

UNITED AIR LINES TRANSPORT CORPORATION
MAINTENANCE MANUAL

B. Burnett-

QUESTIONS ON DC-3

1. Gear Down, Pressure normal, No green light;
Check fuses and warning bulb.
Raise and lower gear several times, allowing pressure to build up each time.
If latch appears jammed, remove bolt from interlocking mechanism and jockey gear handle up and down while maintaining moderate pull on latch. (Check green light)
If unable to get maximum pressure on strut (using hand pump if necessary) put handle in neutral.
If brakes are needed on landing, do not exceed 1500% on front gauge.
Advise ground and stewardess.
2. What is landing procedure, one brake inoperative?
Lock tail wheel---land short---use as much flap as conditions allow---
Get tail on ground as soon as possible---use only good brake---use full flaps to slow planes
3. Give two functions of the "star valve".
 - a. Bypasses check valve and allows pressure to build up in pressure cylinder (or accumulator) when using hand pump with valve open.
 - b. Has small bleed hole for thermal expansion in pressure manifold.
4. What is the effect on the radio equipment of a weak "mike" or headset?
A weak microphone will damage the transmitter, and a weak headset will overload the system, resulting in faulty signals and poor reception.
5. Can accurate bearings be taken at a greater distance with the A.D.F. or the manual loop?
The A.D.F. is accurate over a greater distance (more sensitive than the human ear.)
6. Give two methods of reducing interference from other ranges on the long wave receiver.
 1. Range filter to range position.
 2. Loop in range position.
7. What cockpit indications are there that the gear pins have been left in?
Low airspeed---sluggishness---visual check of gear
8. What are the indications of a short in the battery box?
Little or no radio reception or transmission
Smoke coming up in the cockpit

What should you do?
Put switch in off position and avoid heavy loads on the generators.
9. Why should you not lower the flaps with the gear handle down?
 - a. There is a possibility of air entering the system through the packing nuts.
 - b. There is not enough oil (if pressure cylinder type) to feed both
 - c. Both will operate together, but slowly.
10. Can flap handle be raised with gear handle up?
Yes. Gear handle will move far enough out to clear.

Paul
7/7

11. Why is there poor radio reception after starting engines in cold weather?
Probably because of low batteries. Run at 1500 RPM a few minutes to charge batteries, and if reception is still poor, return to base.
12. Name some precautions to be observed in the use of brakes.
a. Never use more than necessary (may fade due to high temperatures)
b. Use tail wheel in straight taxiing
c. Use engines to help in turns
d. Never drag brakes
e. Never pivot on one wheel
13. How do you use the hand pump to pump up accumulator
Open the star valve and pump.

TROUBLE SHOOTING

23. Hydraulic oil level vs. oil pressure
High pressure shows deep on slight gauge
Low pressure shows rise on slight gauge
Pressure below normal, no loss of oil; is it engine pump or stuck regulator?
a. Shift pump selector to opposite engine, and if pressure returns, it is engine pump failure
b. If pressure remains the same, it is stuck regulator valve. Operate all units with hand pump.
Pressure normal or below with loss of oil?
a. Leak between pump and regulator. Use pressure available, then pump by hand
Loss of pressure and oil?
a. Leak between pressure regulator and pressure manifold
b. Leak in pressure manifold
c. Leak in line actuating unit
24. How may you detect a small leak in system?
a. Regulator will chatter with no units in use
25. How can gear be relatched on ground?
a. Pull dog on control handle forward---allow safety stop to move upward and behind dog, then lock
26. How to get a green light.
a. Wheels down b. both sides locked c. latch handle in spring load d. gear handle in neutral e. fuses and bulbs ok.
27. How to check brakes in flight, if right after take off you suspect one brake out.
Depress brake pedals; pressure will drop a little. If it continues to drop, there is a leak.
28. What is the position of hydraulic valves when plane is parked?
a. flap handle up b. gear handle down c. cowl flaps open (off)
29. What is the emergency supply of hydraulic oil? What is it used for?
a. Three quarts. b. Available to hand pump for all units.

30. What systems are solenoid controlled?
a. Left and right starters b. Feathering pumps. c. Landing lights and four dome lights
31. On what equipment is the range-both-voice filter?
On both the range and the A.D.F.
32. What is wing de-icer pressure and source of supply?
8-9 lbs.; supplied from vacuum pump exhaust
33. What is burning time, rate of descent, and candle-power of flares?
a. Three minutes b. 360 fpm c. 300,000 candle power each
34. What precautions should be observed when dropping flares?
a. Slow to 120 mph b. Not below 1200 ft. c. Drop rear flare first
35. What is oxygen pressure at zero degrees fahrenheit?
(Pressure is 1600 70 degrees and decreases 30% for each 10 degrees Drop in temperature
36. How would you determine altitude from manifold pressure gauges?
a. Place selector to bleed b. Subtract reading from ground kols.
37. How would you determine altitudes in descent and still use normal M.P.?
Below 12,000', M.P. increases one inch for each 1,000' of descent.
38. What units are affected by the emergency static vents, and what are the corrections?
a. Captain's airspeed reads 10 mph fast
b. Captain's altimeter reads 100' too high
39. With low outside temperature, does the altimeter indicate higher or lower than true?
Higher
40. What is the effect of inoperative pitot heaters (in icing conditions)?
a. Fluctuating and erratic indications on airspeed indicator.
41. Rate of climb on emergency static vent?
a. Momentarily affected, but returns to normal.
42. What is the source of current for the head temperature gauges?
a. There is not outside source. Current is generated by the heat absorption rate of two different metals.
43. What is the position of the A.D.F. function for anti-static reception?
a. Set the manual loop parallel to the line of station being used.
44. Which are your ~~two~~ ADF antennas for range position?
The two straight belly antennas, left and right respectively.
45. Where is your company communications antenna?
Wire antenna running from tail forward. (C/W TOP)
46. Where is the marker beacon antenna?
Short wire antenna mounted in a longitudinal position on belly or sometimes on lower right side as on #970.
47. With which ADF is your anti-static loop used.
#2 on the right hand unit.

DATE _____

ASSIGNED TO

BASED AT

RECORD OF CHANGE AND ADDITION MEMOS RECEIVED
AND INSERTED IN THIS MANUAL

[illegible]

PLEASE MAKE AN ENTRY ON THIS PAGE WHEN INSERTING REVISIONS IN THIS MANUAL. KEEP THIS SHEET WITH MANUAL AT ALL TIMES. THIS MANUAL IS NOT TRANSFERABLE. RETURN TO REGULATIONS DEPT. VIA LOCAL STOCKROOM IF NO LONGER REQUIRED OR IF EMPLOYMENT IS TERMINATED.

OPERATIONS SPECIFICATIONS

MAINTENANCE

UNITED AIRLINES TRANSPORT CORPORATION

AIRCRAFT SHALL NOT BE OPERATED IN SCHEDULED AIR TRANSPORTATION UNDER THE TERMS OF THESE OPERATING SPECIFICATIONS, UNLESS:

1. THE AIRCRAFT, AND ITS COMPONENT PARTS, ACCESSORIES, AND APPLIANCES ARE MAINTAINED IN AN AIRWORTHY CONDITION IN ACCORDANCE WITH THE MAXIMUM TIME LIMITS HEREINAFTER SET FORTH FOR THE ACCOMPLISHMENT OF THE OVERHAULING, PERIODIC INSPECTION, AND ROUTINE CHECK OF THE AIRCRAFT AND ITS COMPONENT PARTS, ACCESSORIES AND APPLIANCES.
2. OVERHAULS, PERIODIC INSPECTIONS, AND ROUTINE CHECKS OF THE AIRCRAFT AND ITS COMPONENT PARTS, ACCESSORIES, AND APPLIANCES ARE PERFORMED IN ACCORDANCE WITH THE PROCEDURES SET FORTH IN THE CURRENTLY EFFECTIVE MAINTENANCE MANUAL AND APPROVED BY A DULY AUTHORIZED REPRESENTATIVE OF THE ADMINISTRATOR OR, WHEN SUCH PROCEDURES ARE NOT SET FORTH IN THE MAINTENANCE MANUAL, IN ACCORDANCE WITH PROCEDURES RECOMMENDED BY THE MANUFACTURER OF SUCH AIRCRAFT, COMPONENT PART, ACCESSORY OR APPLIANCE WHEN SUCH PROCEDURES ARE APPROVED BY A DULY AUTHORIZED REPRESENTATIVE OF THE ADMINISTRATOR.

EFFECTIVE: MARCH 6, 1942

UNITED STATES OF AMERICA
DEPARTMENT OF COMMERCE
CIVIL AERONAUTICS ADMINISTRATION
WASHINGTON

CIVIL AERONAUTICS ADMINISTRATION:

RELATED TO CERTIFICATE No. 11

WASHINGTON, D. C.

