454th True Stories

Willow Run

Reference book

Compiled by Members of Plant Guide Staff

454th

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WILLOW RUN

REFERENCE BOOK

(Third Edition)

Compiled
by
Members
of
Plant Guide Staff

February 1, 1945

(Restricted)

PRINTED BY FORD AIRPLANE SCHOOL PRINTING DEPT

NOTE

This book was
made up originally
for the use of the
Willow Run plant guides
and has been revised
from time to time and
kept up to date.
Additions or corrections
will be much appreciated.
Phone 8130 or 8464

Wm. A. Simonds
(Personnel Building)

This copy is No. 143

For Mike Church

PART I

REFERENCE DATA

EXTRACT FROM ESPIONAGE ACT

The enclosed information is strictly confidential and should be regarded as such.

Section 31. Unlawfully obtaining or permitting to be obtained information affecting National Defense; or (D) whoever, lawfully or unlawfully having possession of, access to, control over, or being entrusted with any document,writing, code book, signal book, sketch photograph, photograph negative, blueprint plan, map, model, instrument, appliance, or note relating to the National Defense willfully communicates or transmits or attempts to communicate or transmit the same to any person not entitled to receive it, or willfully retains the same and fails to deliver it on demand to the officer,or employes of the United States entitled to receive it, or (E) whoever, being entrusted with or having lawful possession or control of any document writing, code book, signal book, sketch, photograph, photographic negative, blueprint, plan, map model,note, or information relating to the National Defense, through gross negligence permits the same to be removed from its proper place of custody or delivered to anyone in violation of his trust, or to be lost,stolen, abstracted, or destroyed, shall be punished by a fine of not more than ten thousand dollars or by imprisonment for not more than two years or both.

ADMINISTRATION BLDG:
242 ft.long; 53 ft.wide. Floor space (with garage) 36,730 sq. ft. Occupied in March, 1942.

AILERON: SEE "CONTROL SURFACES"
Total area (each) 41.55 sq. ft. Area aft of hinge - 64.3 sq.ft. Covered with grade A cotton; 6 coats of dope. Travel up 20° & down 20°.

AIR BASE, ARMY:
Accommodation for 3700 men. Area-270 acres. 12,000 men trained up until 7-1-44. Runways-4,817 ft.long. Apron-3325 ft.long x 416 ft. wide. 50-foot taxiways connect apron to runways 27R & 27L.

School: At peak graduated 240 men every 4 days. Training in 4 echelons of aircraft maintenance. B-24 Familiarization school under S.D. Mullikin 1st & 2nd echelon trains crew chiefs, flight engineers & mechanics; largest of 3 schools. Peak enrollment - 1500 students last summer. 3rd echelon - R-2800 School - maintenance & repair 2000 HP Pratt & Whitney engines. 4th echelon (supervision of Chevrolet) - trains men to tear down and overhaul 1250 HP Pratt & Whitney engines.

AIRPORT: SEE "LIGHTS, AIRFIELD"

Size - 1,434 acres. No. of runways - 6. Length of longest runway - 7,286 ft; length of shortest runway - 6,363 ft. Runways 160 ft.wide; 7.7 miles long. Taxiways 80 ft.wide; 2.3 miles long. Area of runways & taxiways-828,000 sq. yds. Area of aprons-320,000 sq.yds. Runways within Bomber Plant Airport total 35,830 ft. Army Air Base runways 4,817 ft.; total 40,647 ft. Paving completed in 94 working days. Drain tile - 58 mi.; sewer 16 mi.; total 74 mi. Thickness of runways - 8 in. in center; 6 in. on each side.

ALROK:

Coat good for 950 hours of exposure before corrosion. Operations: 1-Loading, 2-Cleaner, 3-Rinse tank, 4-Acid tank, 5-Rinse tank, 6-Alrok tank(Time 14 min.), 7-Rinse tank, 8-Rinse tank, 9-Alrok seal (Time 14 min.), 10-Rinse tank, 11-Hot water rinse, 12-Drier,13 Unloading. Baskets remain in dip approximately 3 min. 1/2 min. required for change (except 6 and 9 as indicated). Complete cycle approx. 1 hr. & 20 min. Overall length-33 ft.; distance travelled-66 ft.(Ford-designed)

ALTIMETER:

Tested in airtight chamber. Dial measures height in 20-ft. graduations. A diaphragm in the altimeter expands only 3/16 of an inch to move dial pointer a total of 21 ft. when registering height from sea level to 50,000 ft.

ALTITUDE CHAMBER:

(Hangar # 1) From 70° above to 70° below in 8 min. From ground level to 40,000 ft. in 6 min. Dimensions 21 x 9 ft. Air lock 5 ft. Doors weigh 1 ton each. 500 HP cooling system.

ANTI-ICING FLUID:

Consists of 85% Isopropyl-alcohol and 15% glycerine. Fluid piped from 1000 gal. tank near first overpass to gashouse. Distributed by slinger rings to leading edge of propeller blades. 22-gal. tank located in bomb bay area of ship.

APRON:

(In front of Hangar # 1)-1500 ft.long North end is 480 ft.wide. South end is 720 ft. wide. (In front of Hangar # 2) - 1200 ft. long & 740 feet wide. Area - 320,000 sq. yds. (At Army Air Base) - 3325 ft.long x 416 ft. wide.

AREA:

Plant & flying field-1878 acres. Factory floor area-3,503,016 sq.ft. (80.25 acres). 1st floor area-2,764,836 sq.ft. Mezzanine floors-297,380 sq. ft. Second floors-440,800 sq.ft. Total floor area including hangars - 4,734,617 sq.ft.(109 acres)

Adm. Bldg & garage-36,730 sq. ft. Personnel Bldg.-24,234 sq.ft. Hangar # 1-268,570 sq.ft. Hangar #2-235,174 sq. ft. Winter Hangar-38,822 sq. ft. New Mtls Bldg-577,120 sq.ft. Airplane School-49,494 sq.ft. Sewage Disposal 20,900 sq.ft. Paint & Oil-12,000 sq. ft. Transportation Garage - 9,900 sq. ft. Dope & Paint Storage-8,800 sq.ft. Commissary-13,398 sq.ft. Gas House - 1500 sq.ft. Incinerator-1,420 sq.ft. Power House-47,409 sq.ft.

Total stock areas - 593,502 sq.ft. Per cent of stk to total-17%.(not including New Mtls Bldg).

Summary of Stock: Tool cribs & stations-38,982 sq.ft.Purchased finished stores-54,728 sq.ft. Prod. Fin. Pts-143,796 sq. ft. Component Items - 60,799 sq.ft. G.F.E. Storage-31,754 sq.ft. Mtl Review Cribs-7,725 sq.ft. Shipping-58,316 sq.ft. Power, Millwright & Misc. - 61,687 sq.ft. Total (ground floor) - 457,787 sq. ft.

Stock Areas on Mezzanine & 2nd floors #1: Abrasive Stk - 2240 sq.ft. Area # 4 Office 760 sq.ft. Bbl Stk-2785 sq. ft. Elec Stk 5780 sq.ft.; Elec Stk.-2000 sq.ft.; Elec Drill Stk 1280 sq. ft; Electric Motor Storage-1360 sq. ft. Final Assembly Stk - 7200 sq.ft. Fin. Pts Storage-7200 sq. ft. Furniture Stk-1210 sq.ft. G.F.E.-2800 sq. ft.; G.F.E.-1395 sq.ft.;G.F.E. office 780 sq.ft. IBM Offices - 3900 sq.ft. Mtl Conservation Crib-9040 sq.ft.;Mtl Office-19,040 sq.ft. Millwright stk-990 sq.ft. Misc.Stk-9530 sq.ft.Pneumatic Tool Stk-950 sq.ft. Prod. Rubber Stk-7480 sq.ft. Purch Pts Stores 2400 sq.ft.; Purchase Pts Stores-3000 sq.ft.; Purch Pts Stores-2430 sq.ft; Purch Fin Pts-1280 sq.ft.; Purch Fin Pts-1500 sq.ft; Purch Fin Pts-385 sq. ft; Purch Fin Pts 3000 sq.ft; Purch Fin Pts-900 sq.ft; Purch Fin Pts-440 sq. ft; Purch Fin Pts-900 sq.ft;Purchase Fin Pts 900 sq.ft. Stat.stores-3265 & 2880 sq.ft. Stk Dist Crib-680 sq.ft.Stk Office-1040 sq.ft. Surplus Rough Stk - 4125 sq.ft. Tool Crib-250 sq.ft. Tool Crib-510 sq.ft. Tool Crib 510 sq.ft. Trim Stk-13,280 sq.ft.Wire stk-810 sq.ft. Total-132,715 sq.ft.

Total incl. Bal:	593,502 sq.ft.
New Mtls Bldg:	481,770 sq.ft.
Grand Total:	1,075,272 sq.ft.

ARMAMENT: SEE "TURRETS"

ASSEMBLY LINES: SEE "MOVEMENT OF"
Total length of all-5,450 ft. Width of each bay-150 ft; height of bays - 36 ft. Length of Primary line-720 ft Distance from Transfer bay to east end of plant-1440 ft. Distance from L-40 to exit doors: North bay-2,185 ft; center bay - 1,825 ft. 4 primary lines of 14 stations each. When line between L-40 and sta. 15 is regarded as double, 680 ft. should be added to assy line. North wall to plant exit-930 ft. Transfer Bridge-16 ft. high, 40 ft. wide. Mezzanine between lines 15 ft. wide.

AUTOSYN:
Self-synchronous instruments to measure engine functions. Transmitted electrically from moving parts of engines, thus eliminating use of rigid and semi-rigid connections.

-B-

B-24 STUDIO:
Opened for broadcasting Nov. 3, 1943. Broadcast to 44 lunchrooms and eating places in plant and hangars, besides cafeterias, dining rooms and special outlets.

BATTERY:

Two 24 - volt batteries in each ship. Wt. 75 lbs. ea. Electric needs supplied from 4-200 amp. generators. Batteries serve as emergency supply. Aux generator in each ship - 70 amp. cap. driven by 3 HP motor.

Laboratory: 50 charging panels charge 50 batteries at one time. 500-gallon lead-lined acid tank. Carried in ship in rubber-lined, aluminum containers near bombardier's station.

BOMBS:

The number of demolition bombs to be carried is interchangeable, & varies with the fuel load: 2-4,000 lb;4-2000 lb; 8-1,000 lb; 8-500 lb; 12-300 lb; 20 - 100 lb. Max. load to be carried by plane should not exceed 8,600 lbs. and is determined by the amount of fuel carried.

BOTTOM TURRET: SEE "TURRETS"

BOXES:

Between 500 and 1200 assembled every month in carpenter shop.

BUILDINGS IN PROJECT:

Bomber Plant, New Mtls Bldg, Pump Hse #1. Scale Hse, Oil & Gas, Power Hse, Service Garage, Gas Station, Commis-

sary, Pump Hse #2, Aviation Service, Dope & Paint, Hangar # 1, Hangar # 2, Warm-up Hangar, Apprentice School, Personnel Bldg, Incinerators, Sewage Disposal, Sanitary Pump Hse, Compass Rose. Other facilities include: Sub-station #1 & 2, Cooling towers & buildings in the south yard used by contractors, warehouse etc.

-C-

CABLES IN SHIP:

226 cable assemblies per ship. Longest piece 53'3". Shortest 8". Seven types used.

CABLE:

Amt. required for cranes, conveyors, elevators, etc. - 124,200 ft, ranging in size from 3/16" to 1'-1/8" in dia. Over 6000 ft used for replacement every two wks. At this rate the total footage of cable - 124,200 - will be replaced every 344 working days. Daily use of rope - approx 375 ft. or 4500 ft. every 2 wks. The length of various slings on the equipment ranges from 6" to 200 ft.

CAFETERIA:

No. of people served: Breakfast-800; Dinner-1500; Supper-500. 23 cooks and

bakers employed; 110 waiters. Dining Room: 250 served daily, 146 at one time.

CAMOUFLAGE:
Wt. of paint per ship was between 90 and 120 lbs. Increase in speed of non-camouflaged ship from 8-12 m.p.h. No longer considered essential for effective ship protection.

CARBURETOR AIR TEMP GUAGE:
Tells temperature of air.

CARGO BINS:
Made at Iron Mt. Load cap. - 1200 lb Assembled and used bins reconditioned in Carpenter Shop at Willow Run.

CENTER WING SECTION: SEE ALSO "WING"
No. of diff. bulkheads-27; No. of rivets-78,606. No. of bolts-1,000. No. of individual pts exclusive of rivets & bolts-6,439; Furnished on 2 parallel lines, 468 ft. long. Painting: Fuel cell area sprayed with spark-inhibiting varnish. Weight of entire wing group - 6652 lbs. When center wing leaves vertical fixtures, ends are less than .010" of being perfect.

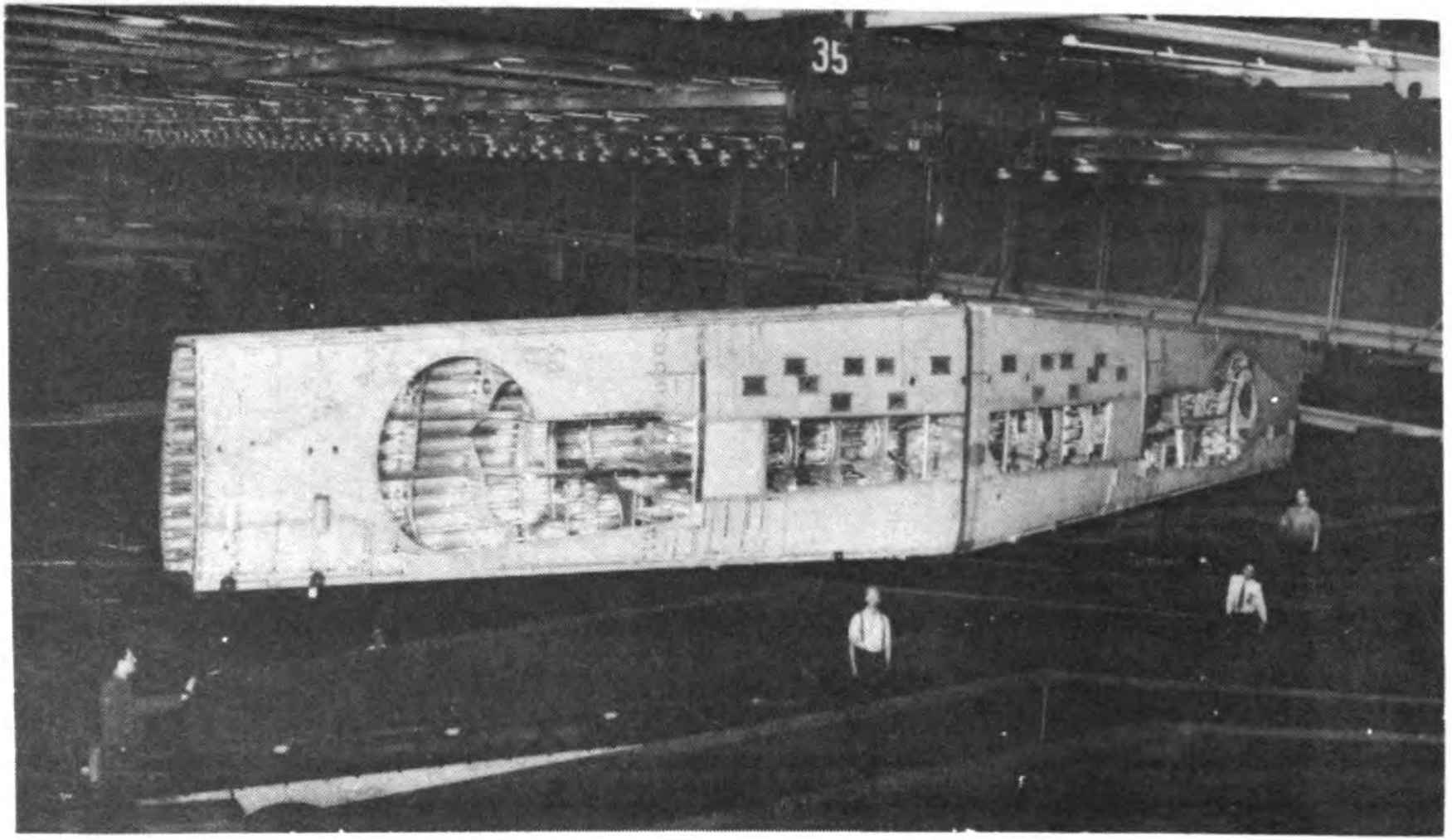
CENTER WING FIXTURE:
Weight of:

Overhead Det 30 R&L (W&K)	12,023	lbs
Overhead Det 1 R&L (W&K)	7,124	"
Overhead Det 2 R&L (W&K)	5,015	"
Overhead Patt A R&L	14,000	"
Overhead Patt B R&L	2,984	"
Overhead Patt C R&L	1,150	"
Overhead Patt D R&L	1,294	"
Overhead Patt E R&L	3,750	"
Overhead Patt G R&L	170	"
Overhead Patt H R&L	170	"
Center Beam	200	"
Center Post	200	"
Center Dets	300	"
End "A" plates R&L	2,000	"
End Carriages	1,000	"
Center Carriages	200	"
Risers R&L	2,000	"
120 ft Drill Flaps	800	"
Patt E Plates & risers R&L	1,000	"
Other Dets	1,500	"
Total	56,880	"

