



April/May 2020

# APRIL/MAY

Dakota Territory Air Museum's P-47 Update

by Chuck Cravens



AIRCORPS AVIATION



Jenny, a 341st Fighter Squadron P-47,

photo downloaded from <http://onepilotswar.blogspot.com/2010/07/full-color-photos-of-341st-fighter.html>, 5/21/2020



[www.dakotaterritoryairmuseum.com](http://www.dakotaterritoryairmuseum.com)



## Update

Adaptations in how we work on warbird restorations in the current health crisis have become more comfortable, and progress on the P-47 is going well. One milestone happened this month when Eric Hokuf transported the spars down to be anodized before assembly.

## Recognition Light Control Box

Systems installation in the cockpit took up a lot of time this month.



The instrument panel as more components are installed.





The lower right instrument panel showing the cowl flap control and the recognition light switch box, in the upper and mid center respectively. The sub panel with the orange light is where the oxygen gauges will live (pressure gauge and blinker).

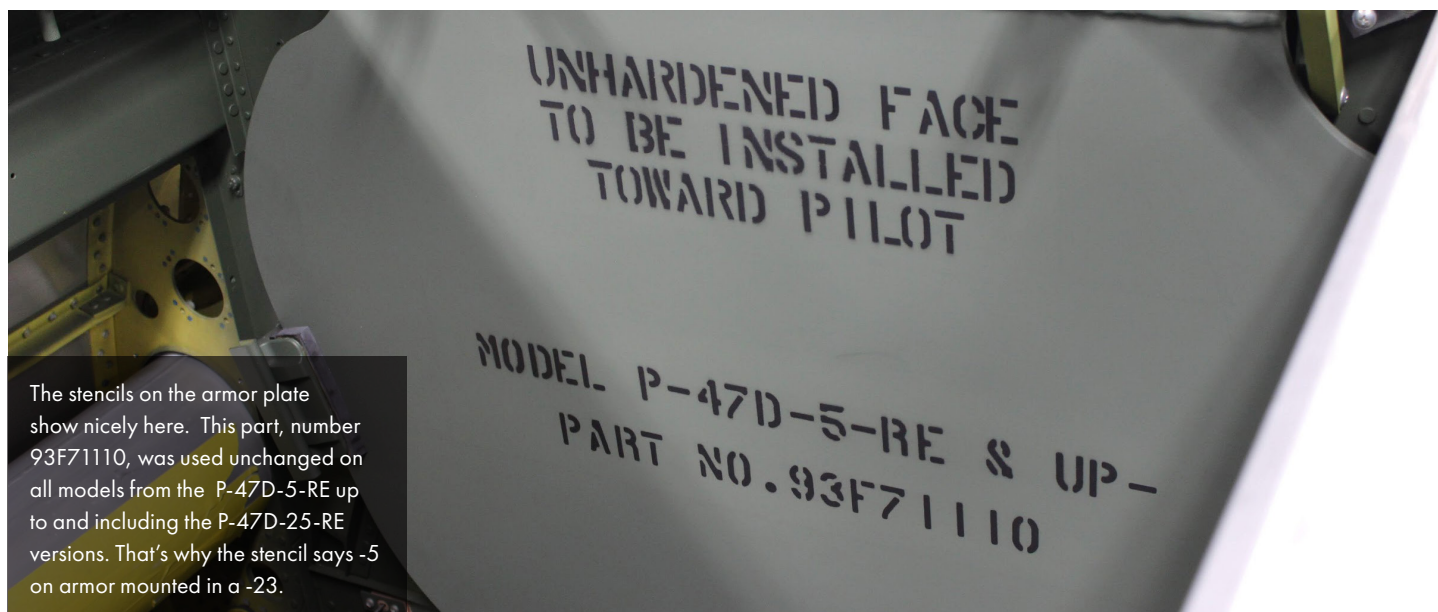
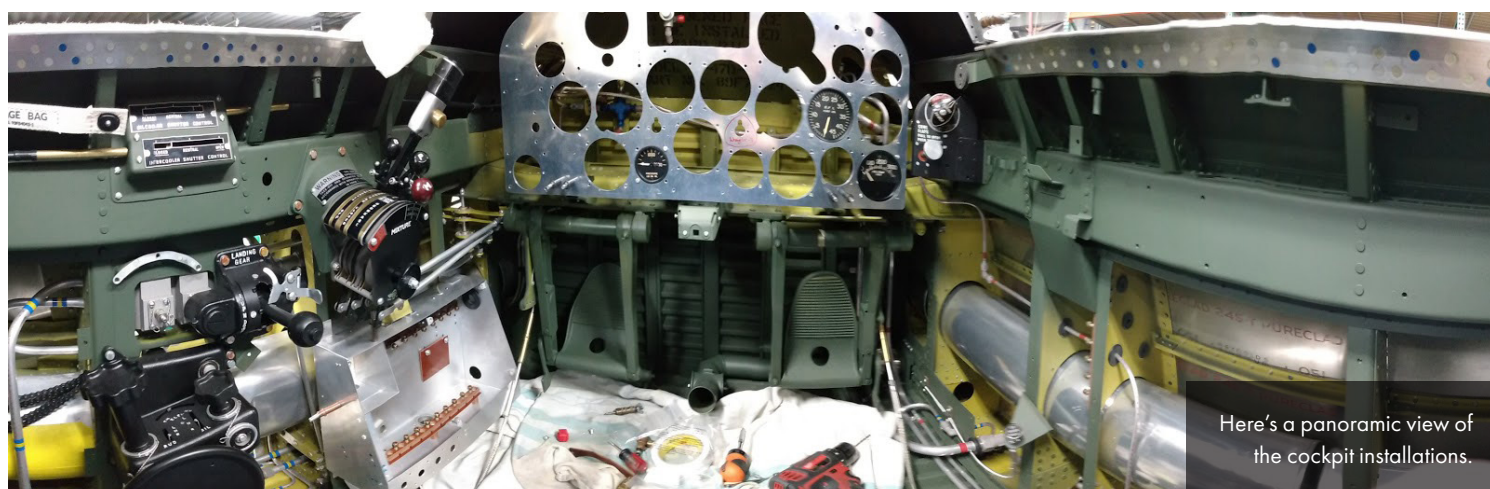


Here is a close look at the recognition light control box.





## Cockpit







The tubing with the blue/yellow/blue tape code marking is the hydraulic line on the outlet side of the hand pump. The bracket is for mounting the releases for wing and fuselage hard points (bombs/drop tanks).