UNITED AIRLINES TRANSPORT CORPORATION

HEREBY MAKES

APPLICATION FOR THE OPERATIONS SPECIFICATIONS APPEARING ON THE REVERSE SIDE HEREOF.

CHANGES REQUESTED:

CHANGES MAINTENANCE COMPETENCY LETTER TO OPERATIONS SPECIFICATIONS (MAINTENANCE)

REASONS AND SUPPORTING DATA (IF INSUFFICIENT SPACE ATTACH TO PAGE):

AMENDMENTS TO CIVIL AIR REGULATIONS

INSPECTOR'S COMMENTS AND RECOMMENDATION:

I AM DULY AUTHORIZED TO MAKE THIS APPLICATION ON BEHALF OF THE APPLICANT.

ORIGINAL SIGNED BY J. A. HERLIHY

(SIGNATURE)

EXECUTIVE VICE PRESIDENT - OPERATIONS

(TITLE)

THE OPERATIONS SPECIFICATIONS SET FORTH ON THE REVERSE SIDE HEREOF ARE APPROVED

AMENDMENT No. _____ BY DIRECTION OF THE ADMINISTRATOR:

EFFECTIVE DATE MARCH 6, 1942

ORIGINAL SIGNED BY W. T. MILLER

(SIGNATURE)

MAINTENANCE COMPETENCY LETTER

SUPERSEDES PAGE 1 AND 2, DATED 7/11/38

CHIEF, AIR CARRIER DIVISION

(TITLE)

RECEIVED BY THE UNDERSIGNED FOR THE APPLICANT ON _____

(DATE)

(SIGNATURE)

(TITLE)

OPERATIONS SPECIFICATIONS

ENGINE AND PROPELLER MAINTENANCE

UNITED AIR LINES TRANSPORT CORPORATION

(Name of air carrier)

Propeller make HAMILTON STANDARD
23E-50 HUB, 6153A-18 BLADE
Propeller model AND 6353A-18

Engine make PRATT AND WHITNEY
Engine model S1C3G - S1CG

COMPONENT	OVERHAUL PERIOD (Hours)	INSPECTION AND CHECK PERIODS (Hours)			
		#1	ROUTINE	#2	#3 PERIODIC BASE
<u>ENGINES</u>	725	AFTER EACH FLIGHT		50	125 725
ENGINE MOUNT	725	-----		50	125 ---
ENGINE MOUNT SHOCKS, FRONT	725	-----		50	125 ---
ENGINE MOUNT SHOCKS ON FIRE WALL.	ON CONDITION	-----		50	125 725
CARBURETOR	1450	AFTER EACH FLIGHT		50	125 725
AUTO MIXTURE CONTROL UNIT	725	AFTER EACH FLIGHT		50	125 ---
CARBURETOR AIR SCOOP	725	AFTER EACH FLIGHT		50	125 ---
CARBURETOR HEATER VALVE	725	AFTER EACH FLIGHT		50	125 ---
INTAKE PIPES	725	-----		50	125 ---
CYLINDER BAFFLES	725	-----		50	125 ---
EXHAUST MANIFOLD	725	-----		50	125 ---
EXHAUST TAIL PIPE	725	AFTER EACH FLIGHT		50	125 ---
PUMP, FUEL	725	AFTER EACH FLIGHT		50	125 ---
PUMP, HYDRAULIC	725	AFTER EACH FLIGHT		50	125 ---
PUMP, VACUUM	725	AFTER EACH FLIGHT		50	125 ---
MAGNETOS	725	AFTER EACH FLIGHT		50	125 ---
MAGNETO BLAST TUBES	725	-----		50	125 ---
SPARK PLUGS	125	AFTER EACH FLIGHT		50	--- ---
IGNITION MANIFOLD	725	AFTER EACH FLIGHT		50	125 ---
FIRE EXTINGUISHER (LINES AND FITTINGS)	ON CONDITION	-----		50	125 725
ENG. RING COWLING	725	AFTER EACH FLIGHT		50	125 ---
ENG. COWLING (AFT OF RING)	725	AFTER EACH FLIGHT		50	125 ---
COWLING SUPPORTS	725	-----		50	125 ---
SWITCH, IGNITION	1450	AFTER EACH FLIGHT		50	125 725
<u>PROPELLERS</u>	725	AFTER EACH FLIGHT		50	125 ---
PROPELLER GOVERNOR	725	AFTER EACH FLIGHT		50	125 ---
PUMP, FEATHERING	1450	-----		50	125 725
<u>CONTROLS (ENGINE AND PROPELLER FWD. FIRE WALL)</u>					
CABLES	ON CONDITION	AFTER EACH FLIGHT		50	125 725
CLEVIS ENDS	ON CONDITION	AFTER EACH FLIGHT		50	125 725
PULLEYS	ON CONDITION	AFTER EACH FLIGHT		50	125 725
PUSH PULL TUBES	ON CONDITION	AFTER EACH FLIGHT		50	125 725
BEARINGS AND RETAINERS	ON CONDITION	AFTER EACH FLIGHT		50	125 725
BELL CRANKS	ON CONDITION	AFTER EACH FLIGHT		50	125 725

16-30356-2

Effective date Oct 15, 1943

PAGE 1

UNITED STATES OF AMERICA
DEPARTMENT OF COMMERCE
CIVIL AERONAUTICS ADMINISTRATION
WASHINGTON

CIVIL AERONAUTICS ADMINISTRATION,
Washington, D. C.

Part of Operating Certificate No. 11

UNITED AIR LINES TRANSPORT CORPORATION hereby makes application for amendment of the Operations Specifications appearing on the reverse side hereof, as follows:

CLARIFICATION OF ENGINE AND PROPELLER OVERHAUL, ROUTINE, AND PERIODIC INSPECTION PERIODS.

Reasons and supporting data (if insufficient space attach additional page):

ADOPTION OF FORM 512-A (REVISED 1-1-43)

I CERTIFY that the statements submitted in connection herewith are true and that I am duly authorized to make this application on behalf of the applicant.

ORIGINAL SIGNED BY J. A. HERLIHY
(Signature)

Date SEPTEMBER 27, 1943

VICE PRESIDENT - OPERATIONS
(Title)

INSPECTOR'S RECOMMENDATIONS:

(Signature)

(Signature)

The Operations Specifications set forth on the reverse side hereof are APPROVED

Amendment No. M-5

Effective date OCT. 15, 1943

Supersedes specifications dated FEB. 16, 1943

By direction of the Administrator:

/s/ JAMES D. BRIDIE
(Signature)

CHIEF, AIR CARRIER BRANCH, THIRD RE
(Title)

Received for the applicant by:

(Signature)

Date

(Title)

OPERATIONS SPECIFICATIONS

ENGINE AND PROPELLER MAINTENANCE

UNITED AIR LINES TRANSPORT CORPORATION
(Name of air carrier)

Propeller make HAMILTON STANDARD
23E-50 HUB, 6153A-18 BLADE
Propeller model AND 6353A-18 BLADE

Engine make PRATT AND WHITNEY
S1C3G - S1CG
Engine model

COMPONENT	OVERHAUL PERIOD (Hours)	INSPECTION AND CHECK PERIODS (Hours)			
		#1	ROUTINE	#2	#3 PERIODIC BASE
FUEL SYSTEM (FWD. FIRE WALL)					
LINES AND FITTINGS	725	AFTER EACH FLIGHT	50	125	---
PRIMER CONNECTIONS	725	AFTER EACH FLIGHT	50	125	---
HOSE CONNECTIONS, INSPECT	---	-----	50	125	725
HOSE CONNECTIONS, REPLACE	1450	-----	--	---	---
HOSE CLAMPS	ON CONDITION	-----	50	125	725
OIL SYSTEM (FWD. FIRE WALL)					
LINES AND FITTINGS	725	AFTER EACH FLIGHT	50	125	---
RADIATOR	725	AFTER EACH FLIGHT	50	125	---
REGULATOR, TEMP. P AND W	6000	AFTER EACH FLIGHT	50	125	725
REGULATOR, TEMP. HARRISON	725	AFTER EACH FLIGHT	50	125	---
CHANGE OIL	125	-----	--	---	---
HOSE CONNECTIONS, INSPECT	---	-----	50	125	725
HOSE CONNECTIONS, REPLACE	1450	-----	--	---	---
HOSE CLAMPS	ON CONDITION	-----	50	125	725

Effective date OCT. 15, 1943

UNITED STATES OF AMERICA
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CHIEF, AIR CARRIER BRANCH, THIRD REGION

(Title)

Received for the applicant by:

(Signature)