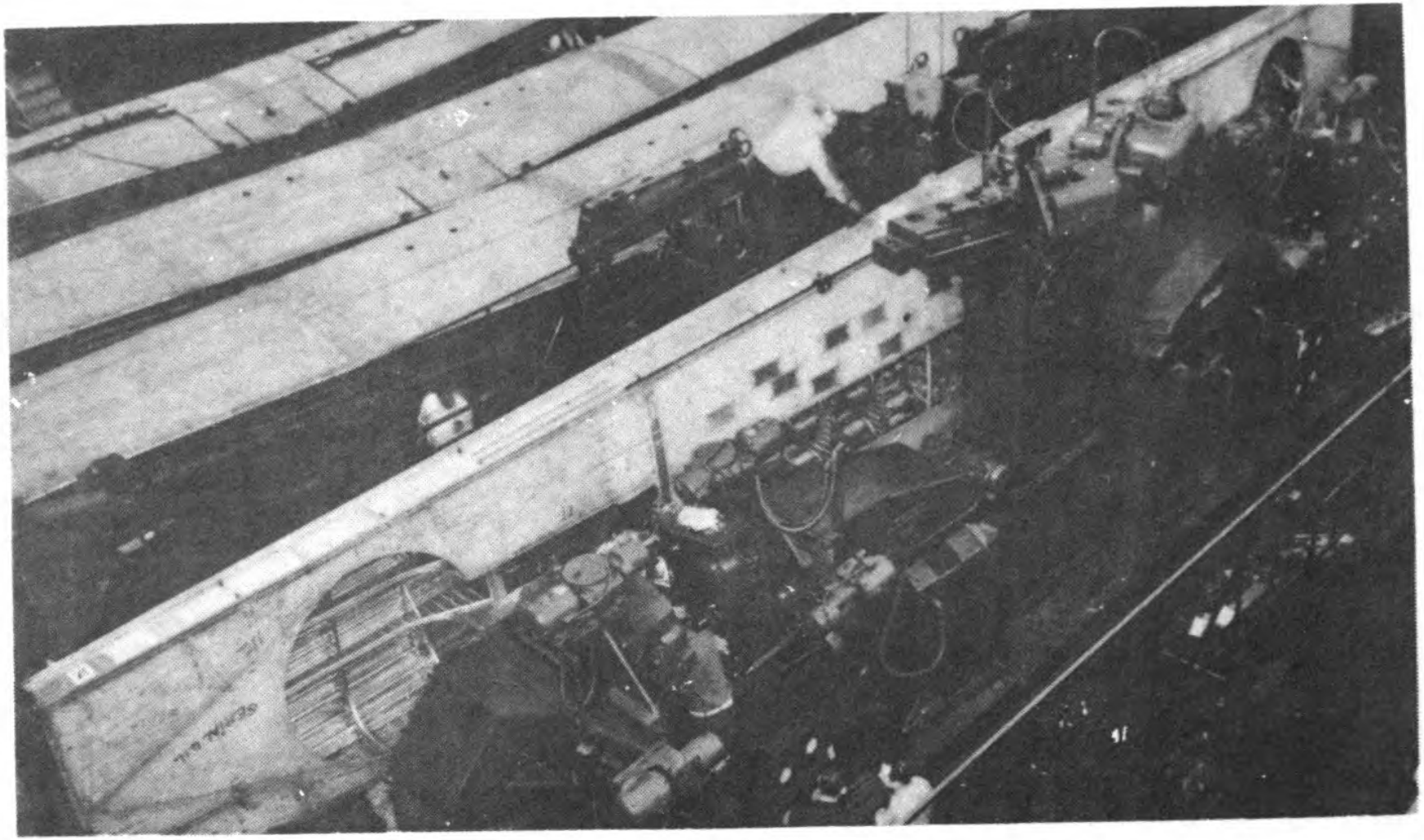
28.44 Tons. Deduct approx. 2 tons for machining. No. of fixtures - 40. Width of fixture-60 ft. Time of assembly (Oct. 1944) 433 man hours.

CENTER WING MILLING MACHINE:

Operations: (1) Set up wing (2) Mill eight upper engine mount pads. 8 op. (3)Mill eight lower engine mount pads 8 op. (4) Drill four 3/8" holes in ea of the eight lower engine mount pads. 8 op. (5) Drill one 13/16" hole in ea



REMOVING CENTER WING SECTION FROM ASSEMBLY FIXTURE



CENTER WING SECTION IN FINAL MACHINING UNIT

of the upper engine mount pads. 8 op. (6) Bore & spotface 4 landing gear needle bearings (2 on each side) 4 op (7) Bore & spotface 6 landing gear bearings (3 on each side) 6 op. (8) Remove wing from machine. Total 42 operations. No. of men: 6 and 1 foreman.

Accuracy of: Motor mount forgings vary from .003 of an inch to .020. Landing gear bearings are within 5 minutes of the required angle.

Cast iron base made at Rouge Plant in 10 pcs, each weighing 12,500 lbs. Total wt 125,000 lbs. Base resting on concrete slab 18" deep, 20' wide, 70' long. Machine weighs 27 tons; cost $168,500. Designed by Ford engineers Built by Ingersoll Milling Machine Co Only one of its kind in existence. Record time for wing - 17 minutes.

CERROBEND- (Wood's Metal)

Used in Tube Bending department to keep tubing from crimping while being formed. 800 lbs. used ea. wk. Of this 720 lbs reclaimed. Melting point 160 degrees. Temperature kept at 200°.

CLEAN-UP: SEE ALSO "PAPER & SCRAP PAPER"

Staff - 750. Amt. of soap used-2bbls liquid, 1½ bbls powdered per wk. Also 1 bbl "Flux" (2 lbs dissolved in 14

qts. of water.) 20 men wash windows daily.

COLD HEADING: SEE "RIVETS"

COMMISSARY:
174 ft. long, 77 ft. wide. 13,398 sq ft. area.

COMPASS ROSE:
Non-magnetic construction. Dia. 52' 2". Wt. 85 tons. Power unit-30 H.P. motor. Only one of its kind in country.

COMPRESSED AIR:
8 compressors in Power Hse. Cap. of ea. 1665 cu.ft. of air per min. 9,000,000 cu.ft. used daily. Highest used in one day - approx. 13,000,000.

CONTRACT ORDERS:
With Douglas (W 535-ac-18722), number of planes-954. With Consolidated-Vultee (W535-ac-18723), 939 planes. With Government(W353-ac-21216)8709 planes. Total-10,602.

CONTROL SURFACES:SEE "EMPENNAGE","AILERONS", "RUDDERS".
(Movable-ailerons,rudders, elevators) cloth - covered with grade "A" cotton to dampened vibration. Given 6 coats

of dope (4 to 5 oz. per sq.yd.).

CONVEYORS:

136 separate conveyors in plant. 75 drive units. Approx 5,000 feet of chain. 425 ft. in Press Shop, 260' in Cold Heading Dept. (Alrok). Approximately 4000 ft. Interplant Conveyor. 2-4 links removed in hot weather because of expansion of chain. Not replaced in winter because of wear on pins.

COST:

Of building & equipment-$103,000,000.

CRANEWAYS:

68 travelling units. 5 & 15 ton cap. Total length 29 mi. 1 1/2 mi. service walk used to repair craneways, 309 lifts made in building bomber. Combined lifting capacity-520 tons.

CRASH TRUCKS:

Equipped with ten 100-lb cylinders of CO_2 under 850 lbs. pressure. Also 200 gal.-per-minute water pump. Equipped with 2-way radio.

CREW OF B-24:

Crew composed of 10 men: Pilot, co-pilot, bombardier, navigator, radio operator, 5 gunners.

CRIBS:

Main Floor - Assembly area: 7 Mtl Review Cribs ranging from 6 x 19 to 20 x 50 ft. Total area-3,975 sq.ft. 4 Purch. Fin. Stores Cribs ranging from 40 x 80 ft. to 90 x 340 ft. Total area-63,303 sq.ft. 11 G.F.E. Stk areas and cribs ranging from 15 x 15 ft. to 135 x 140 ft. Total area of 30,342 sq. ft. 79 Stk Cribs and areas ranging from 7 x 18 ft to 75 x 180 ft. Total area of 186,530 sq. ft. 46 Tool cribs ranging from 5 x 15 ft. to 30 x 200 ft. Total area of 24,447 sq.ft. Millwright & Power Stk area-4,910 sq. ft.

Main Floor - Manufacturing area: 4 Mtl Review cribs ranging from 6 x 19 ft. to 14 x 41 ft. Total area-35,144 sq. ft. 18 Tool cribs ranging from 7 x 7 ft. to 40 x 49 ft. Total area-11,879 sq. ft.

Balconies & 2nd Floors (both areas)	
Stock (Rough Finished)	75,624 sq.ft.
Tool Cribs	7,830 sq.ft.
G.F.E.	840 sq.ft.
Stationery Stock	10,520 sq.ft.
Misc & Abrasive	11,660 sq.ft.
Office Space	18,568 sq.ft.
	125,042 sq.ft.

Grand total area cribs in main building: 487,186 sq. ft.

CYANIDE PLANT:

Average daily flow - 263,633 gals. 3 reaction tanks - 26,000 gal. capacity Only one of its kind in country.

-D-

DEGREASER:

Detrex Solvent Machine (Press Shop) Trichlorethylene or "Permacolor" used Washes stock up to 10 ft. in length. 15 degreasing units in plant consisting of 13 vapor spray units, 1 vapor slush unit, 1 conveyor type unit. Temp of solvent: 188° F. also 3 solvent stills used to reclaim used solvent.

DECENTRALIZATION:

To Jan. 1944, 3,477 sub-assemblies & parts moved to outside plants.

DIES:

Total made since plant started-29,124 Request for work order for first die filed March 24, 1941. Dies in production at Willow Run - 8,721; outside plants-6,536; Salvaged or in storage-13,867.(12-14-44)

DOORS: SEE ALSO "HANGAR"

Pre-flight lines-wt.35 tons ea.400 lbs added to counterweights when painted. Width-143'9". Height 33' 1 7/8".

Same dimensions apply to emergency doors at east end of Hospital area.

DOPE ROOM: SEE ALSO "CONTROL SURFACES"
Temp. of 80° F. and relative humidity of 50% plus or minus 10% required at all times. Ten air changes per hour for entire room. Three 100 - ton refrigeration units to dehumidify the air.

DRAW BENCH:
265 machines. 185,000 pcs delivered to Inspection daily. 6228 pcs per ship. 3700 separate parts formed. Active rolls - 300 for approx. 250 jobs. 260,000 ft. of "Y" stock rolled daily. About 5,000,000 pts rolled, formed, stretched or pierced each mo.

DUAL TACHOMATER INDICATOR:
Indicates RPM of each engine by means of autosyn. Aids in synchronizing the engines.

-E-

ELECTRIC EYE:
Used for opening doors. Also on X-ray machine in Metallurgical Lab to shut off machine when foreign object gets in way.

ELECTRIC WIRING:

Approx. 5 mi. in each ship. Wire cut in approx 3,000 pcs,varying in length from 8" to 32'. 500 sets of harness. Inside Ringout: 2 girls, 33 circuits-time 2 hours.

Circuit Code Prefix Letters: A-Heater B-Bomb, C-Propeller, D-Hydraulic, E-External Lights, G-Instruments, K-Automatic Pilot, L-Lights,(internal) M-Landing Gear, P-Power, R-Radio, S-Starter, T-Engine, H-Ignition, V-Misc.

EMPENNAGE: SEE "CONTROL SURFACES"

Height 12 ft. Width tail fin to tail fin-26'. Area of elevator-67.06 sq. ft. Area of fin-123 sq. ft. Area of rudder aft of hinge-64.3 sq. ft. Wt. of tail group - 906 lbs. No. rivets-14,651. In landing, tail may whip down from 2-4 in. Built to withstand 25 times force of gravity(25Gs). Perfect landing takes 1 or 2 Gs. The highest known was 22 Gs on landing.

ENGINE:

1250-HP Pratt & Whitney; air-cooled; 14 cylinders. Held in place by 4-5/8 inch, nickel steel bolts. Ring-out-15 circuits on each engine. Wt. of 4 engines (Accessories)-1559 lbs. Wt. of engine nacelles-1745 lbs. Before dress-up, ea engine weighs about 1500

lbs. Wt. of engines installed - 6050 lbs. Gasoline consumption at cruising speed per engine 45 gal/hr. At max. speed 95 gal/hr. At take-off 110 gal/hr. Cruising speed-180 mph at 10,000 ft. Max. speed 260 mph. Landing speed 96 mph.

Bolts and Mounts: The four aircraft bolts are std pts and are referred to by engineers as AN 10-71 (upper-5/8" dia. by 7 & 1/8" length) and AN 10-47 (lower 5/8" dia x 4 & 7/8" length). They are tested for tensile strength and rated 29,670 lbs. The yield strength is 23,740. Made of cadmium plated nickel steel.

Mounts: Made of chrome - moly steel. Inside of tubing flushed with linseed oil to prevent corrosion caused by oxidation.

ENGINE "DRESS-UP": SEE "WEIGHT OF SHIP"
At Lincoln plant. Wt.-780 lbs. incl accessories and cowling, flaps, nose ring, air ducts, etc.

ENGINE FUNCTIONS:
1 engine - Air pressure & vacuum; # 2 engine - supply gasoline vapor, alternate for air pressure and vacuum; #3 engine - supercharger to 6 heaters in ship. Operated hydraulic system; # 4 engine - no extra functions.

FABRIC:
Amt used in ea ship-over 380 yds.More than 1850 diff. cuttings used. Amt of waterproof-57 yds. Curtains of coated sateen-47 yds. 35 pads over protruding pts. Kapok replaced by "fiberglass"and later "milkweed". 59 strap assemblies. Fiber-glass also used for protective plates on which fuel cells rest to keep off stringers.(Ford developed).

FIN: SEE ALSO "EMPENNAGE"
Area, total - 139 sq. ft.

FIRE EXTINGUISHER (Ship):
For engine protection.Consists of two 11-lb steel cylinders containing CO_2 gas under 1800 lbs. pressure PSI.

FIRE PROTECTION: SEE ALSO "CRASH TRUCKS"
51,212 sprinkler heads;128 sprinkling systems. 135 trained men; 1200 auxiliary; (sub-station - airport-17 men) No. of fire extinguishers-2182; fire hydrants - 91; fire alarm boxes-183; stand pipes-126; hose-21,825 ft.; deluge sprinkling system-16 gal/min over 10 sq. ft. under 75 lbs pressure. Water supply-east tank (407,000 gals)

FIRST AID:

25 full time first aid men; 110 emergency stretchers. 6 First Aid Sta in plant.

FIXTURES:

Total fixtures ordered-19,002;in production-10,915; at Willow Run-5,867. Salvaged or in storage-8,067. (12-14-44)

FLAPS:

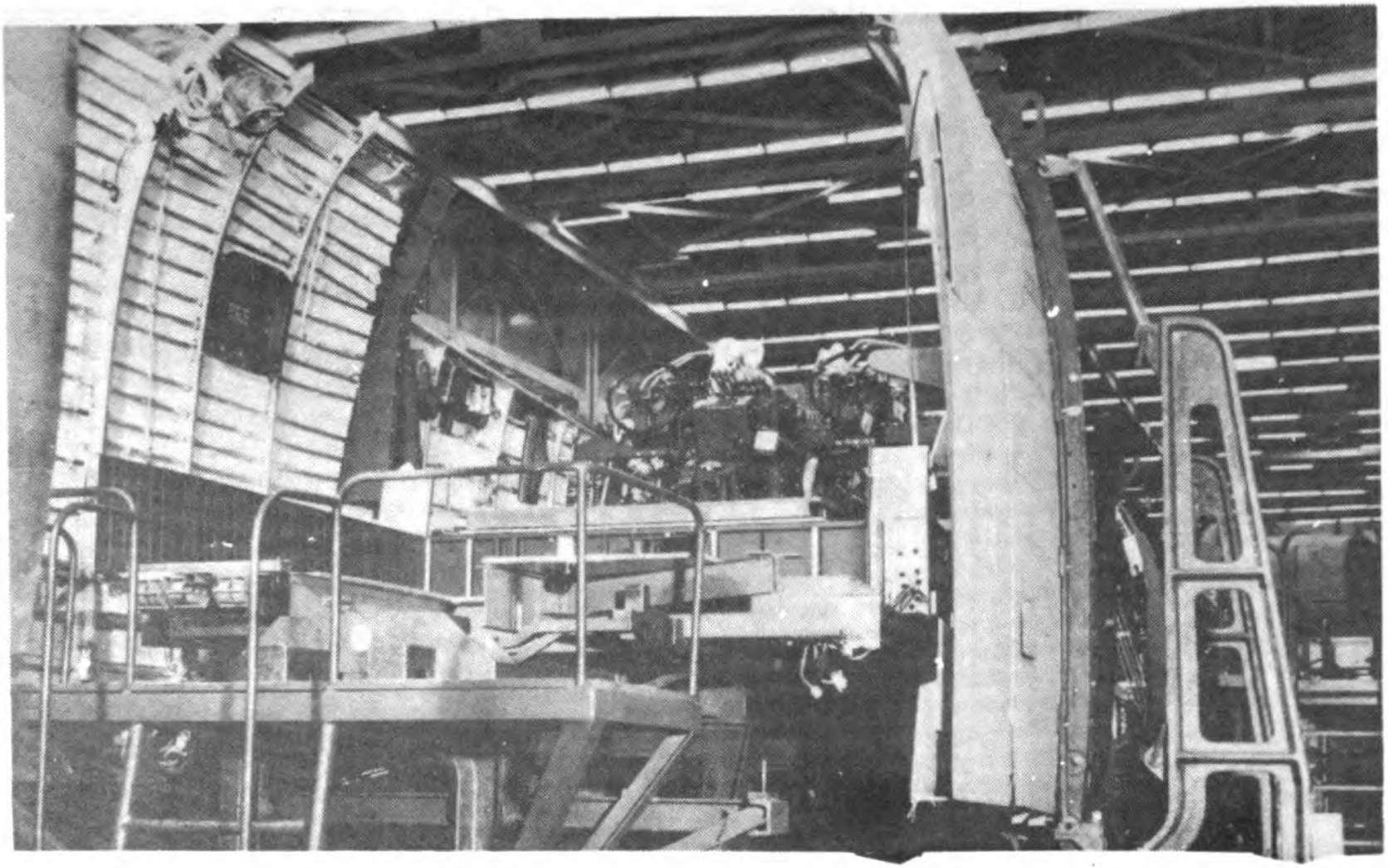
Raised at 750 lbs pressure. Travel of flaps (max.)-40°. Lowered at 450 lbs. pressure. Cannot be lowered if ship is flying above 155 mph. When extended lift of wing increased 55%, drag 70%. Wt-125 lbs each. Area,total-144.1 sq. ft.