Section VIII

RESTRICTED  
AN 01-60JE-2

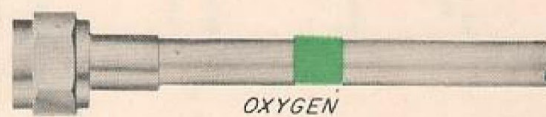
Section VIII

TUBING CHARTS

TUBING  
COLOR IDENTIFICATIONS



FUEL



OXYGEN



OIL-LUBRICATING



VACUUM



COOLANT



MANIFOLD PRESSURE



AIRSPEED - PITOT PRESSURE



HYDRAULIC PRESSURE OIL



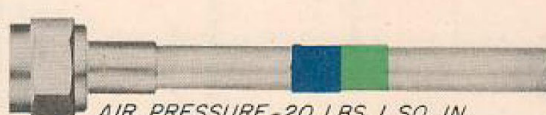
AIRSPEED - STATIC PRESSURE



FLUID - ICE PREVENTIVE

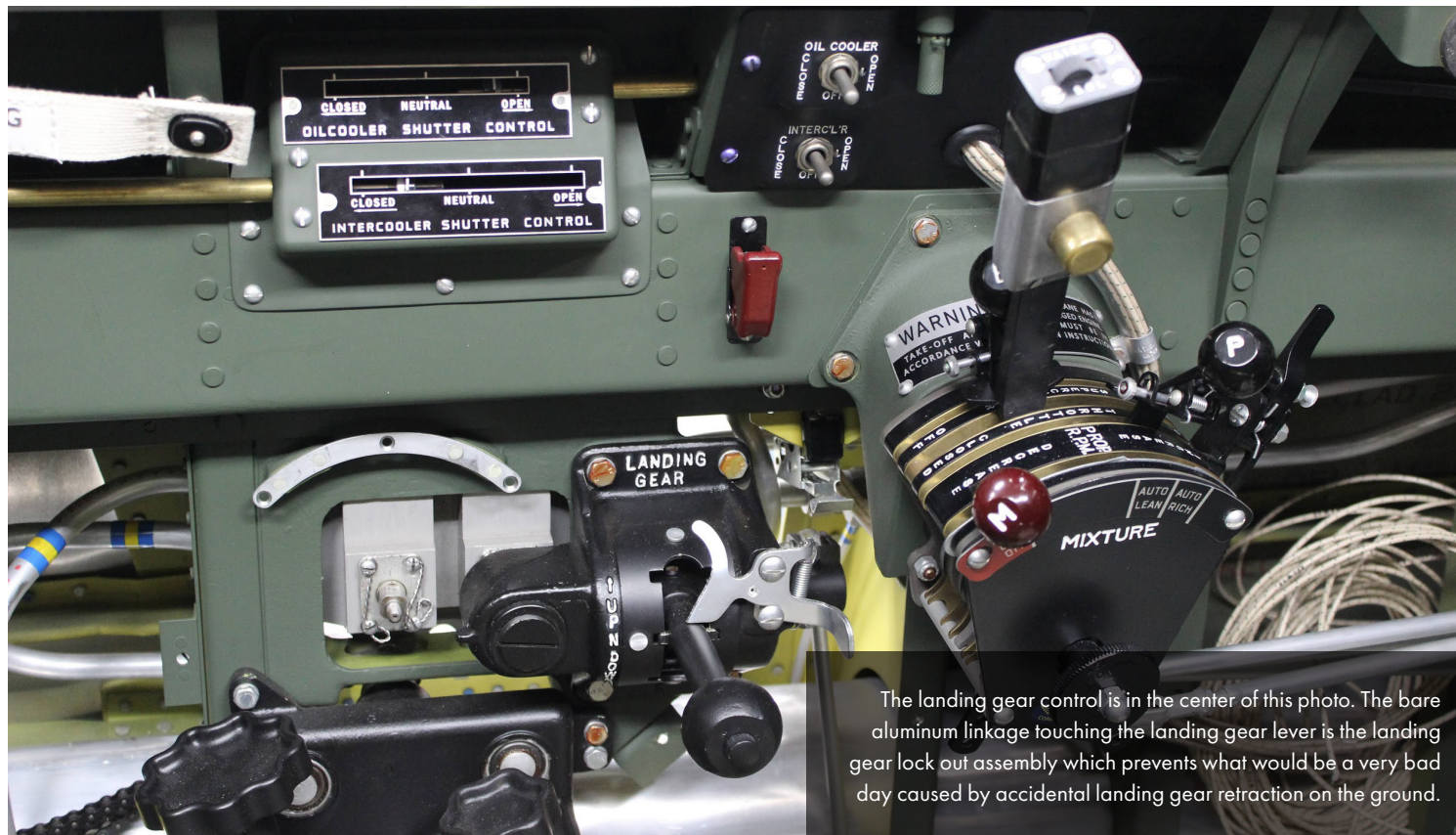