Date _____

(Title)

OPERATIONS SPECIFICATIONS AIRCRAFT MAINTENANCE

UNITED AIR LINES TRANSPORT CORPORATION
(Name of air carrier)

Aircraft make DOUGLAS

Aircraft model DC-3A

COMPONENT	OVERHAUL PERIOD (Hours)	INSPECTION AND CHECK PERIODS (Hours)				
		#1	ROUTINE	#2	#3	BASE
WINGS	ON CONDITION	AFTER EACH FLIGHT		50	125	725
REMOVE FOR INTERNAL INSPECTION	6000	----		--	---	---
ATTACH ANGLE AND BOLTS	4000	----		--	125	725
REPLACE ATTACH ANGLE BOLTS	6000	----		--	---	---
REMOVE TIP FOR INTERNAL INSPECTION	6000	----		--	---	---
AILERON HINGES AND BRACKETS	6000	----		50	125	725
FUSELAGE	ON CONDITION	AFTER EACH FLIGHT		50	125	725
REMOVE ALL CABIN FLOOR	6000	----		--	---	---
REMOVE COCKPIT FLOOR	ON CONDITION	----		--	---	725
REMOVE COMPANIONWAY FLOOR	ON CONDITION	----		--	125	725
REMOVE CENTER-FLOOR BOARDS						
REAR BAGGAGE COMPARTMENT.	ON CONDITION	----		--	---	725
REMOVE CABIN AISLE FLOOR	ON CONDITION	----		--	---	725
REMOVE ALL FLOOR BOARDS REAR						
BAGGAGE	6000	----		--	---	---
REMOVE TAIL CONE FOR INSPECTION	ON CONDITION	----		--	---	725
REMOVE WING ROOT FAIRING	725	----		--	---	---
CABIN DOORS	725	AFTER EACH FLIGHT		50	125	---
EMERGENCY EXITS	ON CONDITION	AFTER EACH FLIGHT		50	125	725
CABIN WINDOWS	ON CONDITION	AFTER EACH FLIGHT		50	125	725
LAVATORY	ON CONDITION	AFTER EACH FLIGHT		50	125	725
BUFFET COMPARTMENT	ON CONDITION	AFTER EACH FLIGHT		50	125	725
CABIN SEATS	6000	AFTER EACH FLIGHT		50	125	725
SEAT BELTS	6000	AFTER EACH FLIGHT		50	125	725
CABIN OXYGEN INSTALLATION	ON CONDITION	AFTER EACH FLIGHT		50	125	725
COCKPIT OXYGEN INSTALLATION	ON CONDITION	AFTER EACH FLIGHT		50	125	725
CABIN FIRE EXTINGUISHERS	ON CONDITION	AFTER EACH FLIGHT		50	125	725
COCKPIT FIRE EXTINGUISHERS	ON CONDITION	AFTER EACH FLIGHT		50	125	725
WINDSHIELD WIPERS	ON CONDITION	AFTER EACH FLIGHT		50	125	725
WINDSHIELD FRAME AND STRUCTURE	ON CONDITION	AFTER EACH FLIGHT		50	125	725
PULLEYS, CABLES AND BRACKETS	ON CONDITION	AFTER EACH FLIGHT		50	125	725
EMERGENCY LANDING FLARES	----	----		50	125	725
EMPENNAGE	ON CONDITION	AFTER EACH FLIGHT		50	125	725
REMOVE HORIZONTAL STABILIZER						
FAIRING	6000	----		--	---	---
REMOVE COVER OVER LIGHTNING						
HOLES REAR SPAR STAB.	6000	----		--	---	---
REMOVE COVER OVER LIGHTNING						
HOLES REAR SPAR FIN	6000	----		--	---	---

UNITED STATES OF AMERICA
DEPARTMENT OF COMMERCE
CIVIL AERONAUTICS ADMINISTRATION
WASHINGTON

CIVIL AERONAUTICS ADMINISTRATION,
Washington, D. C.

Part of Operating Certificate No. 11

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CLARIFICATION OF AIRCRAFT OVERHAUL, ROUTINE, AND PERIODIC INSPECTION PERIODS.

Reasons and supporting data (if insufficient space attach additional page):

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(Signature)

Date SEPTEMBER 27, 1943

VICE PRESIDENT - OPERATIONS
(Title)

INSPECTOR'S RECOMMENDATIONS:

(Signature)

(Signature)

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Amendment No. M-5

By direction of the Administrator:

Effective date OCT 15, 1943

S JAMES D. BRIDIE

(Signature)

Supersedes specifications dated FEB. 16, 1943

CHIEF, AIR CARRIER BRANCH, 3RD R N
(Title)

Received for the applicant by:

(Signature)

Date

(Title)

OPERATIONS SPECIFICATIONS AIRCRAFT MAINTENANCE

UNITED AIR LINES TRANSPORT CORPORATION
(Name of air carrier)

Aircraft make DOUGLAS

Aircraft model DC-3A

COMPONENT	OVERHAUL PERIOD (Hours)	INSPECTION AND CHECK PERIODS (Hours)				
		#1	ROUTINE	#2	#3 PERIODIC	BASE
LANDING GEAR						
TRUSS ASSEMBLY (RIGHT AND LEFT)	6000	AFTER EACH FLIGHT		50	125	725
STRUTS OLEO LANDING SHOCKS (RIGHT AND LEFT)	2175	AFTER EACH FLIGHT		50	125	725
STRUTS OLEO TAIL	2175	AFTER EACH FLIGHT		50	125	725
STRUTS RETRACTING (RIGHT AND LEFT)	2175	AFTER EACH FLIGHT		50	125	725
WHEELS, MAIN LANDING	125	AFTER EACH FLIGHT		50	---	---
AXLES AND BEARINGS	125	----		--	---	---
BRAKES (RIGHT AND LEFT) LANDING	725	AFTER EACH FLIGHT		50	125	---
BRAKES (RIGHT AND LEFT) FLIGHT	ON CONDITION	AFTER EACH FLIGHT		50	125	725
BUNGEE CORDS (RIGHT AND LEFT)	725	----		50	125	---
MECHANICAL LATCH MECHANISM	2900	AFTER EACH FLIGHT		50	125	725
WHEELS, TAIL	725	AFTER EACH FLIGHT		50	125	---
FORK, TAIL WHEEL	725	AFTER EACH FLIGHT		50	125	---
SPINDLE, TAIL WHEEL	2900	----		50	125	725
TIRES, MAIN LANDING	125	AFTER EACH FLIGHT		50	---	---
TIRES, TAIL WHEEL	725	AFTER EACH FLIGHT		50	125	---
REAR DRAG STRUT FITTING	6000	AFTER EACH FLIGHT		50	125	725
LUBRICATION OF LANDING GEAR	----	----		--	125	725
HYDRAULIC SAFETY LATCH AT RETRACTING VALVE	2900	AFTER EACH FLIGHT		50	125	725
CENTER SECTION						
ATTACHMENT FITTINGS	ON CONDITION	AFTER EACH FLIGHT		50	125	725
FAIRING	6000	----		--	---	725
FLAPS	ON CONDITION	AFTER EACH FLIGHT		50	125	725
FLAP OPERATING MECHANISM	ON CONDITION	AFTER EACH FLIGHT		50	125	725
	6000	AFTER EACH FLIGHT		50	125	725
NACELLES						
FIRE WALL	ON CONDITION	AFTER EACH FLIGHT		50	125	725
FAIRING	ON CONDITION	----		50	125	725
ATTACHMENTS AND FITTINGS	ON CONDITION	AFTER EACH FLIGHT		50	125	725
	6000	----		50	125	725
CONTROL SYSTEM						
RUDDER REMOVE	6000	AFTER EACH FLIGHT		50	125	725
REPLACE FABRIC	ON CONDITION	----		--	---	725
RUDDER HINGES AND BRACKETS	6000	AFTER EACH FLIGHT		50	125	725
ELEVATORS (RIGHT AND LEFT) REMOVE	6000	AFTER EACH FLIGHT		50	125	725
REPLACE FABRIC	ON CONDITION	----		--	---	725
ELEVATOR HINGES AND BRACKETS	6000	AFTER EACH FLIGHT		50	125	725
AILERONS (RIGHT AND LEFT)	----	AFTER EACH FLIGHT		50	125	725

UNITED STATES OF AMERICA
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(Signature)

Date SEPTEMBER 27, 1943

VICE PRESIDENT - OPERATIONS
(Title)

INSPECTOR'S RECOMMENDATIONS:

(Signature)

(Signature)

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(Title)

Received for the applicant by:

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Date

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OPERATIONS SPECIFICATIONS AIRCRAFT MAINTENANCE

UNITED AIR LINES TRANSPORT CORPORATION
(Name of air carrier)

