, and detail of Automotive Bodies
3 Years	Experimental Department - Body Project Engineer
14 Years	Chief Project Engineer - Assists the Chief Body Engineer in out-lining and planning the engineering projects, new designs, assignments to the engineering staff and any special engineering requests or projects which may be made by the corporation management.

EDUCATIONAL BACKGROUND

Special Courses: Mechanical Engineer (Graduate)
Automotive Design

Schools Attended: Dewitt Clinton, New York, N. Y.
Chrysler Institute of Engineering, Detroit, Michigan
Edgard C. DeSmet
University of Toledo

Project Engineer, Experimental Engineering

PROFESSIONAL EXPERIENCE

2 Years	Supervision of Heat Treating Department
3 Years	Engine Tool Engineering and Engine Manufacture
2 Years	Senior Tool Engineer in the manufacture of truck and utility engines.
2 Years	Product Division Manager including quality control, body and chassis engineering, research and development, specifications and records.
4 Years	Built and tested new vehicles and initiated changes in production.

SECTION I
PRODUCT ENGINEERING SERVICES

E. PRODUCT ENGINEERING
PERSONNEL

EDUCATIONAL BACKGROUND

Special Courses: Mechanical Engineer (Graduate)

Schools Attended: Michigan College of Mining & Technology, Houghton, Michigan

Engine Engineer, Experimental Engineering

PROFESSIONAL EXPERIENCE

3 Years	Disassemble, inspected, reconditioned and rebuilt aircraft engines.
4 Years	Engineering Staff of R975 Tank Engine Program. Liaison engineering work between Army installations, Fort Knox, Ky., Aberdeen Proving Ground, and tank manufacturing facilities.
2 Years	Senior Project Engineer - Automotive experimental and development of engines.
17 Years	Assistant Chief Engineer in engine development, dynamometer testing and engine build-up.

EDUCATIONAL BACKGROUND

Special Courses: Advanced Mathematics.
Aircraft engine design, overhaul and maintenance.
Obtained aircraft engine license and instructor's license for CAA aircraft engines.
Mechanical Drawing and Advanced Mathematics.
Courses in Public Speaking - Two Semesters.

Schools Attended: Aero Technical Institute
College of Applied Science, University of Kentucky

Project Engineer, Experimental Engineering

Member - S. A. E.
(S. A. E. Member Barrier
Impact & Roll-Over
Subcommittee)

PROFESSIONAL EXPERIENCE

2 Years	Development and testing of automatic transmission components.
8 Years	Experimental vehicle testing and build-up.

SECTION I
PRODUCT ENGINEERING SERVICES

**E. PRODUCT ENGINEERING
PERSONNEL**

EDUCATIONAL BACKGROUND

Special Courses: Graduate Mechanical Engineer
Marketing and Management

Schools Attended: University of Michigan
University of Toledo

Assistant Manager, Experimental Engineering

PROFESSIONAL EXPERIENCE

1 Year	Assisted instructors in Motor Lab (Internal combustion and diesel), Pattern Shop, and Machine Shop
1 Year	Worked as apprentice in Die Shop, Welding, Tool and Plant Engineering Departments
2 Years	Process Engineer. Coordination of F4-U4 and Buzz Bomb
10 Years	Engineering Specifications and Cost Estimating
7 Years	Automotive prototype testing and procurement including super- vision of all phases of prototype procurement

EDUCATIONAL BACKGROUND

Special Courses: Tool Engineering
Chemical Engineering

Schools Attended: General Motors Institute, Flint, Michigan
University of Toledo

Chief Body Development Engineering

PROFESSIONAL EXPERIENCE

7 Years	Automotive Body General Drafting
8 Years	Aircraft Structure Drafting

SECTION I
PRODUCT ENGINEERING SERVICES

E. PRODUCT ENGINEERING
PERSONNEL

7 Years	Automobile Body Structure Designer
7 Years	Body Designer

SCHOOLS ATTENDED

Chrysler School of Engineering (Graduate)
DeSmet School of Planography (Graduate)

Experimental Engineer, Experimental Engineering

Member, S. A. E.
A. U. S. A.

PROFESSIONAL EXPERIENCE

19 Years	Developed course content for instruction in airplane, engine and automobile maintenance and service; also for instruction in the essentials of aeronautical engineering.
1 Year	Supervised testing, development and production of a two-place dive bomber and two-place observation plane for U. S. Air Force. Responsible for content of maintenance and overhaul manuals.
1 Year	Supervised testing, development, and prototype of a 24-cylinder H-type liquid-cooled internal combustion (gasoline) engine for the U. S. Navy. Responsible for preparation of all maintenance and overhaul manuals.
21 Years	Participated in various military vehicle programs, mainly in the test and development phases. Supervised staff engineers working on M-151 and M-274 liaison work for production contracts.

EDUCATIONAL BACKGROUND

Special Courses: Aeronautical Engineering (Graduate) (B. S.)
Industrial Engineering (Graduate) (M. S.)

Schools Attended: Massachusetts Institute of Technology
Ohio State University

Administrative Engineer

Member - A. U. S. A.
S. A. E.

PROFESSIONAL EXPERIENCE

2 Years	Architectural Designer and Draftsman.
---------	---------------------------------------

SECTION I
PRODUCT ENGINEERING SERVICES

**E. PRODUCT ENGINEERING
PERSONNEL**

2 Years	Marine mechanical drafting.
3 Years	Supervisor Engineering Specifications - Marine Engineering
4 Years	Engineering Supervisor - automotive engineering administration.
2 Years	Administrative Engineering - aircraft engineering.
12 Years	Administrative Engineering - automotive engineering.

EDUCATIONAL BACKGROUND

Courses: Mechanical Engineering and Administration

School: University of Washington

Project Engineer, Body Engineering

PROFESSIONAL EXPERIENCE

9 Years	Designed machine parts
1 Year	Detailer of aircraft drawings
11 Years	Checker of automotive body drawings
8 Years	Project engineer concerned with automotive bodies and components, ordnance drawings and special conversion of standard vehicles

EDUCATIONAL BACKGROUND

Special Course: Tool Engineering

Schools Attended: University of Toledo

Member - A. U. S. A.

Manager, Experimental Engineering

PROFESSIONAL EXPERIENCE

6 Years	Responsible for coordination and Government contract compliance.
---------	--

SECTION I
PRODUCT ENGINEERING SERVICES

**E. PRODUCT ENGINEERING
PERSONNEL**

4 Years	Direct supervision of ship yard personnel and coordination of sub-contractors.
7 Years	Production of automobiles and airplanes in various supervisory capacities.
11 Years	Responsible for design tryout and test of products of engineering programs, military as well as civilian. This includes organizing, scheduling and executing of prototype build and test programs. Also supervision engineers and technicians to accomplish these programs.

EDUCATIONAL BACKGROUND

Special Courses: Civil Engineering (Graduate)
General Business (Graduate)

Schools Attended: Washington State College

Project Engineer, Automotive Body

PROFESSIONAL EXPERIENCE

19 Years	Supervisor - Model Design Department. Responsible for designing of glass molds and machine parts.
22 Years	Project Engineer and Coordinator in charge of Body Engineering Drafting Room

EDUCATIONAL BACKGROUND

Special Course: Tool Engineering

Project Engineer, Chassis Engineering

PROFESSIONAL EXPERIENCE

3 Years	Technical Writer - Contract Reports
---------	-------------------------------------

SECTION I
PRODUCT ENGINEERING SERVICES

**E. PRODUCT ENGINEERING
PERSONNEL**

1 Year	Quality Control and Test Equipment Design
3 Years	Project Engineer - special vehicle equipment and Military Vehicles

EDUCATIONAL BACKGROUND

Special Courses: Mechanical Engineering (Graduate)
General Business

Schools Attended: University of Toledo

Project Engineer, Chassis Engineering

PROFESSIONAL EXPERIENCE

8 Years	Designed power tools
5 Years	Designed special vehicles and equipment. Responsible for engineering liaison and coordination with Government Agencies in production of the M-151 Vehicle.

EDUCATIONAL BACKGROUND

Special Courses: Mechanical Engineering (Graduate)

School Attended: University of Toledo

Member, S. A. E.

Product Analyst,
Administrative Engineering

PROFESSIONAL EXPERIENCE

3 Years	Design, Layout & Detailing of Jigs, Fixtures, & Machine Parts.
4 Years	Supervision of Engineering Drafting, surveying, and permanent construction sub-sections of Air Base Engineering Section.
2 Years	Directly concerned with layout drawings of presses, molds, and related equipment.

SECTION I PRODUCT ENGINEERING SERVICES

E. PRODUCT ENGINEERING PERSONNEL

1 Year	Production Supervisor
--------	-----------------------

6 Years Product Analyst and Coordinator in Engineering Management.

EDUCATIONAL BACKGROUND

Special Courses: Psychology with emphasis on Human Engineering, Physics, & Mathematics.

School Attended: University of Toledo

Chief Electrical Engineer,
Electrical Engineering

Member S. A. E.
S. A. E. Electrical
Equip. Comm.
A. U. S. A.

PROFESSIONAL EXPERIENCE

13 Years Supervision - Automotive Radio & Electronic Equipment, Field service and sales

5 Years Development and application of radio communications equipment in combat vehicles and radio interference devices for combat vehicles. Development of instrumentation for measurement or radio interference levels.

18 Years Production design and development of electrical, electronic systems and accessories required for domestic, military, and export vehicles. Design and development of tactical radio suppression and deep water fording.

EDUCATIONAL BACKGROUND

Special Courses: Electrical Engineering

Project Engineer, Body Engineering

PROFESSIONAL EXPERIENCE

8 Years Layout and Detailing - body work.

SECTION I
PRODUCT ENGINEERING SERVICES

**E. PRODUCT ENGINEERING
PERSONNEL**

1 Year	Design leader for layout and design of body structural components.
2 Years	Layout and develop master body surface from clay models for commercial vehicles.
3 Years	Design, development and coordination of Body Engineering projects.

EDUCATIONAL BACKGROUND

Special Courses: Body Sheet Metal and Design Layout.

Schools Attended: Ford Motor Institute, Detroit, Michigan
Edgard C. DeSmet

Member - AUSA

Manager, Engineering Specifications

PROFESSIONAL EXPERIENCE

1 Year	Machine operator in Engineering Reproduction Department.
3 Years	X-Ray Technician and Photographic Laboratory Technician.
8 Years	Specification Writer in Engineering Department processing body and chassis experimental and production releases.
4 Years	Chassis Specification Supervisor in charge of Chassis Release Group.
2 Years	Supervisor of Product Analysis Department.
4 Years	Manager of Engineering Specifications Department. Responsible for the body, chassis, special vehicle and military releases.

SECTION I
PRODUCT ENGINEERING SERVICES

E. PRODUCT ENGINEERING
PERSONNEL

Member - AOA

Assistant to Vice-President of Engineering

PROFESSIONAL EXPERIENCE

8 Years	Chief Truck Chassis Engineer
2 Years	Project Engineer, Automotive chassis components
9 Years	Experimental Engineer - Automotive Development
3 Years	Designer & Research Assistant - Automotive Body

EDUCATIONAL BACKGROUND

Special Course: Mechanical Engineering (Graduate)

School: Purdue University

Project Engineer, Chassis Engineering

PROFESSIONAL EXPERIENCE

2 Years	Development Engineer - Specialized Automotive Equipment
5 Years	Special Equipment Project Engineer in the Chassis Engineering Department.

EDUCATIONAL BACKGROUND

Special Courses: Mechanical Engineering (Graduate)

School Attended: University of Toledo

**SECTION I
PRODUCT ENGINEERING SERVICES**

**E. PRODUCT ENGINEERING
PERSONNEL**

Development Engineer
Engines & Chassis
Chassis Engineering

Member S. A. E .

PROFESSIONAL EXPERIENCE

3 Years	Aircraft technical administration in charge of aircraft maintenance, repair, inspection, testing, etc.
7 Years	Designed engines, chassis, and various chassis components, assembled and tested prototypes.
3 Years	Designed gas turbines
3 Years	Supervised and designed advanced power packages.
6 Years	Developed air-cooled aluminum engines and water-cooled overhead camshaft engine.

EDUCATIONAL BACKGROUND

Special Courses: Mechanical & Aeronautical Engineering (Graduate)
Special Management Training

Schools Attended: Kingston Technical College, England
Ford Motor Institute

Project Engineer,
Chassis Engineering

Member = Tau Beta Pi
Phi Kappa Phi
Pi Mu Epsilon
Reg'd Professional Engr

PROFESSIONAL EXPERIENCE

2 Years	Design and development of aircraft and aircraft components.
20 Years	Designed, developed, product engineered chassis and chassis components.

EDUCATIONAL BACKGROUND

Special Course: Mechanical Engineering (Graduate)

School Attended: University of Toledo

SECTION I
PRODUCT ENGINEERING SERVICES

E. PRODUCT ENGINEERING
PERSONNEL

Chief Body Engineer,
Body Engineering

Member S. A. E.
A. U. S. A.

PROFESSIONAL EXPERIENCE

5 Years	Layout and detailing of automotive body and aircraft.
6 Years	Designer-Automotive body including numerous Military Vehicles
12 Years	Chief Engineer - Automotive Body Work

EDUCATIONAL BACKGROUND

Special Courses: Mechanical Engineering
Mathematics
Surface Development - Planography

Schools Attended: Lawrence Institute of Technology, Allen Park, Michigan
University of Detroit, Detroit, Michigan
Edgard C. DeSmet

Project Supervisor Body

PROFESSIONAL EXPERIENCE

3 Years	Aircraft Structure Drafting
4 Years	Automotive Body Drafting
12 Years	Automotive Body Design
10 Years	Advance Body Concept and Structure Design

EDUCATIONAL BACKGROUND

Special Course: Body Surface Development (Graduate)

School Attended: Edgard C. DeSmet

SECTION VI
FACILITIES AND PERSONNEL

E. PRODUCT ENGINEERING
PERSONNEL

Member S. A. E.

Project Engineer,
Chassis Engineering

PROFESSIONAL EXPERIENCE

6 Years	Layout and detailing of engine and mechanical components.
6 Years	Designing conventional and die-cast overhead valve engines.
10 Years	Engineer and supervise all production and experimental engine releases and changes.

EDUCATIONAL BACKGROUND

Special Course: Mechanical Engineering

School Attended: University of Michigan

Consultant

Member S. A. E.
Tau Beta Pi
Phi Beta Kappa
A. O. A.
A. U. S. A.

PROFESSIONAL EXPERIENCE

14 Years	Assistant Superintendent in manufacturing and production of heavy duty trucks.
7 Years	Chief Quality Engineer for military and civilian vehicles.
1 Year	Technical Consultant - Abroad.
12 Years	Chief Chassis Engineer covering product design of complete chassis for production of military and commercial products.

EDUCATIONAL BACKGROUND

Special Course: Mechanical Engineering (Graduate)

School Attended: Rutgers University

SECTION VI
FACILITIES AND PERSONNEL

E. PRODUCT ENGINEERING
PERSONNEL

Project Engineer,
Electrical Engineering

PROFESSIONAL EXPERIENCE

2 Years	Stress Analyst for turbine blades and turbine wheels of jet engines.
8 Years	Engineering and Development work in electronics associated with aircraft communications and missile guidance.
9 Years	Project Engineer - missile guidance systems and non-metallic mine detectors.
2 Years	Project Engineer - Development of automotive electrical and electronic components.

EDUCATIONAL BACKGROUND

Special Courses: Electrical Engineering (Graduate)
 Communications

Schools Attended: DeSales College
 University of Toledo

Chief Draftsman,
Chassis Engineering

Member S. A. E.

PROFESSIONAL EXPERIENCE

4 Years	Detailer - Automotive components
4 Years	Layout and checking of all airplane components
19 Years	Layout checker, chief checker, assistant to chief draftsman, and chief draftsman.

SECTION I
PRODUCT ENGINEERING SERVICES

**E. PRODUCT ENGINEERING
PERSONNEL**

EDUCATIONAL BACKGROUND

Special Courses: Special Courses: Mechanical Engineering

Schools Attended: University of Wisconsin
Washington University, St. Louis, Missouri

Chief Military Engineer

Member S. A. E.
A. O. A.
A. U. S. A.

PROFESSIONAL EXPERIENCE

1 Years	Supervised and conceived testing operations of vehicles for evaluating performance, ride, cooling, braking and handling characteristics.
5 Years	Supervised staff of experimental test engineers in originating and conducting all types of vehicle and power plant test programs relative to evaluation of experimental vehicle designs.
7 Years	Developed, inspected, and evaluated special equipment items such as winches, compressors, welders, snow plows, and generator installations on vehicles.
3 Years	Supervised and conceived special vehicle designs, and acted as Sales Engineer.
1 Year	Supervised staff engineers working on M-151 and M274A1 liaison work for production contracts. Supervised development of Cerlist Diesel Forward Control Truck for the USMC.

EDUCATIONAL BACKGROUND

Special Courses: Mechanical Engineering (Graduate)

Schools Attended: University of Toledo
Mississippi State College

SECTION I
PRODUCT ENGINEERING SERVICES

E. PRODUCT ENGINEERING
PERSONNEL

Chief Experimental Engineer,
Experimental Engineering

Member S. A. E.
A. U. S. A.

PROFESSIONAL EXPERIENCE

10 Years	Development Engineer - Automotive Suspension and steering systems
8 Years	Supervised testing, evaluation, and development of special vehicles, XM-443E-1 and M-274, as well as production vehicles.

EDUCATIONAL BACKGROUND

Special Courses:	Marine Engineering (Graduate)
Schools Attended:	University of Wisconsin United States Merchant Marine Academy

Experimental Engineer,
Experimental Engineering

Member S. A. E.

PROFESSIONAL EXPERIENCE

8 Years	Laboratory test work.
8 Years	Electrical maintenance, construction, experimental dynamometer operator and cold room operator.
3 Years	Dynamometer operator and group leader of dynamometer section. Supervised training dynamometer personnel.
20 Years	Supervisor engine testing, mechanical component testing, and complete vehicle testing.

EDUCATIONAL BACKGROUND

Special Courses:	Electrical Engineering
School Attended:	University of Toledo

SECTION I
PRODUCT ENGINEERING SERVICES

E. PRODUCT ENGINEERING
PERSONNEL

Assistant Director, Central Estimating

PROFESSIONAL EXPERIENCE

10 Years	Apprentice tool and diemaker.
3 Years	Solved production problems between the press, body and machine divisions as they related to production assembly.
14 Years	Handled production problems between the press, body and machine divisions as they related to production assembly. government vehicle and spare part bids. Handling the evaluation of whether parts are to be made or purchased and special projects. Also coordinated with engineering, purchasing, manufacturing and master mechanics divisions.

EDUCATIONAL BACKGROUND

Special Courses:	General Business
Schools Attended:	Wayne University

Project Engineer, Chassis Engineering

PROFESSIONAL EXPERIENCE

4 Years	Dynamometer Engineer
1 Year	Foreman Dynamometer Laboratory
2 Years	Chassis Experimental Engineer
1 Year	Equipment Engineer
6 Years	Military Liaison Engineer
4 Years	Military Project Engineer

EDUCATIONAL BACKGROUND

Special Courses:	Mechanical Engineering (Graduate)
------------------	-------------------------------------

SECTION I
PRODUCT ENGINEERING SERVICES

E. PRODUCT ENGINEERING
PERSONNEL

Schools Attended: University Of Notre Dame
University of Detroit
DeSales College
University of Toledo

Member S. A. E.

Experimental Engineer,
Experimental Engineering

PROFESSIONAL EXPERIENCE

4 Years	Engineering Department, flying as flight test mechanic and later in charge of aircraft check crews.
6 Years	Performance of general factory maintenance
5 Years	Development of air-cooled engines for aircraft, power units and vehicles
7 Years	Experimental Engineer covering various military vehicles as the M-274, M-274A-1, XM-443E-1, M151, M38A-1 and others.

EDUCATIONAL BACKGROUND

Special Courses: Advanced Hydraulics

Schools Attended: Advanced Mechanic Institute, Chicago, Ill.
Curtiss-Wright Aircraft Institute, Columbus, Ohio

Member S. A. E.

Research Foreman,
Experimental Engineering

PROFESSIONAL EXPERIENCE

4 Years	Conveyor and set-up man on machine tools
11 Years	Research and experimental - Dynamometer Engineer
8 Years	Foreman of dynamometer test cells, engine buildup, mileage, and test drivers.

SECTION I
PRODUCT ENGINEERING SERVICES

**E. PRODUCT ENGINEERING
PERSONNEL**

EDUCATIONAL BACKGROUND

Special Courses: Mechanical Drawing
 Machine Shop
 Mathematics

Estimator, Central Estimating

PROFESSIONAL EXPERIENCE

2 Years	Supervised, analyzed, and prepared cost estimates on vehicles and vehicle components, engineering projects, engineering changes, government bids, and special projects.
11 Years	Organized and operated Central Estimating and Administrative Service Departments.

EDUCATIONAL BACKGROUND

Special Courses: Mathematics (Graduate)

Schools Attended: Arizona State College

Trim Engineer,
Body Engineering

PROFESSIONAL EXPERIENCE

1 Year	Processed engineering releases including Navy Contracts. Revised bills of materials.
3 Years	Serviceman and Service Instructor on Radar Equipment

SECTION I
PRODUCT ENGINEERING SERVICES

E. PRODUCT ENGINEERING
PERSONNEL

1 Year Worked in Specifications Department processing engineering change notices. Supervised department processing all body department's releases and changes.

7 Years Trim Engineer - Commercial & Military Vehicles

EDUCATIONAL BACKGROUND

Special Course: Mechanical Drafting

School Attended: University of Toledo

Member S. A. E.

Project Engineer,
Experimental Engineering

PROFESSIONAL EXPERIENCE

2 Years Conducting and reporting experimental tests on diesel engines, after completing a training program covering engine build-up and dynamometer operation.

3 Years Engineering Officer on two diesel propelled ships. Responsible for operation and maintenance of mechanical equipment.

18 Years Project Engineer covering development of military and commercial engines and vehicle components.

EDUCATIONAL BACKGROUND

Special Courses: Mechanical Engineering (Graduate)

Schools Attended: University of Notre Dame

Member A. U. S. A.

Director, Central Estimating

PROFESSIONAL EXPERIENCE

8 Years Die Setter and Supervisor in sheet metal division.

7 Years Tool Engineer

21 Years Directed Central Estimating Department

SECTION I
PRODUCT ENGINEERING SERVICES

**E. PRODUCT ENGINEERING
PERSONNEL**

EDUCATIONAL BACKGROUND

Special Courses: General Business
Schools Attended: St. John's College, Toledo, Ohio

Project Engineer, Chassis Engineering

PROFESSIONAL EXPERIENCE

1 Year	Detail drafting
2 Years	Ordinance automotive field.
1 Year	Detail and layout drafting on truck transmissions.
13 Years	Detail and layout drafting of commercial vehicles and components.

EDUCATIONAL BACKGROUND

Special Courses: Mechanical Engineering
Schools Attended: University of Toledo

Chief Chassis Engineer
Chassis Engineering

Past Chairman S.A.E.
Member - TAU Beta Pi
Sigma Xi
PHi Kappa PHi
A.O.A.
A.U.S.A.

PROFESSIONAL EXPERIENCE

1 Year	Production Superintendant covering automotive chassis components.
1 Year	Section Manager covering design of control mechanism for control of atomic power plants.

SECTION I
PRODUCT ENGINEERING SERVICES

**E. PRODUCT ENGINEERING
PERSONNEL**

14 Years	Project Engineer covering automotive testing and development of chassis and chassis components.
10 Years	Chief Engineer covering design, testing, and developement of automotive chassis and components.