OXYGEN FILLER

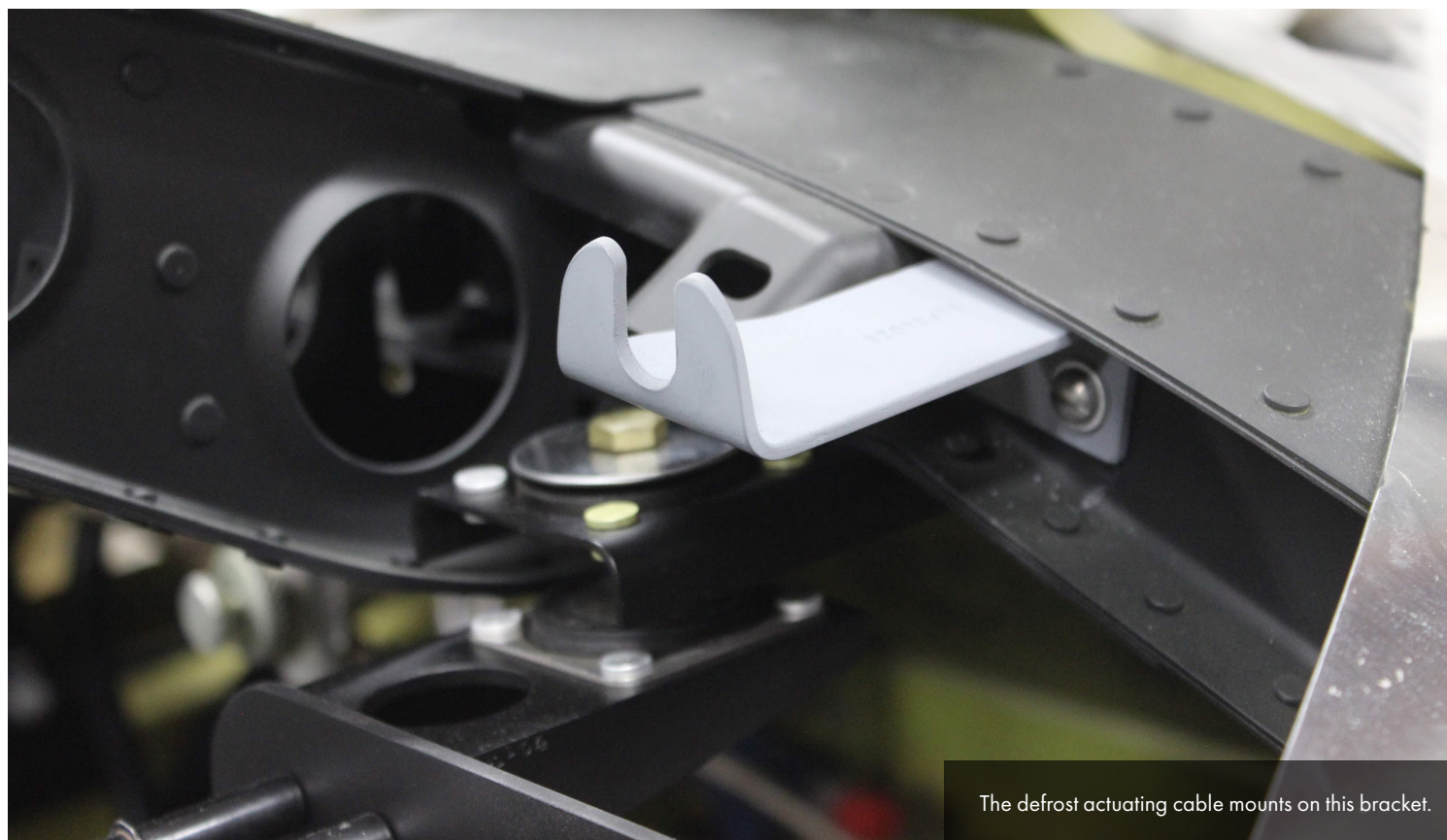


AIR PRESSURE - 20 LBS. / SQ. IN.





The landing gear control is in the center of this photo. The bare aluminum linkage touching the landing gear lever is the landing gear lock out assembly which prevents what would be a very bad day caused by accidental landing gear retraction on the ground.



The defrost actuating cable mounts on this bracket.