Aircraft make DOUGLAS

Aircraft model DC-3A

COMPONENT	OVERHAUL PERIOD (Hours)	INSPECTION AND CHECK PERIODS (Hours)				
		#1	ROUTINE	#2	PERIODIC- #3	BASE
REPLACE FABRIC	ON CONDITION		----	--	---	725
AILERONS HINGES AND BRACKETS	6000	AFTER EACH FLIGHT		50	125	725
RUDDER FLETTNER CONTROL	ON CONDITION	AFTER EACH FLIGHT		50	125	725
AILERON FLETTNER CONTROL	ON CONDITION	AFTER EACH FLIGHT		50	125	725
CONTROL CABLES (FLIGHT)	ON CONDITION	AFTER EACH FLIGHT		50	125	725
PULLEYS AND BRACKETS (FLT. CONTROL)	ON CONDITION	AFTER EACH FLIGHT		50	125	725
CONTROL CABLES (FLETTNER)	ON CONDITION	AFTER EACH FLIGHT		50	125	725
PULLEYS, DRUMS AND BRACKETS (FLETTNER)	ON CONDITION	AFTER EACH FLIGHT		50	125	725
BELL CRANKS	6000	AFTER EACH FLIGHT		50	125	725
CONTROL CABLES ENG. (AFT FIRE WALL)	ON CONDITION	AFTER EACH FLIGHT		50	125	725
CONTROL CABLES PROP (AFT FIRE WALL)	ON CONDITION	AFTER EACH FLIGHT		50	125	725
CONTROL TUBES AND RODS	ON CONDITION	AFTER EACH FLIGHT		50	125	725
CONTROL FIRE EXTINGUISHER	ON CONDITION		----	--	125	725
CONTROL COLUMN AND WHEELS	ON CONDITION	AFTER EACH FLIGHT		50	125	725
CONTROL DE-ICING SYSTEM	ON CONDITION	AFTER EACH FLIGHT		50	125	725
CONTROL HEATING AND VENTILATING	ON CONDITION	AFTER EACH FLIGHT		50	125	725
HYDRAULIC SYSTEM						
PRESSURE, CYLINDER	2175	AFTER EACH FLIGHT		50	125	725
PRESSURE, ACCUMULATOR	2900	AFTER EACH FLIGHT		50	125	725
PANEL, HYDRAULIC	2900	AFTER EACH FLIGHT		50	125	725
ENGINE PUMP HOSE	ON CONDITION	AFTER EACH FLIGHT		50	125	725
LINES AND CONNECTIONS	ON CONDITION	AFTER EACH FLIGHT		50	125	725
TANK (SUPPLY)	2900	AFTER EACH FLIGHT		50	125	725
VALVE, RELIEF (FLAP RETRACTING)	2900	AFTER EACH FLIGHT		50	125	725
VALVE, BRAKE	3625	AFTER EACH FLIGHT		50	125	725
VALVE, (ENG. PUMP SELECTOR)	2900	AFTER EACH FLIGHT		50	125	725
VALVE, GYROPILOT SHUT OFF	2900	AFTER EACH FLIGHT		50	125	725
COWL FLAP HOSE	ON CONDITION	AFTER EACH FLIGHT		50	125	725
BRAKE HOSE, UPPER	2175	AFTER EACH FLIGHT		50	125	725
BRAKE HOSE, LOWER	2175	AFTER EACH FLIGHT		50	125	725
LANDING GEAR RETRACTING STRUT HOSE	2175	AFTER EACH FLIGHT		50	125	725
LANDING FLAP STRUT HOSE	3625	AFTER EACH FLIGHT		50	125	725
VALVE, FLAP, RETRACTING	2900	AFTER EACH FLIGHT		50	125	725
VALVE, LDG, RETRACTING	2900	AFTER EACH FLIGHT		50	125	725
VALVE PRESSURE REGULATOR, 800#	2900	AFTER EACH FLIGHT		50	125	725
VALVE, PRES. REGULATOR GYROPILOT	2900	AFTER EACH FLIGHT		50	125	725
VALVE, SAFETY, 1000# RELIEF	2900	AFTER EACH FLIGHT		50	125	725
VALVES, COWL FLAP	2175	AFTER EACH FLIGHT		50	125	725
VALVE SHUT OFF	2900	AFTER EACH FLIGHT		50	125	725

16-30358-2

Effective date OCT 15, 1943

PAGE 3

UNITED STATES OF AMERICA
DEPARTMENT OF COMMERCE
CIVIL AERONAUTICS ADMINISTRATION
WASHINGTON

CIVIL AERONAUTICS ADMINISTRATION,
Washington, D. C.

Part of Operating Certificate No. 11

UNITED AIR LINES TRANSPORT CORPORATION hereby makes application for amendment of the Operations Specifications appearing on the reverse side hereof, as follows:

CLARIFICATION OF AIRCRAFT OVERHAUL, ROUTINE, AND PERIODIC INSPECTION PERIODS.

Reasons and supporting data (if insufficient space attach additional page):

ADOPTION OF FORM 512-B (REVISED 1-1-43).

I CERTIFY that the statements submitted in connection herewith are true and that I am duly authorized to make this application on behalf of the applicant.

ORIGINAL SIGNED BY J. A. HERLIHY
(Signature)

Date SEPTEMBER 27, 1943

VICE PRESIDENT - OPERATIONS
(Title)

INSPECTOR'S RECOMMENDATIONS:

(Signature)

(Signature)

The Operations Specifications set forth on the reverse side hereof are

Amendment No. M-5

By direction of the Administrator:

Effective date OCT 15, 1943

S JAMES D. BRIDIE

(Signature)

Supersedes specifications dated FEB. 16, 1943

CHIEF, AIR CARRIER BRANCH, 3RD RE
(Title)

Received for the applicant by:

(Signature)

Date

(Title)

OPERATIONS SPECIFICATIONS AIRCRAFT MAINTENANCE

UNITED AIR LINES TRANSPORT CORPORATION
(Name of air carrier)

Aircraft make DOUGLAS

Aircraft model DC-3A

COMPONENT	OVERHAUL PERIOD (Hours)	INSPECTION AND CHECK PERIODS (Hours)				
		#1	ROUTINE	#2	PERIODIC #3	BASE
HYDRAULIC SYSTEM (CONTINUED)						
HAND PUMP	2900	AFTER	EACH FLIGHT	50	125	725
WINDSHIELD WIPER MOTOR	6000	AFTER	EACH FLIGHT	50	125	---
PRESSURE LINES AND FITTINGS	ON CONDITION	AFTER	EACH FLIGHT	50	125	725
LANDING FLAP RETRACTING STRUT	3625	AFTER	EACH FLIGHT	50	125	725
ACCESSORIES AIRCRAFT						
WING DE-ICING BOOTS	ON CONDITION	AFTER	EACH FLIGHT	50	125	725
EMPENNAGE DE-ICING BOOTS	ON CONDITION	AFTER	EACH FLIGHT	50	125	725
DE-ICER LINES AND FITTINGS	6000	AFTER	EACH FLIGHT	50	125	725
OIL SEPARATOR	725	AFTER	EACH FLIGHT	50	125	---
PUMP DE-ICER FLUID	1450	AFTER	EACH FLIGHT	50	125	725
REGULATOR, AIR PRESSURE	725	AFTER	EACH FLIGHT	50	125	---
SHOES, PROPELLER DE-ICING	725	AFTER	EACH FLIGHT	50	125	---
SLINGER, RING, PROPELLER	725	AFTER	EACH FLIGHT	50	125	---
VALVE, AIR DISTRIBUTOR	725	AFTER	EACH FLIGHT	50	125	---
TANK, DE-ICER FLUID	ON CONDITION	AFTER	EACH FLIGHT	50	125	---
FIRST AID KIT	ON CONDITION	AFTER	EACH FLIGHT	50	125	725
HEATING AND VENTILATING SYSTEM						
BOILER, STEAM	ON CONDITION	AFTER	EACH FLIGHT	50	125	725
RADIATOR, STEAM	ON CONDITION	AFTER	EACH FLIGHT	50	125	725
SURGE TANK	6000	AFTER	EACH FLIGHT	50	125	725
VALVE, AIR DUCT (HOT AND COLD)	ON CONDITION	AFTER	EACH FLIGHT	50	125	725
VALVE, DRAIN	ON CONDITION	AFTER	EACH FLIGHT	50	125	725
VALVE, STEAM PRESSURE REGULATOR	725	AFTER	EACH FLIGHT	50	125	---
VALVE, STEAM RELIEF	6000	AFTER	EACH FLIGHT	50	125	725
VALVE, STEAM SAFETY	725	AFTER	EACH FLIGHT	50	125	---
VALVE, STEAM SHUT OFF	ON CONDITION	AFTER	EACH FLIGHT	50	125	725
VALVE, WATER SHUT OFF	6000	AFTER	EACH FLIGHT	50	125	725
VALVE, WATER FILLER	ON CONDITION	AFTER	EACH FLIGHT	50	125	725
AIR DUCTS AND FITTINGS	ON CONDITION	AFTER	EACH FLIGHT	50	125	725
STEAM LINES	ON CONDITION	AFTER	EACH FLIGHT	50	125	725
LAGGING STEAM LINES	ON CONDITION	----		50	125	725
FUEL AND OIL SYSTEM (AFT FIRE WALL)						
OIL LINES	2175	AFTER	EACH FLIGHT	50	125	725
FUEL LINES	ON CONDITION	AFTER	EACH FLIGHT	50	125	725
FUEL TANKS	6000	AFTER	EACH FLIGHT	50	125	725
OIL TANKS	2175	AFTER	EACH FLIGHT	50	125	725
FUEL PUMP, HAND WOBBLE	3625	AFTER	EACH FLIGHT	50	125	725