FLIGHT:

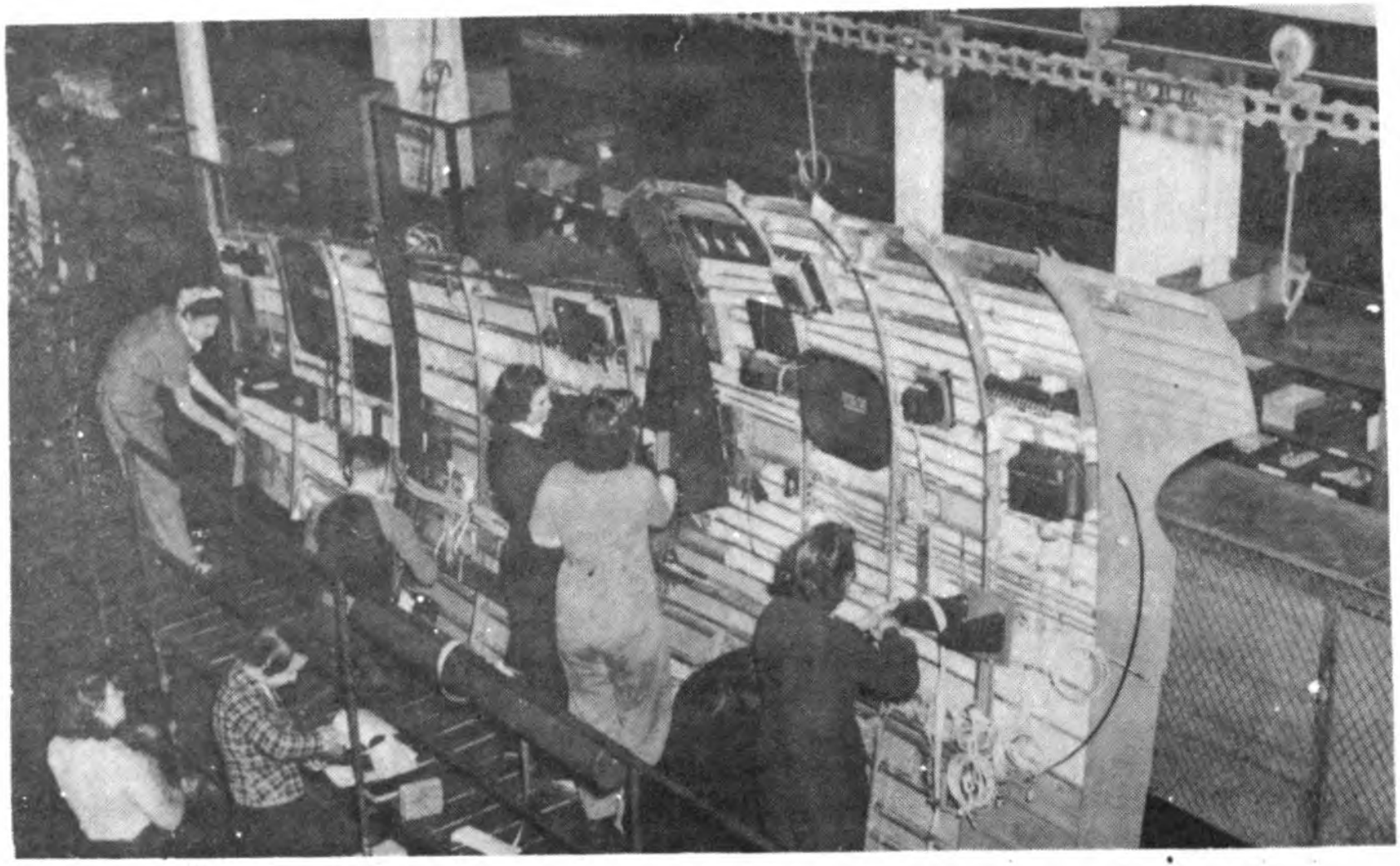
(Dec. 25, 1944) Est. number of miles flown-3,747,400. No. of hours flown-18737. Initial flights-4,149. Army acceptances - 4147. Deliveries-4113. Shortest time ship completed through process from factory to delivery - 44 hours, March 21 - 24, 1944. 73,669 flights without field mishaps.

FLOORS:

Area all bldgs(total)-4,734,617 sq.ft (109 acres). Maintenance-one carload



NOSE FUSELAGE SECTION ASSEMBLY FIXTURE



FURNISHING CONVEYOR, SIDE PANELS, NOSE FUSELAGE

of blocks installed every mo. Blocks rest over an 8 - inch layer of reinforced concrete.

FLUORESCENT LAMPS: SEE "LIGHTS"

FREE AIR TEMP GUAGE:
Tells pilot when ice is likely to form.

FUEL CELLS:
No. in ship-12 in center wing section Cap. 2,372 gal. 3 in ea of two outer wing panels. Cap. 348 gals. Total cap all cells-2720 gals. Wt. of fuel approx - 16,320 lbs. Total wt of cells (empty) - 2468 lbs. Cap. of cells in outer wing panels-58 gal.ea.160 cells installed in center wing panels every 18-hour working day. Three-layer,self sealing construction, built around plaster of Paris mold. Access Doors: two on underside of C. W. section to install and repair fuel cells. Ea. held in place by 750 screws.

FUEL FOR SHIPS: SEE ALSO "WEIGHT"
Approx 30,000 gal of 100 octane gasoline and 1100 gal of oil put in ships every day before delivered to Flight. Stored in 6 - 25,000 gal. underground tanks. Oil & Gas House: 162 ft. long 67 ft.wide. 10,080 sq.ft. Gas handling system: 60,000 gals. oil,150,000

gals. gas. 20 min to gas ship and 4[illegible] other operations in gassing area. Said to be world's largest gas station.

FURNACES:

9 nitrate furnaces. 7 heat treat furnaces.

FUSELAGE:

Dimensions: Length-67'4". Height-10'5" Width-7'5". No. of rivets - 126,651. Top of fuselage to ground-12'1". Top of tail to ground - 17'11". Distance between inboard propeller tips and fuselage-2$3\frac{1}{2}$". Wt. of fuselage group 3407 lbs.

NOTE: Fuselage length as given is from actual measurements of ship on assy line. Loft measurement is 805.54 inches.

(Furnishing Aft Panels): Length of conveyor - approx.400' Travel time-1.8 ft. per. min. Cap. 42 panels in 9 hour shift.

(Nose Panels): Conveyor length - 480 ft. Rate of travel-1.97 ft. per. min Maximum tolerance of 1/16" for mating center wing section.

-G-

GARAGE (ADMINISTRATION):

223 ft. long, 57 ft. wide.

GAS (HEATING):
Consumption - 10,000 cu. ft. daily.

GASOLINE & OIL: SEE "FUEL"

GASOLINE CONSUMPTION OF B-24:
SEE "ENGINES"

GAUGES: (INSPECTION)
15,000 used on ship.

GENERATORS: (PLANE)
4 - 200 amp generators on ea ship. Enough electricity can be generated by these 4 generators to supply electricity for four average homes. Auxiliary: Driven by a 3 HP gasoline motor. Wt.-122 lbs. RPM's-25,000. Cap.-70 amperes, and 27 volts.

GROUND MAINTENANCE:
9442 shrubs, 274 trees planted. 55 tons grass seed.

GUNS: SEE "MACHINE GUNS"

GUN BUTT:
400 cu. ft. of cement used for construction. Walls 20" thick. 65,000 rounds of ammunition fired every mo. Approx size - 30 x 40 ft;30 ft. high; (310 cu. yds. of sand). Every 50th ship, guns fired while ship is in air

Every 300th ship-bomb drop test. Guns of every 5th ship test - fired at gun butt. Spent bullets recovered from sand by electro-magnet.

GYRO HORIZON INDICATOR:
Tells pilot whether ship is level.

-H-

HANGAR NO I:
Length-1,255 ft. 8 in. Depth-162 ft. 79 ft. high. 268,570 sq.ft. 8 bays. Doors - 144 ft. wide by 42 ft. high, moved by motors of 10 HP. Wt.45 tons
Dormitory: 36 beds, 4 private bedrms.
Function: Ships prepared for delivery and delivered from here.

HANGAR NO. II:
Length-1203 ft. Depth-161 ft. 8 bays
Doors-144 ft. wide by 42 ft. high moved by motors of 10 HP. Wt. 45 tons.
Function: Inspection and preparation for initial flight.
Heating: 4 heating plants at rear of building.

HEATERS IN SHIP:
Number of: 6

HEATING & VENTILATING: SEE ALSO "POWER HOUSE","REFRIGERATION", "TOWERS,COOLING"

Fan cap. (Equal to heat 3600 - 5 room houses)-5,500,000 cu.ft. No. of supply fans-201. Cap. 7,500,000 cu.ft./min. No. of exhaust fans-637. Cap.-6,000,000 CFM. No.of condensate pumps 50. No. of air washers-10. Hot water piping ranging in size from 18"in dia to 3/4" and pressure from 250 lbs. There are three 100-ton refrigeration units to de-humidify the air. 1700 radiators, 2500 steam traps.

HEAT TREAT:

No. of parts treated daily-12,800 lbs of rivets. 250,000 ft.drawn sections. 55,000 misc. parts. Press shop-heated to 925° av. Range between 910 & 1010 depending on type of material. Recirculated hot air furnace - electric Ford - Holcroft. Only one of kind in aircraft industry.

HOSPITAL:

8 doctors, 1 dentist, 44 registered nurses, 25 First Aid men. Area-8,560 sq.ft. No. of cases handled in 1943, 819,779. Men's ward-6 beds, 4 cots. Women's Ward-10 beds, 6 cots. First Aid Stations located at: # 1-J-7,# 2-B-12, # 3-G-18, #4-L-38, #5-G-55, #6-L-66.

HYDRAULIC ASSEMBLY:

97 assys in ea ship. 1800 made daily. 43,200 per mo. Cap. of system in ship 18 gals. 850 pcs in system. Wt. 466 lbs.

Accumulators: 10" dia Press, 900-1050 lbs. PSI. Fluid circulated by 7-piston displacement pump driven by # 3 engine. Output approx. 7 gals per min. If it fails, electrically operated pump is mtd on right bomb bay side panel for use. If it fails, hand pump is mtd on floor beside co-pilot.

HYDRO PLANT:

Constructed in Spring, 1940 to make car locks and keys. Now 80 different parts machined for bomber. 640 castings made each day. 55 employes.

Power: 60.3% water wheel, 29.1% steam 10.6% generator set.

-I-

I.B.M.:(Internat'l Business Machines)

Located at B-18, 2nd balcony. 56 employed on 2 shifts. Equipment includes: three-405 alphabetic printers; 3-summary reproducers, 5-sorters, 2 collators, 3 multipliers, 20-key punches and 2 interpreters. Daily production report for Time office, Production Inspection and area offices. Report gives totals of production by part no,

by departments and by division. Also handles all scheduling monthly for production and C. M. P. on six month basis for Material Department, showing production figures and balance to be built. Material Review Report, daily for Material Control, Salvage and Time office.

ICEBOXES: SEE ALSO "RIVETS"

No. in plant approx-100. Temp 10 to 20° below zero. 2 days supply of rivets kept on hand (Press Shop). Temp. 10 to 20° below zero. Large iceboxes 20° below zero. To keep rivets from age-hardening.

INGERSOLL MACHINE: SEE ALSO "CENTER WING MILLING MACHINE"& "FINAL MACHINING UNIT"

INSPECTION:

Inspection Plates: no. on ship - 120. Inspectors: no. of (company)-1805, Army 109.(1-1-45). 15,000 Inspection gauges used in bldg bomber. No. of inspectors (August 1944)-1,956.

INSTRUMENTS:

No. on instrument panel only 54.(Does not include switches or levers.)

INTERVALOMETER:

Releases bombs from racks in sequence

Operates through solenoid in bomb selector panel. Bombs can be spaced to drop from 7 to 750 feet apart. Can release from 1 to 20 bombs per second.

-K-

"KD" SHIPS: SEE ALSO "SHIPPING"
Douglas-954; Consolidated-939.

-L-

LABORATORY: (Metallurgical)
2 General Electric X-ray machines used to detect flaws in castings. 3000 ft. of X-ray film can be developed daily in dark room. Apparatus for testing tensile strength-200,000 lbs. capacity. Has complete chemical laboratory. Special research.

LANDING GEAR:
(Main)-Ea. main strut weighs approx. ½ ton. 4 ways to lower: hydraulic, electric motor to drive pump, hand-operated pump, emergency gear box. Can be retracted in 22 seconds under pressure of 1,000 lbs PSI and lowered and locked in 44 seconds under 800 lbs pressure. Total landing gear wt. 3002 lbs. Oleo strut max. extension - 13". Operative extension - 10½". Operative compression 2½".

LANDSCAPING:

No. of trees-274. No. of shrubs-9,442

LAYOUT, PLANT:

Plant layout boards,36" x 48", painted black. ¼ inch-to-the-foot scale. 157 boards comprise main floor layout for plant, 23 for balconies, 11 for hangar, 7 for school, 1 for Personnel Building.

LIGHTS, AIRFIELD:

1 airport sub-station; 1 hangar sub-station; 1 control panel (control tower) for airport lighting; 1 rotating beacon; 1 code beacon (flashes WR in code);1 ceiling projector; 1 portable traffic signal; 2 search lights (in control tower); 143 building obstruction lights; 64 field obstructions; 113 boundary lights (outline the field); 37 taxi lights (flush & cone-mounted); 12 blue flasher lights; 56 hangar floodlights; 84 field floodlights; 379 contact lights (outline the runways); 36 green flush type range lights (installed on concrete & end of each runway); 55 yellow range lights (mounted on conical bases); 12 "Green Arrow & Red Cross"landing signals; 2 wind "Tees"; 12 field vaults (miniature substations,housing transformers, relays, etc for field light-

ing);1 pedestal vault;12 ground traffic signals (a 3-light signal at end of each runway).