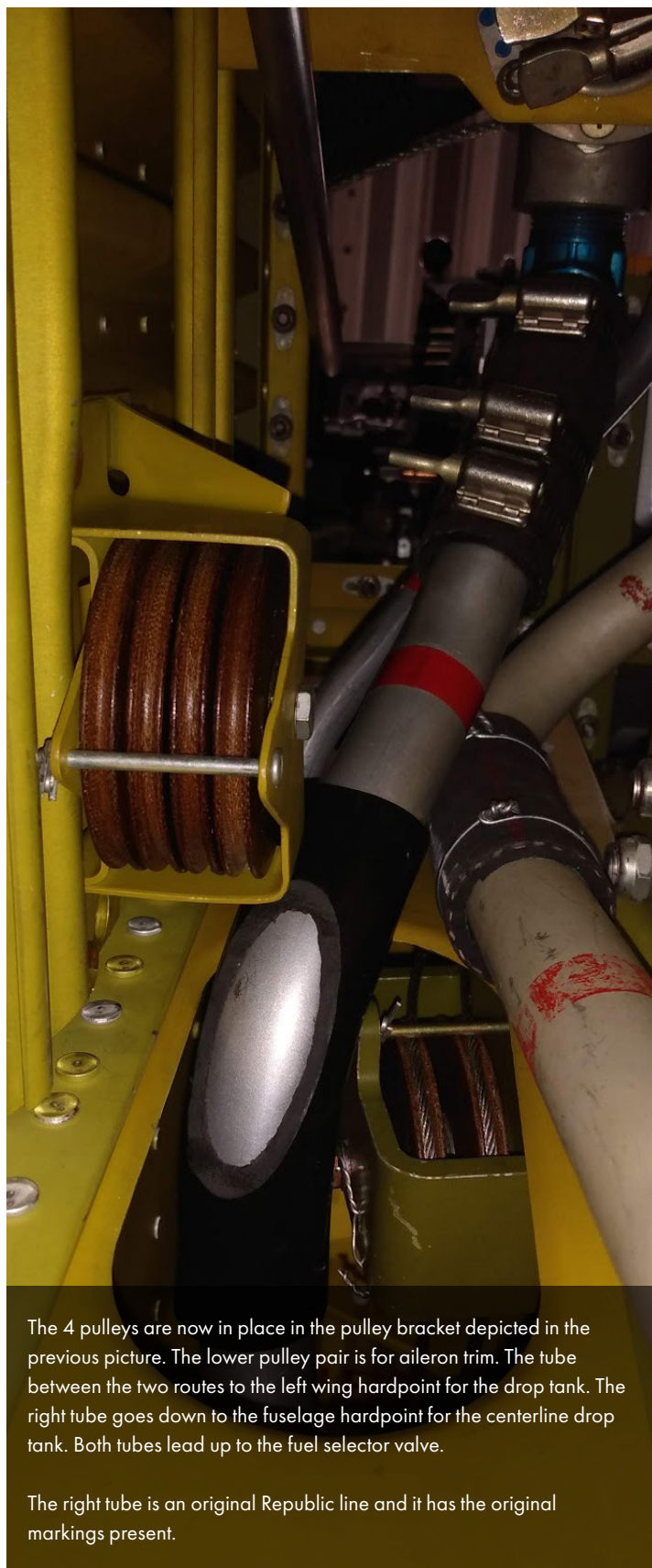




## Cockpit



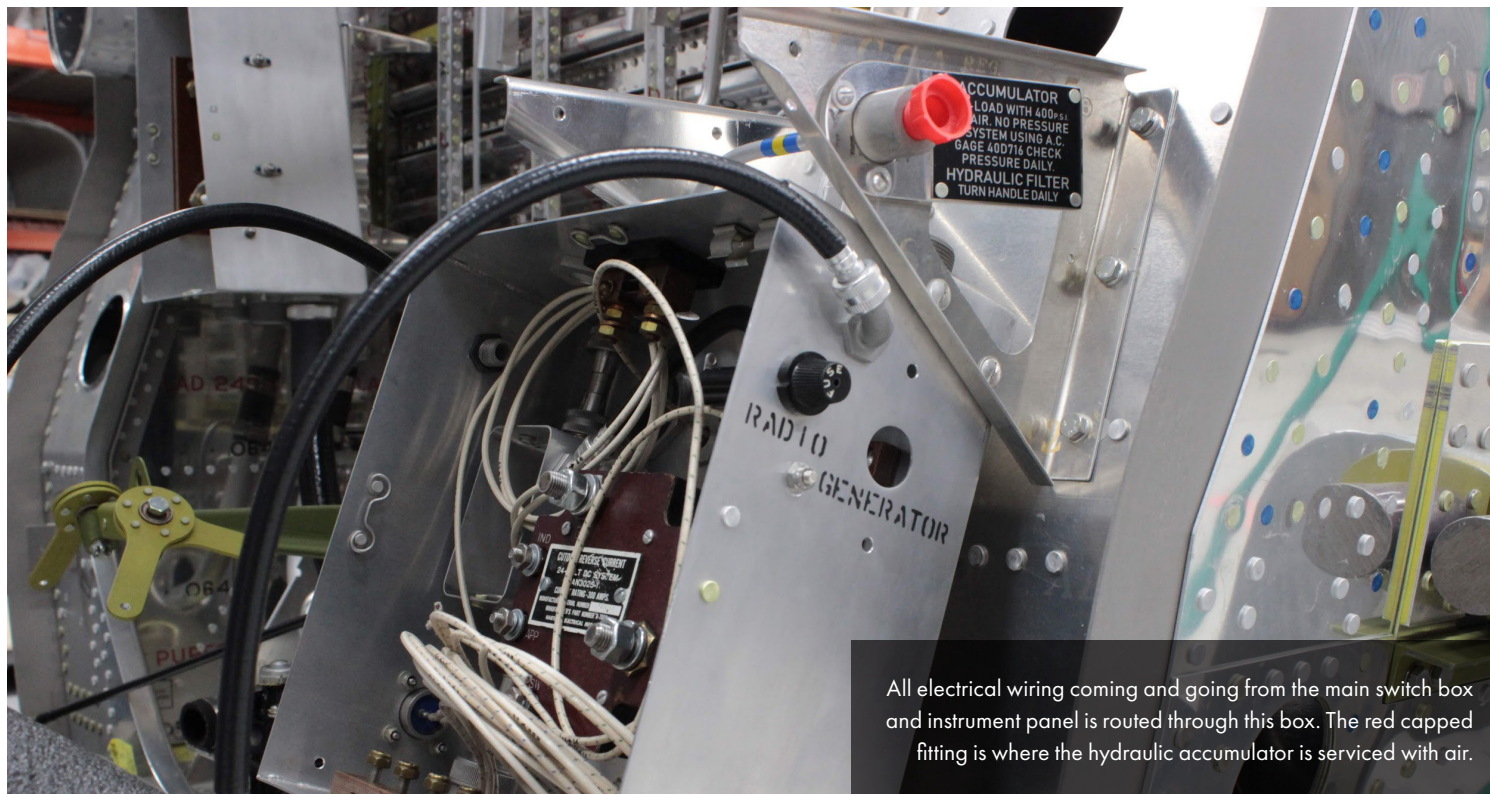
This bracket holds pulleys with cables that run to the wing hardpoints for the arming and release of the bombs or drop tanks. This bracket is original to 42-27609.



The 4 pulleys are now in place in the pulley bracket depicted in the previous picture. The lower pulley pair is for aileron trim. The tube between the two routes to the left wing hardpoint for the drop tank. The right tube goes down to the fuselage hardpoint for the centerline drop tank. Both tubes lead up to the fuel selector valve.

The right tube is an original Republic line and it has the original markings present.





All electrical wiring coming and going from the main switch box and instrument panel is routed through this box. The red capped fitting is where the hydraulic accumulator is serviced with air.



The box also contains the reverse current relay for the generator. Yet to be installed is the circuit breaker for the generator.





This cannon plug is the left wing electrical connector.





## Wing Structure

Erik Hokuf transported the wings spars down to Diversified Services Incorporated in Wellington, Kansas for anodizing. DSI is one of the few anodizers who can handle pieces as long as the P-47 wing spars. Now that they are back, they have been painted and are being prepared for final assembly.



These extrusions have been painted and are ready for the large rib assemblies from the gun bay to the gear well area - Stations 64 to 132.



The extrusions wait on the bench to be assembled to the ribs, wing fixtures fill the background.





Brad works on 89C22121-54 rib assembly, station 26  $\frac{3}{4}$ . It joins Spar #1 to Spar #2



Station 26  $\frac{3}{4}$  identifies the location where this rib will be placed, the furthest inboard rib in the gear well of the wing frame assembly.