EDUCATIONAL BACKGROUND

Special Courses:	Mechanical Engineering (B.S.M.E.) Automotive Engineering - (Master's Degree)
Schools Attended:	University of Michigan Chrysler Institute Graduate School

SECTION I
PRODUCT ENGINEERING SERVICES

EXHIBIT 1

FRONT WHEEL BEARING FOR ARMY WHEEL

TECHNICAL PROPOSAL

SAMPLE -15378

Calculations for Collapsible Spacer

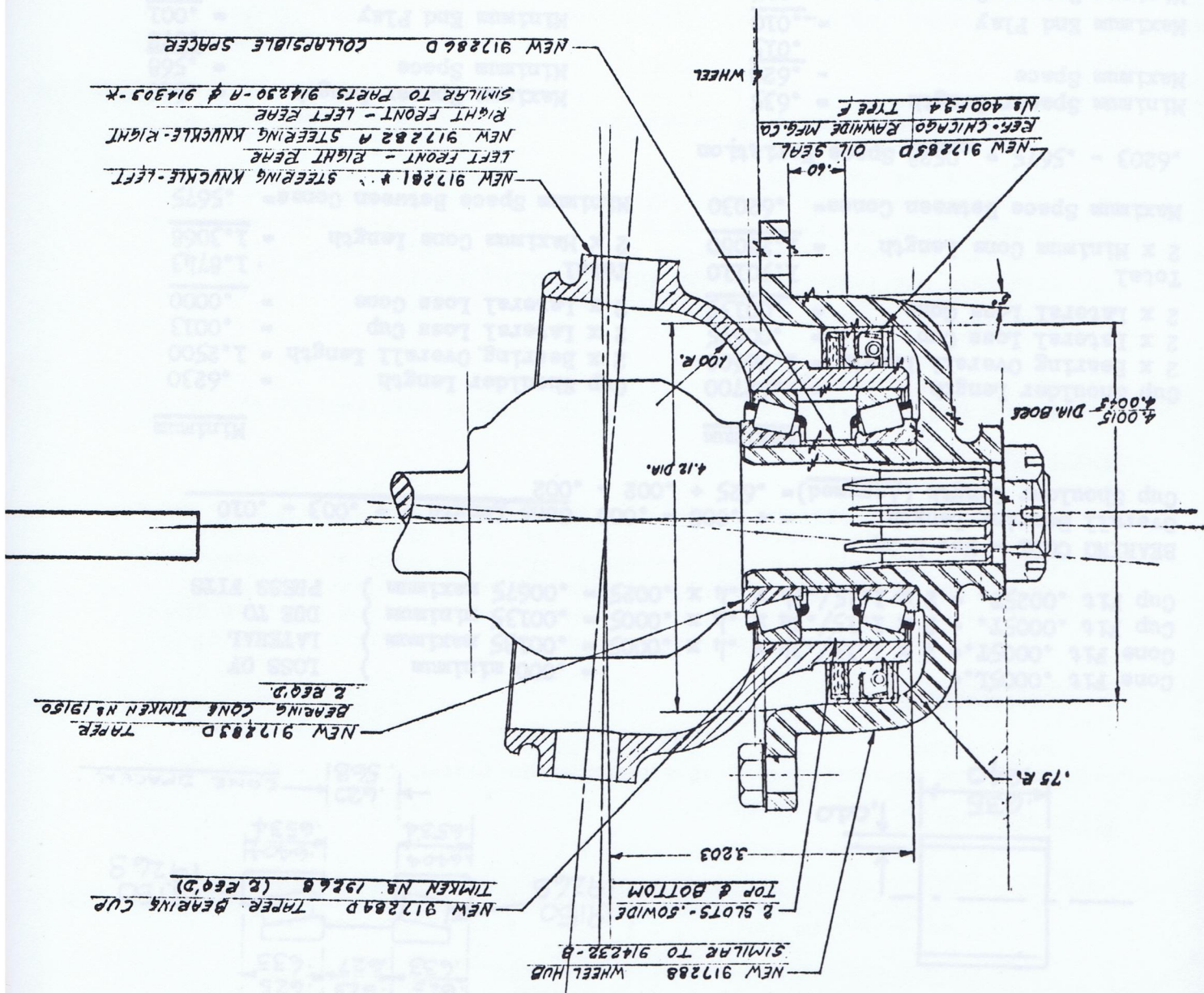
FUTURE DEVELOPMENT

PART NUMBER		NAME		REV		DATE	
L-15578		WHEEL BEARINGS		N-27A			
SCALE		CHECKS		BY		DATE	
FULL		CH. 0.175		NEDMAN		5/15/57	
		MATERIAL		NAME		DATE	
		Q&A		NEDMAN		5/15/57	
		Q&A		NEDMAN		5/15/57	

ALLOWABLE TOLERANCES ON ALL DIMENSIONS
 UNLESS OTHERWISE SPECIFIED ± .01
 CAST OR FORGED OUTLINE DIMENSIONS ± .03
 SHEET METAL PARTS
 ANGLES ± 0° 30'

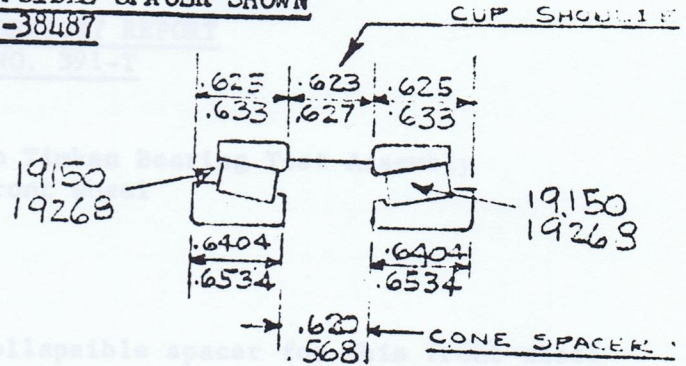
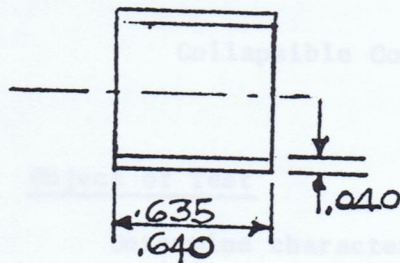
THIS DRAWING IS THE PROPERTY OF WILLYS MOTORS, INC.
 AND MUST BE RETURNED UPON REQUEST. THIS PART MUST
 NOT BE LOANED TO ANY OTHER CONCERN.

NOTE 1:-
 FOR FURTHER INFORMATION SEE
 TIMKEN ROLLER BEARING CO. DRAWING B-30407-A



April 8, 1957

LYS MOTORS INC., TOLEDO, OHIO
 FRONT WHEEL FOR "ARMY MULE"
 CALCULATIONS FOR COLLAPSIBLE SPACER SHOWN
 ON LAYOUT B-38487



Cone Fit .0005L. = .000 minimum) LOSS OF
 Cone Fit .0005T. = 2 x 1.15/.34 x .4 x .0005 = .00135 maximum) LATERAL
 Cup Fit .0005T. = 2 x 1.15/.34 x .4 x .0005 = .00135 minimum) DUE TO
 Cup Fit .0025T. = 2 x 1.15/.34 x .4 x .0025 = .00675 maximum) PRESS FITS

BEARING CODE - No. 4-24

Overall Bearing Length = + .008 - .000 Cone Length = + .003 - .010

Cup Shoulder Length (Assumed) = .625 + .002 - .002

	Maximum		Minimum
Cup Shoulder Length	= .62700	Cup Shoulder Length	= .6230
2 x Bearing Overall Length	= 1.26600	2 x Bearing Overall Length	= 1.2500
2 x Lateral Loss Cup	= .00675	2 x Lateral Loss Cup	= .0013
2 x Lateral Loss Cone	= .00135	2 x Lateral Loss Cone	= .0000
Total	1.90110	Total	1.8743
2 x Minimum Cone Length	= 1.28080	2 x Maximum Cone Length	= 1.3068
Maximum Space Between Cones	= .62030	Minimum Space Between Cones	= .5675

.6203 - .5675 = .0528 Space Variation

Minimum Spacer Length	= .635	Maximum Spacer Length	= .640
Maximum Space	= .620	Minimum Space	= .568
	.015		.072
Maximum End Play	= .010	Minimum End Play	= .001
Minimum Spacer Compression	= .005	Maximum Spacer Compression	= .071

COLLAPSIBLE SPACER SPECIFICATIONS

Material - S.A.E. 1020 Steel Tubing. Ends of spacer must be parallel and square with I.D. within .005 total indicator reading. Bearing set up .001 to .010 end play.

April 25, 1957

PHYSICAL LABORATORY REPORT
ON TEST NO. 391-T

Collapsible Cone Spacer for a Timken Bearing Test Assembly
in the Front Wheel

Object of Test

Determine characteristics of a collapsible spacer for this front wheel application.

Material Tested

A 5208 ball bearing is currently being used in the front wheels of the Army Mule, which is a light 4 x 4 truck. Consideration is being given to use two Timken No. 19150-19268 bearings with a collapsible cone spacer in this application. (Assembly shown on print No. B-38487-A.) Spacer compression with this assembly can range from .005" to .071". The spacer I.D. will be 1.505" to 1.510" and the length .635" to .640".

Spacer Tested

A soft SAE 1020 steel spacer with a .040" thick wall section was made up for this investigation.

Method of Test

This test was conducted on the Olsen Testing Machine. The spacer was subjected to axial load between two cones on a test shaft. The top cone, on which load was applied, was a loose fit so that the load imposed on the spacer would not be affected by frictional resistance between the cone bore and the shaft.

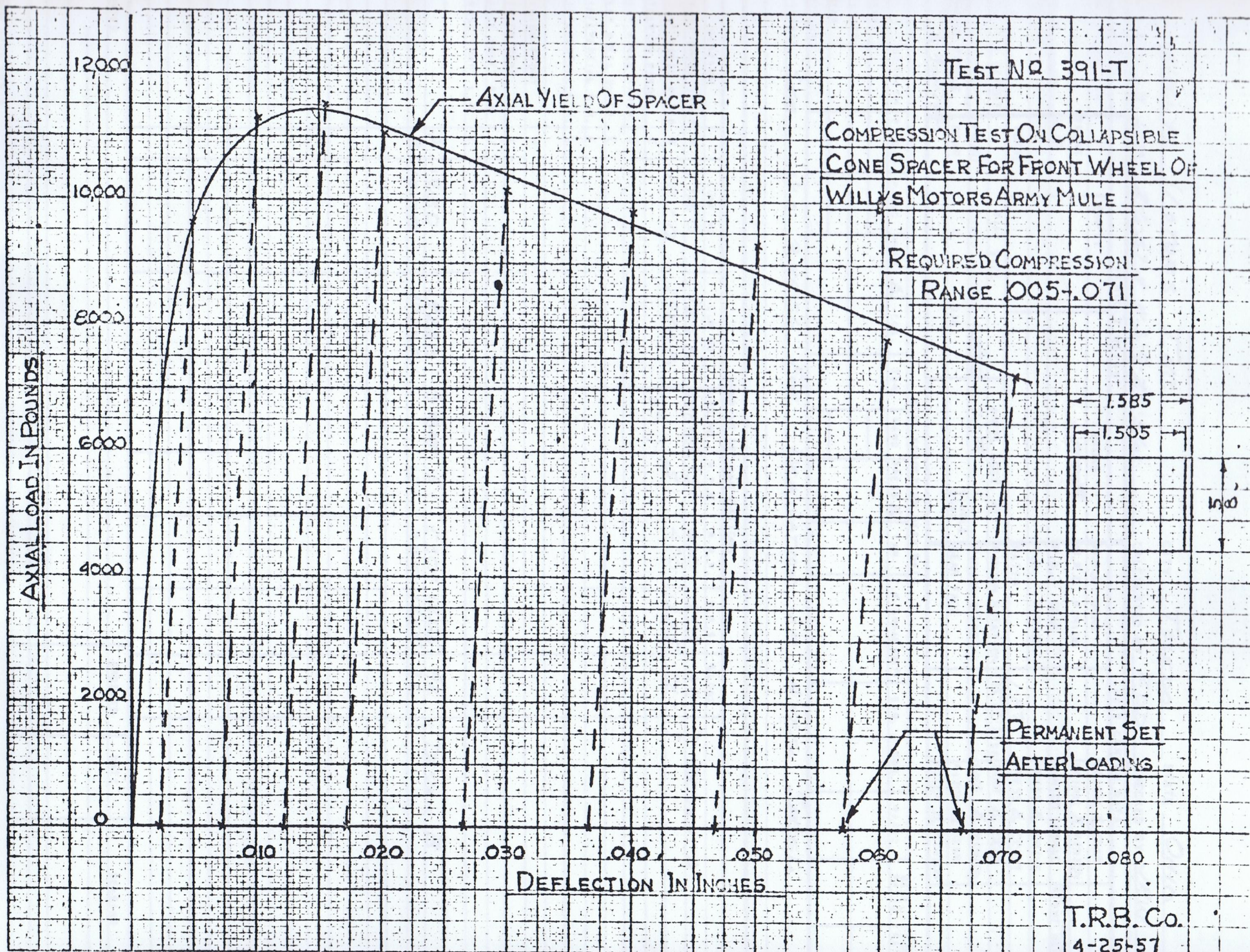
Dial indicators were used to measure the deflection and permanent sets.

Results of Test

The attached chart No. 391-T shows the deflection and set of this spacer.

Conclusion

It is believed that a spacer with a wall section of approximately .040" (as tested) should be satisfactory for this application. The deflections on the attached chart show they may be obtained with loads of approximately 7200 to 11500 pounds. The elastic compression is .0035" to .004" (8000 to 9000 pounds). This is considered satisfactory.



WILLYS MOTORS INC.

CITY TOLEDO STATE OHIO

DATA BY J. L. B. LTR. 2-6-57 & W. S. 9-26-56.

CALCULATED BY R.D.D. CHECKED BY JRW

TYPE		VEHICLE WEIGHT			AXLE CENTER DATA			
PASSENGER CAR		EMPTY		GROSS	M.P.D. GEAR		SPIRAL $\frac{1}{4}$ GEAR	
BUS	FRONT			875 [#]	M.P.D. PINION		SPIRAL $\frac{1}{4}$ PINION	
TRUCK	REAR				P.D. GEAR		PINION SPIRAL	LEFT HAND RIGHT HAND
TRAILER					P.D. PINION		PRESS $\frac{1}{4}$ DRIVE	
	TOTAL				RATIO	1.87	PRESS $\frac{1}{4}$ COAST	
TRACTIVE EFFORT	TIRE SIZE		WHEEL ASSY. WT.		PINION ROTATION	CLOCKWISE CTR.CL.WISE	ROOT $\frac{1}{4}$ GEAR	
	FRONT	X	0.01A. 23.0	70 [#]	PINION OFFSET		FACE $\frac{1}{4}$ PINION	
ENGINE TORQUE	REAR	X	0.01A.	SINGLE DUAL	GEAR FACE		PITCH $\frac{1}{4}$ GEAR	
27 [#] @ 3000 RPM							PITCH $\frac{1}{4}$ PINION	

[illegible]

REMARKS	SEE LOG 7-26-56 FOR DERIVATION OF WHEEL SPEED
---------	---

BEARING RECOMMENDATIONS							
LOCATION	CONF. NO.	CUP NO.	DWG. NO.	R.P.M.	R.R.P.	B.R.R.	% LOAD
FRONT WHEEL INNER	A	19150	19268	338486	151	600	1255 48
FRONT WHEEL OUTER	B	19150	19268	151	400	1255	32
STEERING PIVOT	C		(57-1)				
REAR WHEEL INNER	D						
REAR WHEEL OUTER	E						
DIFFERENTIAL R.H.	F						
DIFFERENTIAL L.H.	G						
PINION FRONT	H						
PINION REAR	I						
CROSS SHAFT R.H.	J						
CROSS SHAFT L.H.	K						
	A	19150	19268	338486	151	530	1255 42
	B	19150	19268	151	325	1255	26

NOTES

ORDERED

DATE _____

BEARING

FIRM Wiley's Motors Inc.

FRONT WHEEL FOR

MODEL ARMY "MULE"

SPIRAL ANGLE PIN. (ϕ_P)	SIN. =	COS. =	SPIRAL ANGLE GEAR (ϕ_G)	SIN. =	COS. =
PRESSURE ANGLE DRIVE (ϕ)	TAN. =		PRESSURE ANGLE COAST (ϕ_c)	TAN. =	
PITCH OR FACE ANGLE PIN. (γ_P)	SIN. =	COS. =	PITCH OR ROOT ANGLE GEAR (γ_G)	SIN. =	COS. =

WHEEL SPEED = $3000 / (1.71 \times 2.83 \times 1.87 \times 2.2) = 151 \text{ R.P.M.}$ $S.F. = 1.432$ $A.F. = 1.5$

LOAD PER HUB = $875/2 - 70 = 368^*$

DESIGN A

$R_A = 368 \times 1.25/80 = 575^*$ $R_B = 575 - 368 = 207^*$

$R_{EA} = R_A = 575^*$

$R_{EB} = .53 \times 207 + .47 \times 575 \times 1.15/1.15 = 380^*$

$R_{RRA} = 575 \times 1.5/1.432 = 600^*$

$R_{RRB} = 380 \times 1.5/1.432 = 400^*$

DESIGN B

$R_A = 368 \times 1.57/1.15 = 505^*$ $R_B = 505 - 368 = 137^*$

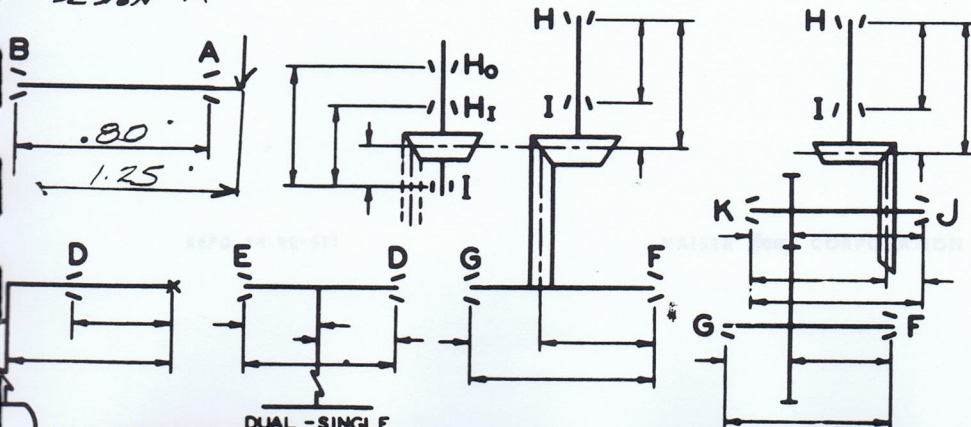
$R_{EA} = R_A = 505^*$

$R_{EB} = .53 \times 137 + .47 \times 505 \times 1.15/1.15 = 310^*$

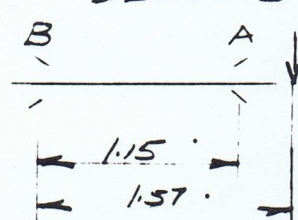
$R_{RRA} = 505 \times 1.5/1.432 = 530^*$

$R_{RRB} = 310 \times 1.5/1.432 = 325^*$

DESIGN A



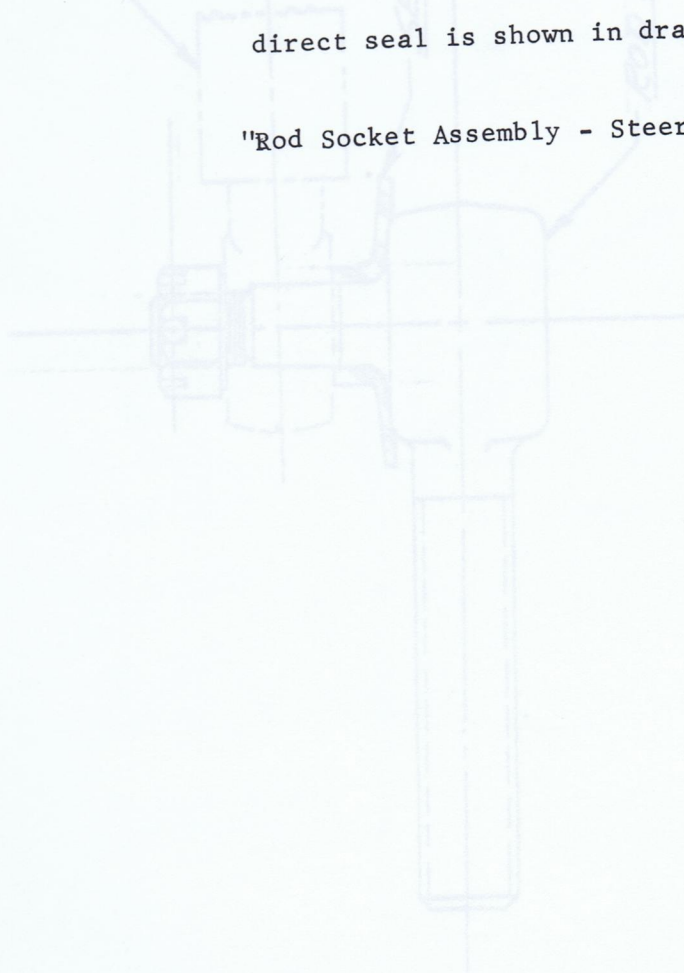
DESIGN B



SECTION I
PRODUCT ENGINEERING SERVICES

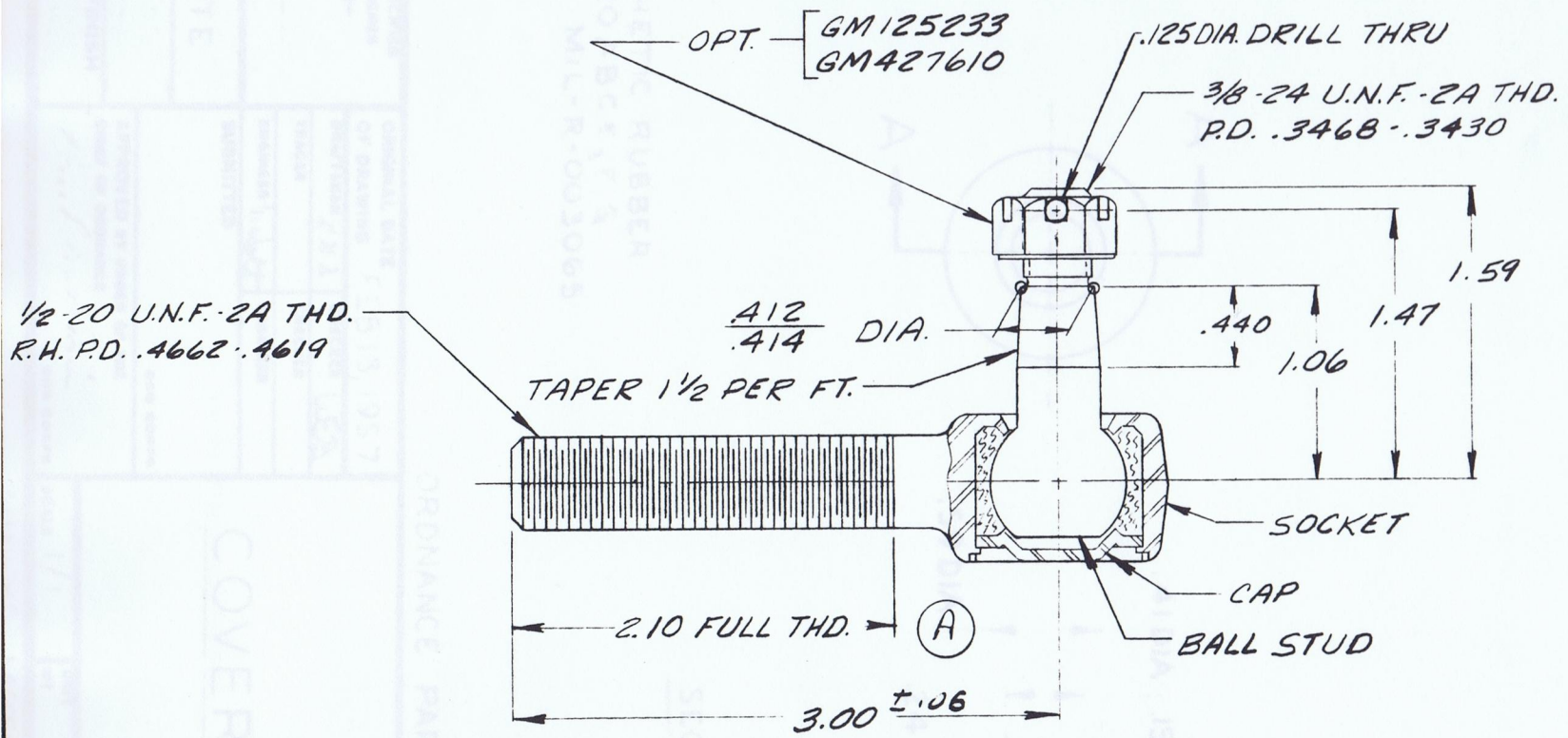
EXHIBIT 2

The sample of the "O" and "S" type tie
rod ball sockets by the addition of a
direct seal is shown in drawing entitled
"Rod Socket Assembly - Steering".