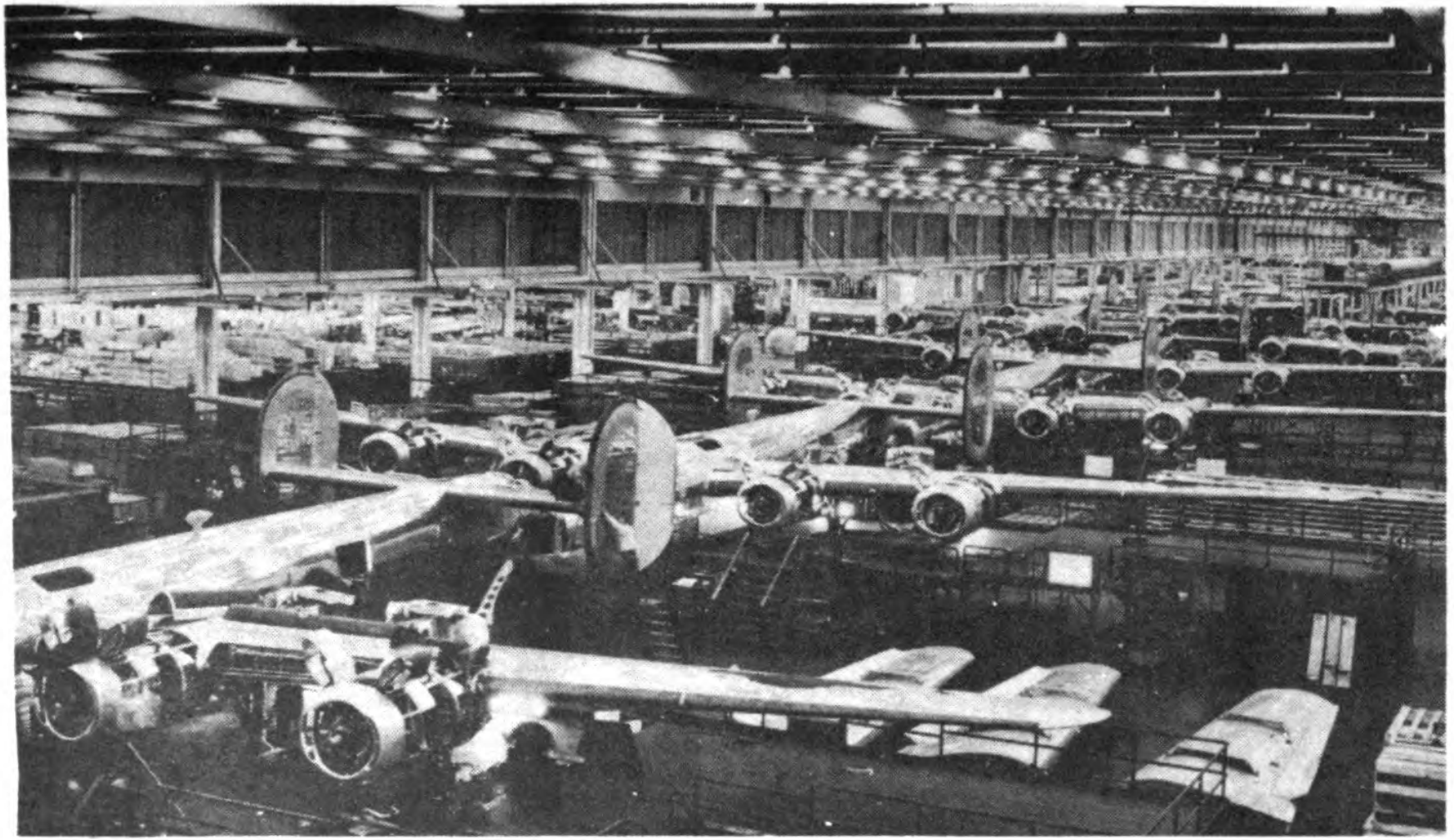
LIGHTS, LANDING:
Two 600 - watt retractable lamps.

LIGHTS, SHIP:
Ultraviolet type used to eliminate glare. Instruments made very sensitive to this type of light by use of special radium paint on dials. 6 ultraviolet type and 16 regular (incl. recognition lights)in each ship. Does not include bulbs behind instrument panel.

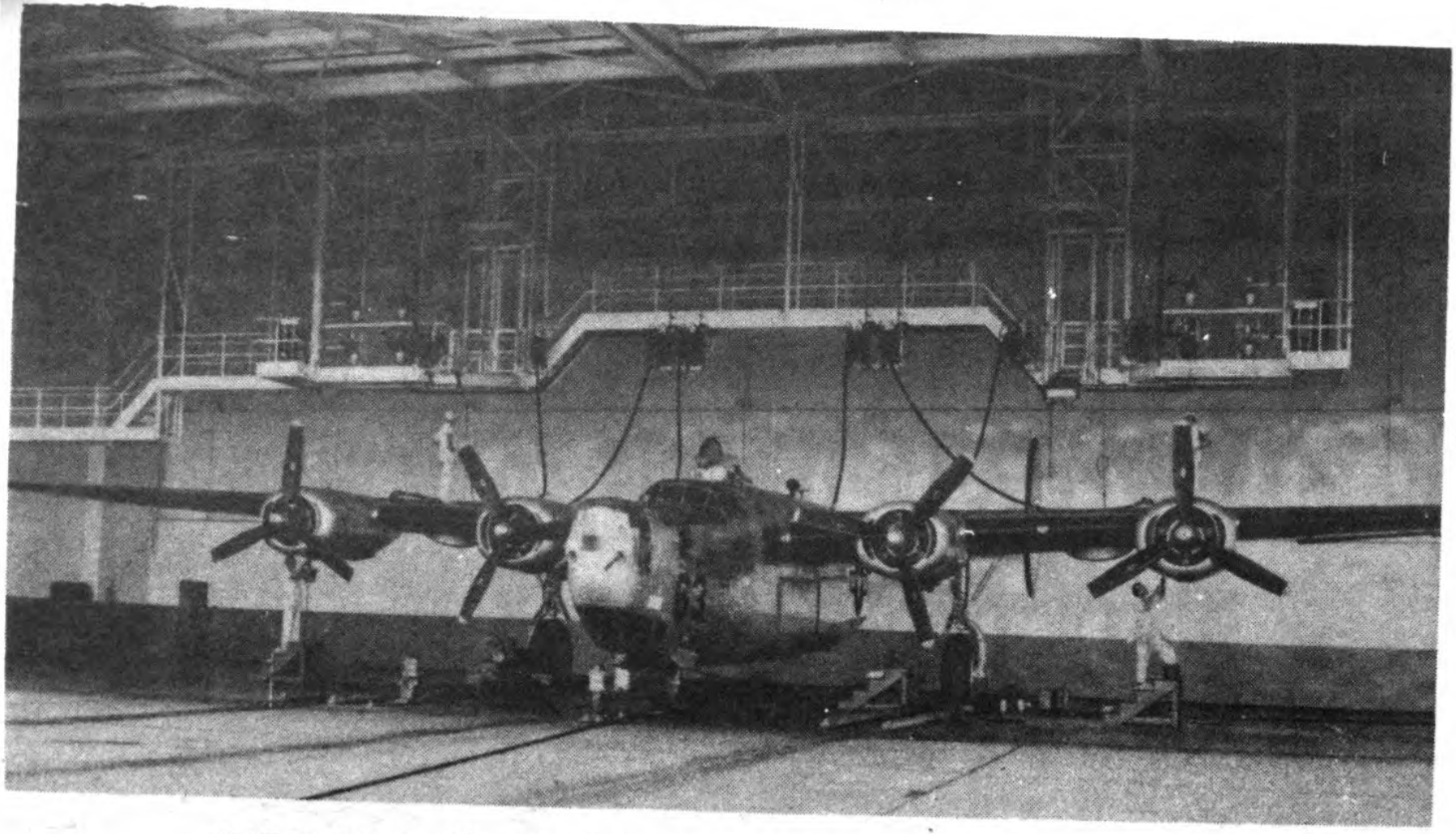
LIGHTS, PLANT:
Fluorescent-104,000 units,76,000 fixtures; 152,000 tubes, 4' long.

LOCKERS:
No. in plant - 54,000.

LOFTING:
Done on 16' x 64',16-gauge steel-surfaced tables. Surface painted with white paint. Deviated limits caused by atmospheric conditions reduced to one 1/100th of an inch by using steel rather than wood-surfaced tables. Division area, 340' x 30'.



VIEW OF FINAL ASSEMBLY LINE



GASSING B-24 BOMBER BEFORE IT LEAVES THE PLANT

LUNCH ROOMS:

No. in plant and hangars-24. Does not include tables set up between lockers.

MACHINE GUNS:

Ten .50 caliber, M2 Browning. Air-cooled, recoil operated, belt fed. Ammunition fed to guns by metallic link disintegrating belt. Ammunition can be fed from either side by repositioning block ass'y. Dimensions: 56½ x 5; 7/8 x 3 & 7/8 in. Wt: Approx 65 lbs. Fires 700-850 rounds per minute 15 to 20 rounds bursts with one min. interval between bursts. Muzzle velocity-2800 ft/sec. Has recoil buffer to help absorb shock. Manufactured by Frigidaire & Colt Fire Arms Co. Shipped in individual boxes from Army depot.

MACHINE SHOP:

500 diff. pts machined. Almost 25,000 parts per day. ½ acre; 220 machines (lathes, drill presses, screw machines etc.) First part produced at Willow Run in Machine Shop - 12/8/41.

MAGNYSN RADIO COMPASS:

Operates from transformer located in wing. Makes possible following radio beam.

MAIL:

1943 avg. of 10 2/3 mail sacks rec'd each day. Outgoing Aug: 13 1/3 sacks daily.

MARKINGS:

Total number on ships - 1,233.

MATERIALS IN PLANE:

Aluminum alloys-85%; Steel-13%; Magnesium-.33%; Brass-copper-bronze-.66% Rubber-glass-plastic-1.01%; Total-100 per cent. Flat sheets 48" x 144" or 36" x 144". Special 48" x 234".

MATERIAL CONSERVATION:

Started at Willow Run, June 28, 1943.

Month	Engineering Changes	Reclaim	Total	Men
July	63,894	13,450	77,344	35
Aug.	107,545	4,048	111,593	42
Sept.	114,588	7,882	122,470	45
Oct.	58,306	24,539	82,845	48
Nov.	78,360	8,726	87,086	49
Dec.	145,253	14,510	159,763	53

MATERIAL IN ONE BOMBER:

To build bomber takes enough aluminum for 55,000 coffee percolators; enough alloy steel to make 6,800 electric irons; and steel in 160 washing machines; enough rubber to recap 800

automobile tires; and enough copper for 550 radio receivers. (From "Flying", October, 1943).

MATERIAL FLOW:

Main assy: Shortages occur when float is below 200 ships. Small Parts shortages occur when float is below 600 ships. Rough stk shortage below 600.

"MERRY-GO-ROUND": (Pilot's Floor)

No. of cars-30. Length of circuit-400 ft. No. of stations-30; Time to complete circuit-approx. 18 to 36 hours. 2 1/2" to 6" per min.) No. of installations-approx 190. Driven by 1 HP electric motor. Ratio geared from 1800 to 1 to 900 to 1.

METALLURGICAL LABORATORY: SEE "LABORATORY"

MIDGETS:

No employed at WR-10. Install stiffener rods in auxiliary fuel cells. Also serve as inspectors and to attach outer wing assembly to center wing at splice joint.

MONORAILS:

Length Mfg. Bldg. - 12 mi. All bldgs-18 miles.

MOVEMENT OF ASSEMBLY LINES:

Line originally planned as 8-hr.sta., 1-12 inclusive. 4-hour stations 13 - 28 inclusive. Time reduced to under 4 hrs in stations 1-14 incl,and 2 hrs in stations 15-28. Master control panel located at east end of balcony at K-54 and H-54. Schedule of movement regulated by Final Assy Office. Based on production requirements.

NACCANOL:

Trade name for solution used to determine leaks around oxygen line connections. Foams when leak is present.

NOSE TURRET: SEE "TURRETS"

NEW MATERIALS BUILDING:

520 x 1028 ft; floor space - 577,120 sq. ft. Started June, 1943. Completed Dec. 1943. 9 furnaces to heat building. 5 stock depts; Shearing dep't; Shipping; Salvage; Material Conservation;Carpenter Shop; Employes Garage; Receiving inspection; Maintenance; Blueprint crib. All component items, such as outer wings, stabilizers,rudders, fins, trailing edges, bomb bay doors, and bottom panels are shipped. 703 boxes ranging from a gross weight of 475 lbs to 4000 pounds are export packed to Army specifications. More than 31 carloads shipped each month.

Emergency kits packed for overseas shipment, average 2 - 10 boxes daily. Rough stock in the form of sheet aluminum, coils, extrusions, wire, bar steel,and sheet steel shipped to Ford plants, outside aircraft plants and South America. The Material Conservation department ships out surplus stk that is available to other aircraft plants.

-0-

OIL:

Amt used for tool maintenance per wk- 3745 gals; 300 lbs. of grease.In Ship 142-gal. tank for each engine.

OIL SEPARATORS:

No. at W.R. - 2 (located at east end west ends of factory). Used to separate oil from water before latter is emptied into Willow Creek. Water entering detention basin contains 16.3 P.P.M. (parts per million). When it leaves the basin its content is 2.4 P.P.M. The oil removed equals approx 85% of original reading. Water kept in detention basin for 1 1/2 hrs.Capacity of oil separator - 1000 gals. per minute, or in dry weather about 400.

OUTER WING PANELS: SEE ALSO "WING"

Length-27½', Wt. 725 lbs. No. of rivets-22,844. No. of bolts to attach to center wing section-120. 15 bulkheads. 13 skin sections. Manufactured at Highland Park.

OXYGEN:

Lines-450 lbs pressure in tanks.50 lb while on lines to keep out moisture . 45,000 - 50,000 cu. ft. used daily in testing equipment in ship under 425 lbs. pressure. Valves in lines freeze if more than .0002% mouisture in oxygen.

System at plant: 24 thirty-ft. cylinders, ea. holding approx. 3300 cu.ft. In vault between assy building & hangar. Piped to 21 points in plant. Tank truck brings liquid oxygen; temp -183°F.

Warning Signal: When pressure drops 450 to 110 lbs. PSI in tanks on ship.

-P-

PAINT:

Paint dries in 3 min. by use of infra red lamps. 30 diff. kinds of paint; 95% made at Highland Park. 8 spray-booths plus main & camouflage booth. 3000 signs and decals per ship. Last camouflaged ship # 3844 (KD 3190).

Paint & Dope Room: 324 ft. long x 79 ft. wide. Spray Booth-150 x 80 ft. 36 ft. ceiling.

PAINT, MAINTENANCE:
Area to cover equal to 5-ft fence 236 mi. long. Approx 4,859,000 sq.ft. covered.

PAPER TOWELING: SEE "SCRAP PAPER"
3 1/2 carloads every month. Wrapping 1 carload. Tissue-176 cartons of 50 rolls each, per month.

PARKING LOTS:
Capacity all lots-15,300 cars.

PARTS: B-24-J

	Unlike	5-23-44 Total
GK (ex sp.std pts)	26,389	70,278
Spec Std pts	310	17,840
Std. pts (ex rivets)	2,970	63,130
Misc pts not in abv gps	200	987
All pts	29,869	152,235
Rivets	519	313,237
Grand Total	30,388	465,472

GHE & purch assys counted-1 pt each.)

PARTS-ASSEMBLY:
12.000 pcs per day (Dept 932); 4,500 per day (Dept 934).

PATTERN SHOP:

kote to protect against scratches. (Ford-developed).

POWER PLANT:

Requirements of entire plant approx. 13,200 K W H. Supplied by Willow Run Power Plant-5,000 KWH (remainder furnished by Det. Edison Co.).
Power House: Size of 160' x 130'. Boilers-four 870 HP each (fuel oil). Oil consumption of boilers av. winter day-35,000 gals. Area-47,409 sq. ft.

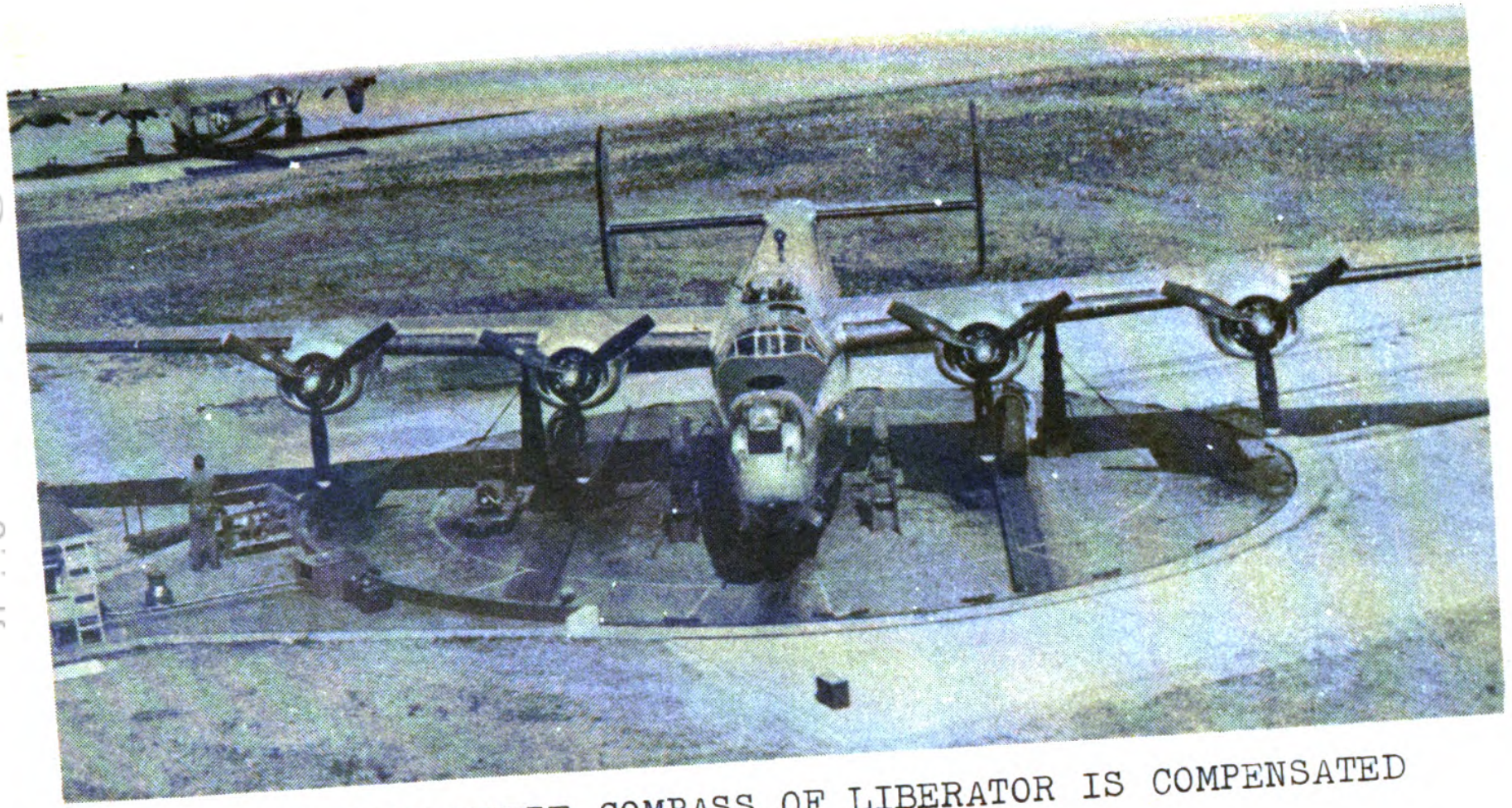
PRESS SHOP:

345 presses incl. 13 hydraulic presses ranging from 100 to 1000-ton cap. Mechanical presses range from 30 to 750 ton cap. 56 heavy presses 150 to 1,000 ton capacity. 109 punch presses (Ferracutes, Niagaras, Clevelands). Wt.of 1,000 - ton presses - 350 tons. Amount of oil used in large hydraulic presses as a hydraulic agent-1500 gal 120,000 pcs processed per day.