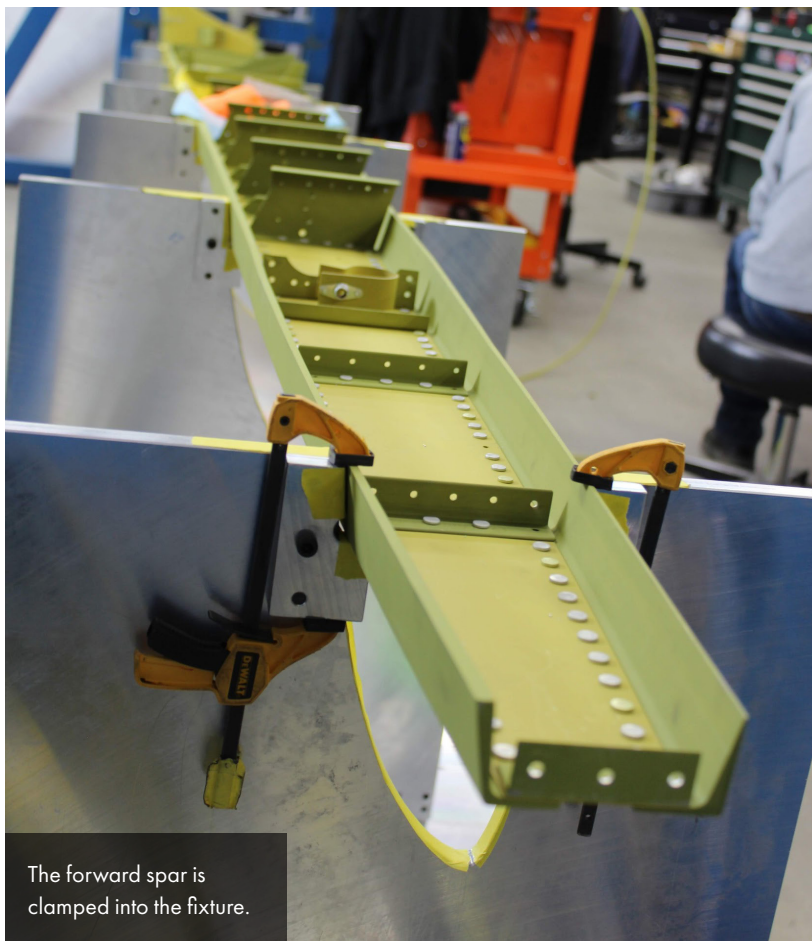


Cory works on final assembly of the main spar (89C22111-54 Spar #1). It has been anodized and painted.





Here is a close look at the many rivets holding the #1 main spar together.

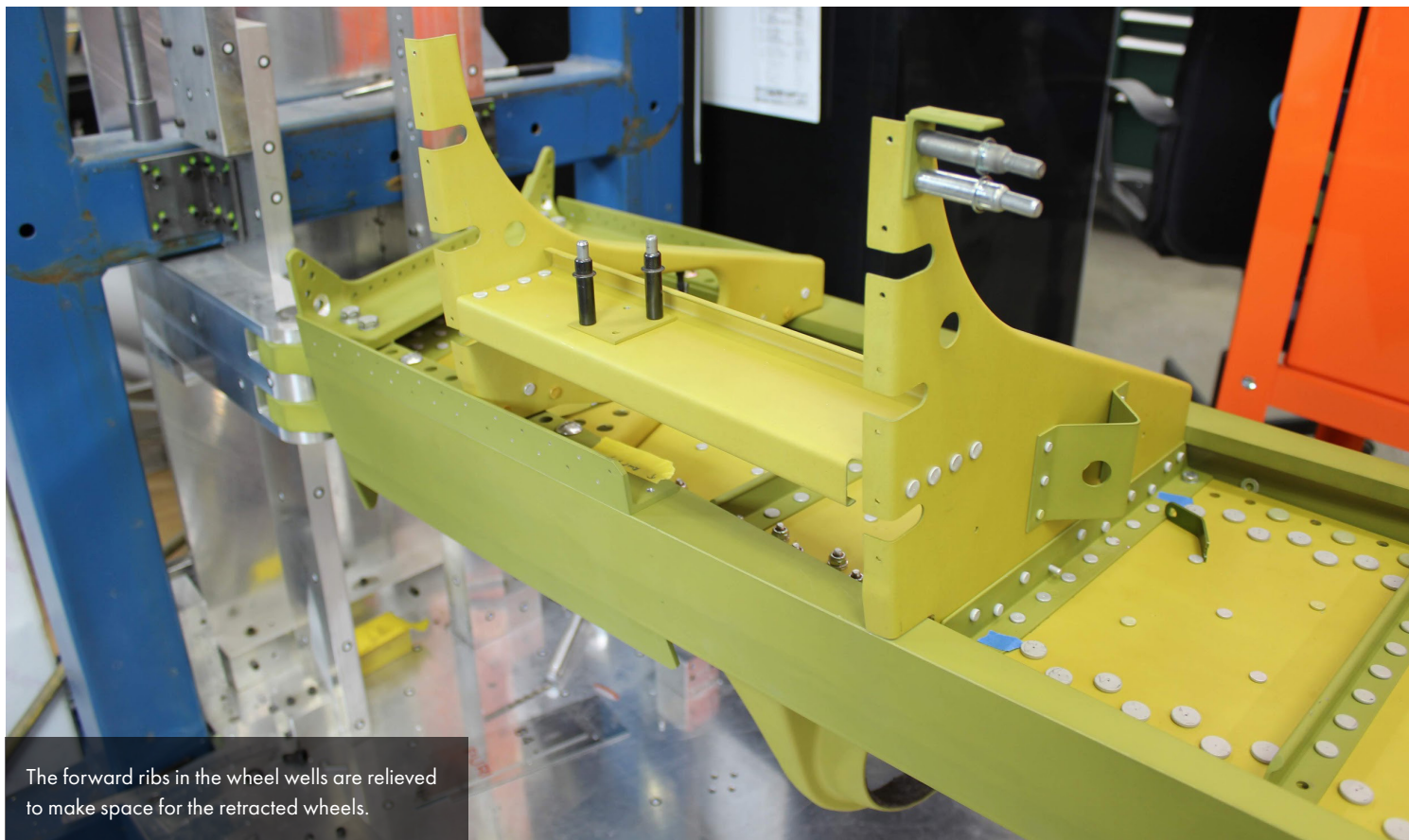


The forward spar is clamped into the fixture.