TYPICAL INSTALLATION - STEERING

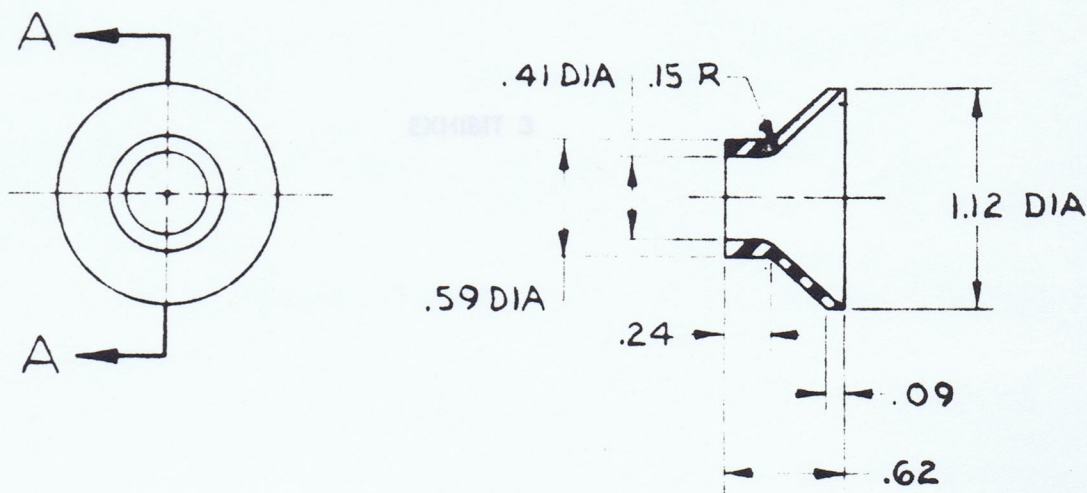
C. R. NO.	LET.	CHANGE	CKR.	DATE	ENG OK	C. R. NO.	LET.	CHANGE	CK	DATE	ENG OK
P-739-00 -C		NEW	D.K.	6/26/59							
P-603-19-C	A	2.10 FULL THD. WAS 2.38 FULL THD.	D.K.	1/16/61							
CN618-00 C-10		REL. FOR PROD. WAS E-923704	D.K.	7/6/62							



SOCKET BEARING MATERIAL:
WOVEN COTTEN FAB. IMPREG. WITH
STERIC ACID COMPOUND
O&S BEARING & MFG. CO. N^o 2683

ALLOWABLE TOLERANCES UNLESS OTHERWISE SPECIFIED (STOCK SIZES, DRILL SIZES, ETC., EXCEPTED) MACHINED DIMENSIONS ± .01 CAST OR FORGED DIMENSIONS ± .03 SHEET METAL PARTS.....± ANGLES ± 0° 30'	± .01	WILLYS MOTORS, INC.	NAME	R. KAUFFMAN	D. Kuschak	J. Bar	Con	FULL		
			DATE	6-24-59	6-26-59	7-13-59	7-14-59			
			BY	DRAFTSMAN	CHECKER	CH. D'S'N	ENG'R		MAT'L OK	SCALE
			ROD SOCKET ASSEMBLY R.H. (COMPLETE) - (AS PURCHASED)							
THIS PRINT IS THE PROPERTY OF WILLY'S MOTORS, INC. AND MUST BE RETURNED UPON REQUEST. THIS PART MUST NOT BE SOLD TO ANY OTHER CONCERN.			923704							

PHYSICAL PROPERTIES		APPLICATION		A7760070			
YP		NEXT ASSY	USED ON	REVISIONS			
TS		SEE ENGINEERING RECORDS		SYM	DESCRIPTION	DATE	APPROVAL
EL 2							
RA		C8336180	CARRIER, LIGHT	35	RELEASED FOR PRODUCTION	10-9-57	thw WED
		C8336181	WEAPON, 1/2 TON				
2H		C8336182					
RH		DO NOT	APPLY PART NO.				



NOTE:

SYNTHETIC RUBBER
SB 620ABCE, F, G
SPEC MIL-R-003065

SECTION A-A

ORDNANCE PART NO. 7760070

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES TOLERANCES ON— DECIMALS $\pm .01$ FRACTIONS ANGLES HORIZONTAL VERTICAL HEAT TREATMENT FINAL PROTECTIVE FINISH	ORIGINAL DATE OF DRAWING FEB 13, 1957 DRAFTSMAN JAB CHECKER WED TRACER CHECKER ENGINEER JAB ENGINEER SUBMITTED	COVER	ORDNANCE CORPS DEPT OF THE ARMY DETROIT ARSENAL	
	APPROVED BY ORDER OF THE CHIEF OF ORDNANCE <i>Paul A. ...</i> ORD CORPS			DWG SIZE A
	SCALE 1/1			UNIT WT
	7760070			

SECTION I
PRODUCT ENGINEERING SERVICES

EXHIBIT 3

**SECTION I
PRODUCT ENGINEERING SERVICES**

EXHIBIT 4

**SECTION II
INSPECTION ENGINEERING SERVICES**

INSPECTION ENGINEERING SERVICES

A. APPROACH

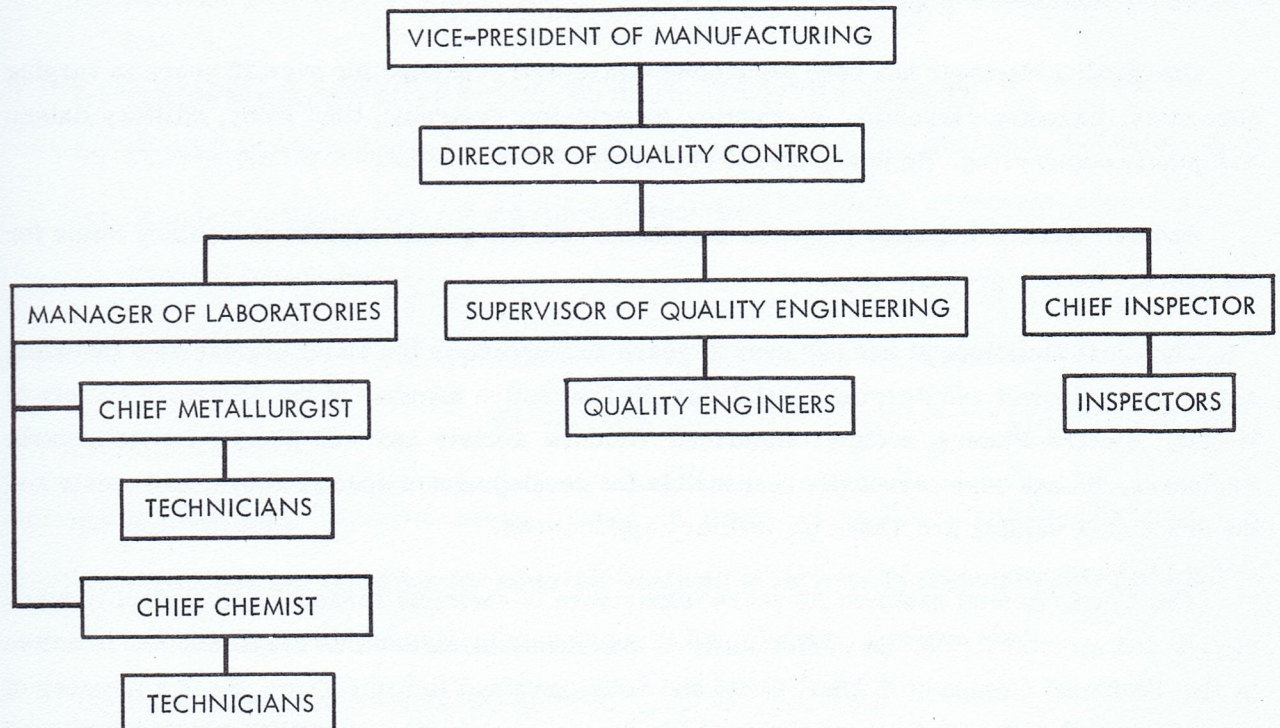
B. INSPECTION ENGINEERING

- **FACILITIES**
- **ORGANIZATION**

SECTION II INSPECTION ENGINEERING SERVICES

B. INSPECTION ENGINEERING SERVICES ORGANIZATION

The production engineer has 34 years experience in the automotive field, is a high school graduate and has had additional engineering education in several specialized technical training courses. He has also extensive experience in tool design and in the supervision of machine shop and tool shop activities.



The Director of Quality Control has had over 15 years' experience in production, quality and designing of military and civilian vehicles. He has a Masters Degree in Automotive Engineering and has been an active member in The American Society for Quality Control for 10 years and The Society for Automotive Engineers for 15 years.

The Supervisor of Quality Engineering is a graduate engineer and has been working in engineering and quality supervisory capacities associated with military products for six years.

The Chief Inspector has been in Automotive (both military and civilian) Inspection and Quality departments for 30 years. He has been an active member in The American Society for Quality Control for 12 years and was very instrumental in establishing this society. Under his leadership, the first statistical program was developed for military vehicles and their controlled quality levels.

SECTION II INSPECTION ENGINEERING SERVICES

B. INSPECTION ENGINEERING SERVICES ORGANIZATION—Continued

The Metallurgical and Chemical facilities are supervised by the Manager of Laboratories who has over 25 years' experience in all phases of Metallurgical and Chemical work associated with Automotive, Military and basic industries. He has been an active member of the American Society for Metals for 25 years and is also associated with the American Welders Society and Society for Automotive Engineers.

One Quality Engineer has been associated with military vehicles for over 22 years in varying capacities, including inspection, production supervision, designing, time study, military liaison and quality engineering. He is a graduate engineer.

Another Quality Engineer has been associated with the quality aspects of military items for six years. He is a graduate engineer.

The Chief Metallurgist has had over 25 years' experience in the Metallurgical field including Automotive, Aircraft and Forging specialties. He is an active member of the American Society of Metals, Electro-Platers Society, American Welders Society and The Society for Automotive Engineers. He has been personally responsible for development of special alloys, tool steels and the associated welding processes for military applications.

The Chief Chemist has over 25 years' experience in chemical research and control in automotive and aircraft fields. He is a member of the Society of Automotive Engineers and is active in the Technical Groups of Rubber, Fuels and Lubricants and Interior Trim. He is a member of the American Society for Metals and served on a special phosphating committee which established the necessary information for the American Society for Metals Journal. He is also a member of the American Society for Quality Control and The Toledo Engineering Society.

PERCENTAGE OF TIME AVAILABLE OF DIRECTLY ASSIGNED PERSONNEL

Personnel Usage

(a) Director of Quality Control	5%
(b) Supervisor of Quality Engineering	5%
(c) Chief Inspector	5%
(d) Manager of Laboratories	5%
(e) Quality Engineers - 4	10%
(f) Chief Metallurgist	5%
(g) Chief Chemist	5%
(h) Laboratory Technicians - 4	10%

SECTION II
INSPECTION ENGINEERING SERVICES

B. INSPECTION ENGINEERING SERVICES
FACILITIES

1. Metallurgical Laboratory

- (a) Complete Metallographic Lab and associated photographic facilities.
- (b) Necessary hardness equipment, including micro hardness, superficial and Brinell testers.
- (c) Tensile testing machines with 12,000 lbs. to 120,000 lbs. capacity.
- (d) Torsion testing machines - 60,000 lbs. capacities.
- (e) Complete machine shop for specimen preparation.
- (f) Standard impact tester.
- (g) Qualified technicians.

2. Chemical Laboratory

- (a) Spectographs
- (b) Equipment and facilities for complete analysis of ferrous and nonferrous materials.
- (c) Complete testing and evaluation equipment for fabric trim materials.
- (d) Paint testing and analysis equipment.
- (e) Facilities for testing all types of oils and lubricants.
- (f) Qualified technicians.

SECTION II
INSPECTION ENGINEERING SERVICES

EXHIBIT 1

**SECTION II
INSPECTION ENGINEERING SERVICES**

EXHIBIT 1

**PRESENTED TO
KAISER Jeep CORPORATION
BY
MODERN ENGINEERING SERVICE COMPANY**

TABLE OF CONTENTS

- I. Quotation
- II. Qualification of the Organization
- III. Evidence of Understanding the Scope of Work to be Performed
- IV. Evidence of Experience in the Specialized Field of Ordnance Inspection Engineering Services
- V. Qualification and Availability of Personnel
- VI. Qualification and Availability of Personnel to be Assigned to the Program
- VII. Brochure

SECTION II
INSPECTION ENGINEERING SERVICES

EXHIBIT 1—Continued

I.

Modern Engineering Service Co

1695 Twelve Mile Road
Box 1007
Berkley, Michigan
Telephone:
Detroit—Jordan 4-5626
Royal Oak—Lincoln 5-1700

16 March 1964

Kaiser Jeep Corporation
940 North Cove Street
Toledo 1, Ohio

Attention: Mr. J. S. Arnold,
Purchasing

Dear Mr. Arnold:

Thank you for extending to us an invitation to Bid on Inspection Engineering services for the M-274.

Our quotation for Inspection Engineering services as set forth in Exhibit "AA", Inspection Engineering Services General Requirements, is as follows:

Development of initial package, excluding micro-filming requirements, within a period of three (3) months, based on a fifty eight (58) hour work week;

<u>Estimated Hours</u>	<u>Composite Rate</u>	<u>Total</u>
1500	5.65	\$8,475.00

Maintenance of the Inspection Engineering package for a period of nine (9) months, based on a forty (40) hour straight time work week;

<u>Estimated Hours</u>	<u>Rate Per Hour</u>	<u>Total</u>
1584	5.00	\$7,920.00

Estimated total cost for engineering services for one year:

\$16,395.00

The above rates apply to work done in our plant on a time and material basis.

(cont'd)

..... Engineer with

SECTION II
INSPECTION ENGINEERING SERVICES

EXHIBIT 1 —Continued

Modern Engineering Service Co.

-2-

Our estimated totals do not reflect the possibility of redrawing any of the present designs on linen other than those which appear to have poor micro-filming characteristics. In fact, any new designs may generally be drawn on a good grade of bond paper or vellum at much less cost. However, this is subject to approval by your ATAC technical representative.

We could assist you with the micro-filming requirements of the contract by making up the required micro-film lists and having your SQAPS and Gage Designs micro-filmed here in Detroit by the Recordak Corp., 51 W. Hancock, Detroit 1, Michigan, a Detroit Ordnance District approval source. We contacted Mr. John Evans and he quoted the following prices:

Drawing Size

A - 8 1/2 X 11	\$ 93.00	per thousand
B - 11 1/2 X 17 1/2	103.00	" "
C - 17 X 22	110.00	" "
D - 22 X 34	132.00	" "
F - 28 X 40	167.00	" "

They also charge \$7.00 per hour for checking film and it requires about 1/2 hr. per roll.

Blueprints, ozalids, photostats and other reproductions and such materials supplied as a convenience to you will be invoiced over and above the hourly rates charged for engineering services. Such costs for blueprints and ozalids will be at the rate of six cents and fifteen cents per square ft. respectively.

Any travel between our plant and yours, required by you, will be invoiced over and above the hourly rates charged for engineering services. Such costs will be at the rate of eight cents per mile.

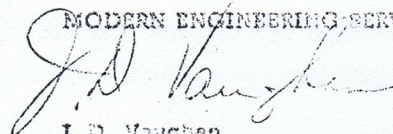
These rates are quoted on a basis of warranty practice as engineering design services have been rendered for many years. Inasmuch the nature of an engineering service results in the furnishing of drawings and engineering data, the warranty limits any liability to the necessary correction of any errors in such drawings or engineering data caused by our performance.

If there is anything at all that you would like in additional information or further discussion, please let us know.

May we thank you for your interest and we indeed are looking forward to serving you.

Very truly yours,

MODERN ENGINEERING SERVICE CO.



J. D. Vaughan

Vice President-Engineering Sales

SECTION II INSPECTION ENGINEERING SERVICES

EXHIBIT 1—Continued

II. QUALIFICATION OF THE ORGANIZATION MANAGEMENT AND TECHNICAL SUPERVISION

Modern Engineering Service Company has been providing the following variety of Industrial Engineering Services to Industry and Government Agencies for a number of years.

1. 18 years - Industrial Engineering services consisting of Plant Engineering and Layout, Inspection and Follow-up service, Product Engineering, Process and Methods Engineering, Quality Assurance Engineering, Tool Design, Die Design, Machine and Automation Design, Plant Equipment Design, Technical Writing and Publication and Graphic Illustrating.
2. 9 years - Government Product Engineering services, Product Design, Technical Analysis of End-items, Major Components, Vehicle, Installation Assemblies and Subassemblies, for Inspection and Testing Procedures.
3. 7 years - Quality Assurance, Inspection Engineering-type services in support of Ordnance Tank-Automotive items.

PRESIDENT AND CHAIRMAN OF BOARD OF DIRECTORS:

Is a qualified engineer with long experience in management and industrial engineering for industry and government agencies.

VICE-PRESIDENT AND TREASURER:

Is qualified in systems, procedures and financial administration with 19 years of combined experience as Contract Administrator in Government Prime and Subcontracts.

CHIEF ENGINEER:

Is a graduate engineer with many years of progressive professional experiences with the ability to direct and co-ordinate engineering activities and a high degree of technical competence in the successful solution of complex and difficult problems, Quality Assurance and Inspection encountered in engineering programs.

SECTION II INSPECTION ENGINEERING SERVICES

EXHIBIT 1 —Continued

III. EVIDENCE OF UNDERSTANDING OF THE SCOPE OF WORK TO BE PERFORMED

Upon receipt of fully executed copy of a contract and the Engineering Order Release, the component part prints are checked against the Engineering Parts List.

The Inspection Planning List Form TAC 71, is prepared, listing the total number of Installations, Assemblies and Components.

All detail drawings applicable to assemblies and components, itemized in the Inspection Planning List are reviewed to determine which items are of a nature for which inspection methods may be adequately prescribed through incorporation of existing SQAPs, then the respective criteria will be applied. Upon approval of an Inspection Planning List or any portion thereof by the Inspection Engineering representative, the scope of work can continue as outlined hereunder.

A search for custodianship of existing Inspection Engineering documents is made through the Inspection Engineering Branch, Quality Assurance Division, OTAC (SMOTA-QEQ).

Upon receipt of first generation reproducibles of any existing Inspection Engineering Documents, additional required SQAPs are developed. Non-custodial Inspection Engineering Documents are reviewed and we initiate the request to the custodian for latest mandatory revisions.

Upon approval of the additional SQAPs (initialed pencil copies) the Inspection Equipment drawings are prepared.

The components that serve a functional purpose, interchangeability requirements, safety, affect life, or serviceability of the item, are reviewed and determination made for inspectability. Drawing discrepancies, dimensioning and tolerancing not in accordance with MIL-STD 8 and ORDM 4-4 are denoted on E.C.R. (Form 1981) and Drawing Change Request (Form 1976) are presented to the Inspection Engineering Representative for engineering action. Upon receipt of properly executed E.O. covering requested changes the necessary Inspection Engineering Documents are revised up to date and proper distribution of the updated documents is made.

SECTION II INSPECTION ENGINEERING SERVICES

EXHIBIT 1 —Continued

Section 4 of the Quality Assurance Provisions of the engineering requirements contained in Section 3 and 5 is prepared as per instruction ORDP-608-MC-1.

Pertinent specifications are reviewed for adequacy of materials, processes and component application to the End Item through the second tier only.

The End Item Final Inspection Records (FIR) will be prepared for the assigned End Item, as per ORDP-608-MC-17 dated March 1962.

Inspection Equipment drawings covering inspection equipment required to inspect the characteristics defined in SQAPs, Section 4 of the Specification and Inspection Equipment Lists shall be in accordance with the terms of MIL-D-70327.

Ten days after the completion of the initial inspection engineering documents (SQAPs and Inspection Designs), a microfilm list will be prepared per OTAC microfilming requirements, dated 10 September 1963 and respective data listed thereon, will be submitted for microfilming.

We will review all pertinent product engineering changes made throughout the life of the contract and participate in the Engineering Change Request - Engineering Order system for all necessary changes to Inspection Engineering Documents. We shall make the necessary revisions to the Inspection Engineering Documents of which we are custodian.

SECTION II
INSPECTION ENGINEERING SERVICES

EXHIBIT 1—Continued

IV.
EVIDENCE OF EXPERIENCE IN THE SPECIALIZED FIELD
OF ORDNANCE INSPECTION ENGINEERING SERVICES

We are currently furnishing Ordnance Inspection Engineering services on seventeen Tank-Automotive vehicles (Trailers), M390, M390C, M514 M545, M101, M101A1, M116A1, M116, M172A1, M146, M353, M119, M126, M128, M447, M498, and the M313, covered in seven contracts out of the Detroit Ordnance District. Also the above services for the Cadillac-Cleveland Ordnance Plant on the T114 Tracked Vehicle.

These services consist of the preparation and maintenance of the following:

a. Quality Control Requirements

- (1) Supplementary Quality Assurance Provisions (SQAPs)
- (2) Draft of Section 4 of Item Specification which includes the review of pertaining specifications for adequacy of materials, processes, and components, and application to the end item through the first and second tier only.
- (3) Final Inspection Records

b. Inspection Equipment Drawings

c. General Requirements

- (1) Progress Reports
- (2) Distribution
- (3) Engineering Change Requests (ECRs)
- (4) Engineering Orders (EOs)

SECTION II INSPECTION ENGINEERING SERVICES

EXHIBIT 1 —Continued

V. QUALIFICATION AND AVAILABILITY OF PERSONNEL

INSPECTION ENGINEER, CHECKER:

Job Summary - To perform a check of engineer and draftsman designs and layouts of Inspection and Test Equipment both for components and assemblies or an entire vehicle, analyzing and making recommendations on component drawings and establishing gaging points on components; to analyze the layout of Inspection and Test Equipment submitted as to acceptance, rejection and/or changes on layouts.

Job Qualifications - 6 years (with present company) of progressive inspection engineering experience with a thorough knowledge of the fundamental, physical and mathematical sciences underlying Inspection Engineering.

GAGE DESIGN DETAILER, SENIOR:

Job Summary - To perform analysis of portions of complete assembly drawings and component drawings with respect to the development of designs and layouts of Inspection and Test Equipment and complete the detailing of required designs.

Job Qualifications - 4 years (with present company) of progressive Inspection Equipment detailing and a thorough knowledge of Inspection Equipment design requirements and the mathematical sciences underlying Inspection Engineering.

GAGE DESIGN DETAILER, JUNIOR:

Job Summary - To perform a variety of Gage and Equipment drafting work including detailing, Leroy inking, minor layout, Inspection and Test Equipment drawing revisions and any incidental work assigned pertaining to Inspection and Test Equipment drawing.

Job Qualifications - 2 years (with present company) of experience detailing Inspection and Test Equipment drawings. Graduate of an accredited trade school with six (6) 1/2-year courses in Engineering Drafting and four (4) 1/2-year courses in Engineering Mathematics plus a High School Diploma.

SECTION II INSPECTION ENGINEERING SERVICES

EXHIBIT 1 —Continued

INSPECTION PROCESS ENGINEER, SENIOR:

Job Summary - To develop and formulate the more difficult or complex Supplementary Quality Assurance Provisions for Tank-Automotive major assemblies, subassemblies, components and parts, performs checking and individual assignments pertaining to the Gages, Inspection and Test Equipment utilized on Tank-Automotive vehicles, assemblies, and components. This consists of the planning for such items as a wide variety of miscellaneous gages, measuring equipment, pneumatic, hydraulic and electronic test equipment, dynamic and/or static balancing test equipment, etc. Checks completed work of other planners to determine correct application of Inspection Equipment.

Personnel Qualifications - 9 years' (with present company) specialized experience in the design of Inspection gaging and Testing Equipment, determination of Inspection Equipment needs and establishment of gaging methods for inspection in manufacturing and end item acceptance, and component analysis. (7) of those years spent assisting with technical writing of manuals and inspection requirements for Tank-Automotive materials, components and assemblies.