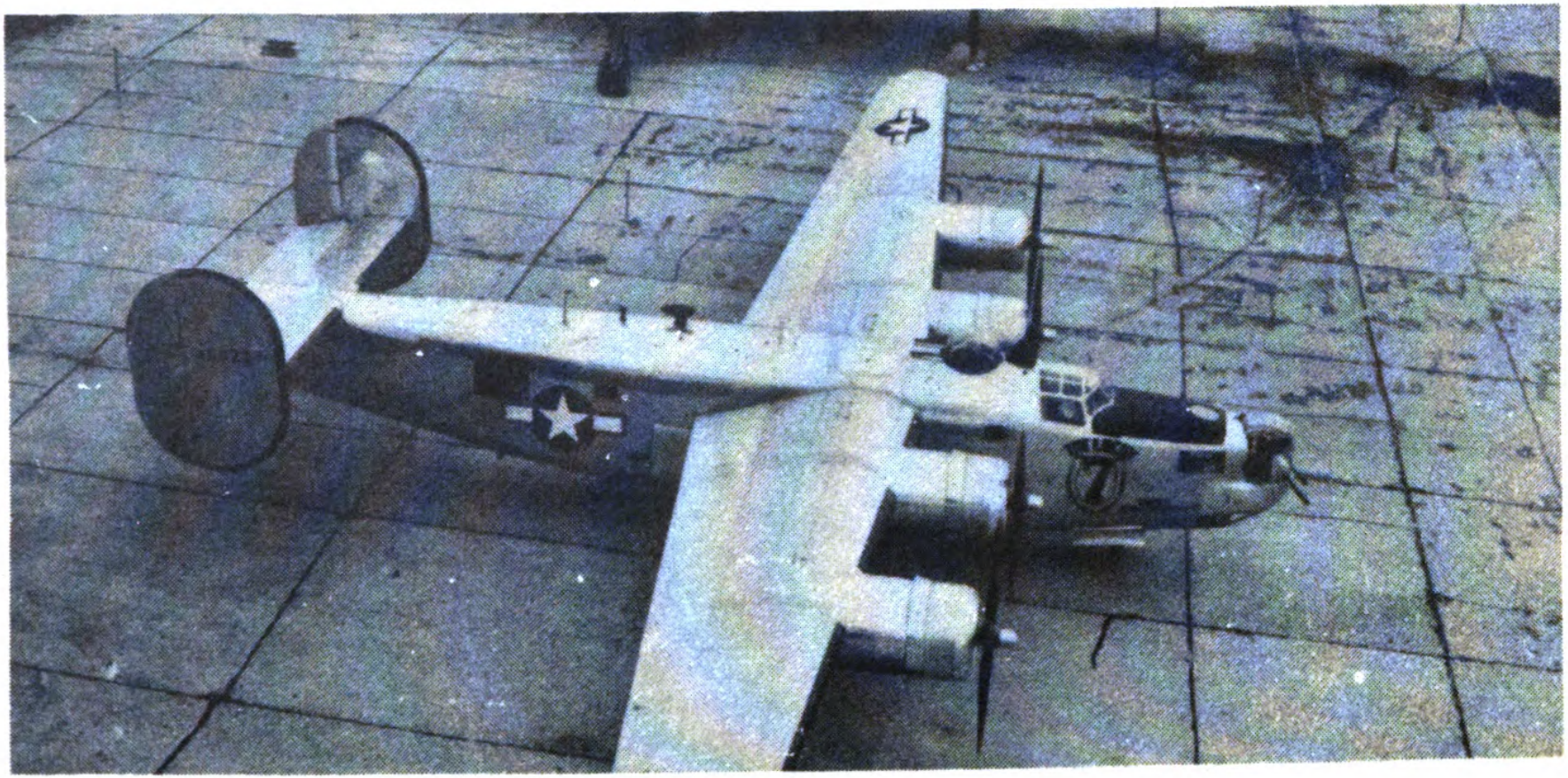
PROPELLER:

Dia. - 11'6". Wt. of, incl gov., (all four)-1892 lbs. No. balanced-65 every 18 hrs. Balancing standards aligned within .003". Blades made of drop - forged aluminum alloy. Hub of steel.

-Q-



COMPASS ROSE WHERE COMPASS OF LIBERATOR IS COMPENSATED



7000th LIBERATOR BOMBER ON APRON AT WILLOW RUN AIRFIELD

QUANTITIES: SEE "PLANT CONSTRUCTION"

-R-

RADIO:

Standard equipment: 3 command receivers, 2 command transmitters, 1 liaison receiver and transmitter, 7 tuning units, 1 marker beacon receiver, 1 radio compass receiver, 1 inter - plane phone system, localizer receiver. 11 stations. Liaison set used between ship and base. Range to 1000 miles; 2 antennae. Localizer receiver used for blind landing. Teardrop houses loop antenna which operates automatic radio compass. In response to radio signal, loop rotates and positions itself and compass dial indicates direction of signal.

RADIO FACILITIES: (Airfield)

1 Radio Range (beacon) Station (Stony Creek and Willis Rd.); 1 Radio Marker Beacon Station (Stony Creek & Willis Rd.); 1 Radio Transmitter Station (near Hangar No.2) which includes: 1 Traffic Control transmitter (245 KC); 1 Army Acceptance transmitter; 1 U.H.F. transmitter (F.M.); 1 State Police transmitter (F. M.); 1 Plant Protection transmitter (F.M.); 2 V.H.F. Acceptance transmitters; 1 Radio Compass Cali-

brating transmitter(360° from compass rose & operated from it); 1 Radio Receiving station containing 14 fixed receivers.
Acceptance Control Station; Operating controls for all transmitters and receivers; recorder for all conversations.
Control Tower: Operating controls for traffic dispatching and police transmitters & receivers.

RATE OF CLIMB INDICATOR:
Registers rate by change in barometric pressure.

RATE DEPARTMENT.
18 checkers.

REFRIGERATION:
Refrigeration equipment in service-2,035 tons.

RIVETS:
Rivets required to build major sections: Total - - - - - - - - - 242,752
Center Wing - - - - - - - - - - 78,606
Outer Wing - - - - - - - - - - 22,844
Fuselage - - - - - - - - - - - 126,651
Tail - - - - - - - - - - - - - 14,651
Note: The foregoing does not include all the rivets on the B-24. The total as given by the Material Control

department is 313,237. Made daily at W.R.-approx. 7,000,000; 520 different rivets; 750 to the lb. From 1/16 to 2 1/2" long. Fastest machines produce 400 per min. 313,000 rivets per ship 686 lbs. 28 cold heading machines; 8 diameters, 100-400 per min. Icebox type-17S.Icebox rivets shear strength is 30,000 lbs per sq.in. Non-icebox-25,0001bs/sq.in.Lightest rivet weighs .00005 lbs. Heaviest rivet weighs.05 lbs. No. of rivets made in 1944 was 1,921,962,810.

Riveting equipment: No. squeeze guns at W.R.-2,889. Loaned out-1,838. Total-4,719.

Rivets, Time to drive: Two teams of riveters drove 6,975 rivets in 9 hrs.

ROADS:

Length of plant roads-8½ mi(concrete) Length of patrol roads around airport 3 mi. Length of gravel roads in salvage yard-3/4 mi. Area of concrete roads & pavement - 229,000 sq. yds.

ROOF AREA:

Total for all bldgs-2,750,000 sq. ft.

ROPE: SEE "CABLE"

RUDDER: SEE ALSO "CONTROL SURFACES"

Total area both-65 sq.ft. Travel ea.

way-20°.

RUNWAYS:

No.-6. Length of longest (9L)-7,366 ft. Length shortest (4L)-6,510 ft. Width-160 ft. Center of SW & NE runways on radio beam from airport range station. Runways numbered according to compass headings. Last digit is dropped from figure. Numerals in concrete 50 ft. long at end of ea runway with a circle of concrete around each At intersection of runways are 10 acres of concrete. Area runways & taxiways-828,000 sq.yds. Inside WR airport area-35,830 ft. Army Air Base-4,817 ft. Total length of runways-40,647 ft. (7.7 mi.) Thickness of,8" tapered to 6". If runways of airfield were placed end to end, they would make a highway (2 lanes) 40' wide, 31 mi. long or a single highway 62 miles long.

-S-

SALVAGE: SEE "SCRAP"

SAWS:

Av. 200 circle saws and 30 hand saws a day sharpened. 25,000 ft. of band saw blades used every month. 2 plants Manchester & Highland Park send saws

to Willow Run for sharpening.

SCALES:
134 scales ranging in size from 100 lbs. to 60 ton capacity.

SCHOOL, AIRPLANE:
Trained 50,000 students up to Nov.'44. No. of classroom instructors-18; on production-11. Area, school building 49,494 sq. ft. 410 ft. long, 58 feet wide. Laboratories incl. electrical, radio, hydraulics, chemistry, instrument and research. Facilities incl. library, auditorium (seats 325), small furnaces, small machine shop. Classrooms incl. engine, blueprint reading, drafting and rivet theory.

SCHOOL, APPRENTICE:
Length of time to complete-6,000 to 8,000 hrs. Length of classes-2-4 hrs. wk. Av. age 18-21. At Willow Run - December, 1942 - 385 apprentices.

SCHOOL, ARMY AIR BASE: SEE "AIR BASE"

SCHOOL, PRODUCTION TRAINING:
Operated in departments.

SCHOOL, RIVET:
Up to Oct. 27, 1944 - 21,785 riveters completed rivet training. Now confined

to dept's on floor as shop training "on the job".

SCRAP:

1400-1800 cans emptied daily. Saving in paper toweling from 50 cases to 90 over 24 hour period; 187,500 sheets used. Salvage at Willow Run will represent a daily total of 206,000 lbs. a large part of total is in aluminum, which reaches the figure of 84,312 lb 90% of which is type segregated. Waste paper will run 35,560 lbs daily. Solids & turnings which include steel, cast iron, copper, bronze, brass and zinc will total 76,995 pounds daily. Plexiglas-953 lbs, old files-54 lbs., grinding wheels-173 pounds, material from sewing shop total 557 lbs. About 171 gals. of oil are also salvaged daily. The Salvage dep't returns many items to production. The daily average amounts to 69,699 pieces.

SELECTIVE SERVICE:

In 1943, 15.18% of total quits were employes entering military service. No. of men called January '43 - 888; No. of men called January '44 - 178.

SERVICE GARAGE: (New Materials Bldg.)

For plant employes. Open 19 hrs daily starting at 7 A. M. Towing & service

all makes. Phone 8757 - Russ Dawson.

SEWERS:

Mfg Bldg-18 mi; parking lots-9 miles; parking lots (drain tile)-6 mi; waste and soil pipe - 17 mi; airport storm sewers - 72 mi; airport drain tile-85 miles.

Sewage Disposal: Approx.1 1/2 million gals.treated daily. Plant-27 ft.long, 27 ft. wide. Area - 3,300 sq. ft.

SEWING: SEE "FABRIC"

SHEARING: (New Materials Bldg)

14 shears:3-20 foot, 3-8 foot, 7-6 ft 1 Allegheny scrap cutter. 7000 pcs. sheared per ship. 50 diff. kinds of metal sheared-mostly Alclad from .012 to .25" thick. 140,000 pcs daily, 2 shifts, 61 men.

SHIELDED RADIO TEST ROOM:

Copper-walled room built inside copper-walled room. Said to be only one in existence. Effective as high as 500 mega-cycles.

SHIPPING:

Shipments from Willow Run, New Materials Bldg, Salvage yards, and Defense Plant Corp average 935 daily under inter-plant transfers, direct sales &

shipments of government materials. Shipments of regular spares average 10% of total B-24 parts list. To date parts to cover 7,000 bombers have been shipped. Expedite shipments are sent by Air Freight or Railway Express, covering every request of Air Service Command.

SHOWERS:
56 in plant.

SKIN:
Thickness of, from .128" to .025".

STABILIZER,HORIZONTAL: SEE "CONTROL SURFACES"
Total area: 140.54 sq. ft.

STAGGER BALANCING:
Leading edges of rudder and elevators flared to permit slip stream of air to pass through to assist pilot in moving control surfaces.

STATIC DISCHARGERS:
On vertical fins and wing tips. Metal arms with self-contained wick saturated with glycerine. Used to discharge static electricity that builds up in ship while in flight.

STRINGERS: SEE "DRAW BENCH"

STOCK: SEE "AREA" & "CRIBS"

SILICA-GEL:
Moisture absorbent and dehydrating agent kept with precision-made parts while in storage. Indicates amount of moisture by changing color from original shade of blue to red.

-T-

TABS, CONTROL:
Manufactured at Rouge Tire Plant. Area of elevator tabs (both) 2.40 sq. feet. Used to "trim" ship while in flight. All metal construction.

TABULATING: SEE "I.B.M."

TANKS: SEE "WATER"

TAXIWAYS:
Width-80 ft. Two lead from Apron 1 to Apron 2. Eastern taxiway leads to runways 4L, 4R, 9R. 50-ft. taxiways connect apron at Army Air Base & runways 27R & 27L. Total length-12,081 ft.(2.3 mi.). Area of runways & taxiways-828,000 sq. yds.

TELAUTOGRAPH:
Issues general orders from main office of Material Control to 22 sta-

tions.Relieves traffic on trunk telephone lines. Furnishes written evidence of each request for stock or shortage in all Matl Control areas.

TENSIOMETER:
Used to check tensions on cables in ship.

THERMOCOUPLE INSTRUMENT:
Registers heat of engines. Coupled to no. 5 cylinder of each engine.

THIMBLES, SAFETY:
350 in use by operators of squeeze rivet machines.

TIME DEPARTMENT:
140 employes; 8 field offices. No. of clocks - 220.

TIRES: (Main Strut)
Size: 56" dia.; 16 ply. Wt.-250 lbs. Wt. of tube-37½ lbs. Wt. of complete wheel assembly - 562 pounds.
Construction:Natural rubber sidewalls Synthetic tread. Ground contact area 345 sq. in.
Nose Wheel: Size-36" dia, 10 ply.Designed to carry load of 8,200 lbs.
Tubes: All tubes are made from natural rubber. Must support 27,000 lbs. Will support (as set)over 200,000 lbs

TOLERANCE:

Max. allowed in mating fuselage sections to center wing - 1/16". Engine mounts-.02" to .003"; C.W. ends-.010"

TOWERS, COOLING:

Three towers constucted of sheet metal, lined with redwood. Cool air for Adm. Bldg, Dope Room and Decompression chamber.

TOWER, CONTROL:

5 transmitters, 16 radio receivers, 1 radio range station, 2-35mm film recorders, 1 teletype. Over 500 pr. electric wires enter control panel;436 switches. 73,669 flights (to 12-1-44) without field mishaps. First used: June 24, 1942.

TRAILERS:

(For "KD" Ships) Original fleet-114 trailers. 85 since transferred to other aircraft plants. Since Aug.1, 1944, no assemblies shipped from Willow Run as "KD". Comparing shipment of a B-24 by railroad & trailer discloses that 4 railroad cars were needed as against $2\frac{1}{2}$ trailers. A trip to San Diego and back made by trailers in $9\frac{1}{2}$ days. While on road, drivers changed every 5 hours. At some points along the route, overhead bridges had

to be cleared; a three-inch clearance was average. Maximum weight that a trailer could carry was 27,000 lbs. Av. 250 round trips a month. The high est number ever made was 375. Trailers transferred; Consolidated-42;Curtiss-Wright, Buffalo-30; North American, Dallas-4; North American, Kansas City-4;Douglas, Oklahoma City-4;Douglas, Tulsa-1; Ford-6.