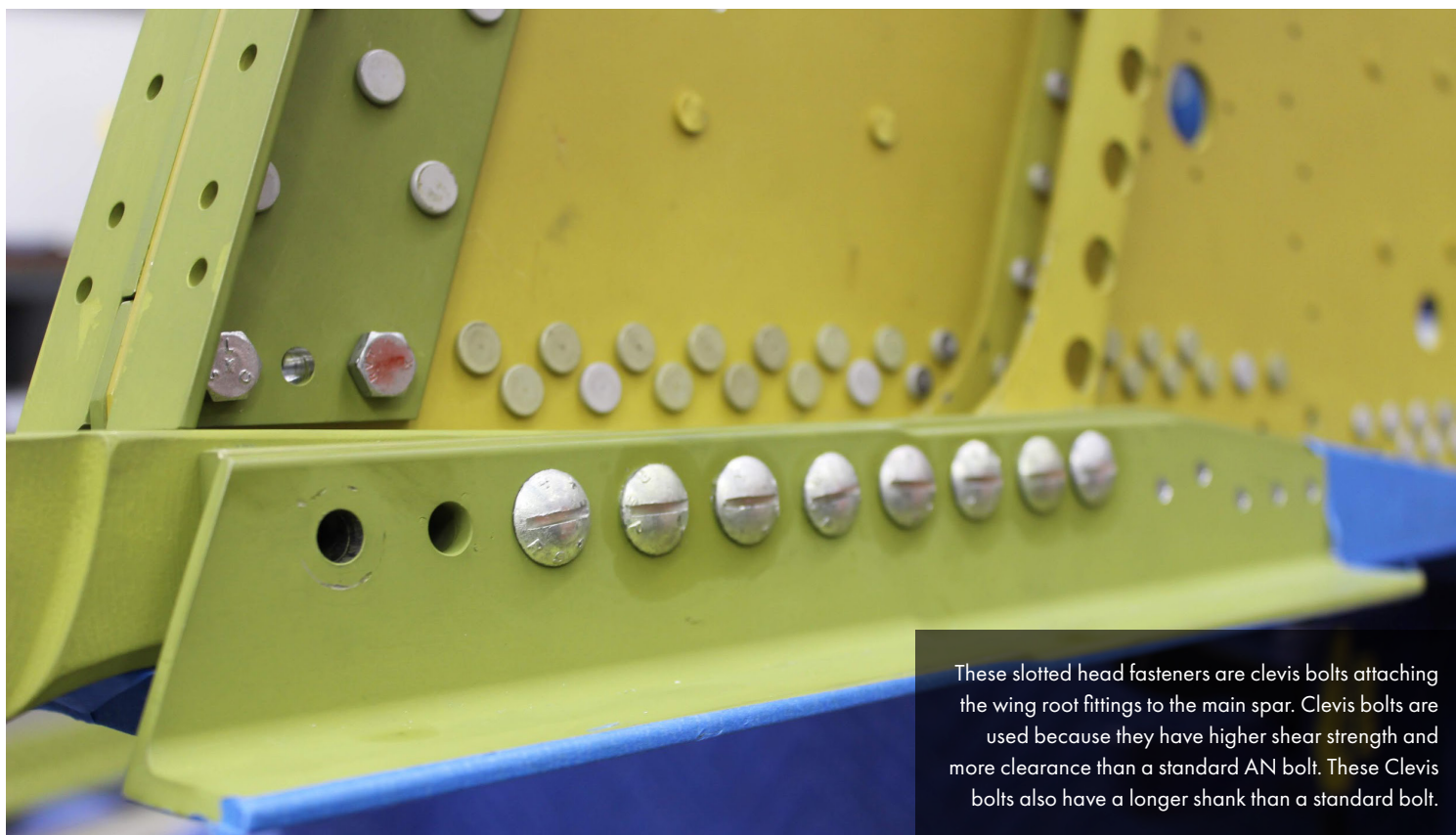


The gun openings in the main spar. The reinforcements for the spar around each hole and the stiffeners are clearly visible.





The forward ribs in the wheel wells are relieved to make space for the retracted wheels.

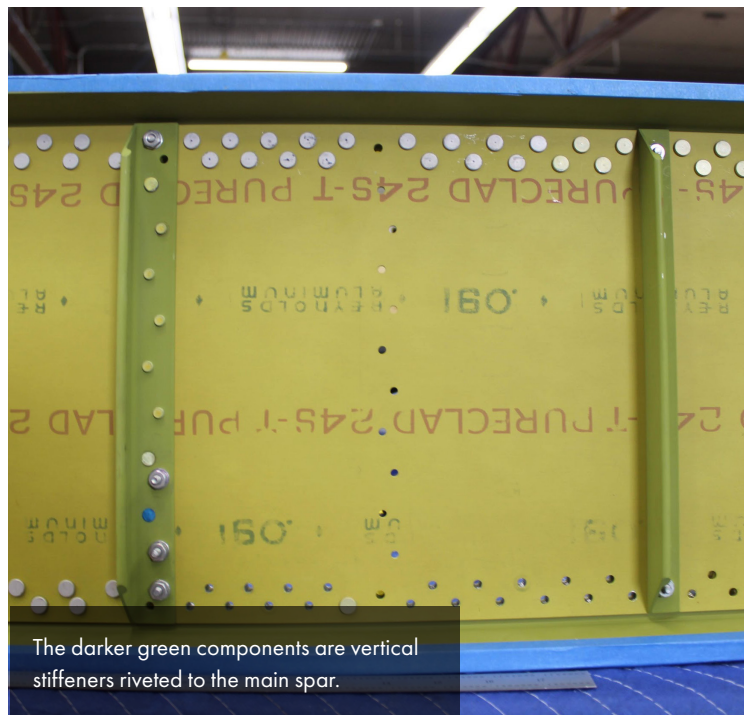


These slotted head fasteners are clevis bolts attaching the wing root fittings to the main spar. Clevis bolts are used because they have higher shear strength and more clearance than a standard AN bolt. These Clevis bolts also have a longer shank than a standard bolt.





Here is a view of the upper wing attachment fitting held on with the clevis bolts.



The darker green components are vertical stiffeners riveted to the main spar.



Ammunition boxes await permanent installation.