UNITED STATES OF AMERICA
DEPARTMENT OF COMMERCE
CIVIL AERONAUTICS ADMINISTRATION
WASHINGTON

CIVIL AERONAUTICS ADMINISTRATION,
Washington, D. C.

Part of Operating Certificate No. 11

UNITED AIR LINES TRANSPORT CORPORATION hereby makes application for amendment of the Operations Specifications appearing on the reverse side hereof, as follows:

CLARIFICATION OF AIRCRAFT OVERHAUL, ROUTINE, AND PERIODIC INSPECTION PERIODS.

Reasons and supporting data (if insufficient space attach additional page):

ADOPTION OF FORM 512-B (REVISED 1-1-43).

I CERTIFY that the statements submitted in connection herewith are true and that I am duly authorized to make this application on behalf of the applicant.

ORIGINAL SIGNED BY J. A. HERLIHY
(Signature)

Date SEPTEMBER 27, 1943

VICE PRESIDENT - OPERATIONS
(Title)

INSPECTOR'S RECOMMENDATIONS:

(Signature)

(Signature)

The Operations Specifications set forth on the reverse side hereof are

Amendment No. M-5

By direction of the Administrator:

Effective date OCT 15, 1943

S JAMES D. BRIDIE
(Signature)

Supersedes specifications dated FEB. 16, 1943

CHIEF AIR CARRIER BRANCH, 3RD REG
(Title)

Received for the applicant by:

(Signature)

Date

(Title)

OPERATIONS SPECIFICATIONS AIRCRAFT MAINTENANCE

UNITED AIR LINES TRANSPORT CORPORATION
(Name of air carrier)

Aircraft make DOUGLAS

Aircraft model DC-3A

COMPONENT	OVERHAUL PERIOD (Hours)	INSPECTION AND CHECK PERIODS (Hours)			
		#1 ROUTINE	#2	#3 PREGNANT	BASE
FUEL AND OIL SYSTEM (CONTINUED)					
DUMP CHUTE, FUEL	725	AFTER EACH FLIGHT	50	125	---
VALVE, FUEL DUMPING	6000	AFTER EACH FLIGHT	50	125	725
VALVE, CROSS FEED (D-2)	2175	AFTER EACH FLIGHT	50	125	725
VALVE, CROSS FEED, APV AND 241BA	6000	AFTER EACH FLIGHT	50	125	725
VALVE, TANK SELECTOR	2900	AFTER EACH FLIGHT	50	125	725
FUEL STRAINER	ON CONDITION	AFTER EACH FLIGHT	50	125	725
HOSE CONNECTIONS, INSPECT	----	AFTER EACH FLIGHT	50	125	725
HOSE CONNECTIONS, REPLACE	1450	----	--	---	---
HOSE CLAMPS	ON CONDITION	----	50	125	725

16-30358-2

Effective date OCT 15, 1943

UNITED STATES OF AMERICA
DEPARTMENT OF COMMERCE
CIVIL AERONAUTICS ADMINISTRATION
WASHINGTON

CIVIL AERONAUTICS ADMINISTRATION,
Washington, D. C.

Part of Operating Certificate No. 11

UNITED AIR LINES TRANSPORT CORPORATION hereby makes application for amendment of the Operations Specifications appearing on the reverse side hereof, as follows:

CLARIFICATION OF AIRCRAFT OVERHAUL, ROUTINE, AND PERIODIC INSPECTION PERIODS.

Reasons and supporting data (if insufficient space attach additional page):

ADOPTION OF FORM 512-B (REVISED 1-1-43).

I CERTIFY that the statements submitted in connection herewith are true and that I am duly authorized to make this application on behalf of the applicant.

ORIGINAL SIGNED BY J. A. HERLIHY
(Signature)

Date SEPTEMBER 27, 1943

VICE PRESIDENT - OPERATIONS
(Title)

INSPECTOR'S RECOMMENDATIONS:

(Signature)

(Signature)

The Operations Specifications set forth on the reverse side hereof are

Amendment No. M-5

By direction of the Administrator:

Effective date OCT 15, 1943

S JAMES D. BRIDIE

(Signature)

Supersedes specifications dated FEB. 16, 1943

CHIEF, AIR CARRIER BRANCH, 3RD RE
(Title)

Received for the applicant by:

(Signature)

Date

(Title)

OPERATIONS SPECIFICATIONS INSTRUMENT MAINTENANCE

UNITED AIR LINES TRANSPORT CORPORATION

(Name of air carrier)

Aircraft make DOUGLAS

Aircraft model DC-3A

INSTRUMENTS	MODEL	OVERHAUL PERIOD (HOURS)	INSPECTION AND CHECK PERIODS			
			#1	ROUTINE	#2	PERIODIC BASE
AIRCRAFT AND ENGINE						
ALTIMETER, SENSITIVE TYPE	KOLLSMAN PIONEER	5800	AFTER EACH FLIGHT	50	125	725
COMPASS	KOLLSMAN PIONEER	4350	AFTER EACH FLIGHT	50	125	725
CLOCK	KOLLSMAN ELGIN LONGINES	2900	AFTER EACH FLIGHT	50	125	---
FILTER, GYROPILOT	SPERRY	725	AFTER EACH FLIGHT	50	125	---
GAUGE, DE-ICER PRESSURE	PIONEER	2900	AFTER EACH FLIGHT	50	125	---
GAUGE, GYROPILOT OIL PRESSURE	U.S. GAUGE Co. PIONEER SPERRY	2900	AFTER EACH FLIGHT	50	125	---
GAUGE, HYDRAULIC PRES.	U.S. GAUGE Co.	6000	AFTER EACH FLIGHT	50	125	---
GAUGE, LANDING GEAR DOWN PRESSURE	U.S. GAUGE Co.	6000	AFTER EACH FLIGHT	50	125	---
GAUGE, OXYGEN PRESSURE	PIONEER	2900	AFTER EACH FLIGHT	50	125	---
GAUGE, STEAM PRESSURE	U.S. GAUGE Co. PIONEER	725	AFTER EACH FLIGHT	50	125	---
GAUGE, SUCTION	U.S. GAUGE Co. SPERRY	4350	AFTER EACH FLIGHT	50	125	725
GAUGE, FUEL PRESSURE	U.S. GAUGE Co. PIONEER	1450	AFTER EACH FLIGHT	50	125	725
GAUGE, OIL PRESSURE	U.S. GAUGE Co. PIONEER	1450	AFTER EACH FLIGHT	50	125	725
GAUGE, MANIFOLD PRESSURE	KOLLSMAN-UAL	5800	AFTER EACH FLIGHT	50	125	1450
GYROPILOT BANK AND CLIMB	SPERRY	2175	AFTER EACH FLIGHT	50	125	725
GYROPILOT DIRECTIONAL	SPERRY	1450	AFTER EACH FLIGHT	50	125	725
SERVO, GYROPILOT	SPERRY	6000	AFTER EACH FLIGHT	50	125	---
RELAY, GYROPILOT AIR	SPERRY	725	AFTER EACH FLIGHT	50	125	---
MOUNTING UNIT GYROPILOT	SPERRY	6000	AFTER EACH FLIGHT	50	125	---
HORIZON, ARTIFICIAL	SPERRY	2175	AFTER EACH FLIGHT	50	125	725
TUBE, PITOT	KOLLSMAN	6000	AFTER EACH FLIGHT	50	125	---
INDICATOR, AIR SPEED	PIONEER	5800	AFTER EACH FLIGHT	50	125	725
INDICATOR, RATE OF CLIMB	PIONEER	5800	AFTER EACH FLIGHT	50	125	725
INDICATOR, BANK AND TURN	PIONEER	5800	AFTER EACH FLIGHT	50	125	725
INDICATOR, OUTSIDE AIR CAPILLARY	KOLLSMAN MOTOMETER	ON CONDITION	AFTER EACH FLIGHT	50	125	725

Effective date OCT 15, 1943

UNITED STATES OF AMERICA
DEPARTMENT OF COMMERCE
CIVIL AERONAUTICS ADMINISTRATION
WASHINGTON

CIVIL AERONAUTICS ADMINISTRATION,
Washington, D. C.