TRAIN: (For visitors)
Powered by 18-plate Philco storage battery,weighing 1358 lbs.(Type 19XV)

TRANSPORTATION:
(Automotive equipment) 56 passenger cars, 12 station wagons, 47 stake trucks,16 truck tractors, 31 pickups, 78 dump trucks, 51 misc. trucks, 72 scooters,14 Ferguson-Sherman tractors 45 Moto - tugs, 50 four - wheel stake trailers, 24 semi-trailers,10 gravity dump trucks, 28 shop trucks, and 9 Mercury Banty tugs. (Does not include units used by contractors & serviced by Transportation Department).

TRANSPORTATION BUREAU:
No. of cars registered-12,885; Drive about 274,960 mi. per day. Use about 18,331 gals. per day. Approx. 49 tire certificates used daily. Av. 3.1 ri-

ders per car. Detroit-201 zones; 50 surrounding townships. 35 bus trips daily by DSR; 150 trips daily by private lines. Av. bus count per day-2,854.

TUBING:

Amt used-278 ft. rubber;3,300 ft. metal. 1800 tubes in ship; 12 systems; 36 hand-benders; 4 power-driven Parkomatic. Hydraulic system - 2 on each ship. Approx. 25,000 tubes bent and marked with identification tape daily Identification colors: Smoke screen-Brn-Wht; Hydraulic-Lt. Blue-Yellow-Lt Blu; Compressed Air (Pressure-25 PSI) Yellow-Green; Steam-Lt. Blu-Blk;Purging-Lt. Blue-Yel; Exhaust-Lt.Blu-Brn; Anti-icing-Wht-Red; Oxygen-Green;Airspeed Pitot Pressure-Black; Air Speed Static Pressure-Gr.-Blu; Manifold-Lt. Blue-Wht; Vacuum-Lt.Gr-Wht; Air Pressure, Compressed (20 PSI)-Lt.Blu-Grn; Fuel line-Red; Fuel and oil vent-Red-Blk; Lubricating oil-Yellow; Coolant-& Prestone-White-Blk-Wht; Fire Extinguisher-Brn; Water-Wht; Floatations-Lt. Blue. Master form blocks made in carpenter shop.

TURRET, BOTTOM: (Sperry Retractable)

Local control (gunner inside). Power-Vicker electro-hydraulic unit. Volt-

age-40 volts. Sight-Sperry Automatic computing type. Guns are charged individually by manual chargers. Dia.of turret-44"; dia. of turret ring-47½". Height of hanger assembly (retracted) 104 1/8". Height of turret & hanger assembly (extended)-131 5/8". Rotation in azimuth - 360°; elevation of guns - 85° from vertical. Ammunition stored in containers attached to hanger assembly outside of turret. Ammunition storage-650 rounds per gun. Wt. of turret - 780 lbs.
Operation:Side pressure on hand grips gives azimuth rotation; forward or back pressure moves turret up or down.

TURRET,NOSE:(Emerson Electric-Type A-3D) Local control (gunner inside). Electrically operated; voltage-27.5. Guns are charged individually by manual chargers. Sight: ring reticle reflector type. Protection: bullet - proof glass and armor plate in front of the gunner. Dia. of turret-42"; height-69"; Weight: 720 lbs; azimuth rotation-150°;elevation of guns-60° above horizontal;depression of guns-50° below horizontal. Ammunition storage-700 rounds per gun, stored in boxes located outside of turret on ea. side of nose fuselage.

TURRET, TAIL:

Type-Army A-6-C.Mf'd by Southern Aircraft Corp. Hydraulically-operated; no armor protection. Equipped with K-10 compensating sight. Dia. - 40"; height-58"; Wt. approx 550 lbs. 500 rounds ammunition per gun stored in bins located in aft section of fuselage. Azimuth rotation-122°. Depression of guns-40° below horizontal;elevation 71° above horizontal.

Operation: Side pressure on gun grips actuates a rack & pinion (located under gunner's seat) which rotates the turret. Fwd or back pressure actuates hydraulic jack (in front center of turret)which moves the guns in a vertical plane.

TURRET, TOP: (Glenn L Martin-Type A-3D)

Local control (gunner inside turret). Power-electrical. Voltage-27.5 volts DC. Sight: reflector ring reticle compensating type. Guns are charged individually by manual charger. Protection: armor plate below ring in front of gunner. Dia. of turret-42" Height-60"; weight-564 lbs. Azimuth rotation-360°; elevation of guns from 3° to plus 85°; depression of guns-8° below horizontal. Ammunition storage-480 rounds per gun stored in containers suspended from turret ring

in front of gunner.

TURRET INTERRUPTERS:
Used to prevent gunner from accidentally firing into his own ship during combat.

TURBO SUPERCHARGER:
Inventor Dr. Sanford Moss, Gen. Electric. HP generated-180 ea. Temp. of supercharger air 400°F. Lubrication-Jet & splash system. Each engine requires 135 lbs of air per min. at sea level. Speeds up to 28,000 RPMs;Ford-built at Rouge Plant until Oct.,1944. 52,244 produced.

TYLER LAKE:
Surface Area: 640,000 sq. ft. Contents: approx 30,000,000 gals. Depth-average - 9 feet.

TYPEWRITERS:
734 at Willow Run,including 250 Electromatics. (1-5-45)

-V-

VISITORS: (Sunday)
Past 200,000 mark (December 10, 1944)

-W-

WATER: SEE ALSO "TOWER, COOLING"

Approx 5,000,000 gals. daily. 2 water tanks hold 400,000 gals. ea. Supplied by 3 Rawsonville wells;pumped through two 24" mains at rate of 270,000 gals per hour.

Water Treatment Plant: Cap.-6,000,000 gals per day; 700 gals per min. Av. treated-4,500,000 gals per day. Amt. of lime used - approx 1,600 lbs per million gals. of water. Soda ash-av. 250 lbs daily. Size: 71 ft. long; 70 ft. wide. Area-18,000 sq. ft.

WEIGHT OF BOMBER: (From Engineering)

	Wt. in lbs.
Wing Group	6,652
Tail Group	906
Fuselage Group	3,407
Landing Gear	3,002
Engine Nacelles	1,745
4 Engine (Installed)	6,050
4 Engine (Access)	1,559
Power Plant Control	288
Propellers & Governors	1,892
Starting System	212
Lubricating System	682
Fuel System (SS tank)	2,468
Instruments	179
Surface Control	594
Furnishings	1,146
Communications	773
Electric Equipment	1,064

Anti-icing	208
Aux. Power Plant	119
Hydraulic	466
Armament	2,819
Designed Load	-36,231
Crew & Parachutes	2,000
Fuel (2087 gals)	-12,946
Oil (120 gals)	870
Flex guns & Instl	2,370
Bombs (4-500 lb)	2,006
Useful Load	-19,769
Max wt. allowable	-56,000

Plane weighs 37,205 lbs. as it enters Gas House, 47,255 when it leaves. In hangar added 500 lbs. stowage, 1,600 gal gas, 120 gal oil. Wt. on delivery 49,900 lbs. 50 lb variation in ships.

WEIGHING THE B-24:

15% of all ships are weighed. Scales located in Gas House are only ones of kind in aircraft. Ships leveled and weighed in 5 minutes. Each of three weighing platforms has 52,000 lb.cap.

WELDING:

Welding, Spot:8500 pcs.per day;60,000 welds; 25 welds per min. 700 assys are spot welded. 63 machines at W.R. 66 proposals accepted,with 46 in production. 90.55 man hrs saved per ship or 37,668 per month; replacing 5,620 rivets. Total of 7181 spot welds per

ship. In front bomb doors are 1992 welds; in aft, 1176. Roller welders capacity-300 welds per min. Arc and gas - 2500 pcs per day.

WELDING, ACETYLENE:
85 unlike aluminum duct and tubing assemblies welded with acetylene gas. 10 chemical cleaning tanks.

WINDOWS:
No. in plant - 28,855. 30 different types of glass used.

WING:SEE ALSO "CENTER WING","OUTER WING" AND "FUEL CELLS"
Dimensions: Length-110'. Area- 1048 sq. ft. Wt. of wing group-6652 lbs. When plane climbs,wing tips are higher than normal. Limit of wing deflection 45", but safety margin permits up to 6'. Tail may whip down 3/4". Built to withstand 25Gs (25 times force of gravity). In perfect landing might be 1 to 2 Gs. Known record is 22 Gs.

WING TIPS:
Mf'd by E. G. Budd Co. Contains 1,650 rivets. Built separately from outer wing panel.

ADDENDA

ALROKING:
52,115 pcs. and 9,000 lbs. rivets alroked daily.

AMMUNITION LOAD: (From Wt. Engineering)

Nose Turret:	1200 rounds,	349 lbs.
Top Turret:	800 rounds,	233 lbs.
Bottom Turret:	1016 rounds,	296 lbs
Tail Turret:	632 rounds,	184 lbs.
Waist Guns:	1000 rounds,	292 lbs.
Total	4648 rounds,	1354 lbs.

AREA, SHIP:
Skin Surfaces: Wing-2200 sq.ft; Fuselage-1200 sq.ft; Empennage-500 sq.ft. Engine Nacelle-300 sq.ft. Total-4200 sq. ft.

ENGINE INSTALLATION:
10 minutes to lower and secure with 4 bolts. 1-1/2 hrs. per engine for complete installation.

HEAT TREAT: (Draw Bench)
Four Holcroft electric furnaces and quenching chambers. Temp. of furnaces 935°F. Time-approx. 2 hrs. depending on gauge of material. Capacity - 1800 lbs. per hour per furnace.

NOSE WHEEL:

Wt. of assembly-358 lbs; tire 51 lbs; tube-20 lbs.; wheel-38 lbs.

STURDYBENDERS:
Used to punch holes in stringers for aluminum skin riveting. 312 holes can be punched in a 28-ft. strip at one time.

SUPERCHARGER:
Each weighs 140 pounds.

TUBING:
1726 tubing assemblies in ship.

YODER ROLLS:
250 different rolls used. 11 machines

CHRONOLOGY ADDENDA

CONTRACTORS' MANCOUNT:

January 1, 1941	0
July 1, 1941	183
January 1, 1942	3762
January 30, 1942	4500
July 1, 1942	3163
January 1, 1943	614
July 1, 1943	181
January 1, 1944	646
July 1, 1944	885
January 1, 1945	43

IMPORTANT VISITORS

Hon. Norman Armour, Amb. to Argentina
General H. H. Arnold, AAF
Dr. Eduard Benes, Pres. Czechoslovakia
Joseph Beck, Grand Duchy of Luxembourg
Irving Berlin, Composer "This Is The Army"
Prince Bernhard, Pr. Consort Netherlands
Attorney General Francis J. Biddle
Joe E. Brown
Walter Davenport, Staff Writer, Colliers
Sir John Dill, British Field Marshall
Walt Disney, Hollywood
Hon. Joseph B. Eastman, Chief Def. Transp.
James Farley, ex-Postmaster General
Gracie Fields
Harvey Firestone, Jr. Firestone Tire
Herbert Gaston, Asst. Sec'y Treasury
Maj. Gen. Giles, Asst. Chf. of Staff AAF
General Henri Giraud, Free French Forces
Manfred Gottfried, Managing Editor, Time
Hon. Joseph Grew, Under Sec'y of State
W. Averill Harriman, Amb. to Russia
Wm. Randolph Hearst, Jr.
C. D. Howe, Can. Minister Munit. & Supply
Paul Hunter, Publisher, Liberty
Eric Johnson, U. S. Chamber of Commerce
Gertrude Lawrence
Walter Lippmann, Commentator
Capt. Oliver Lyttleton, British Supply
Dr. Carlos Martins, Amb. of Brazil
Louis B. Mayer, M. G. M. Studios
Sir Malcolm Mc Donald, Brit. High Comm.

Adolph Menjou
Raymond Moley, Writer
Henry Morgenthau, Jr. Sec'y of Treasury
Charles Murphy, Editor, Fortune
Justice Frank Murphy Supreme Court
Hon. Walter Nash, Minister, New Zealand
Donald Nelson, War Production Board
Dr. Licenciado Ezequiel Padill, Mexico
Robert S. Patterson, Under Sec'y of War
Gen. Enrique Penaranda, Pres. of Bolivia
King Peter II, Jugoslavia
Walter Pidgeon
President Manuel Prado, Republic of Peru
Hon. Sam Rayburn, Speaker, House of Rep.
Col. Eddie Rickenbacker
Gen. Alberto Romero, Ecuador
President and Mrs. Franklin D. Roosevelt.
Gen. L. G. Rudenko, USSR
Beardsley Ruml, Author "Ruml Plan"
Gov. General Ryckmans, Belgian Congo
Manuel de Freyre Y Santander, Amb. Peru
Governor Sewell, State of Maine
Chester Shaw, Managing Editor, Newsweek
C. W. Shaw, Asst. Sec'y of State
Igor Sikorsky, Aircraft
General Brehon Sommervell, Serv.of Supply
Boyden Sparks, Writer
Arthur Hayes Sulzberger, New York Times
Lowell Thomas, News Commentator
Senator Harry Truman & Committee
Gen. Sir W. K. Venning, Brit.Sup.Mission
Vice-President Henry A. Wallace
C. E. Wilson, War Production Board

WILLOW RUN IN A NUTSHELL

Area (entire project)	1,878	acres
Floor space	109	acres
Floor space	4,734,617	sq.ft
Factory only	80¼	acres
Factory only	3,503,016	sq.ft
Plant length (east to west)	3,200	feet
Plant width	1,277	feet
Ass'y lines total length	5,450	feet
No. rivets in B-24	313,237	
Runways (longest)	7,366	feet
(shortest)	6,510	feet
Airport concrete equivalent to 20-foot highway 115 miles long.		
Airport size	1,434	acres
Wt. of B-24 on delivery	49,900	lbs.
Cost of project	$103,000,000	
Conveyors in plant	136	
Craneways in plant	29	miles
Monorails (all bldgs)	18	miles
Power requirements (approx)	13,200	KWH
Floor wood blocks	16,000,000	
No. of dies made	29,124	
No. of fixtures in prod.	10,915	
Fluorescent tubes	152,000	
Students trained in school	50,000	
No. windows in plant	28,855	
Water used daily(approx)	5,000,000	gals
Plant roads (concrete)	8½	mi.
Parking lots (capacity)	15,300	cars
Fuel cap. (gasoline)	150,000	gals
Fire Prot. (sprinkler heads)	51,212	

PART II

CHRONOLOGICAL DATA

Jan 4 Mr. Edsel B. Ford and other Ford officials leave to visit Consolidated Plant at San Diego to determine if Ford could build the B-24 Bomber in quantity.

7 Mr. Ford on West Coast to "study aircraft industry." Meets with Logan Miller, W.F. Pioch, Ed. Scott, Ernie Walters, Wm. Taylor.

8 Mr. Ford announces that Company will begin immediately with plans to use its mass production facilities in construction of B-24 bomber parts. Ford said entirely new type of plant would be constructed to handle the job.

12 Ford officials visited Wright Field and notified Air Corps that Ford could start as soon as ordered by the Government.

Feb 5 OPM declines Ford offer to build complete bomber, "at least for the present." War Department officials said they would adhere to a plan for Ford to make bomber parts only, to be assembled elsewhere.

19 Knudsen announces Ford will build bomber plant at Ypsilanti to produce subassemblies.

21 Ford received letter of intent to

Feb 21 build airframes for 1,200 bombers to be shipped to assembly plants at Tulsa and Fort Worth.

22 Ford has plans and drawings for plant virtually completed.

Mar 4 Party of Company officials leaves for San Diego. They rent offices and prepare to set up drafting room and other equipment. They also set up tool room at the Consolidated Plant.

11 Crew of 200 Ford engineers and production experts reach San Diego from Dearborn.

13 Ford receives educational contract on the B-24, amounting to $3,418,000.

24 Work Order request filed for 1st die.

28 First work done on site of plant as crews began clearing away woodlands to make room for airfield.

31 Bomber Educational Contract W535-ac18061 signed.

Apr 18 Ground-breaking and excavation work started on Bomber Plant.

20 First concrete poured in foundation footings.

May 1 Company begins plans for enlarged Willow Run Plant on verbal assur-

May 1 ance from the Government that it will build complete B-24 bombers as well as B-24 subassemblies.

3 Railroad spur from New York Central Railroad main line reached Bomber Plant site.
First piece in structural steel framework erected.

20 Ford receives sub-contracts from Douglas and Consolidated to build airframes (590 KD and 10 BU on each).

June 5 Air Corps sent letter of intent for 800 complete planes.
Willow Run Plant dedicated.

18 First orders placed for tools to be used in bomber construction.

25 First concrete floor poured.
Defense Plant Corporation Lease (Plancor 151) signed by E.B. Ford.

July 14 Designing of Center Wing Vertical Fixture started.

26 Production and engineering staff return from San Diego to set up airframe division at the Ford Airport.

Aug 12 First machinery installed at Willow Run.

13 First sewers laid in airfield.

15 First brick walls under construction at Willow Run Plant.

Aug 22 First concrete poured on runways in airfield.

Sept 1 First piece of machinery equipment arrives at Bomber Plant.