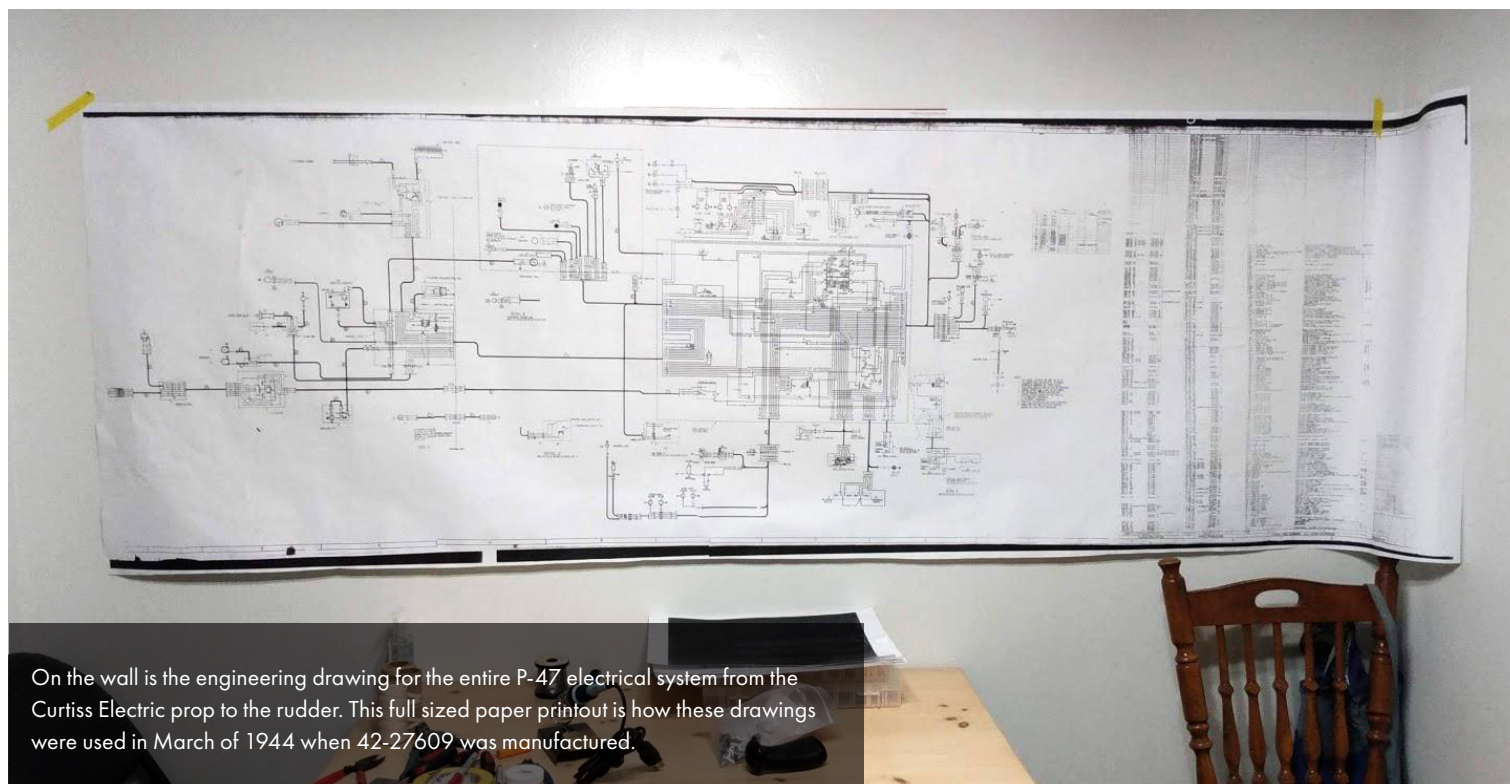




## Aaron's work from home station.

Like so many Americans, AirCorp Aviation's employees have been doing as much work at home as possible for health safety reasons.

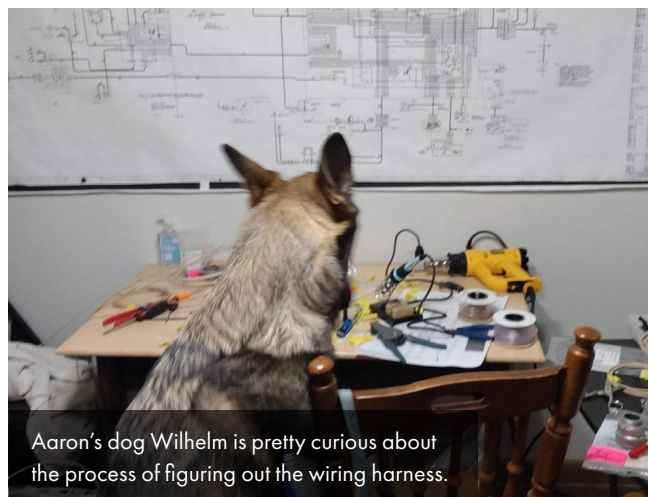
Aaron shared some pictures of his work area at home, where he assembles electrical components and solders connections.



On the wall is the engineering drawing for the entire P-47 electrical system from the Curtiss Electric prop to the rudder. This full sized paper printout is how these drawings were used in March of 1944 when 42-27609 was manufactured.



Wires, cannon plugs, tools, and benches all are part of Aaron's home work station.



Aaron's dog Wilhelm is pretty curious about the process of figuring out the wiring harness.





## Outside Contractors

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The contributions to victory in WWII were many and varied, but the production mobilization in America was undeniably a huge factor in the final outcome. That contribution has been immortalized as the “Arsenal of Democracy”.

Like all aircraft manufacturers, Republic couldn’t produce complete planes without many components made by outside suppliers. Additionally, some of the actual assembly work was contracted to outside suppliers.

Many outside contractor companies produced consumer goods before the war and had to completely (and quickly) change their production over to aircraft parts or assembly during the war years.

One of the postwar parts catalogs for the F-47D included a list of approved contractors. While it is likely the list would be slightly different and perhaps longer during the war, it still gives a good idea of some of the contributors to the manufacture of the Thunderbolt.<sup>1</sup>

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<sup>1</sup> Parts Catalog for F-47D-25 Thru F-47D-40, AN 01-65BC-4A, 12-Feb-1951



AN 01-65BC-4A  
SECTION I INTRODUCTIONSection I  
Introduction

This is the Parts Catalog for the P-47D-25 and subsequent P-47D airplanes: parts for P-47 airplanes prior to the P-47D-25 are cataloged in AN01-65BC-4.

This catalog is divided into five sections as follows:

Section I - IntroductionSection II - Group Assembly Parts ListsSection III - Numerical Parts ListSection IV - Standard Parts ListSection V - Service Tools

Section II is a break-down of the parts of the airplane. Major installations appear as column 1 entries; column 2 entries are sub-assemblies of the column 1 entry; column 3 entries are sub-sub-assemblies of column 1 entries, etc. The "Figure No." column refers to illustration or figure number on which the part is shown and the "Index No." column indicates the number of the item in the figure.

The illustrations of Section II in general indicate sub-assemblies by adding a numerical or alphabetical suffix to the index

numbers; for example, parts indexed as 21A, 21B, 21C, 21D, etc., are sub-assemblies of the part indexed as 21 and parts indexed as 21A1, 21A2, 21A3, etc., are sub-assemblies of the part indexed as 21A. Where this method is not possible, straight numbering is used.

The contractor designates right and left hand parts either by dash numbers or by the use of L or R after the part numbers. Supply personnel are to exercise every precaution to insure that the proper designation appears after the part number. Nomenclature of all parts is indicated with the noun first and the description following. Parts which are not considered replaceable bear an asterisk before the part number.

"Ref" in the "Units per Assembly" column of Section II indicates that the part has been listed previously and is located on the figure appearing in the parenthesis after the part nomenclature.