SECTION II INSPECTION ENGINEERING SERVICES

EXHIBIT 1—Continued

VI. QUALIFICATION AND AVAILABILITY OF PERSONNEL TO BE ASSIGNED TO THE PROGRAM

PROJECT LEADER (QUALITY CONTROL)

Job Summary - Is in complete charge of the planning and administration of functions involving the supervision and control over the following:

1. The review of all component drawings to determine which items are of a nature for which inspection methods may be adequately prescribed through incorporation of existing SQAPs and Equipment Lists indicating SQAPs and Equipment Lists to be developed.
2. Draft of section 4 of the Item Specification.
3. Review of Pertaining Specifications.
4. Review Coverage of Repair Part Item.
5. End Item Final Inspection Requirements.
6. The preparation, detailing and checking of Inspection Equipment drawings and the continued maintenance thereof.

Do all the necessary liaison to insure performance and continuity between our facility and the Contracting Officers' Representative.

Personnel Qualifications - 20 years (with present company) of successful and progressive experience in technical and inspection engineering with a thorough knowledge of the fundamentals and mathematical sciences underlying inspection engineering, which includes 2 years as a Gage Design Detailer, Senior, demonstrating the ability to perform difficult engineering work under general supervision.

4 years as a Gage Design Engineer, Junior, demonstrating a good knowledge of engineering principles and the ability to perform very difficult engineering work under only general supervision.

5 years as a Gage Design Engineer, Senior, demonstrating a thorough knowledge of engineering principles, their application and the ability to direct and co-ordinate engineering activities of importance.

SECTION II
INSPECTION ENGINEERING SERVICES

EXHIBIT 1 —Continued

9 years of broad and progressive professional work in the field of Statistical Quality Control. 6 of these 9 years were spent in customer plant installations. Experience has demonstrated a thorough knowledge of Quality Control principles and their application, and the ability to direct and co-ordinate engineering activities of importance and a high degree of technical competence in the original and successful solution with development and application of Quality Control policies, programs and procedures. Is currently working with MIL-STD-105B, MIL-STD-414 and ORD-M608-11.

7. Formal Education: Highland Park, Mich. Public School through St. Benedict's High School
University of Detroit M.E. - 2 years, Ford Motor Co. Quality Control Training Program
- 2 years.

INSPECTION ENGINEER:

Job Summary - Is now performing technical review of Tank and Automotive Product design drawings, Specification and Military characteristics, developing Supplementary Quality Assurance Provisions and Standards for Quality Control as per ORDP-608-MC-1 and MIL-STD-105B. Initiates Inspection Equipment designs of equipment required to inspect the characteristics defined in SQAPs, Section 4 Quality Assurance provisions and the Inspection Equipment Lists.

Personnel Qualifications - 11 years (with present company) of successful and progressive experience in technical and Inspection Engineering with a thorough knowledge in the use and preparation of control charts and sampling inspection procedures with classification of defects and acceptable quality levels. Is now co-ordinating, developing and formulating detailed mechanical procedures and techniques required for processing raw data into required form. Assisted in rewriting the Gage Engineer's Hand Book for the calculation and design of Master Gears. Developed new procedures that have been accepted and are now required in the Ordnance Tank-Automotive Command Inspection Engineering requirements.

Education:

Muskegon Senior High School
Hackley Manual Training School, Muskegon - 2 years
Course in Mechanical drawing and machine shop practice
Heat Treating Course - sponsored by - American Society of Metals
Gearing - Night School course by - D. Houston - Ford Motor Co.
Quality Control & Inspection Engineering (Night School) Lawrence Institute of Technology

SECTION II INSPECTION ENGINEERING SERVICES

EXHIBIT 1—Continued

TECHNICAL WRITER

Wrote and prepared diagrams on the Digital Geoballistic Computer and Digital Control Computer for the Polaris submarine. Wrote detailed theory to logic diagrams for the Parallel-to Serial Converter and the Printer/Reader. Both analog and digital circuits were involved. Is now reviewing and analyzing drawings specifications MS-Standards on Tank-Automotive equipment, materials and processes, prepares a compilation of technical data for the promulgation of Supplementary Quality Assurance Provisions (SQAPs) Inspection Engineering Directives to assure compliance with Section 4 of Military Specifications and Purchase Descriptions to meet the requirements outlined in Section 3 of the procurement documents, analyze and appraise inspection and test procedures utilized by contractors supplying Ordnance Tank-Automotive Equipment and components. Establishing acceptable quality levels (AQL) Inspection and test criteria for Quality Control in accordance with Department of Defense Document M205. Describes in a technical, narrative concise form and formulates the literature in a manner that is suitable for a professional technical publication.

Education:

Detroit Public School through Northwestern High School
Wayne University, M.E.
Duquesne University Military
Wayne University, B.S.M.E. Degree

CLERK-TYPIST:

Job Summary - Is performing a variety of typing and clerical duties pertaining to the activity of the Inspection Engineering Branch requiring familiarity with related forms and work processes.

Personnel Qualifications - 6 years (with present company) types SQAPs, IELs, ECRs, EOs, DCRs, reports, letters and instruction manuals. Types (60) sixty words per minute.

Education:

Public School and High School, Nicetown, Indiana
3 Mos. Course in Mechanical Design at Rockford College, Rockford, Illinois
Various refresher courses in bookkeeping and typing since employed with Modern Engineering

**SECTION III
FIELD SERVICE PROVISIONING SERVICES**

FIELD SERVICE PROVISIONING SERVICES

A. UNDERSTANDING AND EXPERIENCE

B. ORGANIZATION

SECTION III FIELD SERVICE PROVISIONING SERVICES

A. UNDERSTANDING AND EXPERIENCE

Under the direction of designated representatives of the Maintenance Division of ATAC, services and material will be provided in the selection and documentation of repair parts. KAISER Jeep CORPORATION has a Parts Technical Group located within our Parts Division skilled and equipped for the purpose of selecting and documenting repair parts. Files, books, records and historical documents are maintained. The Parts Department can provide documentation which may be utilized for the identification of repair parts, determination of repair parts support and the supporting records for cataloging.

During previous contracts for the M-274 this group supplied repair parts notice (TAC Form 309) and, therefore, are experienced in the initiation, preparation and usage of the form. To provide adequate support of parts for vehicles currently in the field we have kept records on the current forms recording changes during the life of the vehicle. This applies equally well to the requirements necessitated by TAC Form 472.

Our Parts Technical Group has maintained close liaison to keep current with the newer techniques in technical documentation.

Experience in the field of Parts Publications was acquired and maintained through publication service contracts which included the transition from ORD 8 and ORD 9 formats to the formats currently used.

The function of the Parts Technical Group in the area of Parts Publication consists of the preparation of the material for the Organizational and Field Maintenance repair parts publications and the editing of this material for content and proper format as it is formulated into the publication manuscripts and related illustrations materials.

Service and operator publications are prepared under the guidance of our service personnel. See Miscellaneous Services Section IV-B. Final manuscript documentation is performed by a qualified subcontractor. Background and facility capabilities of a typical supplier of these services is shown in EXHIBIT 1, Section III.

Familiarity with specifications necessary to maintain and produce in the new form has been demonstrated during the course of performance to support the previous contract for the M-274.

SECTION III FIELD SERVICE PROVISIONING SERVICES

A. UNDERSTANDING AND EXPERIENCE—Continued

The phase of the PEC connected with metal reusable containers would be handled by our subcontractor, DeVilbiss Metal Fabricators Company, who specialize in reusable steel and aluminum shipping containers. Their design and engineering staff is fully qualified. They have designed and manufactured containers for the Army, Navy and Air Force to government specifications for aircraft engines, missiles, torpedos, electronic equipment, fire-control components, atomic submarine components and various other applications. They are completely equipped to fabricate prototypes and perform all leakage, vibration and shock tests.

Within our Parts Division is the Packaging Engineering Section. It is experienced in the use of PETB 10-60 and DAPD 555A as well as superseding specifications. A complete file of Federal and Military packaging specifications is maintained.

Packaging materials, meeting specifications, are available for pilot packages as well as testing facilities.

Our packaging engineers developed the packaging data sheets under the VEA for the original M-274 concurrent spare parts contract. They have worked closely with the Materials Branch of ATAC and several original package designs have been adopted by the military.

B. ORGANIZATION

The following employees are regularly assigned to government contract projects:

Senior Engineering Specialist (analyst, government miscellaneous contracts and bids). Process Engineer (Class B) - 4 years. Availability - 50%.

Junior Engineer Specialist (aids in publications and other projects. Electronic technician, custom military electronic wiring - 4 years. Inspector - 5 years - assignments included: military vehicles (M-151), BAT Kits (M38A1) and Fording Kits (M38A1). Availability - 100%.

SECTION III
FIELD SERVICE PROVISIONING SERVICES

B. ORGANIZATION—Continued

Senior Engineering Specialist assigned to contract projects - 12 years. Manager, Tabulating Section of Parts Division - 2 years. Chief Operator, Tabulating Section of Parts Division - 2 years. Staff Assistant to Director of Conservation - 2 years. Military service - 3 years (aircraft and engine statistics, specialized aircraft parts consumption). Factory Accounting - 1 year. Education: Associate in Business Administration and Associate in Industrial Engineering. Availability - 50%.

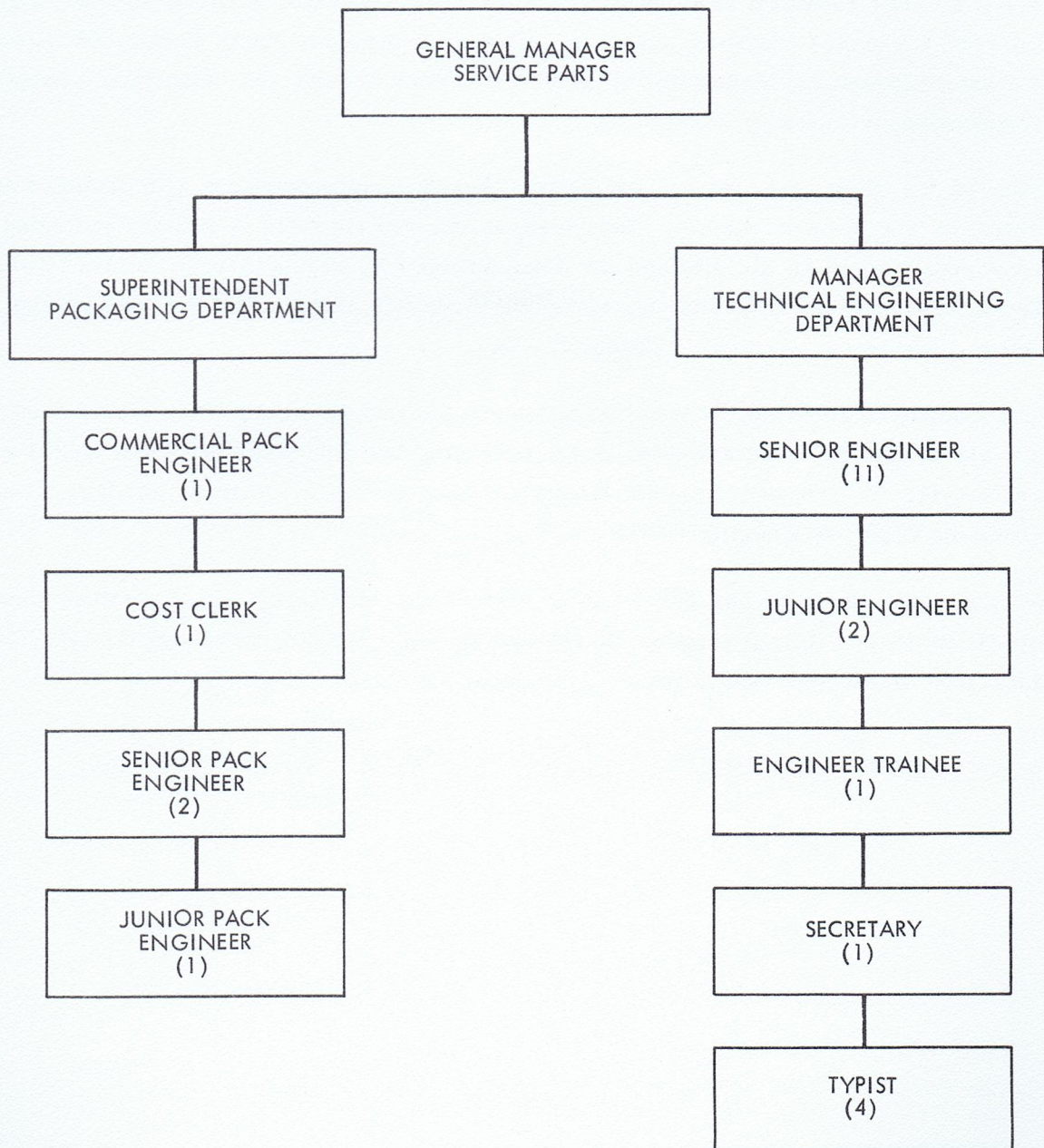
Director of the Packaging Engineering Section, has 8 years' experience with Ordnance and 4 years in his present position. Nearly all of this experience is in military packaging and packaging inspection. He attended the Joint Military Packaging Course, Phases I and II at Rossford Ordnance Depot and courses at the Ordnance Management Engineering Training Agency, Rock Island Arsenal. Availability - 20%.

Senior Packaging Engineer has 15 years' experience in military packaging, design and estimating. He was active in the development of the packaging data sheets for the initial M-274 spare parts contract. Attended the Joint Military Packaging Course, Phases I and II at Rossford Ordnance Depot. Availability - 50%.

Senior Packaging Engineer has 2-1/2 years' engineering experience, 1-1/2 years of which he specialized in military packaging. He attended the Joint Military Packaging Course, Phases I and II at Rossford Ordnance Depot. Availability - 50%.

SECTION III
FIELD SERVICE PROVISIONING SERVICES

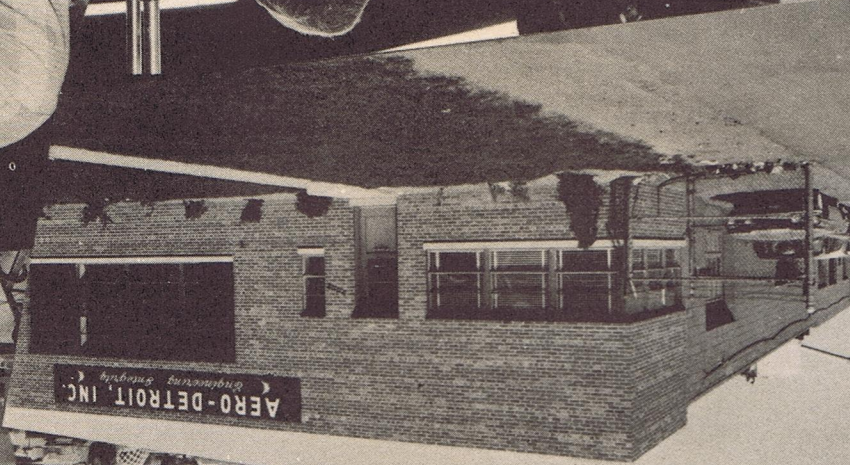
B. ORGANIZATION—Continued



NOTE: This chart represents only those Parts Personnel who may be involved in this P.E.C. program.

SECTION III
FIELD SERVICE PROVISIONING SERVICES

EXHIBIT 1



A black and white aerial photograph of a large, multi-story brick industrial building. The building has a flat roof and several windows. A sign on the side of the building reads "AERO-DETROIT, INC. Engineering & Shipbuilding". The building is surrounded by other industrial structures and parking lots.

Aero-Detroit, Incorporated

Facility Sheets

ENGINEERING DEPARTMENT

INTRODUCTION • • •

Aero-Detroit, Inc. was established in July of 1953, and has built a solid reputation as a highly qualified service organization in the fields of Engineering and Publications.

Aero-Detroit has extensive facilities consolidated in one central location to increase the degree of efficiency and quality required to maintain such a reputation.

Employees of Aero-Detroit take a special pride in their work. It is through these employees and supporting facilities that the highest degree of engineering and publication services come to you.

The following pages are designed to give you a deeper insight into Aero-Detroit and its capability of handling your particular requirements.

A vast reserve of progressive engineering experience offers our clients complete mechanical, electrical, and automotive body engineering services. Individual components, complete systems, and vehicles have been designed and/or developed by Aero-Detroit specialists in our plant or in the facilities of our clients.



Aero - Detroit, Incorporated

Integrity First

ENGINEERING DEPARTMENT

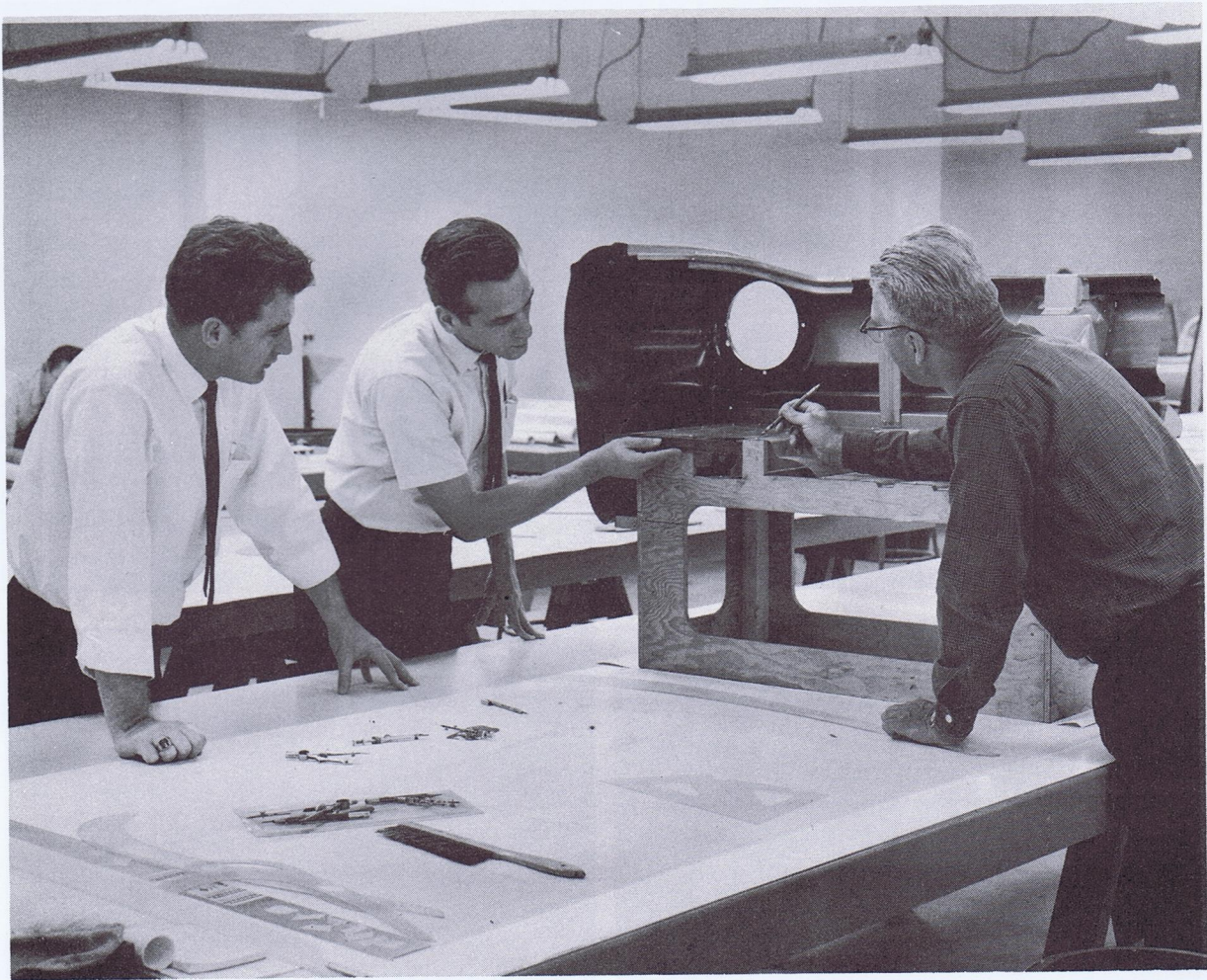


A vast reserve of progressive engineering experience offers our clients complete mechanical, electronic, and automotive body engineering services. Individual components, complete systems, and vehicles have been designed and/or developed by Aero-Detroit specialists in our plant or in the facilities of our clients.



Call JO-rdan 6-4630 for service . . .

PRODUCT ENGINEERING



Through a series of expandable partitions, product engineering areas may be arranged to meet each customer's requirements and afford the proper security provisions required.

Adequate drafting equipment, boards, files, and related items are available together with a large quantity of loft and layout tables.



Call JO-rdan 6-4630 for service . . .

PLASTIC MODEL SHOP



Fabrication of plastic Keller models, spotting racks, checking fixtures, gages, die model duplications, experimental projects, and complete plastic show car bodies are some of the services performed by experienced craftsmen in our Plastic Model shop.

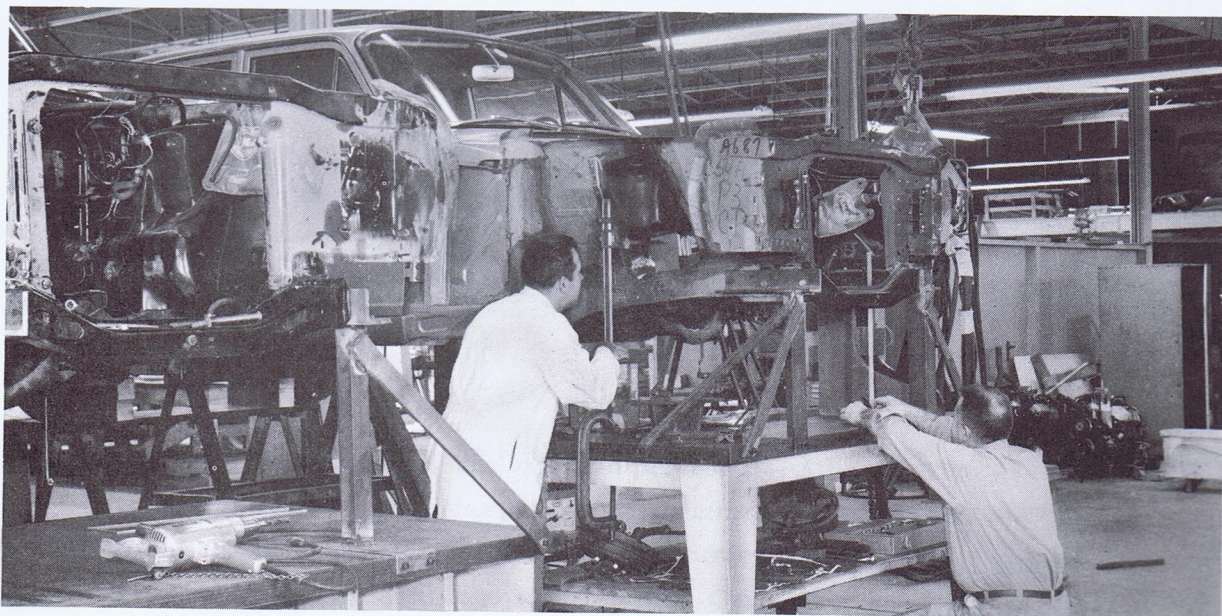
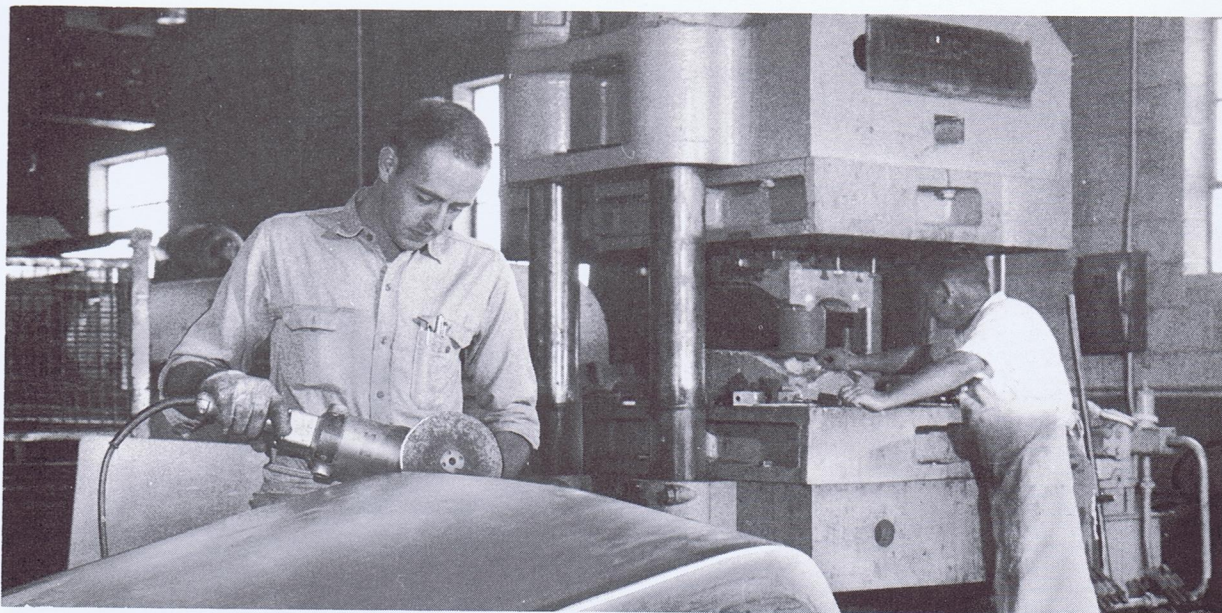


Call JO-rdan 6-4630 for service . . .