7 First group of men transferred from Dearborn Airframe to Willow Run.

26 Ford becomes a primary contractor on the Consolidated B-24 with a Government contract for 795 complete bombers. (W535-ac21216).

27 Machines in Tool Room started for first time.

Oct 15 First bomber part produced in Press Shop, Rouge.

21 First fixture completed.
First landing at Willow Run Airport on radio beacon by H. P. Henning and C. W. Thomas.

22 First official landing at Willow Run Airport made by Maj. Doolittle.

Nov 6 First assembly fixture arrived at Willow Run (Wing Flap).

19 Aft fuselage for # 1 ship started at Dearborn Airframe.

Dec 3 Last sewer in airfield completed.

4 Last concrete poured in runways.

8 First horizontal milling machine put in operation and first part produced at Willow Run.

24 Started setting up first Center Wing fixture.

Jan 4 Nose fuselage for #1 ship started at Dearborn.

13 Letter of intent for 700 complete planes and spare parts received.

14 Ground broken for Trade School at Willow Run.

15 Center Wing fixture ready for production. The first part was also placed in the fixture on this day. Change order #1 to prime contract W535-ac21216 was signed increasing order for spare parts for 795 complete B-24E bombers from $19,870,000 to $27,375,000.

23 Pilot's Floor for #1 ship started.

Feb 10 Rudder for #1 ship started.

11 Miss Agnes Menzies, first woman employe, started work as nurse in the First Aid Department.

16 Ford Motor Company entered into special facilities contract No. W535-ac26564 with War Department covering facilities for transport by truck of component assemblies to Tulsa and Fort Worth.

18 Center Wing Leading Edge for # 1 ship started.

21 L.H. Outer Wing Panel for #1 ship started.

24 Bomber subassembly trucking con-

Feb 24 tract between Ford Motor Company and E & L Transport Company was signed whereby E & L were engaged to transport certain materials and component assemblies between Willow Run, Tulsa and Fort Worth.

25 Government contracts increased to a total of 4,495 ships to be built.

Mar 18 Elevator for #1 ship started.

19 Pilot's Floor for #1 ship completed.

21 Rudder for #1 ship completed.

23 Charles A. Lindbergh engaged as engineering research consultant.

31 First shipment of subassemblies left Bomber Plant, consigned to Douglas Aircraft Corp., Tulsa, Okla.

Apr 1 L.H. Outer Wing Panel for #1 ship removed from vertical fixture. Ford Motor Company started training in First Aid.

7 Elevator for #1 ship completed.

8 Second shipment of subassemblies left Bomber Plant for Tulsa.

9 Aft fuselage for #1 ship completed at Dearborn.

10 Center Wing Leading Edge for # 1 ship completed.

11 Supplement #1 signed with Douglas providing for 1000 additional K.D. and spare parts for 1600 planes.

Apr 14 Supplement # 1 signed with C.A.C. providing for 800 additional K.D. and spare parts for 1400 planes.
15 No. 1 Center Wing taken out of vertical fixture.
16 No. 1 Center Wing completed.
18 Nose fuselage for #1 ship completed at Dearborn.
20 Ratio established between Douglas, C.A.C. and Ford on K.D. shipments.
May 15 First Ford-assembled bomber (Ship .01) completed and turned over to Flight Department.
19 M. L. Bricker assigned to Willow Run full time.
June 6 Donald Nelson, Head of War Production Board, Sir Oliver Lyttleton, British Minister of Production, and Averill Harriman of Lend-Lease Administration visit Willow Run.
8 Pilot line of assembly fixtures completed.
12 1st ship to hangar from factory.
19 First Ford-assembled bomber flight tested this day (3:45 to 4:20 P.M.).
22 First contingent of Air Corps ground crew trainees, 6 in number, reported for school.
24 Contract W-2119acll for training enlisted personnel signed.

June 24 First class held in new Airplane School Building.

July 1 King Peter II of Jugoslavia visits plant and talks with workers of Jugoslavian descent.

2 Hangar hosiptal occupied.

12 First K.D. set shipped to Douglas.

13 Central unit of hangar occupied.

14 No. 4 wing, first to be placed in Final Machining Unit.

21 Construction of barracks for Air Corps Ground Crew students started. Wing #4 completed in Final Machining Unit.

25 New State Highway Road System to the south parking lot opened to traffic.

31 Lt.Gen. H.H. Arnold, Chief of Army Air Forces, inspects Willow Run.

Aug 17 On contract W535ac Supplement Agt. #5, Ford was allowed an additional 900 B. U. ships making a total of 5,395.

Sept 1 First ship accepted.

8 Contract DAW 525-ac2820 (Bombardment Squadron Service) signed.

10 Ship # 1 completed on Final Line.

12 New highway with triple overpasses dedicated by Under-Secretary of War Robert S. Patterson.

Sept 18 President and Mrs. Franklin D. Roosevelt, accompanied by Donald Nelson, inspect plant.

25 Lt.Col.Bradley Saunders, Resident Representative, AAF succeeded by Capt. Frank Moonert.

30 Ship # 1 accepted by Army.

Oct 3 Center Wing # 59 assembled in 93¼ hours.

29 Conference with General Wolfe, Consolidated, Douglas, North American and Ford representatives.

31 Seventh ship delivered to Flight (including .01).
Ground broken on Federal project east of airfield.

Nov 4 First Ford-made set of superchargers installed in ship # 28.

6 Paving started on apron of Federal project.

7 First shipment to North American leaves Willow Run.

8 First ship delivered to Ft. Worth.

10 100th Center Wing assembled in vertical fixture.

15 San Diego offices closed and Ford representatives return to Willow Run.

16 B-24 Engineering Sub-committee at Willow Run.

Nov 27 Center Wing # 145 assembled in 37 hours 50 minutes, or 1619 man-hours. Average of 41 men on fixture.
28 Ships #1 and 2 flown away by Ferry Command 3:35 P.M.
Dec 1 Gas rationing started.
9 W535-ac18061 merged with 21216.
17 Center Wing # 178 assembled in 19 hours 10 minutes, or 933 man-hours.
18 Left-hand Outer Wing # 160 assembled in 3 hours 55 minutes, or 44.32 man-hours.
23 Center Wing # 200 commenced on assembly fixture.

1943

Jan 7 Ship # 100 entered Final Assembly Line.
11 First class in Production Training School began training.
15 On first anniversary of commencement of first Center Wing #237 was started in fixture.
22 Col. Eddie Rickenbacher visits the plant and writes name on ship #99.
Feb 15 First unit of Willow Run housing facilities opened - "Willow Lodge."
19 Senate Committee headed by Senator H.S. Truman visits Willow Run.
Mar 3 Approval for manufacture of stabilizers at Ford Rouge Plant.

Mar 8 Approval for manufacture of Landing Light Doors and Island Doors at Ford Motor, Hamilton, Ohio.
12 Outboard and Fuel Access Doors approved for manufacture at Hamilton.
15 Plant water system supplied 100% by Rawsonville Wells.
Ship # 99 flown away.
16 Ship # 100 delivered to Flight.
19 Oleo Doors approved for manufacture at Hamilton, Ohio.

Apr 2 Willow Run Plant awarded "Bulls-Eye" flag for high war bond subscription. Herbert Gaston, Assistant to Secretary of Treasury made presentation.
6 C.E. Wilson, Executive Vice-Chairman of WPB, visited Plant.
12 First Landing Light Door and Island Door assemblies received from Ford Motor, Hamilton, Ohio.
13 Pattern Shop moved to Airframe at Dearborn.
14 500th Center Wing Section commenced in vertical fixture.
Received approval for manufacture of Pilot's Enclosure by Pittsburgh Plate Glass Company.
First finished Oleo Doors received from Hamilton.

Apr 14 Island Doors Assemblies released to Hamilton Plant.

15 First finished Outboard Fuel Access Doors received from Hamilton.

22 Radio Operator's Floors and Truss Bulkhead approved for manufacture at the "B" Bldg., Rouge Plant.
Landing Light Doors Assemblies released to Ford Hamilton Plant.

24 Ship # 200 delivered to Flight.

26 Center Wing Flap approved for manufacture at Gibson Refrigeration Co.
Trailing Edges approved for manufacture at Reynolds Spring.
Construction started on Warm Up Hangars.

27 Engine Cowling, Nose Ring, and Engine Dress-Up approved for manufacture at Lincoln Plant.

28 Ship # 300 entered Final Assembly Line.

29 Brake and Pedal Control Assembly approved for manufacture at the Oakes Products.

30 Fixtures (rudder) sent to Rouge Tire Plant.
Air Ducts approved for manufacture at Lincoln Plant.
Flyaways for the month reached 100 for the first time.

May 4 Fins approved for manufacture at Rouge Tire Plant.

5 Aileron and Elevator approved for manufacture at Rouge Tire Plant. Side Gunner's Door approved for manufacture at Hamilton, Ohio.

7 First finished parts (Nose Ring and Engine Cowling) received from Lincoln Plant.

10 General Enrique Penaranda, President of Bolivia, visits Plant. Wing # 600 completed in vertical fixture.

11 First finished parts (Truss Bulkhead) 4.1 and Radio Operator's Floor received from Rouge "B" Building.

14 Wing Tips approved for manufacture at E. G. Budd Co.

15 First finished parts (stabilizer) received from Rouge Tire Plant. Bomb Doors approved for manufacture by Budd Manufacturing Co.

18 Brake Pedal Control Assemblies released to Oakes Products. Purchasing Department moved offices to Willow Run.

21 First finished parts (rudder) received from Rouge Tire Plant. Ship # 300 delivered to Flight.

May 22 Fixtures (Bomb Rack) sent to Metal Moulding, Detroit.
First Finished parts (Pilot's Enclosure) received from Pittsburgh Plate Glass Company.
Ship # 400 entered Final Assembly Line.

24 Ship K.D. 801 (BU 489) entered the Final Assembly Line.
Bomb Rack approved for manufacture by Metal Moulding.

25 Wing # 700 completed in vertical fixture.

26 Mr. Edsel B. Ford, President of the Ford Motor Company died.

June 1 Mr. Henry Ford resumed presidency of Company.
Army Air Base School opened in new quarters east of the airfield. Transferred from MM 11 Balcony.

2 First finished parts (Side Gunner's Doors) received from Hamilton.
Wing #700 sold and sent to Douglas.
Dr. Eduard Benes, President of Czechoslovakia, visits Plant.

3 First finished parts (Bomb Rack) received from Metal Moulding Co., Detroit.

4 First finished parts(Fin)received from Rouge Tire Plant.

June 4 First finished parts (Brake and Pedal)received from Oakes Products Decatur, Illinois.

7 Wing # 800 commenced in vertical fixture.

8 Electrical Assembly approved for manufacture by National Totalizator.

9 Wing # 800 completed in vertical fixture.
Ship # 500 entered Final Assembly Line.

11 Canopy approved for manufacture by Rouge Tire Plant.

12 Compass Rose tested for the first time.
First finished parts (Center Wing Flap)received from Gibson Refrigerator Company.
Ship # 400 delivered to Flight.

15 First of Sewing Department approved for manufacture by Allen Industries Detroit, Michigan.

17 Wing # 800 sold to Ford.

19 First finished parts (Center Wing and Outer Wing Trailing Edge) received from Reynolds Spring Co.
First finished parts (Aileron Assembly) received from Tire Plant.

21 Wing # 900 started in vertical fixture.

June 24 K. D. Ship 801 (BU 489) delivered to Flight.
Construction began on New Materials Building.
26 Wing # 900 completed in vertical fixture.
30 First Wing Tip Assemblies received from E. G. Budd Company.
Catwalk Assembly approved for manufacture by Glenvale Products.
July 1 Loft boards moved to MM11 Balcony.
First finished parts (Trim) received from Allen Industries.
2 First Canopy Assemblies received from Tire Plant.
3 First Elevator Assemblies received from Tire Plant.
7 Wing # 1000 started in vertical fixture.
First concrete poured for New Materials Building.
8 North line of Outer Wing horizontal conveyor moved out.
First application of new U.S. Army insignia on B-24's in assembly lines.
10 Wing # 1000 completed in vertical fixture.
First finished parts (Air Ducts) received from Lincoln Plant.
13 Ship # 500 delivered to Flight.

July 15 Nose Ring Assemblies released to Lincoln Plant.
Gen. Henri Giraud inspected Willow Run.
19 Ship # 600 entered assembly line.
22 Wing # 1100 started in vertical fixture.
Air Ducts released to Lincoln Plant.
First finished parts (Bomb Doors) received from E. G. Budd.
Oleo Doors released to Hamilton Plant.
24 Vice-President Henry Wallace made tour of Plant.
25 Lt. Col. H.S. Jones replaced Lt. Col. Gordon as U. S. Army Air Forces Resident Representative.
26 Wing # 1100 completed in vertical fixture.
28 First electrical assemblies received from National Totalizator.
Anniversary of first graduation of Army Ground School.
Radio Operator's Floor released to Rouge Plant, "B" Building.
30 Mr. Henry Ford's 80th birthday.
Aug 5 Ground broken for # 2 Hangar in southwest corner of airfield.
Outer Wing (25%) approved for manufacture by Bechtel, McCone & Parsons Co.

Aug 5 Wing # 1200 started in vertical fixture.

6 Outboard Fuel Access Doors and Side Gunner's Door released to Hamilton Plant.

7 Ship # 600 delivered to Flight.

9 Truss Bulkhead released to Ford Rouge Plant, "B" Building.

13 Outer Wing (75 %) for manufacture by Highland Park Plant.

14 Pilot's Enclosure released to Pittsburgh Plate Glass Company.
Ship # 700 started in Final Assembly Line.

21 K.D. Ship 1201 (BU 742) started in Final Assembly Line.
Outer Wing Trailing Edge released to Reynolds Spring Co.

23 Wing # 1300 started in vertical fixture.

25 Motor Cowling Assemblies released to Lincoln Plant.

26 Engine Dress-Up Assemblies released to Lincoln Plant.

27 Work Order issued to move Plexiglas Department to Pittsburgh Plate Glass Company at Creighton, Pa.
Work Order issued to move Tail Cone fixtures to Highland Park.

Aug 31 Door Bulkhead (Sta. 6.0) approved for manufacture by W. B. Deyo.

Sept 1 Ship # 700 delivered to Flight.
Bomb Door Assemblies released to E. G. Budd Co.

4 First Catwalk Assembly (Item 16) received from Glenvale Products.
Major Moonert Transferred to Central District.
Bomb Rack Assemblies released to Metal Moulding.

6 Wing # 1400 in vertical assembly fixture.
Side Panels (Items 5 & 6) approved for manufacture by Ford Highland Park.
1st Wing on 2nd contract entered Final Assembly.
Commence replacement of Station 15 by transverse conveyor.
Secretary of Treasury, Henry Morgenthau Jr., inspected Plant.

7 2000 lb. Bomb Rack approved for manufacture by Metal Moulding.
Rudder Assembly released to Tire Plant.

8 Final Line 2A started to close down.
Rear Bottom Panel (Item 32) approved for manufacture by Highland Park.

Sept 9 Ship #800 begun in Final Assembly Line.
Electrical Assemblies released to National Totalizator.
"Aft" Fuselage Side Panels (Items 30 & 31) approved for manufacture at Highland Park.

13 Center Wing Bulkheads approved for manufacture by Lincoln Plant. -

17 Wing # 1500 in vertical assembly fixture.

22 Ship # 795 last on original contract delivered to Flight.

23 Ship # 800 delivered to Flight.
Hydraulic tubing (27 assemblies) approved for manufacture by Highland Park.

25 Wing # 1801 started in vertical assembly fixture.

28 1st ship on 2nd contract flown away.
First finished parts (Outer Wing) received from Highland Park.

30 Monthly schedule of 250 exceeded by four ships giving a total of 254 for the month.

Oct 4 Elevator Assembly released to Tire Plant, Rouge.

5 Miscellaneous Assemblies (932) approved for manufacture at Ford Highland Park.

Oct 6 Forward Upper Deck (Item 3) approved for manufacture by Lloyd Mfg. Co.

8 Center Wing Trailing Edge released to Reynolds Spring.

9 Wing # 1700 started in vertical assembly fixture.

10 Miscellaneous Electrical Assemblies approved for assembly by Highland Park.

12 First Nose Wheel Doors received from Hamilton, Ohio.

14 First Upper Rear Deck (Item 12) received from Tire Plant.

15 Departments 981 (Shipping), 977 (Maintenance), 913 (Clean-Up), 989 (Heating & Power) and 979 (Plant Protection) occupy space in the New Materials Building.
Ship # 900 delivered to Flight.
Machine Shop work approved by Highland Park Plant.

16 K. D. 1801 entered Final Line (BU 1020) (Line 2).
First Rear Side Panels (Items 30 & 31) received from Highland Park.

18 Lowell Thomas broadcast from School Auditorium.

19 First Forward Upper Deck (Item 3) received from Lloyd Mfg. Co.

Oct 20 Wing # 1800 in vertical assembly fixture.
2000 lb. Bomb Rack Assembly released to Metal Moulding.
First Door Bulkhead (Station 6.0) received from Deyo Co.
Engineering changes in B-24 halted except those authorized by prior approval of the Chief Material Command, Wright Field.