Parts furnished by vendors other than the prime Contractor, are symbolized after the part nomenclature by a number preceded by the letter "V" - as for example "V-12." The name and address of vendors with their coding as appear in this catalog are as follows:

V-1	Scoville Mfg. Co.	Waterbury, Conn.
V-2	Torrington Needle Bearing Co.	Torrington, Conn.
V-3	Tinnerman Products, Inc.	Cleveland, Ohio
V-4	Elastic Stop Nut Corp.	Union, N. J.
V-5	P. R. Mallory Co., Inc.	Indianapolis, Ind.
V-6	Minnesota Mining and Mfg. Co.	St. Paul, Minn.
V-7	Thomas and Betts Co.	Elizabeth, N. J.
V-8	Dzus Fastener Co.	Babylon, N. Y.
V-9	B. F. Goodrich Co.	Akron, Ohio
V-10	Lear Aviation Corp.	Piqua, Ohio
V-11	Boots Aircraft Nut Corp.	New Canaan, Conn.
V-12	Baldwin Duckworth Co.	Hollywood, Calif.
V-13	Warner Aircraft Corp.	Detroit, Mich.
V-14	Adel Precision Products Co.	Burbank, Calif.
V-15	Alemite Corp.	New York, N. Y.
V-16	Pesco Products Co.	Cleveland, Ohio
V-17	Parker Appliance Co.	New York, N. Y.
V-18	Air Associates, Inc.	Cleveland, Ohio
V-19	Marman Products Co.	Inglewood, Calif.
V-20	Aeroquip Corp.	Jackson, Mich.
V-21	Purolator Products, Inc.	Newark, N. J.
V-22	Vickers, Inc.	Detroit, Mich.
V-23	Bendix Aviation Corp.	Hollywood, Calif.
V-24	William Brand and Co.	Willimantic, Conn.
V-25	Neal and Brinker	New York, N. Y.
V-26	Micro Switch Corp.	Stamford, Conn.
V-27	Cleveland Pneumatic Tool Co.	Cleveland, Ohio
V-28	Menasco Mfg. Co.	Burbank, Calif.
V-29	A. Schrader, Sons	Brooklyn, N. Y.
V-30	M. D. Hubbard Co.	Pontiac, Mich.
V-31	Timken Bearing Co.	Canton, Ohio
V-32	Chrysler Corp. (Amplex Div.)	Detroit, Mich.
V-33	Pratt and Whitney	East Hartford, Conn.



AN 01-65BC-4A  
SECTION I - INTRODUCTIONSection I  
Introduction

V-34	Jack and Heintz	Bedford, Ohio
V-35	Ideal Clamp Mfg. Co.	Brooklyn, N. Y.
V-36	Lord Mfg. Co.	Erie, Penn.
V-37	Aero Supply Mfg. Co., Inc.	Corry, Penn.
V-38	Fafnir Bearing Co.	Chicago, Ill.
V-39	Wittek Mfg. Co.	Chicago, Ill.
V-40	Lunkheimer Co.	Cincinnati, Ohio
V-41	Thompson Products Co.	Cleveland, Ohio
V-42	American Magnesium Corp.	Pittsburgh, Penn.
V-43	United Aircraft Products Co.	Dayton, Ohio
V-44	Young Radiator	Racine, Wis.
V-45	Koehler Aircraft Products, Inc.	Dayton, Ohio
V-46	S. S. White Dental Mfg. Co.	New York, N. Y.
V-47	General Electric Co.	Bloomfield, N. J.
V-48	Aluminum Co. of America	New Kensington, Penn.
V-49	Huber Mfg. Co.	Cincinnati, Ohio
V-50	Chandler - Evans	Detroit, Mich.
V-51	Colt Firearms Co.	New Haven, Conn.
V-52	Breeze Corp., Inc.	Newark, N. J.
V-53	Allen - Bradley Co.	New York, N. Y.
V-54	Johns - Manville	New York, N. Y.
V-55	Cutler - Hammer, Inc.	Milwaukee, Wis.
V-56	Grimes Mfg. Co.	Urbana, Ohio
V-57	Shakeproof, Inc.	Chicago, Ill.
V-58	American Bosch Co.	Springfield, Mass.
V-59	Little Fuse, Inc.	Chicago, Ill.
V-60	Harvey Hubbell	Bridgeport, Conn.
V-61	International Resistance Co.	Chicago, Ill.
V-62	Ohmite Mfg. Co.	Chicago, Ill.
V-63	Clarostat Mfg. Co.	Brooklyn, N. Y.
V-64	Parker Kalon Corp.	New York, N. Y.
V-65	Liquidometer Corp.	Long Island City, N. Y.
V-66	Maytag Corp.	Newton, Iowa

Section III lists all parts with quantities per airplane and reference to assembly list pages. As directed in T. O. 00-35A-6, "Part Numbers and Nomenclature," contractor's parts are listed alphabetically and numerically. Further explanation of contractor's part numbers may be found on pages 4, 5 and 6. Referenced main assembly parts (indicated as "Ref" in "Units per Assy" column) in Section II are not listed in Section III under their corresponding page numbers but are included on referenced pages. All parts in Section II preceded by an asterisk are non-procureable but are listed; however, no entry is made in the "Total Quantity" column.

Section IV lists all standard parts used

in Section II giving their number per assembly and attaching quantity in the following order: Contractor's Standards (symbolized by the letter "S"), Army Navy Standards (AN), Army Air Force Standards (AAF) and Naval Air Force Standard Parts (NAS).

Section V lists and illustrates the special service tools giving: Figure, Index and parts number, Nomenclature and Quantity.

NOTE: All abbreviations in this catalog are in accordance with convention established in T. O. 00-35A-6, "Part Numbers and Nomenclature" with the exception of "As Required" which is listed as "As Req" and are used when space limitations arise.





In the single city of Evansville, Indiana, fifty different companies contributed the P-47s coming out of Republic's Evansville factory.

Because this manual is dated post-war, not every subcontractor of the P-47D-23s made in Evansville appears on the parts list

**A few of the more important local subcontractors for the Evansville Republic plant were:**

- **Firestone Tire & Rubber:** Self sealing fuel tanks, tires, engine oil seal "o" rings
- **Servel Corporation:** Manufacturer of heating and cooling appliances (produced almost all P-47 wings for Evansville plant)



Corporate photo to celebrate the 20,000th P-47 wing panel made by subcontractor Servel Corporation. Photo courtesy of Harold B. Morgan Collection





- **Hoosier Cardinal:** An Evansville stamping company that made metal refrigerator parts, including ice cube trays, and lamps (manufactured tail surface sections of the P-47)



Workers near completion of a P-47 horizontal stabilizer at the Hoosier Cardinal factory. Photo courtesy of Harold B. Morgan Collection