Aero - Detroit, Incorporated

Integrity First

SHEET METAL PROTOTYPE SHOP



Our Sheet Metal Prototype shop services include ornamentation, grilles, mouldings, body panels, and complete body build-up, making it one of the most complete operations of its type available.



Call JO-rdan 6-4630 for service

Aero - Detroit, Incorporated

Integrity First

TECHNICAL WRITING SECTION



Technical writers, parts analysts, and processors, utilizing techniques that reflect the latest advancements, produce commercial and military publications in the highest degree of technical accuracy and clarity to your most demanding specifications and requirements. Qualified technical editors and proofreaders assist in a rigid quality control program.

and satisfaction. The effect of a rigid quality control program is evident in their work.



Call JO-rdan 6-4630 for service . . .

Aero - Detroit, Incorporated

Integrity First

COLD-TYPE COMPOSITION SECTION



This section, through the maximum use of semiautomatic equipment, specializes in the preparation of reproduction text to all military and commercial specifications. The large variety of type styles and various methods of forming the text assure each customer individual attention and satisfaction. The effect of a rigid quality control program is evident in their work.



Call JO-rdan 6-4630 for service . . .

Aero - Detroit, Incorporated

Integrity First

RETOUCHING AND RENDERING SECTION

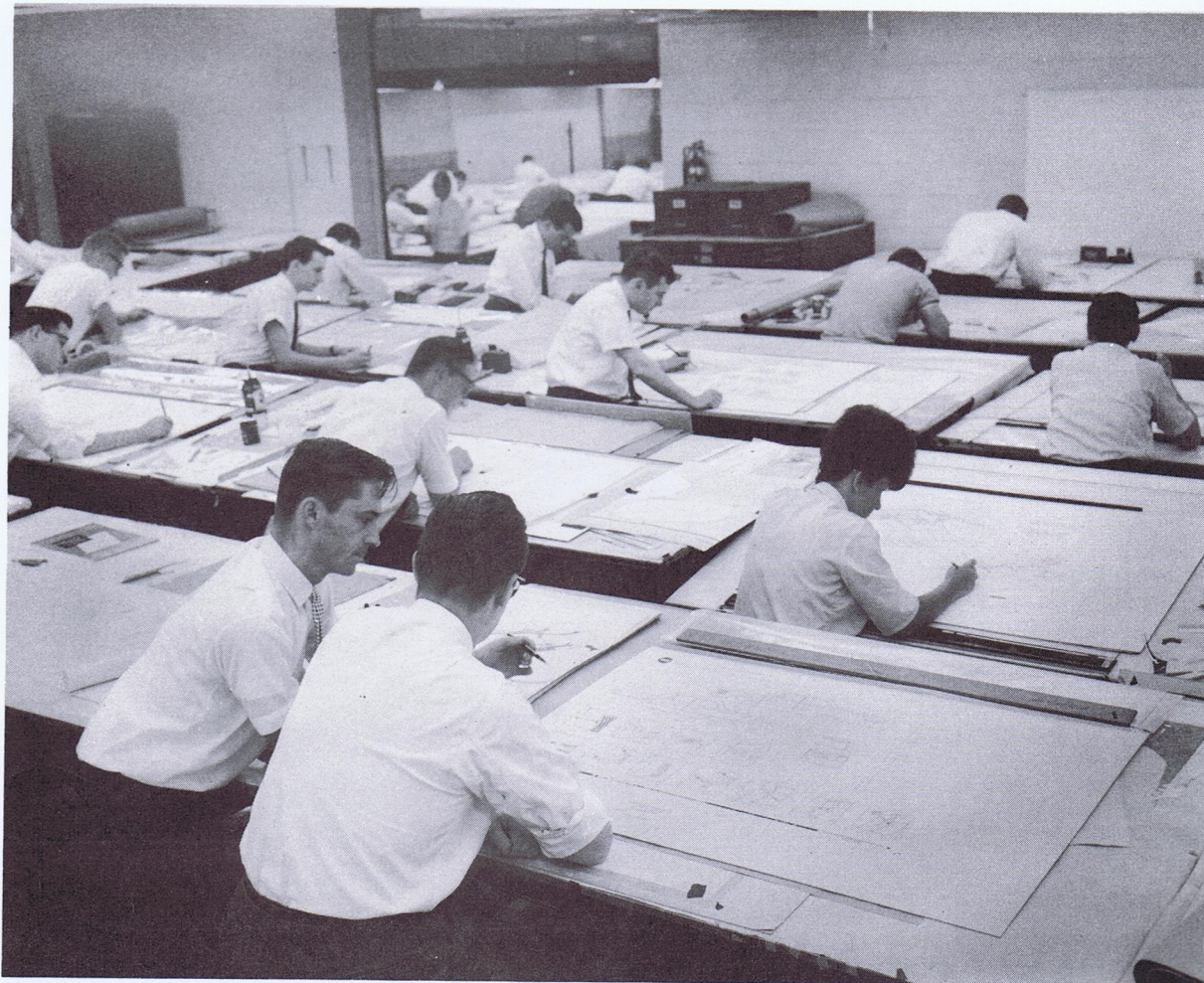


The close relationship of Aero-Detroit's retouching and photographic activities has produced the utmost in quality and accuracy in photo retouching, air brush work, wash drawings, and line renderings. Effective use of good photos with the right amount of retouching and rendering has identified Aero's work as being equal to the finest available anywhere.



Call JO-rdan 6-4630 for service . . .

ILLUSTRATION AND KEYLINING SECTION

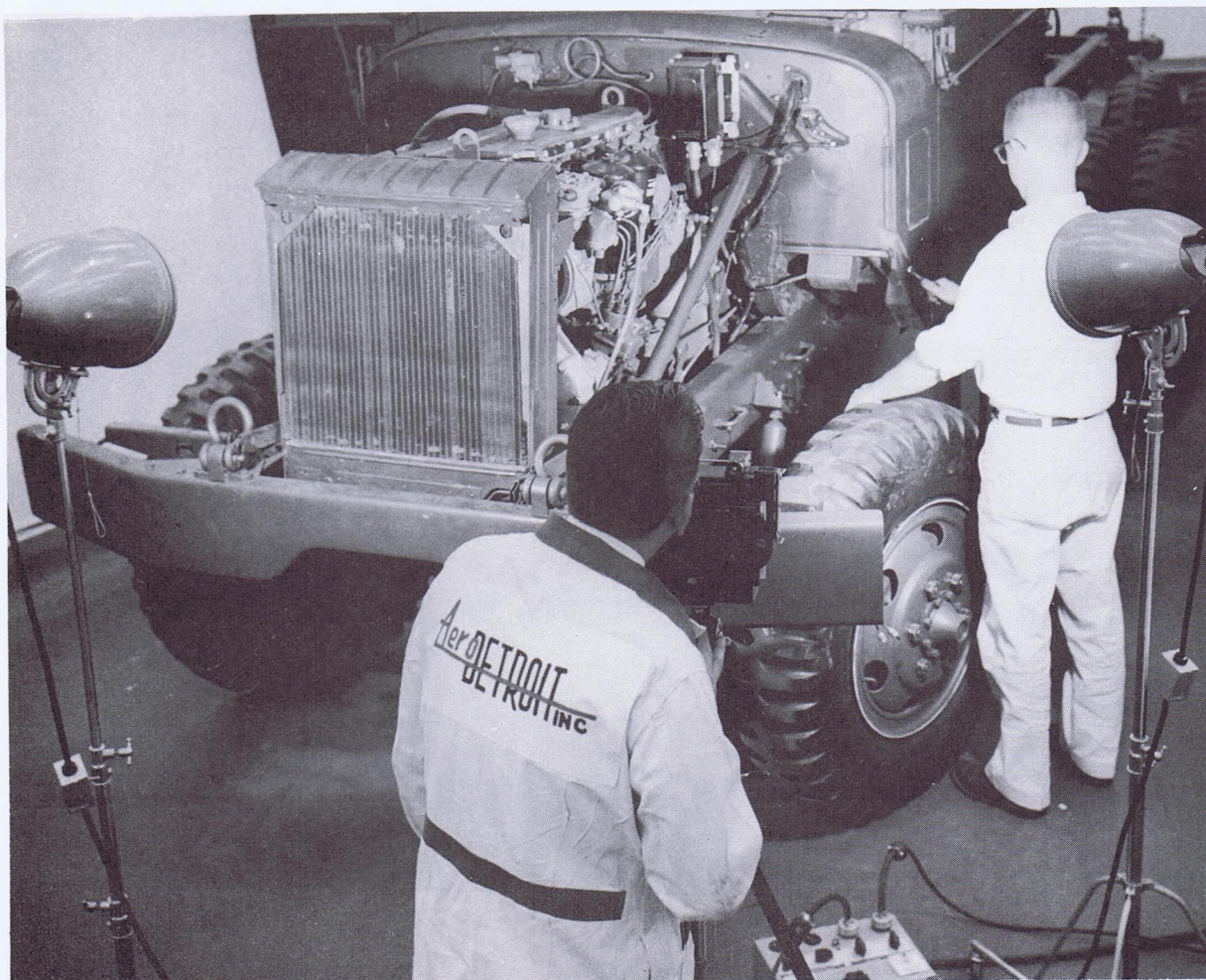


The illustrators and keyliners working in our drawing section are experienced in all phases of the Graphic Arts, specializing in preparation of schematics, diagrams, cutaways, perspective line drawings, and exploded component views.

Working from engineering drawings, layouts, etc., and sometimes hand-waving, they are capable of preparing any type of drawing to either military or commercial specifications and requirements.



COMPONENT TEARDOWN STUDIO

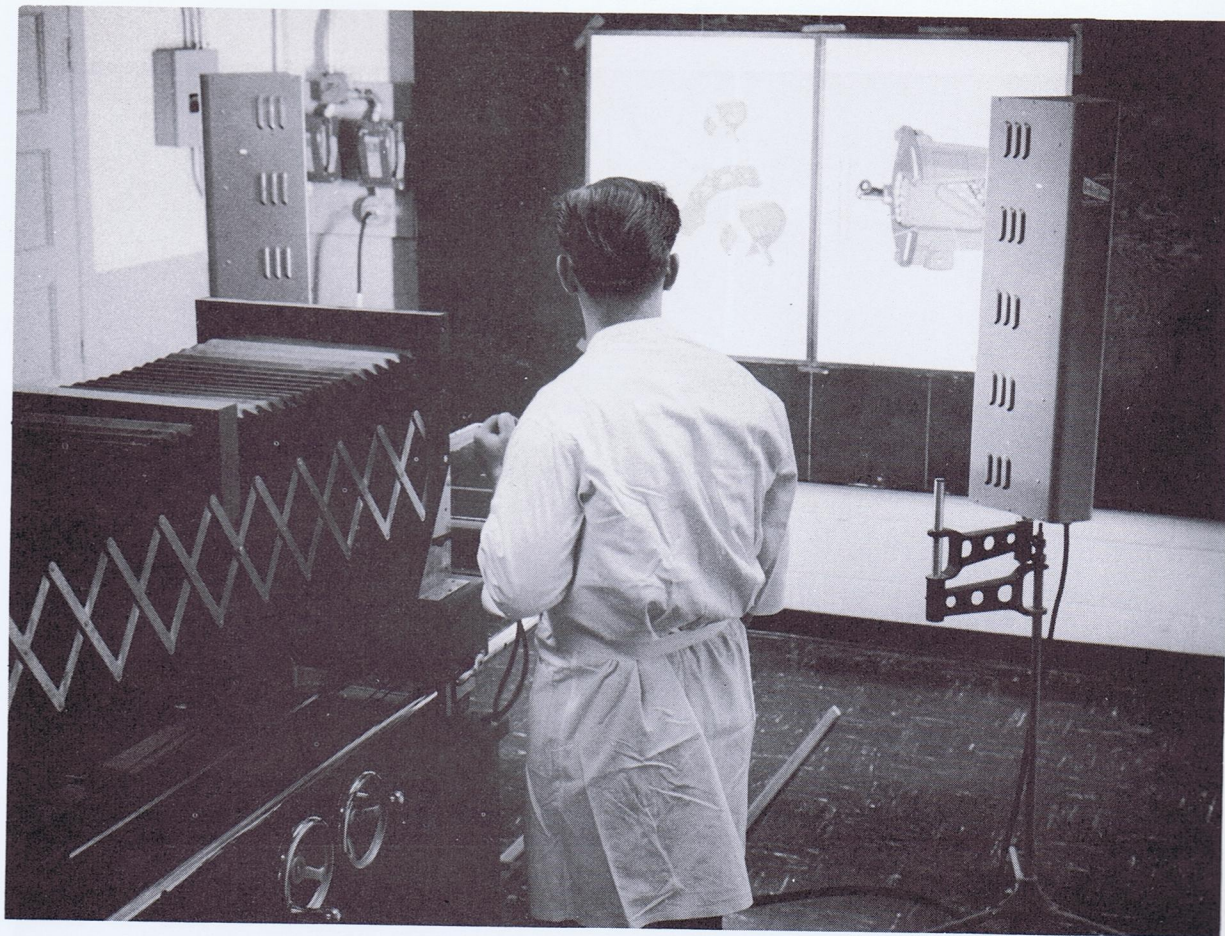


Aero-Detroit's component teardown facilities reduce costs and eliminate many coordination problems normally associated with publication photography. Overall program efficiency, resulting in the highest quality and technically accurate coverage, is assured with less burden to our customers and reduced headaches for us.



Call JO-rdan 6-4630 for service . . .

PHOTOGRAPHIC SECTION

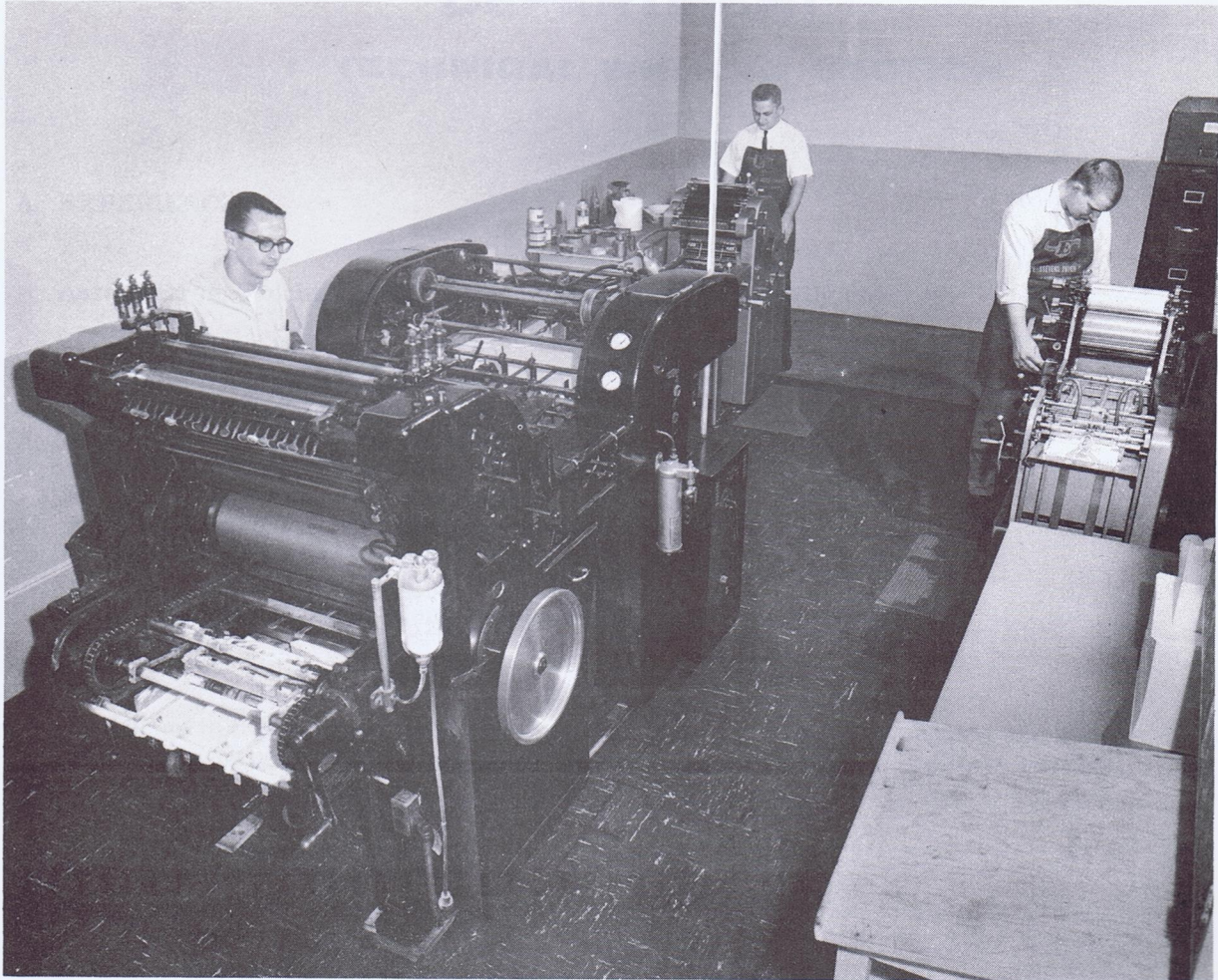


Complete photographic facilities are an integral part of the overall Aero-Detroit Graphic Arts activity. Experienced camera crews, using the latest equipment, provide rapid top-quality service in all photographic phases of publication preparation from on-location photography to photolithographic negatives of the finished product.

Production of copy negatives and prints, enlargements, charts, training aids, slides, film strips, and top-notch commercial photography are available as added services to our customers.



PRINTING AND BINDERY SECTION



The printing and bindery section, capable of handling the sum product of all our Graphic Activities, also provides facilities to handle smaller commercial material. The completeness of this section affords us the potential and flexibility so very vital in meeting customer deadlines.



PUBLICATION AND GRAPHIC DEPARTMENT

I. TECHNICAL WRITING SECTION

A. EXPERIENCE

Aero-Detroit's technical writing experience has specifically covered:

- Electronic Test Equipment (Ground and Mobile)
- Hydraulic Systems and Components
- Electro-Mechanical Equipment
- Electronic Sighting and Fire Control
- Missile Systems and Components
- Wheeled and Tracked Vehicles
- Oxygen and Liquid Oxygen Components
- Electrical Welding Equipment
- Navigation and Flight Control Components
- Computers

In addition to top-quality commercial publications of all types, complete manuals have been prepared to military specifications for nearly all branches of the military service.

- Department of the Air Force
- Department of the Navy
 - NavAer
 - NavWeps
 - NavShips
 - NavOrd
 - Marine Corps
 - BuShips
 - BuWeps
- Department of the Army
 - Signal Corps
 - Army Tank Automotive Center
 - Army Weapons Command
 - Corps of Engineers
- Air Transport Command

We offer superior reliability and performance, based on the capabilities and dedication of our personnel in the writing and illustrating of all types of technical documentation to either military or commercial specification requirements.



B. TECHNICAL WRITING STAFF

Aero-Detroit's highly specialized and experienced technical writing staff prepares complete manuals and brochures on all types of military and commercial equipment within the scope of all governing specifications. All writing personnel have individual offices located within the publications department. A comprehensive technical library assures availability of specifications to cover the constantly changing customer requirements.

II. ILLUSTRATION AND KEYLINING SECTION

A. EXPERIENCE

Aero-Detroit's Illustration and Keylining Section is divided into three basic operating units:

- Line Illustration -- includes perspective, isometric, orthographic, trimetric, diagrams (wiring and schematics), cutaways, and exploded component views.
- Photo Retouching and Rendering -- includes mechanical retouching and rendering, wash drawings, color renderings, and separations, creative pictorial drawings, phantom views and commercial art.
- Keylining and Art Production -- includes keylining, nomenclature paste-up, ruling, scaling, flapping, mounting and reproduction text finalization.

B. IN-PLANT FACILITIES

In addition to modern air-conditioned work areas, the illustration groups are provided with modern drafting boards, mechanical and art tools, light boxes, two dry-mounting presses, and art storage files for safeguarding classified materials and documents.



III. PHOTOGRAPHIC SECTION**A. EXPERIENCE**

The Aero-Detroit Photographic Section encompasses all areas of photography, including lithographic processes in support of the printing department. Specific areas of experience include:

- In-plant sequence photos of mechanical part breakdowns and procedures
- On-location sequence photos of mechanical part breakdowns and procedures
- Photographic exploded views
- Product photos for promotional uses (color or black and white)
- Industrial photography -- on location (color or black and white)
- Slides (color or black and white)
- Film strips (color or black and white)
- Copy negatives and prints (continuous tone or line)
- Photographic negatives
- Half-tone negatives and screened prints

B. EQUIPMENT

1	14 x 17 Prismatic Copy Camera	1	#0 Duto Lens
1	Kodak Print Straightener	3	Time-O-Lite Timers
1	Pako 44" Photo Dryer	2	Electra Timers
1	Pako 26" Electroglass Dryer	1	B and J 8 x 10 Printer
2	14 x 17 Kenro Copy Cameras	1	B and J 11 x 14 Printer
1	Princeton 11 x 14 Copy Camera	1	80MM Lens
1	Set Colortran Copy Lights	1	8-1/2 x 11 Hyran Continuous High-speed Printer
1	Rolliflex Camera	1	Set Super Colortran Lights
1	Nikon F Camera 35MM	1	Miniature Condenser
1	Rowi Copy Stand, rear illumination device	1	4 x 5 Omega Enlargers (135MM Lens)
1	4 x 5 Super Graphic Camera	1	Besslar Enlarger 4 x 5
1	Weston Densitometer	1	8 x 10 Elwood Enlarger
1	90MM Super Angulon Lens	1	12" Process Lens
1	210MM Symmar Lens	1	10" Process Lens
1	Super Director Exposure Meter	1	Print Washer
1	14" Apochromat Lens	1	Photo-Offset Point Light Source
1	6-1/2" Process Lens	2	32 x 94 Kreonite temperature control sinks
1	240MM Lens	1	8 x 10 Durst enlarger (300MM Lens)
1	10" f4.5 Lens	2	Negative washers
1	#1 Rollienaar Lens		
1	#2 Rollienaar Lens		



IV. COLD-TYPE COMPOSITION SECTION

A. EXPERIENCE

Full cold-type composition capability is provided within our plant. All section personnel are experienced in typewriter composition (justified and unjustified) to military and commercial specifications.