21 Nose enclosure approved for manufacture by Highland Park.
Life Raft and Emergency Hatch Door approved for manufacture at Hamilton, Ohio.

22 Rear Upper Deck (Item 12) approved for manufacture at Rouge Tire Plant.

24 Final Line #2 reopened with Ships Nos. 1020, 1022, 1023, (1801 series).

25 Excavating for drain tile for new apron started.

26 Wing Tip Assembly released to E.G. Budd Co.
First Rear Bottom Panel Assemblies received from "B" Bldg., Rouge.

27 Aileron Assemblies released to Tire Plant, Ford Motor Company.
Ship #1000 enters 8-hour stations at Final Line.

Oct 27 Grading preparatory to pouring of concrete for new apron started.

30 Catwalk Assemblies released to Glenvale Products.

31 Monthly schedule of 302 exceeded by 5 ships giving a total of 307 for October.

Nov 3 Broadcasting Station B-24 opened for business at Willow Run.
Ship # 1000 delivered to Flight.

4 First Nose Side Panels (Items 5 & 6) received from Highland Park.
First Miscellaneous Assemblies (Dept.932) received from Highland Park.

5 Hydraulic Tubing Assemblies released to Highland Park and first ones received.

6 Wing # 2000 started in vertical fixture.
First 2000 lb. Bomb Rack received from Highland Park.

7 Departments 981E (Rough Stock and Sheet Stock), 976 (Transportation), 981 (Receiving) and 981 (Salvage) moved into New Materials Bldg.

8 Work commenced on construction of Gun Butt.
Canopy Assembly released to Tire Plant.

Nov 8 Machine Shop Assemblies released to Highland Park and first ones received.

10 Nose Wheel Door Assemblies released to Hamilton Plant.

12 Door Bulkhead Assemblies (Station 6.0) released to Deyo.

15 Wing # 2100 started in vertical fixture.

17 Master Change Ship # 1176 (K.D. 2101) entered 8-hour stations of Final Line.
Miscellaneous Electrical Assemblies released to Highland Park.

18 Department 927 (Shears) set up in New Materials Building.

19 Miscellaneous Assemblies (Department 932) released to Highland Park Plant.

20 Center Wing Flap Assembly released to Gibson Refrigerator.
Record set for Flyaways and Army delivery when twenty planes were delivered in one day.

21 Department 981 (Spare Parts Crib) set up in the New Materials Bldg.

22 Stabilizer Assembly released to Rouge Tire Plant.

24 Wing # 2200 entered the vertical fixture.

Nov 24 Ship #1176 (K.D.2101) removed from assembly line and delivered to Flight.
25 Master Change Ship # 1020 (K. D. 1801) removed from Line 2.
27 Department 981 (Barrel Stock)moved to New Materials Building.
30 Monthly schedule of 307 exceeded by 28 ships giving a total of 335 ships.
Dec 2 Center Wing #2300 started in vertical fixture.
4 Orders issued at Wright Field to discontinue camouflage of B-24's.
5 Carpenter Shop moved to the New Materials Building.
8 Master Change Ship (K.D.2401) entered 8-hr stations of Final Line.
9 Center Wing # 2400 started in the vertical fixture.
10 Upper Rear Deck (Item 12) released to Tire Plant.
11 Center Wing # 2400 completed in vertical fixture.
13 "Shop coat" of zinc chromate on skin sections discontinued.
17 Center Wing #2500 started in vertical fixture.
18 BU Ship 1300 completed in the Final Assembly Line.

Dec 23 BU Ship 1200 completed in Final Assembly Line.

27 Ship No. K. D. 3201 designated as effective ship for deletion of exterior camouflage.

29 Poured last of concrete for Gun Butt.
Center Wing #2600 started in vertical fixture.

31 At 12:00 o'clock east end of the new hangar was occupied by Flight Department.
At 3:15 o'clock the first ship was moved into the new south hangar.
Monthly schedule of 352 exceeded by 13 ships giving a total of 365 ships.

1944

Jan 1 1272 BU ships completed during 1943.
1300 ships flown away from Willow Run during 1943.
1106 KD ships shipped to Douglas and Consolidated during 1943.

3 Master Change Ship K. D. 2801 entered 8-hour stations of Final Line.

6 BU Ship # 1400 completed in Final Assembly Line.
Center Wing #2700 started in vertical fixture.

Jan 8 New record for Flyaways established when 29 ships were flown from Willow Run Airport.

12 A Center Wing was sent to Airframe Bldg. at Dearborn for experiment on engine removal.

Fourth War Bond Drive started at Willow Run. A.M. Krech in charge.

14 BU Ship # 1500 entered the 8-hour stations of the Final Line today.

Center Wing #2800 started in vertical fixture.

20 Center Wing #2900 started in vertical fixture.

21 BU Ship # 1500 completed in Final Assembly Line.

25 New Willow Run Gun Butt used for the first time.

28 Center Wing #3000 started in vertical fixture.

29 Installation of cascade oxygen supply system completed.

31 Equipment moved from Ypsilanti Stove Works to New Materials Bldg.

Feb 4 Ship No. 1600 completed in Final Assembly Line.

5 Master Change Ship K. D. No. 3201 entered # 1 Final Assembly Line.

Wing # 3100 started in vertical fixture.

Feb 12 Master Change Ship K. D. No. 3201 completed in assembly line. First ship to be assembled at Willow Run without camouflage paint.

14 Wing # 3200 started in vertical fixture.

15 Willow Run went over the top in the 4th War Loan Drive.

16 Ship No. 1700 completed in Final Assembly Line.

19 Wing # 3300 started in vertical fixture.

20 Open House for Willow Run employes and their families.

24 Willow Run Inspection Department received Class "A" rating.
10,000th student graduated from AAFTTC School at Willow Run Air Base.

26 Wing # 3400 started in vertical fixture.

27 Ship #1800 completed in Final Line.
Open House for employes.

29 To date 1824 ships have been assembled at Willow Run. In addition, 657 K. D.'s have been shipped to Douglas at Tulsa and 809 to Consolidated at Fort Worth.

Mar 2 BU Ship # 1900 entered Line No. 4 of Primary Assembly.

Mar 4 Master Change Ship No. K. D. 3601 entered Line No. 1.
Wing # 3500 started in vertical fixture.
10 Master Change Ship No. K. D. 3601 completed in Final Assembly.
11 Wing # 3600 started in vertical fixture.
12 Parking lot for 150 cars built at Salvage Yard.
13 BU Ship #2000 entered #1 Assembly Line.
14 Highest number of initial flights released (19).
15 Master Change Ship No. K. D. 3901 entered Line No. 2.
17 BU Ship # 1900 completed in Final Assembly.
18 Ship No. 2000 completed in Final Assembly.
Prototype B-24-K started at Willow Run.
Highest no. of initials flown (42).
50 acceptances in one day.
21 Master Change Ship # KD 3901 completed in Final Assembly (BU 2285).
24 Record set from factory to delivery (44 hrs.).
25 Wing # 3800 started in vertical fixture.

Mar 31 462 KD sets have been produced at Willow Run, 62 to Consolidated, 78 to Douglas and 322 to Final Assembly. Total produced at Willow Run to date is 3752 - 735 to Douglas, 871 to Consolidated, 2146 to Ford final assembly lines. 57 over Army schedule for March.

Apr 1 Center Wing #3900 started in vertical fixture.

5 Ship No. 2100 completed in Final Assembly.

7 Ship No. 2200 completed in Final Assembly.
Wing # 4000 started in vertical fixture.

14 Wing # 4100 started in vertical fixture.

18 Last of Outer Wing fixtures removed from Assembly Building.

20 Wing # 4200 started in vertical fixture.

21 Ship No. 2300 completed in Final Assembly.

24 Ship No. 2400 completed in Final Assembly.
Master Change Ship # 4401 started in Line No.2 of Primary Assembly.
Record for Flyaways established when 42 ships were flown away.

Apr 24 Production flights set new record (94).
27 Wing # 4300 started in vertical fixture.
30 Total production to date - Ford 2483 - Douglas 801 - Consolidated 923 - Grand Total 4207.
May 3 Wing # 4400 entered vertical fixture.
8 Ship No. 2500 left Final Line.
10 Wing # 4500 entered vertical fixture.
Last KD shipment to Consolidated, closing sub-contract.
12 Ship # 2600 left Final Assembly Line.
17 Wing # 4600 entered vertical fixture.
23 Ship #2800 entered Primary Assembly.
24 Ship # 2700 left Final Assembly Line.
Wing # 4700 entered vertical fixture.
25 KD # 5001 (3142) entered Primary Assembly Line.
31 Ship # 2800 left Final Assembly Line.
June 1 Commencement of the 5th War Loan Drive at the Bomber Plant.

June 2 Center Wing #4800 started in vertical fixture.
3 BU Ship # 2900 entered #3 Primary Line.
6 D-Day. Plant observed silence for 1 minute.
8 Center Wing #4800 ready for Final Line.
9 Center Wing #4900 started in vertical fixture.
12 BU Ship No. 3000 entered Primary Line No. 2.
13 BU Ship # 2900 completed in Final Line.
15 Athletic field used for first time for ball game between Dept. 935 A and 938 A.
16 Wing #5000 started in Center Wing vertical department.
BU Ship # 3000 completed in Final Line.
19 BU Ship No. 3100 entered Primary Line No. 1.
21 Wing #5100 started in Center Wing vertical department.
22 Wing #5000 entered Primary Line #1.
24 BU Ship # 3100 completed in Final Line.
26 BU Ship No. 3200 entered Primary Line No. 4.

June 28 5000th Ship (BU 3154 KD 5016) completed in Final Line.
Wing #5200 started in Center Wing vertical department.

30 Total shipments to date - Ford 3204, Douglas 937, Consolidated 939. Total for June - Ford 387, Douglas 66.

July 5 BU Ship No. 3300 entered Line No. 2.
Wing # 5300 entered vertical fixture.

6 Master Change Ship KD 5251 removed from Final Assembly.

7 Last knock-down shipment to Douglas (KD 5224). Total shipped 954.
BU Ship # 3200 removed from Final Line.

10 Ship No. 3300 completed in Final Assembly Line.

11 Wing # 5400 entered vertical fixture.

12 BU Ship No. 3400 entered line.
Master Change Ship KD 5501 entered line.

13 Gen. H. H. Arnold at Willow Run.

17 BU Ship # 3400 completed in Final Line.

18 Wing # 5500 entered vertical fixture.

July 19 Master Change Ship No. KD 5501 completed in Final Assembly.
22 Master Change Ship No. KD 5751 entered Final Line.
25 Wing # 5600 entered vertical fixture.
26 Ship No. 3600 entered Final Line.
29 Master Change Ship # KD 5751 removed from Final Line.
31 BU Ship # 3600 completed in Final Line.

Aug 1 Wing # 5700 started in vertical fixture.
Single tail ship fixture and tool design begun.
2 Ship BU 3700 entered Primary Line No. 2.
7 Wing # 5800 started in vertical fixture.
8 Ship No. 3700 removed from Final Line.
10 Ship No. 3800 entered Line No. 2.
14 Wing # 5900 started in vertical fixture.
15 Ship #3800 finished in Final Line. Master Change Ship # 6001 entered Line No. 2.
16 BU Ship #3900 entered Line No. 1.
19 First Ford Bomber(BU 3655)crashed near Almont, Michigan.

Aug 19 Master Change Ship No.KD 6001 (BU 4107) completed in Final Line.
21 Wing # 6000 started in vertical fixture.
22 BU Ship # 3900 completed in Final Assembly.
24 Ship BU No. 4000 entered Line No. 1.
28 Wing # 6100 started in vertical fixture.
29 Ship No. 4000 completed in Final Line.
31 BU Ship No.4100 entered Line No.2 of Primary Assembly.
BU 4106 6000th Ship entered Line No. 4 of Primary Assembly.
Total BU's for August - 432; Total to date - 4013; Grand Total (KD's & BU's) - 5906.

Sept 1 Five 9-hour days per week.
1st log run of altitude chamber.
7 Ship BU 4100 completed in Final Assembly.
Wing # 6200 entered vertical fixture.
8 Master Change Ship BU 4357 (KD 6251) entered Line No. 2.
11 6000th Ship off the line.
14 Master Change Ship KD 6251 (BU 4357) removed from Final Line.

Sept 15 Employe's service garage in northwest corner of New Materials Bldg. started.
18 Wing # 6300 entered vertical fixture.
19 BU Ship # 4300 entered Line No.1.
22 Master Change Ship KD 6501 (BU 4607) entered Line No. 3.
25 BU 4400 entered Line No. 2.
26 Wing # 6400 entered vertical fixture.
29 Total to date - Ford 4388, Douglas 954, CAC 939, Grand Total 6281; Monthly Total 375; Army Accept. 4357; Flyaways 4304.

Oct 2 Master Change Ship 4607 (KD 6501) completed in Final Line.
Employe's service garage completed.
4 Ship #4500 entered Line #2 today.
Wing # 6500 started in vertical fixture.
6 Wing # 6500 completed in vertical fixture.
10 Ship # 4500 completed in Final Assembly.
11 Wing # 6600 started in vertical fixture.
12 Ship # 4600 entered Line No. 1.
13 Wing # 6600 completed in vertical fixture.

Oct 18 Ship No. 4600 completed in Final Assembly.

20 Fixtures for Items 8 and 11 (radio operator's floor and truss bulkhead, Sta.4.1) returned to Willow Run.
Wing # 6700 started in vertical fixture.
Ship # 4700 entered Line No. 2.

21 Prototype ship fueled.

22 First running of engines on Prototype.

23 Master Change Ship 4857 (KD 6751) entered Line No. 2.
Work begun on construction of single tail cone fixture in Willow Run Pipe Shop.

24 Wing # 6700 completed in vertical fixture.

27 Master Change Ship 4857 (KD 6751) completed in Final Assembly.

30 Installation work begun on tail cone fixture for Prototype at K-20.

31 Ship # 4800 entered Line No. 1.
Wing # 6800 started in vertical fixture.
Production for October - 348; 23 ships over schedule.
Total production to date including KD's - 6629.

Oct 31 U. S. Ferrying Command set up offices in Winter Warm Up Hangars.

Nov 2 Wing # 6800 completed in vertical fixture.

3 BU Ship # 4800 completed in Final Assembly.

5 First flight of single tail prototype of B-24.

8 Production schedule increased from 275 to 308 for month.
Wing # 6900 started in vertical fixture.

9 Ship # BU 4900 entered Line No. 1 of Primary Assembly.
Lt. Col. H. S. Jones, Resident Officer, USAAF promoted to full Colonel.

10 Wing # 6900 completed in vertical fixture.

13 Departments 940 A and B placed on one shift (days).

14 Master Change Ship # BU 5107 (KD 7001) model B-24-M entered Line No. 1.
BU Ship # 4900 completed in Final Assembly.

15 Prototype design accepted.

16 Wing # 7000 started in vertical fixture.

17 BU Ship # 5000 entered Line No.1.

Oct 19 First of four Sundays plant opened for public inspection.

20 Sixth War Loan Bond Drive started. First of the fixtures for Items 8 and 11 returned to Willow Run.

21 Wing # 7000 completed in vertical fixture.

24 Fixtures for Items 8 and 11 completely moved to Willow Run.
Master Change Ship #5107 (KD 7001) completed in Final Assembly.
BU Ship # 5000 completed in Final Assembly.

27 Wing # 7100 started in vertical fixture.
George Hayes *5172, General Shift Foreman, Dept 934 was first blood donor at Willow Run Blood Bank.
Miss Helen Manchester, BK 4206, Tubing Inspector was the first woman.

29 Wing # 7100 completed in vertical fixture.

30 Production for November - 318. Total BU's to date - 5054. Total KD sets to date - 6982.

Dec 5 Master Change Ship KD 7201 (BU 5307) entered Line No. 1.

7 Col. H. S. Jones left to take up new duties at Boeing Aircraft.

Dec 7 Wing # 7200 started in vertical fixture. # 7000 ship completed.
8 First B-29 to land at Willow Run Airfield.
Ship # 450233 first to enter experimental 7-station assembly line in Hangar # 1.
9 BU Ship #5200 entered Line No. 1.
10 23,568 visitors attended Open House.
11 Wing # 7200 completed in vertical fixture.
13 Master Change Ship KD 7201 (BU 5307) completed in Final Assembly.
15 Property (33.279 acres) upon which Army cantonment stands was returned to Ford Motor Company together with buildings.
Wing # 7300 started in vertical fixture.
16 6th War Loan Drive oversubscribed 40.2%.
18 Master Change Ship KD 7401 (BU 5507) entered Line No. 1.
BU Ship No. 5300 entered Line No. 2.
Wing # 7300 completed in vertical fixture.
22 Master Change Ship KD 7401 (BU 5507) completed in Final Assembly.

Dec 26 Directive received from Wright Field requesting 206 ships without ball turrets by January 30, 1945. Also 55 ships without tail turrets to be delivered by Jan. 30, 1945. Wing # 7400 started in vertical fixture.

29 Ship BU #5400 started in Line #2. Wing # 7400 completed in vertical department.

30 Production for December - 296; 2 over schedule. Army Acceptance - 296; Total BU's to date - 5350; Total KD sets to date - 7242.

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