Part of Operating Certificate No. 11

UNITED AIR LINES TRANSPORT CORPORATION hereby makes application for amendment of the Operations Specifications appearing on the reverse side hereof, as follows:

CLARIFICATION OF INSTRUMENT OVERHAUL, ROUTINE, AND PERIODIC INSPECTION PERIODS.

Reasons and supporting data (if insufficient space attach additional page):

ADOPTION OF FORM 512-C (REVISED 1-1-43)

I CERTIFY that the statements submitted in connection herewith are true and that I am duly authorized to make this application on behalf of the applicant.

ORIGINAL SIGNED BY J. A. HERLIHY
(Signature)

Date SEPTEMBER 27, 1943

VICE PRESIDENT - OPERATIONS
(Title)

INSPECTOR'S RECOMMENDATIONS:

(Signature)

(Signature)

The Operations Specifications set forth on the reverse side hereof are APPROVED

Amendment No. ORIGINAL

By direction of the Administrator:

Effective date OCT 15, 1943

S JAMES D. BRIDLE
(Signature)

Supersedes specifications dated

CHIEF, AIR CARRIER BRANCH, 3RD REGION
(Title)

Received for the applicant by:

(Signature)

Date

(Title)

OPERATIONS SPECIFICATIONS INSTRUMENT MAINTENANCE

UNITED AIR LINES TRANSPORT CORPORATION

(Name of air carrier)

Aircraft make DOUGLAS

Aircraft model DC-3A

INSTRUMENTS	MODEL	OVERHAUL PERIOD (HOURS)	INSPECTION AND CHECK PERIODS			
			#1 ROUTINE	#2	#3 PERIODIC	BASE
AIRCRAFT AND ENGINE (CON'T.)						
INDICATOR, OUTSIDE AIR ELECTRIC	WESTON	5800	AFTER EACH FLIGHT	50	125	1450
INDICATOR, FUEL QUANTITY	LIQUIDOMETER	5800	AFTER EACH FLIGHT	50	125	1450
INDICATOR, OIL TEMPERATURE	WESTON	5800	AFTER EACH FLIGHT	50	125	1450
INDICATOR, CARBURETOR AIR TEMPERATURE	WESTON	5800	AFTER EACH FLIGHT	50	125	1450
INDICATOR, CYLINDER HEAD TEMPERATURE	WESTON	5800	AFTER EACH FLIGHT	50	125	1450
INDICATOR, TACHOMETER	WESTON	5800	AFTER EACH FLIGHT	50	125	1450
THERMOCOUPLE	UAL	725	AFTER EACH FLIGHT	50	125	----
VALVE, GYROPILOT-BALANCE OIL	SPERRY	6000	AFTER EACH FLIGHT	50	125	----
VALVE, GYROPILOT SPEED CONTROL	SPERRY	6000	AFTER EACH FLIGHT	50	125	----
VALVE, VACUUM RELIEF	SPERRY ECLIPSE	725	AFTER EACH FLIGHT	50	125	----
MAGNETO TACHOMETER	WESTON	725	AFTER EACH FLIGHT	50	125	----
SWITCH FUEL QUANT.	LIQUIDOMETER	2900	AFTER EACH FLIGHT	50	125	1450
TANK UNIT, FUEL QUANT.	LIQUIDOMETER	3625	AFTER EACH FLIGHT	50	125	----
COMPENSATOR, FUEL QUANT.	LIQUIDOMETER	6000	AFTER EACH FLIGHT	50	125	----
VOLTMETER	WESTON	2900	AFTER EACH FLIGHT	50	125	725
FLOWMETER, PROP, ANTI-ICER	UAL	6000	AFTER EACH FLIGHT	50	125	1----
DRAIN TRAP GYROPILOT	SPERRY	1450	AFTER EACH FLIGHT	50	125	----
BULB RESISTANCE THERMOMETER	WESTON	725	AFTER EACH FLIGHT	50	125	----
ANALYZER, FLIGHT	FRIEZ	4 MONTHS	AFTER EACH FLIGHT	50	125	----
AMMETER PITOT	WESTON	5800	AFTER EACH FLIGHT	50	125	1450

Effective date OCT. 15, 1943

PAGE 2-32669-1

UNITED STATES OF AMERICA
DEPARTMENT OF COMMERCE
CIVIL AERONAUTICS ADMINISTRATION
WASHINGTON

CIVIL AERONAUTICS ADMINISTRATION,
Washington, D. C.

Part of Operating Certificate No.11.....

UNITED AIR LINES TRANSPORT CORPORATION hereby makes application for amendment of the Operations Specifications appearing on the reverse side hereof, as follows:

CLARIFICATION OF INSTRUMENT OVERHAUL, ROUTINE, AND PERIODIC INSPECTION PERIODS.

Reasons and supporting data (if insufficient space attach additional page):

ADOPTION OF FORM 512-C (REVISED 1-1-43).

I CERTIFY that the statements submitted in connection herewith are true and that I am duly authorized to make this application on behalf of the applicant.

ORIGINAL SIGNED BY J. A. HERLIHY
(Signature)

Date SEPTEMBER 27, 1943

VICE PRESIDENT - OPERATIONS
(Title)

INSPECTOR'S RECOMMENDATIONS:

(Signature)

(Signature)

The Operations Specifications set forth on the reverse side hereof are APPROVED

Amendment No.ORIGINAL.....

By direction of the Administrator:

Effective date OCT. 15, 1943

S. JAMES D. BRIDIE
(Signature)

Supersedes specifications dated

CHIEF, AIR CARRIER BRANCH, 3RD REGION
(Title)

Received for the applicant by:

(Signature)

Date

(Title)

OPERATIONS SPECIFICATIONS
MAINTENANCE

UNITED AIR LINES TRANSPORT CORPORATION

(Name of air carrier)

Aircraft shall not be operated in scheduled air transportation under the terms of these operations specifications, unless:

The aircraft, and its component parts, accessories, and appliances are maintained in an airworthy condition in accordance with the maximum time limits hereinafter set forth for the accomplishment of the overhauling, periodic inspection, and routine check of the aircraft and its component parts, accessories and appliances.

Effective date OCT 15 1943

UNITED STATES OF AMERICA
DEPARTMENT OF COMMERCE
CIVIL AERONAUTICS ADMINISTRATION
WASHINGTON

CIVIL AERONAUTICS ADMINISTRATION,
Washington, D. C.

Part of Operating Certificate No. 11

UNITED AIR LINES TRANSPORT CORPORATION hereby makes application for amendment of the Operations Specifications appearing on the reverse side hereof, as follows:

Reasons and supporting data (if insufficient space attach additional page):

ADOPTION OF FORM ACA-512 (REV. 1-1-43)

I CERTIFY that the statements submitted in connection herewith are true and that I am duly authorized to make this application on behalf of the applicant.

ORIGINAL SIGNED BY J. A. HERLIHY
(Signature)

Date OCTOBER 12, 1943

VICE PRESIDENT - OPERATIONS
(Title)

INSPECTOR'S RECOMMENDATIONS:

(Signature)

(Signature)

The Operations Specifications set forth on the reverse side hereof are

Amendment No. M-1

By direction of the Administrator:

Effective date OCT 15 1943

S. A. F. NOTLEY
(Signature)

Supersedes specifications dated MARCH 6, 1942

CHIEF, AIR CARRIER MAINTENANCE SECTION
AIR CARRIER DIVISION
(Title)

Received for the applicant by:

(Signature)

Date

(Title)

OPERATIONS SPECIFICATIONS APPLIANCE MAINTENANCE RADIO AND ELECTRICAL EQUIPMENT

UNITED AIR LINES TRANSPORT CORPORATION
(Name of air carrier)