B. EQUIPMENT

- 7 12 point Boldface IBM Executives (Bookman)
- 3 10 point Boldface IBM Executives (Booktype)
- 2 12 point Mid-Century IBM Executives
- 2 12 point Italic Friden Justowriter Recorder
- 1 14 point Commercial Friden Justowriter Recorder
- 3 12 point Boldface Friden Justowriter Reproducers (Bookman)
- 1 10 point Boldface Friden Justowriter Reproducer (Booktype)
- 1 Model 840 Headliner
- 1 Complete Set of "Typit" Symbols and Greek Alphabet



V. PRINTING AND BINDERY SECTION**A. EXPERIENCE**

To complete and round out the facilities at Aero-Detroit, Inc., our printing and bindery section provides much needed service in publication and technical data preparation. Experience includes the printing, collating, and binding of:

- Engineering Reports
- Progress and Evaluation Reports
- Instruction Manuals and Handbooks
- Brochures
- Bulletins
- Forms
- Sales Literature
- Direct Mail Pieces
- Letterheads and Envelopes
- Labels

B. EQUIPMENT

- | | | | |
|---|---------------------------------------|---|----------------------------------|
| 2 | ATF Chief 15 Presses | 2 | 30 x 40 Nuarc Stripping Tables |
| 1 | 38" Oswego Paper Cutter | 1 | 40 x 50 Douthitt Stripping Table |
| 1 | 30 x 40 Nuarc Platemaker | 1 | Liberty Folder |
| 1 | A. B. Dick Model 360 Press | 1 | Speed Master Print Machine |
| 1 | 17-1/2" x 22-1/2" Harris Offset Press | 2 | GBC Collators |
| 1 | 40 x 60 Douthitt Stripping Table | 1 | GBC Electric Punch |

A close association with a joint facility provides for high volume printing, including maximum fold-out sizes.



C. COLD-TYPE FACES AVAILABLE

Same Size (100%)	Reduced Size (Approximately 80% of Original Size)
This is a sample of 14 point COMMERCIAL. Being a large, bold face, Commercial is primarily used for headings and accentuating important words. <i>This is a sample of 12 point ITALIC. Primarily used for figure titles, the Italic typeface can be used for highlighting certain areas of text.</i> This is a sample of 12 point MID-CENTURY. Mid-Century is ideally suited for figure call-outs and parts listings. This is a sample of 12 point BOOKMAN. This typeface is used for book text and is ordinarily reduced for final reproduction. This is a 10 point BOOKMAN. This is used for same-size reproducible copy and direct plate work.	This is a sample of 14 point COMMERCIAL. Being a large, bold face, Commercial is primarily used for headings and accentuating important words. <i>This is a sample of 12 point ITALIC. Primarily used for figure titles, the Italic typeface can be used for highlighting certain areas of text.</i> This is a sample of 12 point MID-CENTURY. Mid-Century is ideally suited for figure call-outs and parts listings. This is a sample of 12 point BOOKMAN. This typeface is used for book text and is ordinarily reduced for final reproduction. This is a 10 point BOOKMAN. This is used for same-size reproducible copy and direct plate work.



EQUIPMENT LIST**Die Model Shop:**

- 1 Three Plane Base Machine
- 1 18" x 36" Surface Plate
- 1 24" x 54" Surface Plate
- 2 36" x 72" Surface Plates
- 4 48" x 60" Surface Plates
- 2 48" x 72" Surface Plates
- 2 48" x 108" Surface Plates
- 4 50" x 150" Surface Plates
- 5 74" x 148" Surface Plates
- 1 100" x 160" Surface Plate
- 1 120" x 440" Surface Plate
- 2 8" x 18" x 30" Angle Plates
- 2 7" x 18" x 36" Angle Plates
- 3 10" x 24" x 60" Angle Plates
- 26 Miscellaneous Sizes of Angle Plates
- 12 5" Risers
- 11 10" Risers
- 4 20" Risers
- 1 Walker Turner Wood Lathe
- 1 Delta Wood Lathe

- 1 Buss Shaper #9, Detail
- 1 Stanley Surface Plate Router, Model M1-A, 18,000 RPM
- 1 12" Delta Table Saw, 38" x 48"
- 1 24" Crescent Planer
- 1 Heston & Anderson #25 Swing Saw
- 1 Spindle Sander, Model B-4
- 1 24" Kindt-Collins Sander
- 1 15" State Disc Sander
- 1 36" Crescent Wood Band Saw
- 1 36" Moak Band Saw, 5 H. P.
- 1 14" Delta Variable Speed Band Saw
- 1 17" Delta Floor Drill Press
- 1 Bridgeport Vertical Mill, 1/2 H. P.
- 1 Saylor-Beall Air Compressor, Model VT-735
- 1 16" Newman #60 Jointer
- 1 Delta Bench Grinder, Double End
- 1 10" Atlas Metal Lathe, 32" Bed
- 1 18" Greenlee Shaper, 2 Spindle
- 1 Rako 36" Overarm Router

Template Shop:

- 1 49" x 98" surface Plate
- 1 66" x 108" Surface Plate
- 1 42" x 60" Surface Plate
- 1 36" Do-All Contour Saw

- 1 Atlas Drill Press, 1/2 H. P.
- 1 Moak Template Duplicator, Master Motor, 1 H. P.

Sheet Metal Shop:

- 1 600 Ton Williams White Hydraulic Press 42" x 60" Bed
- 1 10' Colombia Power Shear, 3/16" Capacity
- 1 12' Sturdy Bender Press Brake, 10 Gauge Capacity
- 1 Miller #300 Heliarc Welder AC or DC, Range 3 Amp to 425 Amp
- 1 75 KVA Pedestal Spot Welder
- 1 75 KVA Portable Spot Welder and Gun
- 1 16' Moulding Draw Bench, used to make prototype moldings
- 1 Drive All Metal Shaper-Single Spindle
- 1 Brown and Sharp #2 Surface Grinder

- 1 36" Do-All Metal Cutting Band Saw
- 1 20" Powermatic Metal Cutting Band Saw
- 1 14" Delta Metal Cutting Band Saw
- 1 12" Craftsman Metal Cutting Band Saw
- 2 Hammond Variable Speed Buffing Lathes
- 1 5 H. P. Toro Dust Collector
- 1 4' x 6' Surface Plate
- 1 3' x 6' Surface Plate
- 2 3' x 5' Surface Plates
- 1 Keller Power Hack Saw
- 1 H. P. Flexible Shaft Grinder
- 1 1/2 H. P. Flexible Shaft Grinder
- 1 H. P. Pedestal Grinder
- 1 1/2 H. P. Bench Grinder



Sheet Metal Shop: (Continued)

1	Bridgeport 1 H.P. Vertical Mill, 42" Table	1	Delta 6" Vertical Belt Sander
1	32" x 40" Pratt and Whitney Profile Mill	1	3' Hand Forming Roll
1	KR Wilson 60 Ton Hydraulic Press	1	Whitney-Jenson Hand Punch Press 24" Throat
1	Sebastian 20" x 8' Geared Head Metal Lathe	1	Di-Acro Hand Punch Press
1	10" Atlas Metal Lathe	1	15 Ton Punch Press - Crank Type
1	Cincinnati Metal Planer, 2' x 2' x 8' Capacity	1	1" Floor Model Drill Press
1	20 H.P. Air Compressor	1	1/2" Bench Model Drill Press
1	3' Portable Die Table	1	24' x 35' 2 Ton Capacity Overhead Traveling Crane
		1	4' 12 Gauge Capacity Box Brake
		1	4000 lb. Fork Lift Truck

Plastic Shop:

1	30" x 33" Surface Plate	5	20" Risers
1	36" x 48" Surface Plate	1	Saylor-Beall Air Compressor, 5 H.P. Lima Motor, HD-187
2	42" x 48" Surface Plates	1	Powermatic Band Saw, Model 86, 20" Variable Speed
3	46" x 110" Surface Plates	1	20" Delta Band Saw
2	47" x 108" Surface Plates	1	14" Delta Band Saw
2	73" x 150" Surface Plates	1	18" Drill Press, 1/2 H.P.
1	120" x 440" Surface Plate	1	15" Atlas Drill Press, 1/3 H.P.
2	8" x 18" x 30" Angle Plates	1	15" State Disc Sander, 1 H.P.
1	10-1/2" x 19" x 36" Angle Plate	1	20" State Disc Sander, 2 H.P.
2	12" x 24" x 42" Angle Plates	1	12" Delta Disc Sander
1	7" x 6" x 45" Angle Plate	1	State Spindle Sander, Model B-4
2	10" x 16" x 48" Angle Plates	1	Thor Grinder, Bench Double End
4	11" x 24" x 60" Angle Plates	1	24" Oliver Jointer
15	Miscellaneous Sizes of Angle Plates	1	6" Delta Jointer
4	5" Risers	1	12" Powermatic Planer
1	Industrial Grieve-Hendry Oven, Model PL-1	1	10" Delta Table Saw, 27" x 36"
1	Overarm Router	1	Arrow-Hart & Hegeman Swing Saw
5	10" Risers		

Miscellaneous:

1	Allen Type E-275 Amp Arc Welder	1	Lane, 500 lb. Scale
1	Acetylene Unit	1	Yale, 1 Ton Chain Fall
1	Baker Hi-Lo Lift Truck	1	Yale, 1/2 Ton Chain Fall



VI. LIST OF CLIENTS

Following is a partial list of clients for whom all or parts of the services of the Publication and Graphic Department are used:

A. C. Spark Plug, G.M.C.	General Motors Defense Systems, G.M.C.
Aeroquip Corporation	GM Truck and Coach Division
Allison Division, G.M.C.	Holley Carburetor Company
American Motors Corporation	Ingersoll Kalamazoo Division, Borg-Warner Corporation
Army Tank Automotive Center	International Harvester Company
Baker Industrial Truck	Johnstone Pump Company
Bendix Corporation, Mishawaka Division	Lear, Incorporated
Bendix Corporation, Special Products Division	Link Welder Corporation
Bendix Corporation, Systems Division	Magnavox Company
Bowen-McLaughlin-York, Incorporated	McDonnell Aircraft Company
Bryant Corporation	MC Manufacturing Company
Burroughs Corporation	Met-Pro, Incorporated
Buick Motor Division, G.M.C.	Model Engineering and Manufacturing Company
Brunswick Corporation	National Water Lift Division, Cleveland Pneumatic Industries
Cadillac Tank Plant, G.M.C.	National Cash Register Company
Cadillac Motor Division, G.M.C.	North American Aviation, Incorporated
Chevrolet Motor Division, G.M.C.	North Electric Company
Chrysler Missile Division	Pontiac Motor Division, G.M.C.
Chrysler Defense Operations	Pyles Industries
Continental Motors Corporation, Aircraft Engine Division	Ram Meter Company
Courter Products	Republic Aircraft Company
Dearborn Marine Engine	Saginaw Steering Gear, G.M.C.
Detroit Arsenal, Research and Engineering	Sparton Electronics Division
Detroit Diesel Engine Division, G.M.C.	Superior Instrument Company
Diamond T Motor Truck Company	Twin Coach Company
Food Machinery and Chemical Corporation	US Broach
Ford Division, F.M.C.	Vickers, Incorporated
Ford Special Military Division, F.M.C.	White Motor Company, Lansing Division
General Motors Photographic, G.M.C.	Willys Motors, Incorporated

May we add your name to this list ?



GOVERNMENT EXPERIENCE

Aero-Detroit, Inc. has experience in contract administration as a prime contractor to the Government as well as subcontractor to prime equipment manufacturers. Cost-plus-fixed-fee contracts have been performed for various Government agencies.

Our administrative and service engineer personnel are familiar with procurement regulations as applied to Government contracts. This also applies to our accounting practices which are compatible with commercial and Government auditing requirements.

OUT-OF-PLANT OPERATION

Personnel in all of our departments are available for location within or adjacent to your plant or field locations.



SUMMARY

SERVICES:

PUBLICATION AND GRAPHIC DEPARTMENT

- Technical Writing
- Illustration and Keylining
- Reproduction Typing
- Photography and Binding
- Printing

ENGINEERING DEPARTMENT

- Product Design and Development
- Drafting Layout, Detail, and Checking
- Lofting

DIE MODEL AND TEMPLATE, SHEET METAL PROTOTYPE, AND PLASTIC SHOPS

- Wood and Plastic Die Models
- Mock-ups
- Prototypes
- Duplicates
- Templates
- Temporary Tooling and Aids
- Fixtures
- Gages

FACILITIES:

- 83,000 square feet of modern brick, one-story buildings. Air conditioned and fully equipped.
- We are proud of our past, confident of our future, and equipped to meet the challenges of this technological age through exhaustive quality-control techniques and a desire to provide the finest service available in the Midwest.



**SECTION IV
MISCELLANEOUS SERVICES**

MISCELLANEOUS SERVICES

A. VEHICLE CARLOADING AND PRESERVATION STUDY

B. MAINTENANCE ENGINEERING SERVICES

**SECTION IV
MISCELLANEOUS SERVICES**

A. VEHICLE CARLOADING AND PRESERVATION STUDY

A1 INTRODUCTION

A2 VEHICLE PRESERVATION

- (a) Processing
- (b) Cube Reduction
- (c) Deprocessing

A3 ON VEHICLE EQUIPMENT

- (a) "OVE" Saddle
- (b) Closure, Kit, Vehicle Protective

A4 VEHICLE CARLOADING

- (a) Requirements
- (b) Types of Equipment

A5 PERSONNEL

A6 FACILITIES

SECTION IV MISCELLANEOUS SERVICES

A. VEHICLE CARLOADING AND PRESERVATION STUDY A1 INTRODUCTION

The purpose of the Vehicle Carloading and Preservation Study Section of this proposal is to set forth our method of accomplishing the following:

- (1) Vehicle Preservation Studies from the basic vehicle unpreserved and ready for immediate field use through that vehicle which may be stored out of service for an indefinite period.
- (2) Vehicle Carloading Methods as applicable for the most efficient use of facilities in conjunction to the type of transporting equipment available. Develop carloading procedures based on varying quantities in order to assure the maximum of efficiency in loading and the minimum of costs in transportation.
- (3) Design and Development of a Closure, Kit, Vehicle Protective for storage and/or shipping.

A2 VEHICLE PRESERVATION

(a) Processing

Vehicle processing is that change which a unit must undergo after it has been accepted by inspection and prior to the time it is shipped to the ultimate consignee. During this phase every consideration must be given to the requirements as spelled out in the "Vehicle Preservation Data Sheet TAC FORM 4497A" and cross referenced with "Military specification on vehicle equipment (OVE) for military vehicles" (MIL-P-12841A).

The M-274 Series vehicles have currently two "Vehicle Preservation Data Sheets" issued that are applicable. The first, issued with FSN 2320-064-6373 is for the M-274 vehicle; second, issued with FSN 2320-049-4804 is for the M-274A1 vehicle. In using the appropriate data sheet as described in a contract and in applying those sections of MIL-STD-281A, it is necessary to take into consideration all notes as listed on TAC FORM 4497A.

The four basic methods of processing are Level "A," Level "B," Level "C," and Manufacturer's Commercial Practice. The offeror is experienced with each type as he is presently processing the M-274 under a production contract. If required by directive during the PEC a complete review of these methods will be made.

SECTION IV
MISCELLANEOUS SERVICES

A. VEHICLE CARLOADING AND PRESERVATION STUDY
A2 VEHICLE PRESERVATION—Continued

(b) Cube Reduction

Cube reduction as applied to the M-274 series vehicle becomes an integral part of the processing phase. In obtaining the end goal in cube reduction, some of the basic items, footrest, seats and steering column, are removed and must be stowed on the vehicle, whereas the side rail is lowered to its minimum fixed position. The footrest and seat as a unit become the "On Vehicle Equipment Saddle" when stowed.

A reduction in vehicle cube is practical when it accomplishes a reduction of transportation cost and preserves the basic unit structure without an increase in cost of the vehicle.

When considering the feasibility of cube reduction, cost to reduce the cube and cost to reassemble at destination must be evaluated. Likewise transportation cost must be evaluated with and without cube reduction to arrive at the most economical method for shipment.

(c) Deprocessing

Deprocessing is that action taken by the ultimate consignee to restore the vehicle to its original form. The "Vehicle Preservation Data Sheet" states, "Vehicle shall be deprocessed in accordance with the level of preservation specified in the contract." The action required to deprocess levels "A," "B" and "C" along with the necessary tools required and the cost created therein, will be detailed in the P.E.C. study. A simple detailed instruction sheet will become a part of this study.

A3 ON VEHICLE EQUIPMENT

(a) "OVE" Saddle

The "OVE" Saddle is to serve the purpose, in export shipments, of joining the exterior "OVE" containers to the vehicle. Although the M-274 Series vehicle does have the basic requirements for an "OVE" Saddle it does not meet the export requirement of being in a wood container. We shall, if required by the PEC design an "OVE" Saddle, fabricate a prototype, conduct an on-vehicle rail installation, make any required design modification and prepare necessary documentation.

SECTION IV MISCELLANEOUS SERVICES

A. VEHICLE CARLOADING AND PRESERVATION STUDY A3 ON VEHICLE EQUIPMENT—Continued

(b) Closure, Kit, Vehicle Protective

The "Closure, Kit, Vehicle Protective" development shall include design concept, prototype fabrication and trial loading (trial shipment, if specified). The Closure design concept shall include:

- (1) Consideration of transportation clearances and hazards per Appendix "B" of AR705-8.
- (2) Minimum cube.
- (3) Use of fireproof material.
- (4) Recommendation as to use of closure for shipping, storage, or for both.

A4 VEHICLE CARLOADING

(a) Requirements

The American Railroad Publication titled "Rules Governing the Loading of Commodities in Open-top Cars" Section 6 (Loading of Department of Defense Material on Open-top Cars) shall be reviewed and those procedures applicable therein for the M-274 Series Vehicles shall be applied. Although this section does not specifically reference the M-274 Series Vehicles, particular attention will be paid to the types of Blocks, Braces, Cleats and end blocking as used on other types of vehicles so as to determine the best means applicable to this vehicle.

We shall develop best carloading method so as to obtain the most efficient loading procedure and economical way of shipping these vehicles.

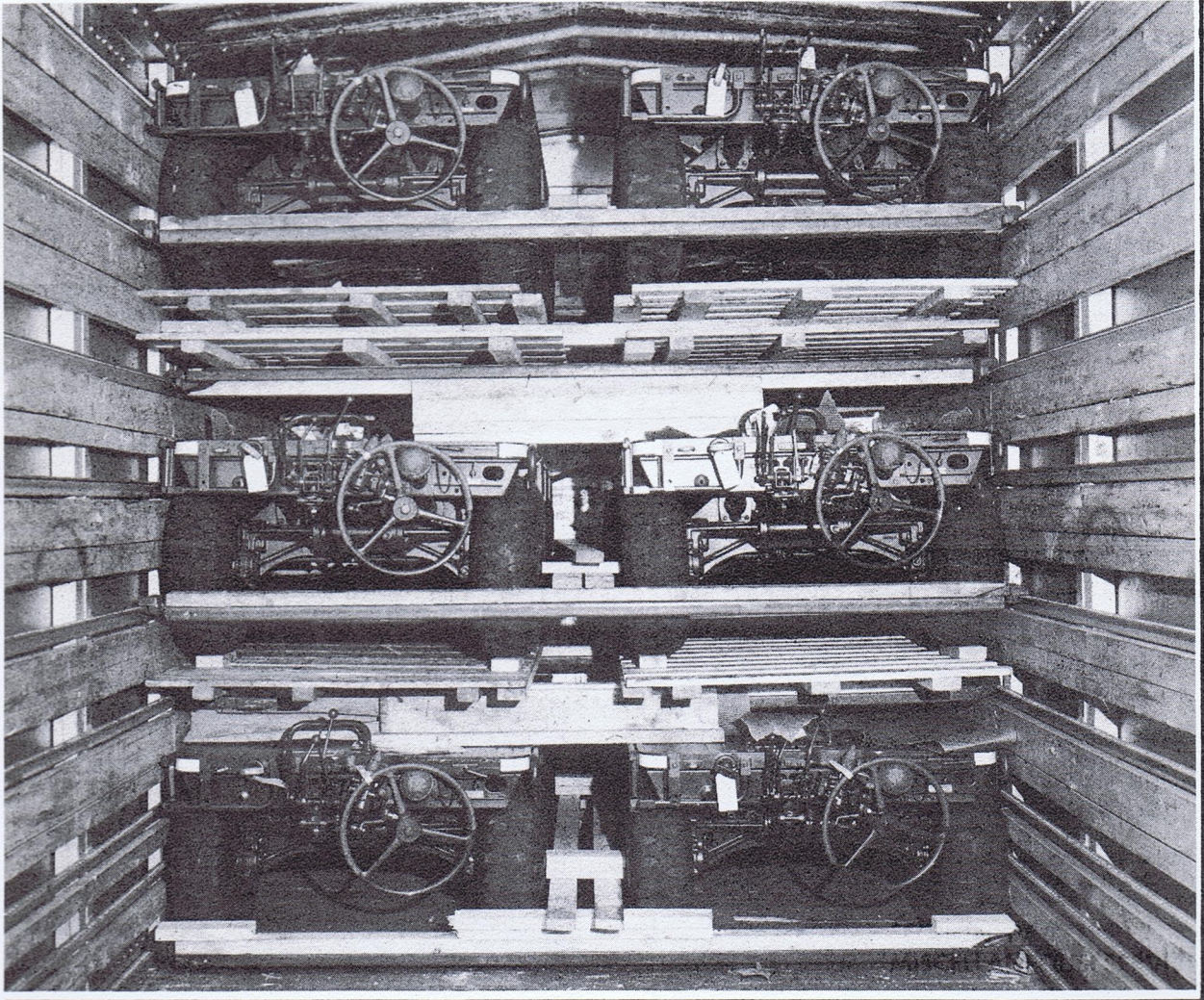
The attached photograph shows one tier of M-274's loaded into a D.F. Rail Car. Note the complete utilization of space.

(b) Types of Equipment

The types of equipment used to obtain the most efficient and economical method of shipping are many and varied. Consideration of the type of processing and the extent to which cube reduction has been achieved on the M-274 should always be the first consideration when planning a shipment. We shall in the P.E.C., if directed, develop a loading procedure and give a cost comparison on the following types of equipment: Open-top flats, Box Cars (DF and PD type) Truck Flat Beds, Vans, Haulaway and bi-tri level loading. Examples of various loading methods are found on the following pages.

SECTION IV
MISCELLANEOUS SERVICES

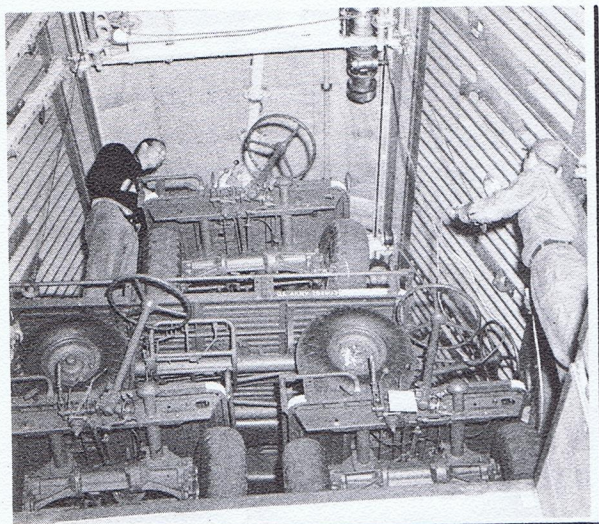
A. VEHICLE CARLOADING AND PRESERVATION STUDY
A4 VEHICLE CARLOADING—Continued



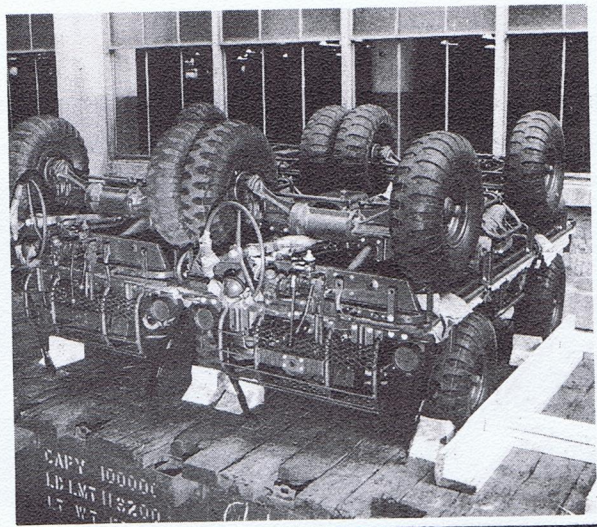
TIERS OF M274'S LOADED IN RAIL CARS

SECTION IV
MISCELLANEOUS SERVICES

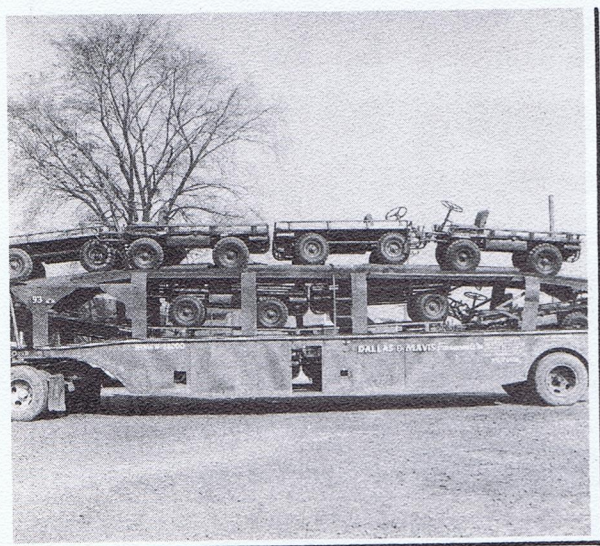
A. VEHICLE CARLOADING AND PRESERVATION STUDY
A4 VEHICLE CARLOADING—Continued



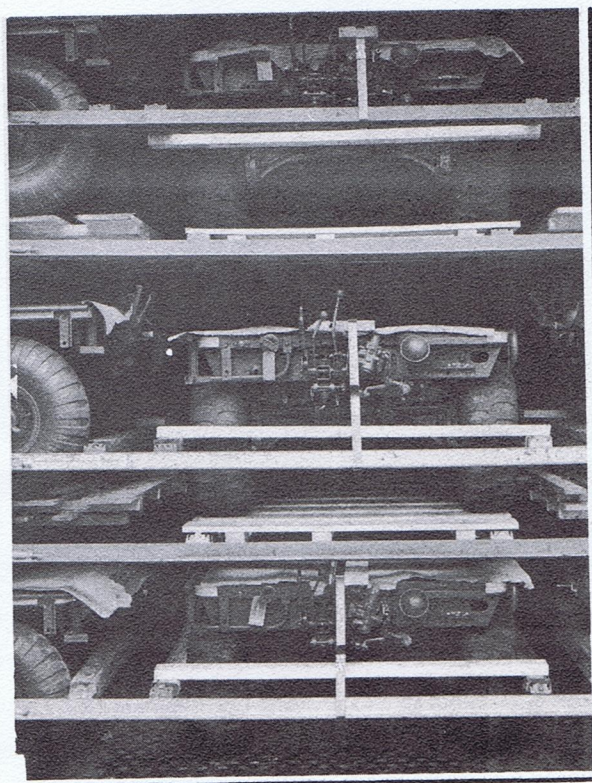
C124 CARGO PLANE



BACK TO BACK FLAT CAR



TRANSPORT TRUCK



FULLY LOADED D. F. RAIL CAR

SECTION IV
MISCELLANEOUS SERVICES

A. VEHICLE CARLOADING AND PRESERVATION STUDY
A5 PERSONNEL

PERSONNEL ASSIGNMENTS

	<u>TITLE</u>	<u>% TIME TO PEC STUDY</u>
I.	<u>MANAGER-MATERIAL HANDLING</u>	<u>15%</u>

In his position as Manager Material Handling, he is responsible for:

- 1) Government Shipping - Driveaway - Haulaway - Bi-Tri level loading and loading when required in DF cars.
- 2) Pre-pack of "OVE" and "GFP" as required by contracts purchase orders, etc.
- 3) Export Prepack, Export boxing, loading and shipping.
- 4) Domestic Shipping - Driveaway - Haulaway - and Bi-Tri level loading.
- 5) Stores Division.
- 6) Receiving Division.
- 7) Plant Transportation.

EDUCATION - BBA - MBA

EXPERIENCE - 10 Years

II.	<u>SUPERINTENDENT-SHIPPING</u>	<u>10%</u>
-----	--------------------------------	------------

In his position as Superintendent of Shipping, he is responsible for all phases of Shipping: Truck, Rail, Waterway and Air. All Shipping Division Personnel assigned to government contract work report all progress to his office.

EDUCATION - High School - College - 2 Years

EXPERIENCE - 15 Years

SECTION IV
MISCELLANEOUS SERVICES

A. VEHICLE CARLOADING AND PRESERVATION STUDY
A5 PERSONNEL—Continued

PERSONNEL ASSIGNMENTS

	<u>TITLE</u>	<u>% TIME TO PEC STUDY</u>
III.	<u>PACKAGING ENGINEER</u>	<u>20%</u>

In his position as Packaging Engineer, his duties are:

- 1) Design all boxes, crates, cartons, pallets and skids used in shipping material and finished products from KAISER Jeep CORPORATION.
- 2) Experimental boxing and crating of finished vehicles.
- 3) Develop for production from government data sheets, requirements for processing to various levels.
- 4) Develop vehicle pilot packs.

EDUCATION - BE Degree

EXPERIENCE - 3 Years - Supervisor Government Packaging, Rossford Ordnance Depot.
5 Years - Supervisor Government Prepack and Packaging Parts, Willys Motors.
10 Years - Packaging Engineer in charge of Experimental Box Department, Kaiser Jeep Corporation.

IV.	<u>GENERAL FOREMAN</u>	<u>15%</u>
-----	------------------------	------------

In his position as General Foreman, he is responsible for the processing of all government vehicles shipped from KAISER Jeep CORPORATION, regardless of type or to degree of processing. He is in charge of all car loading, Bi-Tri Level, DF or DP, Evans Loader and box cars.

EDUCATION - High School - 4 Years

EXPERIENCE - Prepack (Government Parts) - 3 Years.
General Foreman - 12 Years.

SECTION IV
MISCELLANEOUS SERVICES

A. VEHICLE CARLOADING AND PRESERVATION STUDY
A5 PERSONNEL—Continued

PERSONNEL ASSIGNMENTS

	<u>TITLE</u>	<u>% TIME TO PEC STUDY</u>
V.	FOREMAN	15%
	In his position as foreman, he is responsible for processing of M38A1, M170 and CJ3B vehicles. Assists Packaging Engineer in developing pilot pack vehicles on various contracts.	
	EDUCATION - High School - 4 Years Technical - 2 Years	
	EXPERIENCE - 10 Years - Shipping 7 Years - Foreman - 6 Years - Prepack (Government Parts)	
VI.	GENERAL OFFICE MANAGER	15%
	In his position as General Office Manager, he is responsible for all Government Contracts with respect to shipments from KAISER Jeep CORPORATION. All shipping forms are his responsibilities. Assists Shipping Superintendent in completion of shipping schedules. Supervises the preparation of all domestic, export and government paper work for shipment of built-up, boxed and CKD units.	
	EDUCATION - College - BA 3 Years Law School - 2 Years	
	EXPERIENCE - Present Position	

SECTION IV
MISCELLANEOUS SERVICES

A. VEHICLE CARLOADING AND PRESERVATION STUDY
A5 PERSONNEL—Continued

The Shipping Division contains approximately 500,000 square feet of work area. Of this area we will set aside for the development of the P.E.C. contract: (1) 12,000 square feet for the processing study; (2) 12,000 square feet for the development of the "Closure;" (3) 6,000 square feet of dock loading area for any and/or all loading trials.

In addition to the work area allotted to this study, the following plant equipment is available and will be utilized as is required.

- 1) Overhead Crane - 5-ton Capacity
- 2) Fork Trucks - Capacity ranging from 1 ton to 5 tons.
- 3) Saws - Hand, Skill, Thru Bench and Band types.
- 4) Hand Tools - Hammers, Wrench and Power.
- 5) Portable Vehicle Loading Ramps.

SECTION IV
MISCELLANEOUS SERVICES

B. MAINTENANCE ENGINEERING SERVICES

The offeror proposes to perform the following program under the Maintenance Engineering phase of the PEC in support of engineering changes and under the direction of ATAC technical representatives in the following areas:

1. The contractor will furnish services and necessary supplies to support the activities of a government maintenance evaluation team and understands such support services as follows:
 - (a) Understands and agrees that a government maintenance team may, from time to time, conduct maintenance evaluation on the contractor's premises during normal working hours.
 - (b) Agrees that he shall render all administrative, mechanical, photographic and other required assistance as requested by this maintenance team.
 - (c) Assists in the maintenance evaluation of these operations regarding the vehicle or its components as chosen by the team.
 - (d) Have performed for the team all physical disassembly of the vehicle or its components.
 - (e) Supply working space, office space, tools, equipment and test facilities as required by maintenance team.
2. The contractor will review any engineering order releases to determine what effect on performance and maintenance of the vehicle or its components, and also what effect such release might have on current technical publications. Such findings are to be reported to the contracting officer's technical representative.
3. Under this phase the contractor is to supply services to develop any necessary modifications or special purpose kits and will perform trial installation of modifications or special purpose kits using Ordnance-type tools and simulated military facilities and to gather all data to assure practicality of the design under trial.
4. The contractor is to be responsible for performing any equipment performance and/or durability tests on the vehicle and/or its components as required by the technical representative.

SECTION V
TERMS AND CONDITIONS

TERMS AND CONDITIONS

It is a condition of KAISER Jeep CORPORATION's proposal that KAISER Jeep CORPORATION would not be considered an ineligible contractor by reason of performing the production engineering called for by this proposal for any procurement of the 1/2 ton, 4x4 M-274 and any procurement of the vehicle by the government whether competitive bid or negotiated.

To the extent that KAISER Jeep CORPORATION has proprietary rights and can give the government rights, without cost to KAISER Jeep CORPORATION, this corporation would be willing to grant to the government the rights set forth in the Patent Clause found in ASPR 9-107.2(b) and the Data Clause found in ASPR 9-203.1 and ASPR 9-203.4.

KAISER Jeep CORPORATION

- FACILITIES
- ORGANIZATIONAL STRUCTURE
- PAST PERFORMANCE

KAISER INDUSTRIES CORPORATION

- FACILITIES
- ORGANIZATIONAL STRUCTURE
- PRODUCTS

SECTION VI
KAISER Jeep CORPORATION

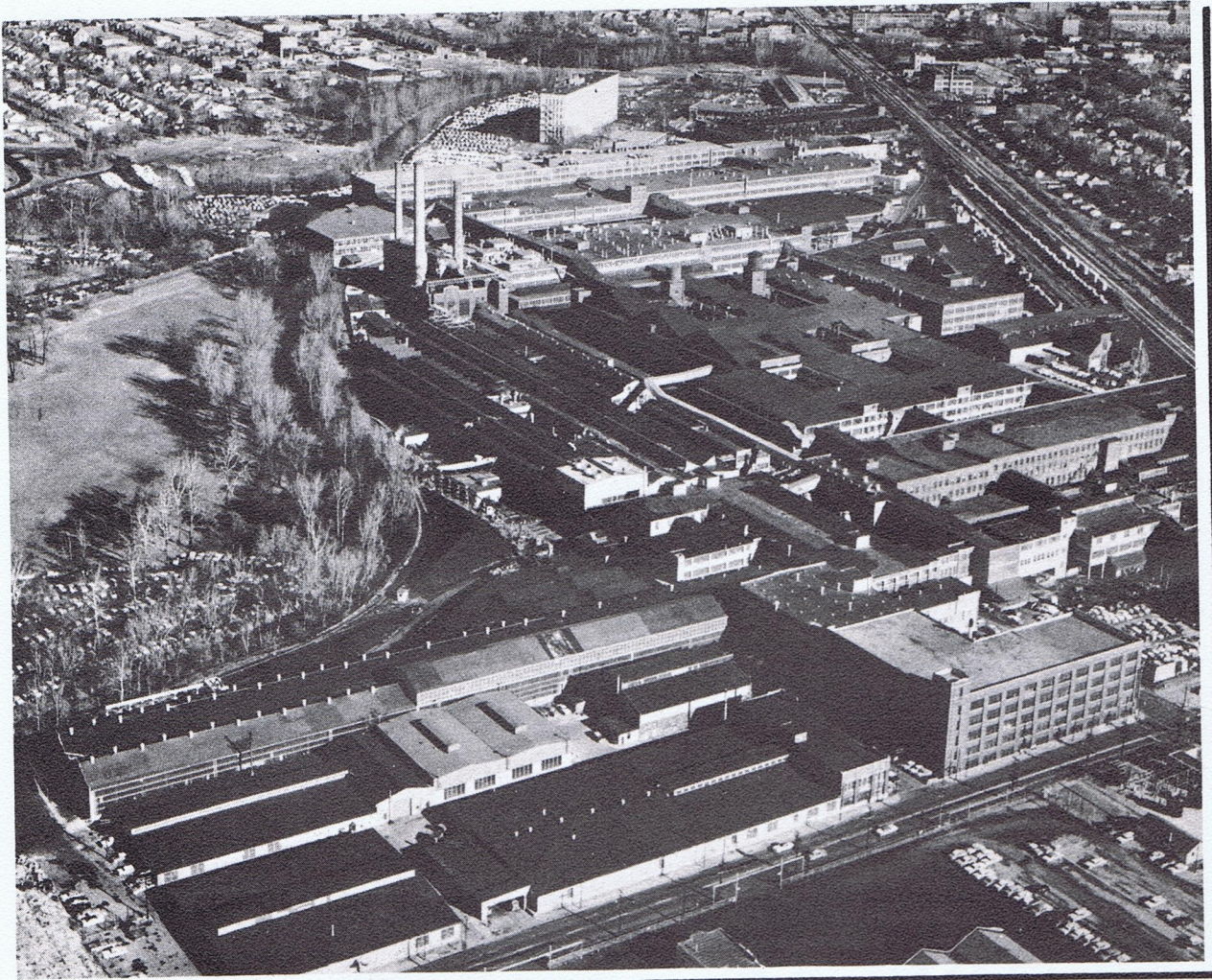
KAISER Jeep CORPORATION

- **FACILITIES**
- **ORGANIZATIONAL STRUCTURE**
- **PAST PERFORMANCE**

SECTION VI KAISER Jeep CORPORATION

FACILITIES

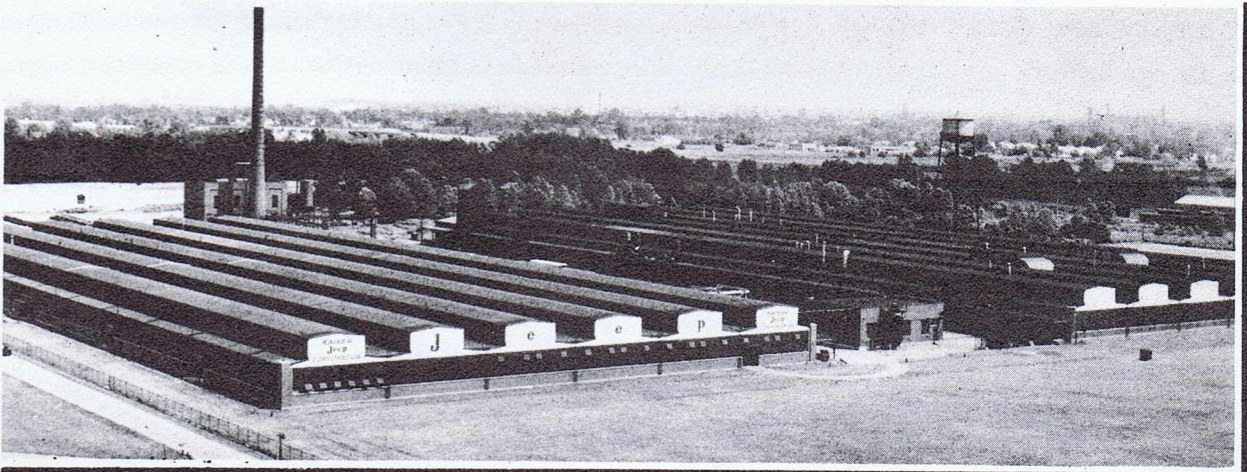
Manufacturing facilities of KAISER Jeep CORPORATION are comprised of three integrated plants for manufacturing and assembling 'Jeep' vehicles as pictured below and on the following page.



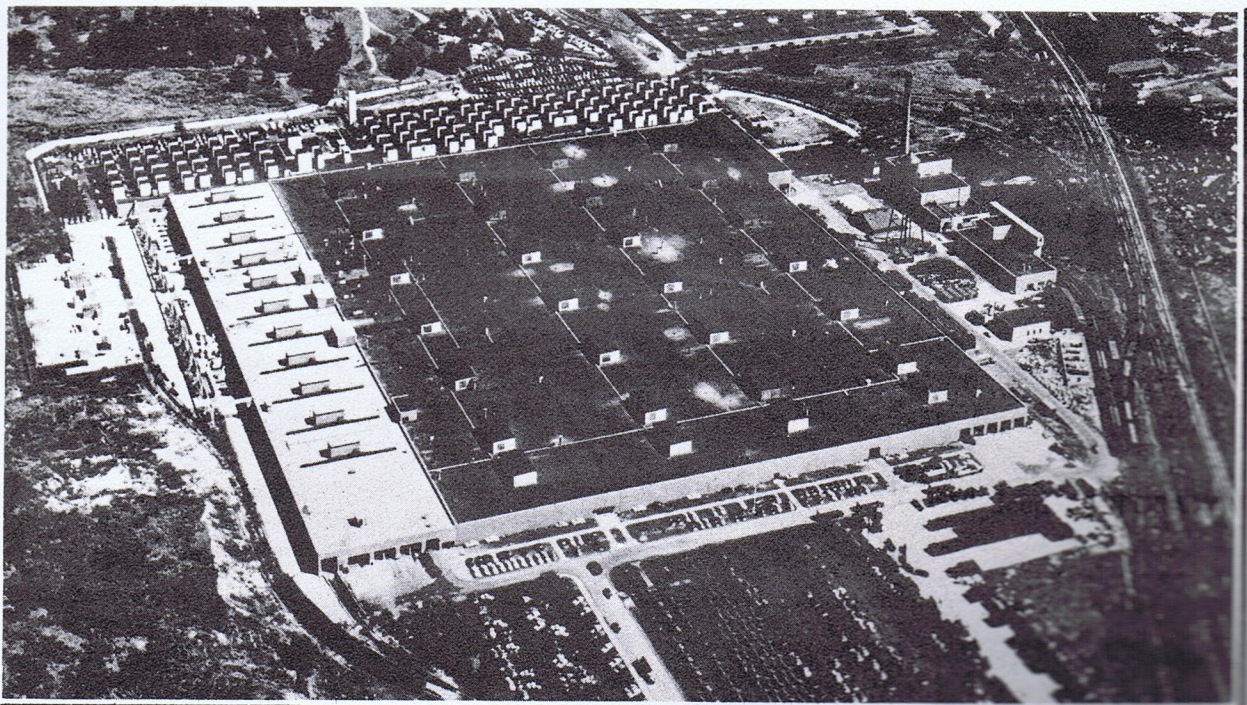
Main plant and central offices of KAISER Jeep CORPORATION on North Cove Boulevard in Toledo. This self-sufficient facility includes a Press Division, Machine Shop Division, Body Division, Paint Division, Export Packing Division, Tube Mill Division, Production Engineering Division, and many supporting departments which make this a completely integrated facility.

SECTION VI
KAISER Jeep CORPORATION

FACILITIES



Plant #2 is located on Stickney Avenue in Toledo and is currently utilized as the M-151 facility. This modern plant consists of approximately 500,000 square feet of assembly and manufacturing area and a half-mile hard surface test track.



Plant #3 is a modern, completely air-conditioned facility in South Bend, Indiana. This building has a manufacturing and assembly area of nearly 1,000,000 square feet.

SECTION VI
KAISER Jeep CORPORATION

FACILITIES

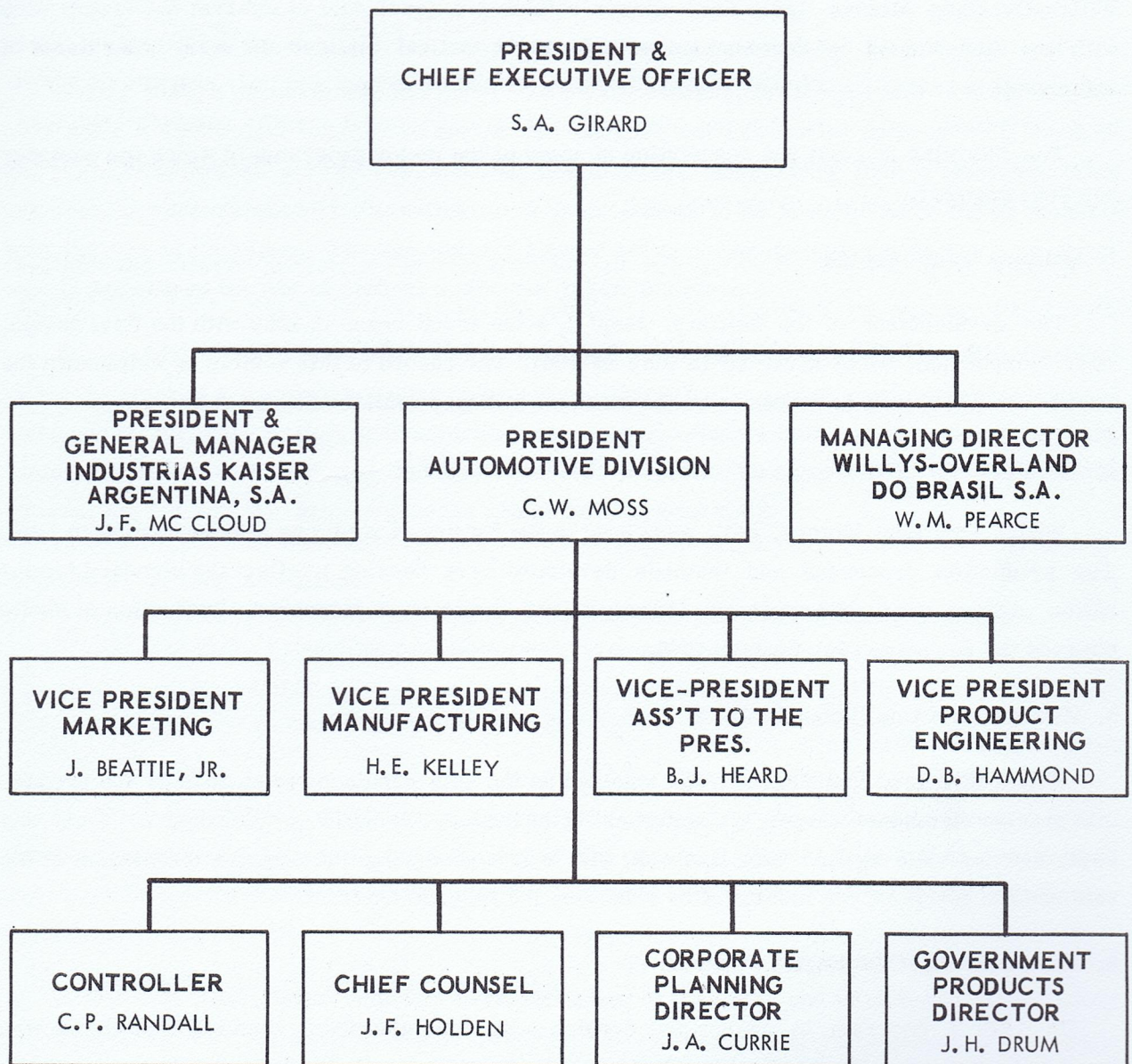
KAISER Jeep CORPORATION is a wholly owned subsidiary of Kaiser Industries Corporation, and is one of the few automotive operations which date back more than a half-century. This year marks 62 years of automotive manufacturing by KAISER Jeep CORPORATION, builders of the world-famous line of 'Jeep' vehicles.

There are now 19 basic 'Jeep' models on wheelbases ranging from 80 to 126 inches. This fundamental versatility is further enhanced by specialized equipment and body adaptations which can convert basic units to an amazing variety of applications to meet specific requirements. Led by the ubiquitous 'Jeep' Universal, KAISER Jeep CORPORATION today continues as the world's largest producer of 4-wheel drive vehicles.

KAISER Jeep CORPORATION is now the nation's largest exporter of commercial vehicles under 10,000 pounds gross weight. 'Jeep' vehicles are manufactured or assembled in 23 foreign plants and are marketed in more than 150 countries of the free world.