Aircraft make DOUGLAS

Aircraft model DC-3A AND DST-A

APPLIANCE	MODEL	OVERHAUL PERIOD	INSPECTION AND CHECK PERIODS	
			ROUTINE	PERIODIC
RADIO COM. UNIT	BENDIX RTA-A	725 HOURS	AFTER EACH FLIGHT	50 AND 125 HOURS
RANGE REC.	WE - ES 198	725 HOURS	AFTER EACH FLIGHT	50 AND 125 HOURS
MARKER REC.	WE - 27A	725 HOURS	AFTER EACH FLIGHT	50 AND 125 HOURS
MARKER IND.	UAL ES-283-A	6000 HOURS	AFTER EACH FLIGHT	50 AND 125 HOURS
ADF AND AUX. REC.	BENDIX MN-26N	725 HOURS	AFTER EACH FLIGHT	50 AND 125 HOURS
LOOP DIRECTOR	BENDIX MN-31B	725 HOURS	AFTER EACH FLIGHT	50 AND 125 HOURS
ADF LOOP	BENDIX MN-36A	725 HOURS	AFTER EACH FLIGHT	50 AND 125 HOURS
ADF CONTROL UNIT	BENDIX MN-28S	725 HOURS	AFTER EACH FLIGHT	50 AND 125 HOURS
AZIMUTH IND.	BENDIX MN-37A	725 HOURS	AFTER EACH FLIGHT	50 AND 125 HOURS
AMPLIFIER	UAL ES-295-G	725 HOURS	AFTER EACH FLIGHT	50 AND 125 HOURS
RECEIVER DYN.	ECLIPSE AD-2: 2749	725 HOURS	AFTER EACH FLIGHT	50 AND 125 HOURS
CONTROL PANEL	UAL ES-295-H-6	725 HOURS	AFTER EACH FLIGHT	50 AND 125 HOURS
JACK BOXES	UAL ES-295-H-4	725 HOURS	AFTER EACH FLIGHT	50 AND 125 HOURS
CONTROL UNIT	WE 1A	6000 HOURS	AFTER EACH FLIGHT	50 AND 125 HOURS
HEADPHONES	WE 1019A	6 MONTHS	BEFORE EACH FLIGHT	
MICROPHONES	AE 26	725 HOURS	AFTER EACH FLIGHT	50 AND 125 HOURS
RANGE FILTER	KENYON S-6353	725 HOURS	AFTER EACH FLIGHT	50 AND 125 HOURS
ANTENNA TRANSF.	UAL ES-309-1	6000 HOURS	AFTER EACH FLIGHT	50 AND 125 HOURS
ANTI-STATIC CARTRIDGE	BENDIX	REPACKED AND DISCHARGED	AFTER EACH FLIGHT	50 AND 125 HOURS
EQUIPMENT MOUNTINGS	UAL	725 HOURS	AFTER EACH FLIGHT	50 AND 125 HOURS

Effective date NOVEMBER 3, 1943

UNITED STATES OF AMERICA
DEPARTMENT OF COMMERCE
CIVIL AERONAUTICS ADMINISTRATION
WASHINGTON

CIVIL AERONAUTICS ADMINISTRATION,
Washington, D. C.

Part of Operating Certificate No. 11

UNITED AIR LINES TRANSPORT CORPORATION hereby makes application for amendment of the Operations Specifications appearing on the reverse side hereof, as follows:

LIST OVERHAUL PERIODS (MAXIMUM HOURS) AFTER EACH COMPONENT TO CONFORM WITH OPERATIONS SPECIFICATIONS FORM.

Reasons and supporting data (if insufficient space attach additional page):

REQUESTED BY CIVIL AERONAUTICS ADMINISTRATION

I CERTIFY that the statements submitted in connection herewith are true and that I am duly authorized to make this application on behalf of the applicant.

ORIGINAL SIGNED BY J. A. HERLIHY
(Signature)

Date OCTOBER 17, 1942

EXECUTIVE VICE PRESIDENT - OPERATIONS
(Title)

INSPECTOR'S RECOMMENDATIONS:

(Signature)

(Signature)

The Operations Specifications set forth on the reverse side hereof are

Amendment No. RE-3

By direction of the Administrator:

Effective date NOV 3 1942

S. J. D. BRIDIE
(Signature)

Supersedes RE-2 DATED MARCH 6, 1942

ACTING CHIEF AIR CARRIER BRANCH
(Title)

Received for the applicant by:

UNITED AIR LINES TRANSPORT CORPORATION

(Signature)

Date NOVEMBER 9, 1942

(Title)

OPERATIONS SPECIFICATIONS APPLIANCE MAINTENANCE RADIO AND ELECTRICAL EQUIPMENT

UNITED AIR LINES TRANSPORT CORPORATION
(Name of air carrier)

Aircraft make DOUGLAS

Aircraft model DC-3A AND DST-A

APPLIANCE	MODEL	OVERHAUL PERIOD	INSPECTION AND CHECK PERIODS	
			ROUTINE	PERIODIC
RADIO AIRCRAFT RADIO SYSTEM INCL. JUNCTION BOXES, TACH SHAFTS, ANTENNA SYSTEM, TRANSMISSION LINES, CONDUITS AND WIRING, ETC.		725 HOURS	AFTER EACH FLIGHT	50 AND 125 HOURS
<u>ELECTRICAL SYSTEM</u>				
STARTER	ECLIPSE 2611-C	725 HOURS	AFTER EACH FLIGHT	50 AND 125 HOURS
GENERATOR	ECLIPSE E-7	725 HOURS	AFTER EACH FLIGHT	50 AND 125 HOURS
GEN. CONTROL BOX	UAL ES-296 3348 (or)	725 HOURS	AFTER EACH FLIGHT	50 AND 125 HOURS
DE-ICER MTR.	ECLIPSE 3153	725 HOURS	AFTER EACH FLIGHT	50 AND 125 HOURS
FEATHERING MTR.	PESCO 238D	1450 HOURS	AFTER EACH FLIGHT	50 AND 125 HOURS
ANTI-ICER MTR.	AUTOPULSE 12A	1450 HOURS	AFTER EACH FLIGHT	50 AND 125 HOURS
MASTER SWITCH	DOUGLAS STANDARD	1450 HOURS	AFTER EACH FLIGHT	50 AND 125 HOURS
AIRCRAFT ELEC. SYSTEM INCLUD. JUNCTION BOXES, ELEC. DISTRIBUTION PANEL, LIGHT SYSTEM, ETC.	UAL AND DOUGLAS	725 HOURS	AFTER EACH FLIGHT	50 AND 125 HOURS

Effective date NOVEMBER 3, 1943

UNITED STATES OF AMERICA
DEPARTMENT OF COMMERCE
CIVIL AERONAUTICS ADMINISTRATION
WASHINGTON

CIVIL AERONAUTICS ADMINISTRATION,
Washington, D. C.

Part of Operating Certificate No. 11

UNITED AIR LINES TRANSPORT CORPORATION hereby makes application for amendment of the Operations Specifications appearing on the reverse side hereof, as follows:

LIST OVERHAUL PERIODS (MAXIMUM HOURS) AFTER EACH COMPONENT TO CONFORM WITH OPERATIONS SPECIFICATIONS FORM.

Reasons and supporting data (if insufficient space attach additional page):

REQUESTED BY CIVIL AERONAUTICS ADMINISTRATION

I CERTIFY that the statements submitted in connection herewith are true and that I am duly authorized to make this application on behalf of the applicant.

ORIGINAL SIGNED BY J. A. HERLIHY
(Signature)

Date OCTOBER 17, 1942

EXECUTIVE VICE PRESIDENT - OPERATIONS
(Title)

INSPECTOR'S RECOMMENDATIONS:

(Signature)

(Signature)

The Operations Specifications set forth on the reverse side hereof are

Amendment No. RE-3

By direction of the Administrator:

Effective date NOV 3 1942

S J. D. BRIDIE
(Signature)

Supersedes RE-2 DATED MARCH 6, 1942

ACTING CHIEF AIR CARRIER BRANCH
(Title)

Received for the applicant by:

UNITED AIR LINES TRANSPORT CORPORATION

(Signature)

Date NOVEMBER 9, 1942

(Title)

OVERHAUL

Date

UNITED AIR LINES TRANSPORT CORPORATION

Number

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OVERHAUL

IN ORDER TO MAINTAIN AIRCRAFT IN A STATE OF CONSTANT AIRWORTHINESS, COMPONENTS OF AIRCRAFT, ENGINES AND ACCESSORIES, IN ADDITION TO BEING PERIODICALLY CHECKED AND INSPECTED, ARE OVERHAULED AT REGULARLY DESIGNATED INTERVALS, AT WHICH TIME AIRCRAFT IS ROUTED TO A CERTIFICATED REPAIR BASE AT CHEYENNE OR SAN FRANCISCO.