ORGANIZATIONAL STRUCTURE

ORGANIZATION AND MANAGEMENT
KAISER Jeep CORPORATION



SECTION VI KAISER Jeep CORPORATION

PAST PERFORMANCE

PAST PERFORMANCE AND EXPERIENCE IN SIMILAR OR RELATED FIELDS

KAISER Jeep CORPORATION and its predecessor companies (Willys Motors, Inc. and Willys-Overland Motors, Inc.) have always exhibited a great deal of interest and cooperation with the Government in development of lightweight tactical vehicles and many other items of equipment.

The following is a list and description of some of the major programs in which the company has been engaged:

1. Military 'Jeep' Vehicle

The development of the Military 'Jeep' 1/4-ton truck began in 1939 with the final design, after competition, being accepted in July of 1941. The record of this vehicle is well known the world over and it still continues to be the standard Military vehicle of many nations.

2. 155 Millimeter Shells

Willys-Overland Motors, Inc., pioneered in the forging of shells as against casting in 1940. The production processes and methods developed here became in effect the standard for the nation at that time. Subsequently 155mm smoke shells were pioneered. Production of shells covered the period of 1941 through 1945.

3. MX-544 Airframe (Robomb; JB-2)

Willys-Overland Motors, Inc., was selected as the only manufacturer to develop and produce this precise electronic weapon, a counterpart of the famous German V-2 'Buzzbomb.' Year was 1944, and the race against time was won, with Willys producing this complex mechanism at the rate of 1200 per year, six months after receiving the Robomb contract.

4. Aluminum Die-Cast Engine Program

In 1949 a program to design and develop a die-cast aluminum, liquid-cooled engine was instituted. Subsequently the Doehler-Jarvis Division of National Lead came into the program. The development work was continued to the point that an actual six-cylinder block was success-

PAST PERFORMANCE

fully die-cast. While this program was not initiated specifically or exclusively for the military market, it was presented for consideration and possible further development work under government contract. The results of this pioneering effort can be seen in today's automobiles.

5. Military Projects - Lightweight Materials

During 1950, a program was instituted at company expense, for the purpose of designing and developing a lightweight engine. An engine was designed and a prototype actually built; the program scope embraced a V-4, V-6, and V-8, liquid-cooled. Also during 1950, a study was made and designs were completed for an entirely new 'Jeep' vehicle to be constructed as far as possible with the use of aluminum. The Government elected not to pursue this avenue at this time, principally because of the use of critical materials (prime aluminum).

During 1951 to 1953, an extensive study was made of the then existing Military 'Jeep' vehicle in the interest of reducing the weight of the entire vehicle by the use of aluminum in the various components, including engine, transmission, etc., as well as prime aluminum for use in the body. Aluminum was to replace steel and iron wherever possible. This project was presented to the Government but rejected again due to the use of critical materials.

6. M170 Front Line Ambulance

In 1951, the M170 Front Line Ambulance was developed and sold in quantities. It is currently a standard military vehicle.

7. Allison Torque Converter Project

In 1952, the Allison Division of General Motors Corporation in conjunction with Willys Motors developed an Allison Torque Converter for use on a Military Jeep unit to demonstrate and check the performance of an automatic transmission on a 4-wheel drive vehicle for military evaluation.

In October, 1953, these vehicles were submitted to the Army and were tested by the Army in conjunction with Allison and Willys personnel at various test agencies including Aberdeen, Fort Benning, Fort Bragg and Fort Knox. The tests were completed and while some interest was

SECTION VI KAISER Jeep CORPORATION

PAST PERFORMANCE

displayed, no contract resulted and shortly thereafter a directive was issued by the Chief of Ordnance that automatic transmissions would not be used in any vehicle under the 2-1/2 ton class.

8. TCP Engine Program

In 1952, a \$60,000 contract was accepted from Army Ordnance to build six 4-cylinder multi-fuel engines to operate on the Texas Combustion Process. The project was carried on in conjunction with the Texas Oil Company. In May, 1954, the engines were delivered to Ordnance for their further study and experimental tests. Willys Motors was asked to submit a proposal for design and fabrication of die-cast prototype engines, and it was submitted to the Commanding General of the U.S. Marine Corps on July 15, 1954. However, a contract did not develop.

9. Lightweight Airborne Military 'Jeep' Program

In 1953, Willys developed a lightweight airborne 'Jeep' vehicle known as Model MX (Bobcat). This vehicle was constructed of major units used in the World War II 'Jeep' model, redesigned to eliminate weight and to use lightweight metals to the fullest extent. A prototype was built and delivered to Aberdeen Proving Grounds and the Marine Corps Equipment Board at Quantico for test. This vehicle was on test at these two agencies for a period of approximately two years, and while it proved quite successful both from a weight and performance standpoint (and considerable interest shown), no contract resulted.

Concurrently with the building and testing of the prototype Model MX (Bobcat), Willys was designing an entirely new airborne 'Jeep' vehicle which would be constructed of new components including an air-cooled engine. This program was presented to Ordnance and the Marine Corps and other potential users.

PAST PERFORMANCE

10. M274, Mechanical Mule Program

In 1952 the Government authorized Willys to build five experimental models of a weapons carrier utilizing a revolutionary platform design which was first conceived for use in South Pacific jungles during World War II. The work done under these contracts led to concurrent Engineering (VESA) and Production Contracts and subsequent production for the Marine Corps and Army. This vehicle has been standardized and is currently in production.

A concept study leading toward a Mechanical Mule family was provided and a contract awarded in June, 1956. This contract called for concepts for the following three vehicles:

- a. An improved M274 (rearrangement of components, etc.)
- b. A 3/4-ton capacity "convertible" Mule, capable of carrying either cargo or seating 6 passengers
- c. A 1-1/2 ton capacity "Super Mule"

Four convertible Mules (XM443E1) were sold to the Government and Willys Motors made studies for an amphibious version at its own expense. Further improvements and modifications of the M274 were done under a contract with Ordnance, but entirely at Willys Motors' expense.

11. Audio Visual Vehicles

In 1956, an audio-visual truck was developed for the Voice of America, incorporating electronic equipment produced by Kaiser Aircraft and Electronics Division. During the subsequent period of time, the unit has grown more elaborate and popular, especially for offshore usage. It is a rugged vehicle, self-contained and completely equipped with generator, transformer, film projector, tape recorder, etc.

12. Fluid Cargo Carrier

In 1956, the U.S. Rubber Company with Willys Motors, developed the Army Transportation Corps' new fluid cargo carrier. The cargo carrier is a large, hollow, rubber roller capable of

SECTION VI
KAISER Jeep CORPORATION

PAST PERFORMANCE

carrying 500 gallons of fluid cargo and equipped for towing in single or paired columns behind a 'Jeep' unit or other vehicle. This unit has been dubbed the "windbag with brakes." Early in 1957, Willys completed four units on an R & D contract.

13. Army Security Agency Project

In 1956, discussions were started with Army Security Agency concerning its requirement for a vehicle built around a stripped down M170 ambulance. In 1957, Willys received an invitation to design and fabricate one truck, Electronic, 1/4-ton 4 x 4 M170EL. Willys subsequently received a contract and delivered this vehicle to the Army Security Agency.

14. Aluminum Air-Cooled Engine Program

A project was initiated in 1956, entirely at Willys Motors' expense, to develop a family of die-cast aluminum air-cooled multi-fuel engines ranging from 1 to 8 cylinders and varying in horsepower from 12-1/2 to 200. This program has now reached the stage where there are several prototype 4-cylinder, 100-H.P. engines built, currently using gasoline as fuel, but with diesel and multi-fuel capabilities expected in the near future. The 100-H.P. air cooled gasoline units are installed in the XM443E1 vehicles.

15. FC-170 Cargo Personnel Trucks

In June, 1959, four (4) 'Jeep' Forward Control Trucks were modified to meet U.S. Marine Corps requirements for Cargo-Personnel transporting. A contract for a quantity of these vehicles is now in production.

PAST PERFORMANCE

16. J-Series

Late in 1962, the all-new 'Jeep' Wagoneer Station Wagon series and 'Jeep' Gladiator Truck lines were introduced as a culmination of a major product development program.

17. Miscellaneous Projects

In addition to the foregoing list of projects, considerable other developmental work has been performed by KAISER Jeep CORPORATION through the years. Some of these projects are vehicle designs adapted to Military usage, such as an Armored vehicle, a Missile Carrier, a Snow vehicle, as well as a 'Jeep' Foam Firefighter, Crash and rescue trucks, Aircraft Cargo Belt-Loader, Lavatory Service Truck, and ADI Water truck, etc.

KAISER Jeep CORPORATION has designed, developed and is producing a complete commercial line of 4-wheel drive vehicles in the 2600- to 9000-pound GVW category. Many models have 2-wheel drive counterparts. Their versatility, ruggedness and economy have achieved for 'Jeep' vehicles an enviable reputation in the light truck industry. Their success is attested to by wide distribution in Domestic and Export markets.

SECTION VI
KAISER INDUSTRIES CORPORATION

KAISER INDUSTRIES CORPORATION

- FACILITIES
- ORGANIZATIONAL STRUCTURE
- PRODUCTS

SECTION VI
KAISER INDUSTRIES CORPORATION

FACILITIES

Management of KAISER Jeep CORPORATION is strengthened and depth provided through the parent organization Kaiser Industries Corporation. Following is a composite of the Kaiser industrial organization and products . . .

*Active Companies and Subsidiaries	60
Employees	68,677
Annual Payroll	\$ 436,747,000
Stockholders	138,100
Plants and Facilities	139
Products and Services	300
Annual Sales	\$ 1,315,922,000
Assets	\$ 1,962,422,000

PRODUCTS

*September 30, 1963

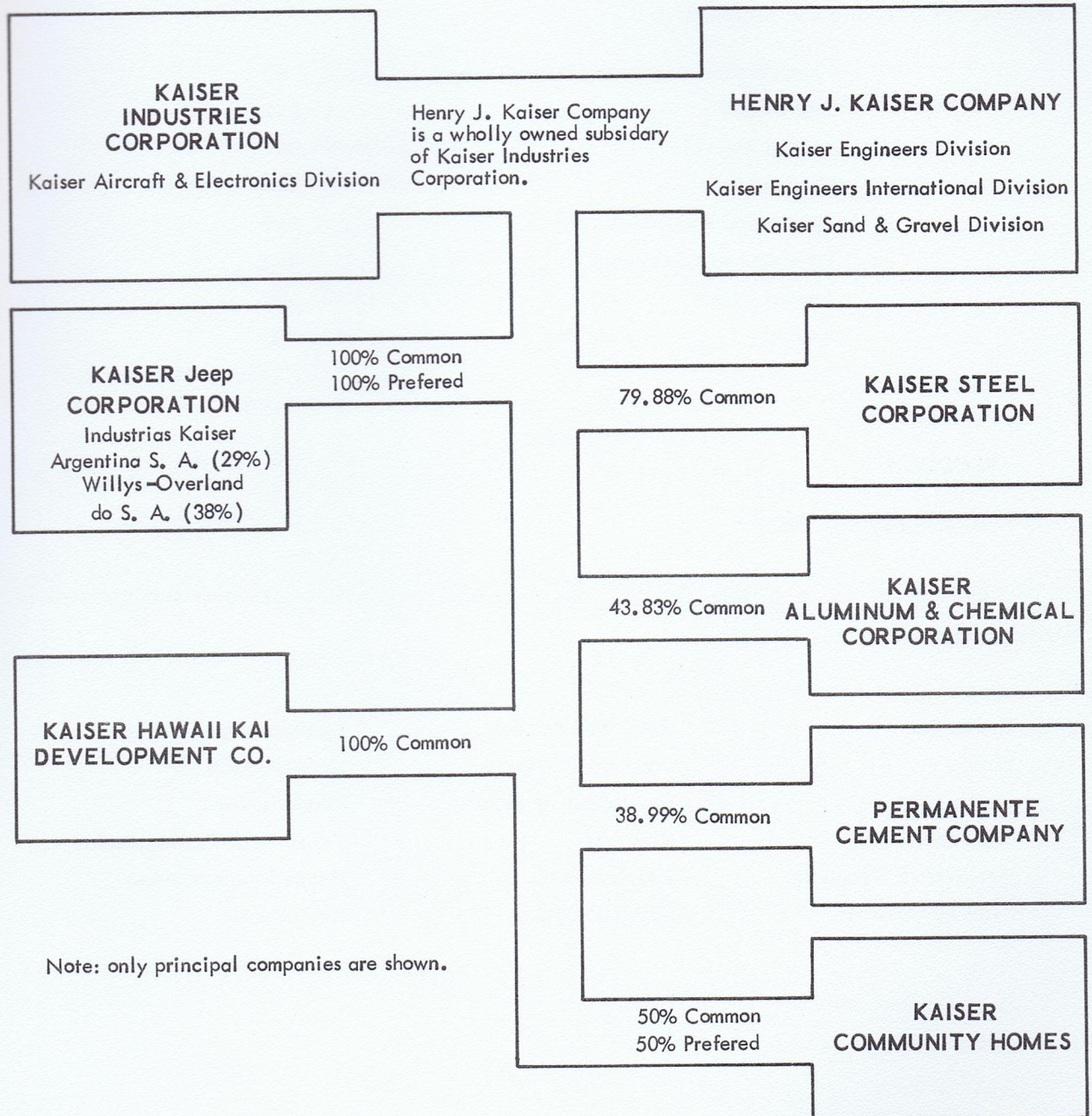
In addition to the complete line of 'Jeep' vehicles other basic products and services of Kaiser Industries are:

Aluminum	Steel Fabricating	Engineering
Steel	Gypsum Products	Construction
Chemicals	Insulating Products	Shipbuilding
Cements	Aircraft	Television Transmission
Refractory Products	Electronics	Radio Transmission
Sand and Gravel	Metal Products	Real Estate

SECTION VI
KAISER INDUSTRIES CORPORATION

ORGANIZATIONAL STRUCTURE

ORGANIZATION AND MANAGEMENT



SECTION VII
ESTIMATED COST

ESTIMATED COST

SECTION VII
ESTIMATED COST

Estimated Hours & Cost

SECTION I	Average Hourly Rate	Man Hours	Material	Labor	Burden @ 75%	Sub Total Cost	G & A Expense @ 4%	Total Cost	Fixed Fee @ 6%	Total
PRODUCT ENGINEERING										
a) Drawing changes required due to Field Service requirements	\$ 4.00	1566		\$ 6,264.00	\$ 4,698.00	\$ 10,962.00	\$ 438.48	\$ 11,400.48	\$ 684.03	\$ 12,084.51
b) Inspection and corrections of drawings for contract 4051(T)	4.00	3480		13,920.00	10,440.00	24,360.00	974.40	25,334.40	1,520.06	26,854.46
c) Future drawings for contract 4051(T)	4.00	1042		4,168.00	3,126.00	7,294.00	291.76	7,585.76	455.15	8,040.91
d) Drawings for a more Austere Vehicle Redesign		2884		11,536.00	8,652.00	20,188.00	807.52	20,995.52	1,259.73	22,255.25
e) Drawings corrected for Spare Parts Kits		174		696.00	522.00	1,218.00	48.72	1,266.72	76.00	1,342.72
f) Maintenance Tools		174		696.00	522.00	1,218.00	48.72	1,266.72	76.00	1,342.72
g) Technical Documentation for Manufacturing		2088		8,352.00	6,264.00	14,616.00	584.64	15,200.64	912.04	16,112.68
h) Monthly Progress Reports		522		2,088.00	1,566.00	3,654.00	146.16	3,800.16	228.01	4,028.17
i) Periodic Technical Report		650		2,600.00	1,950.00	4,550.00	182.00	4,732.00	283.92	5,015.92
SECTION II										
INSPECTION ENGINEERING										
a) Purchased Engineering Services	5.65	1500	\$ 8,475.00			8,475.00	339.00	8,814.00	528.84	9,342.84
b) Maintenance of Inspection Engineering Package	5.00	1584	7,920.00			7,920.00	316.80	8,236.80	494.21	8,731.01
c) In plant Tool Engineering Labor	3.75	616		2,310.00	1,732.50	4,042.50	161.70	4,204.20	252.25	4,456.45
d) Microfilming Services			500.00			500.00	20.00	520.00	31.20	551.20
SECTION III										
FIELD SERVICE PROVISIONING										
a) Repair Parts Provisioning	3.66 1.96	300 25		1,149.00	861.75	2,010.75	80.43	2,091.18	125.47	2,216.65
b) Publication Services	2.00 5.50	1173 3281	18,046.00	3,290.00	2,467.50	23,803.50	721.84	24,525.34	1,471.52	25,996.86
SECTION IV										
MISCELLANEOUS SERVICES										
a) Maintenance Engineering	4.68	2000		9,360.00	7,020.00	16,380.00		16,380.00	982.80	17,362.80
TOTAL ESTIMATED HOURS & COST		23,059	\$34,941.00	\$66,429.00	\$49,821.75	\$151,191.75	\$5,162.17	\$156,353.92	\$9,381.23	\$165,735.15
ADDITIONAL SERVICES WHICH MAY BE REQUIRED BUT NOT INCLUDED IN OUR PROPOSED COST										
FIELD SERVICE PROVISIONING										
Metal reusable container study	\$ 10.00	2320	\$23,197.00	\$	\$	\$ 23,197.00	\$ 927.88	\$ 24,124.88	\$ 1,447.49	\$ 25,572.37
MISCELLANEOUS SERVICES										
Vehicle Carloading and Preservation Study	3.66	3300	1,000.00	12,085.00	9,063.75	22,148.75	885.95	23,034.70	1,382.08	24,416.78
Special Maintenance Tools			20,000.00			20,000.00	800.00	20,800.00	1,248.00	22,048.00

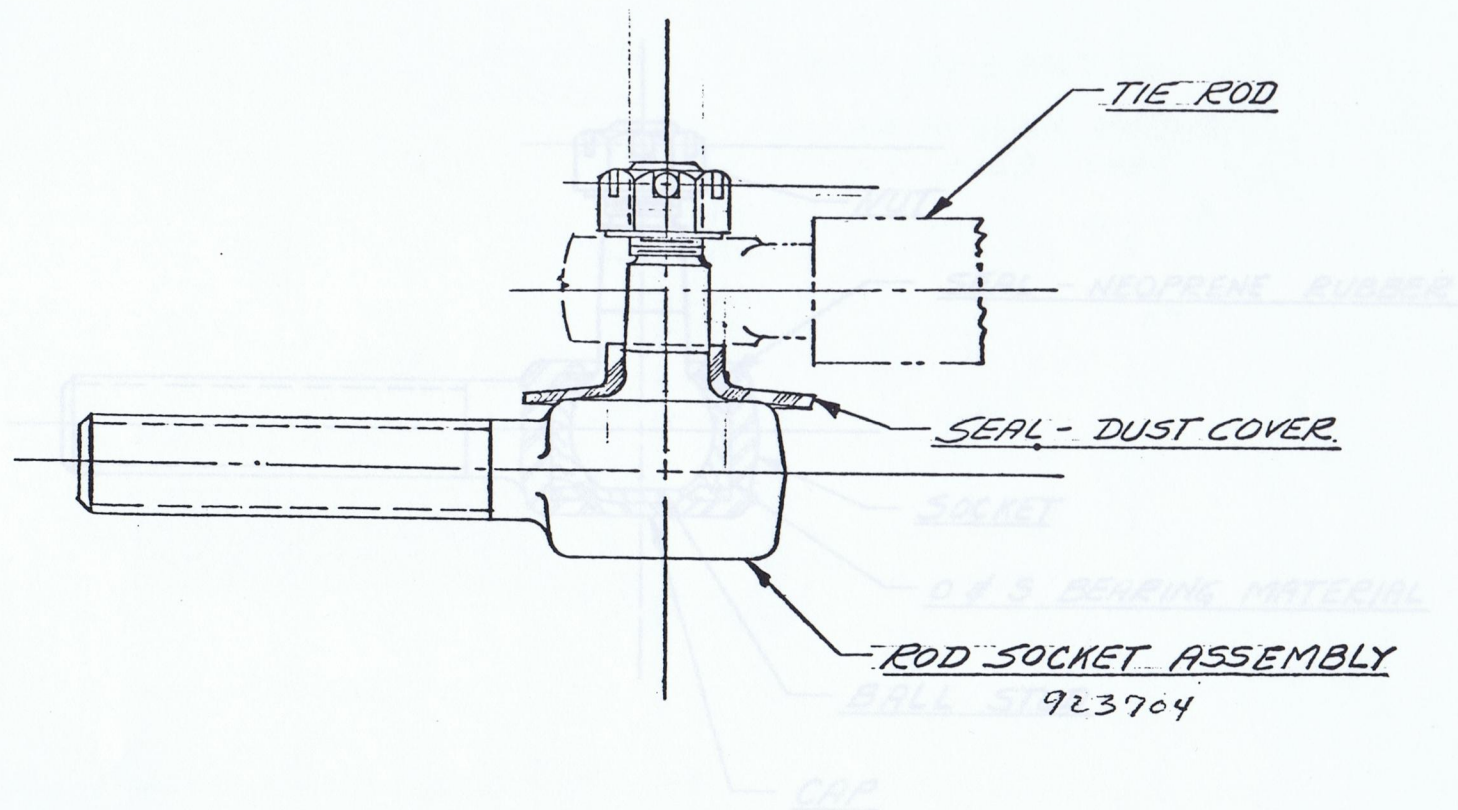
SECTION I
PRODUCT ENGINEERING SERVICES

**E. PRODUCT ENGINEERING
FACILITIES**

EXPERIMENTAL DIVISION, Toledo



This facility is equipped to make, assemble and test all items pertaining to automotive experimental and development work. Major departments include a pattern and model shop, sheet metal shop, soft-trim shop, paint shop, engine build-up and testing equipment which consist of a modern dynamometer laboratory, Belgian Rolls, electrical test laboratory, micro-measurements inspection laboratory, and photography department.



EXISTING
TYPICAL INSTALLATION - STEERING

SECTION II INSPECTION ENGINEERING SERVICES

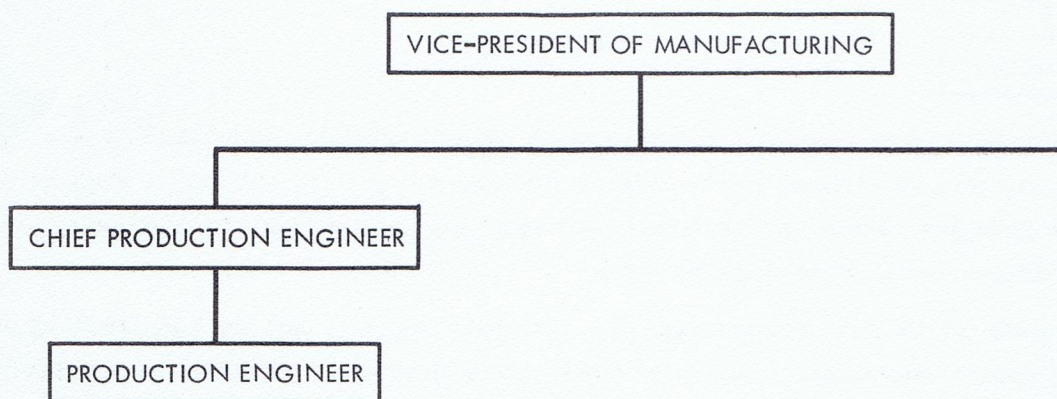
A. APPROACH

The approach of KAISER Jeep CORPORATION to Inspection Engineering requirements of the program would be substantially to subcontract to Modern Engineering Service Co., 1695 Twelve Mile Road, Berkley, Michigan. We have included in EXHIBIT 1, Section II their quotation including their understanding, approach and qualifications to do this work.

Management of this subcontract effort will be by our Chief Production Engineer who will be responsible for organizing and supervising the preparation and maintenance of Inspection Equipment drawings, Inspection Equipment Supply Lists and EPL's.

The Director of Quality Control in close association with Production Engineering will be responsible for providing and maintaining Inspection Planning lists, EPL's and SQAP's and End Item inspection requirements and SQAP inspection methods.

Supporting services will be provided "in house" by the personnel listed under the Section entitled Organization. Inspection Facilities available for this program are listed under Facilities.



The chief production engineer has had 18 years experience in the automotive industry. He has an engineering degree from the University of California, is a member of the California Scholarship Federation and is a member of ETA-Kappa Nu, National Engineering Honor Society. His experience includes chief electrical engineer, chief facilities engineer, and assistant production engineer.