REPAIRS ARE THERE EFFECTED BY CERTIFICATED MECHANICS AND TECHNICIANS AS DEEMED NECESSARY BY INSPECTION, AND ALL DAMAGED OR DETERIORATED PARTS OF THE PLANE, ENGINES, ACCESSORIES AND INSTRUMENTS ARE REPAIRED OR REPLACED TO RESTORE COMPONENTS TO A CONDITION OF OPERATING EFFICIENCY, AMENABLE TO SPECIFICATIONS OUTLINED BY THEIR RESPECTIVE MANUFACTURERS AND IN ACCORDANCE WITH CAR 18.6*

AFTER COMPLETE REASSEMBLY OF AN AIRCRAFT, AND PRIOR TO ITS REASSIGNMENT IN SCHEDULE, IT IS TEST FLOWN TO CHECK THE PROPER AND SAFE FUNCTIONING OF ALL COMPONENTS.

THE FOLLOWING OVERHAUL SPECIFICATIONS ARE BASED ON TESTS AND MANUFACTURERS' SPECIFICATIONS, AND ARE IN COMPLIANCE WITH MAINTENANCE OPERATIONS SPECIFICATIONS AS SET FORTH IN UNITED AIR LINES OPERATING CERTIFICATE.

*CIVIL AIR REGULATIONS PART 18. - MAINTENANCE, REPAIR AND ALTERATION OF CERTIFICATED AIRCRAFT AND OF AIRCRAFT ENGINES, PROPELLERS AND INSTRUMENTS
SECTION 18.6

DESIGN, TECHNIQUES, AND MATERIALS. REPAIRS SHALL BE SO EXECUTED AND MATERIALS OF SUCH STRENGTH AND QUALITY SHALL BE USED THAT THE CONDITION OF THE REPAIRED AIRCRAFT, AIRCRAFT ENGINE, PROPELLER, OR INSTRUMENT SHALL BE AT LEAST EQUIVALENT TO ITS ORIGINAL OR A PROPERLY ALTERED CONDITION IN REGARD TO AERODYNAMIC AND MECHANICAL FUNCTION, STRUCTURAL STRENGTH, AND RESISTANCE TO VIBRATION AND DETERIORATION, AND ALL OTHER QUALITIES AFFECTING AIRWORTHINESS. ALTERATIONS SHALL BE SO DESIGNED AND EXECUTED THAT THE ALTERED AIRCRAFT, AIRCRAFT ENGINE, PROPELLER, OR INSTRUMENT WILL COMPLY WITH THE AIRWORTHINESS REQUIREMENTS IN EFFECT WHEN THE PARTICULAR MODEL OF THE AIRCRAFT OR PART OF THE AIRCRAFT WAS ORIGINALLY CERTIFICATED AND, IN ADDITION, WITH PARTICULAR PROVISIONS OF THE CURRENT AIRWORTHINESS REQUIREMENTS RENDERED NECESSARY FOR SAFE OPERATION BY THE ALTERATION.

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DOUGLAS DC3-A

OVERHAUL TIME CHART

AIRCRAFT COMPONENTS, ACCESSORIES AND INSTRUMENTS WILL BE OVERHAULED AT THE END OF A SPECIFIED NUMBER OF NORMAL ENGINE OVERHAUL PERIODS, OR AT THE TIME OF PLANE OVERHAUL, AS FOLLOWS (EXCEPTIONS AS NOTED):*

AIRCRAFT COMPONENT	OVERHAUL PERIOD-MAX. HOURS
WINGS	PLANE OVERHAUL - - 6000
FUSELAGE	PLANE OVERHAUL - - 6000
EMPENNAGE	PLANE OVERHAUL - - 6000
LANDING GEAR:	
AXLES-BEARINGS	ONE- - - - - 725
STRUT, WING, FLAP RETRACTING	FIVE - - - - - 3625
STRUT, OLEO SHOCK	THREE- - - - - 2175
STRUT, L. AND R. RETRACTING	THREE- - - - - 2175
TRUSS ASSEMBLY L. AND R.	PLANE OVERHAUL - - 6000
WHEELS, LANDING-MAIN	ONE- - - - - 725
WHEELS, TAIL	ONE- - - - - 725
STRUT, TAIL WHEEL SHOCK	THREE- - - - - 2175
FORK, TAIL WHEEL	ONE- - - - - 725
SPINDLE, TAIL WHEEL	FOUR - - - - - 2900
TIRES, L. AND R.	ONE- - - - - 725
TIRES, TAIL	ONE- - - - - 725
CENTER SECTION	PLANE OVERHAUL - - 6000
NACELLES	PLANE OVERHAUL - - 6000
CONTROL SYSTEM	PLANE OVERHAUL - - 6000
CONTROL CABLES, ENGINE	THREE- - - - - 2175
CONTROL CABLES, FLIGHT	PLANE OVERHAUL - - 6000
**HYDRAULIC SYSTEM:	
PRESSURE CYLINDER	FOUR - - - - - 2900
PANEL HYDRAULIC	FOUR - - - - - 2900
PUMP, HAND	FOUR - - - - - 2900
TANK, SUPPLY (AND FILTER)	FOUR - - - - - 2900
VALVE, FLAP, RETRACTING	FOUR - - - - - 2900
VALVE, COWL FLAP	THREE- - - - - 2175
VALVE, LDG. GEAR RETRACTING	FOUR - - - - - 2900
VALVE, ENGINE SELECTOR	FOUR - - - - - 2900
VALVE, GYRO PILOT SHUT OFF	FOUR - - - - - 2900
VALVE, PRESSURE REGULATOR GYROPILOT	FOUR - - - - - 2900
VALVE, SHUT OFF	FOUR - - - - - 2900
VALVE, 800 LB. RELIEF	FOUR - - - - - 2900
VALVE, 1000 LB. RELIEF	FOUR - - - - - 2900
HAND GEAR ASSEMBLY	FOUR - - - - - 2900
VALVE, FLAP RELIEF	FOUR - - - - - 2900

INSTRUMENTS (FLIGHT) SEE PAGE 5

* SEE CURRENT ACA FORMS #512 AND #514 FOR ENGINE OVERHAUL AND PLANE OVERHAUL TIMES.

**SEE ACCESSORIES (AIRCRAFT)

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OVERHAUL TIME CHART

AIRCRAFT COMPONENT (CONTINUED)

OVERHAUL
PERIOD-MAX. HOURS

FUEL AND OIL SYSTEMS:

LINES, OIL, (AFT OF FIREWALL)
**TANKS, FUEL
VALVE, DUMP
LINES, FUEL (AFT OF FIREWALL)
PUMPS - D2-A WOBBLE
**VALVES, CROSSFEED-D2
**VALVES, CROSSFEED-APV AND 241B
**VALVES, FUEL-K3

ONE - - - - - 725
PLANE OVERHAUL - - 6000
PLANE OVERHAUL - - 6000
PLANE OVERHAUL - - 6000
FIVE - - - - - 3625
THREE - - - - - 2175
PLANE OVERHAUL - - 6000
FOUR - - - - - 2900

*SEE CURRENT ACA FORMS #512 AND #514 FOR ENGINE OVERHAUL AND PLANE OVERHAUL TIMES.

**SEE ACCESSORIES (AIRCRAFT)

DOUGLAS DC3-A
OVERHAUL TIME CHART
AIRCRAFT INSTRUMENTS (FLIGHT)

<u>COMPONENT</u>	<u>TEST CHECK</u> <u>PERIOD-MAX. HOURS</u>	<u>OVERHAUL</u> <u>PERIOD-MAX. HOURS</u>
ALTIMETER	ONE - - - 725	EIGHT- - - - - 5800
AMMETER, PITOT	TWO - - - 1450	EIGHT- - - - - 5800
ANALYZER, FLIGHT	-	FOUR MONTHS
BULB RESISTANCE THERMOMETER	-	ONE- - - - - 725
CLOCK	-	FOUR - - - - - 2900
COMPASS	ONE - - - 725	SIX- - - - - 4350
DRAIN-TRAP, GYROPILOT	-	TWO- - - - - 1450
FILTER, GYROPILOT OIL	-	ONE- - - - - 725
FLOWMETER, ANTI-ICER	-	PLANE OVERHAUL - 6000
GAGE, DE-ICER PRESSURE	-	FOUR - - - - - 2900
" GYROPILOT OIL PRESSURE	-	FOUR - - - - - 2900
" HYDRAULIC PRESSURE	-	PLANE OVERHAUL - 6000
" OXYGEN PRESSURE	-	FOUR - - - - - 2900
" STEAM PRESSURE	-	ONE- - - - - 725
" SUCTION	ONE - - - 725	SIX- - - - - 4350
GYROPILOT, BANK AND CLIMB	ONE - - - 725	THREE- - - - - 2175
GYROPILOT, DIRECTIONAL	ONE - - - 725	TWO- - - - - 1450
HORIZON	ONE - - - 725	THREE- - - - - 2175
INDICATOR, AIR SPEED	ONE - - - 725	EIGHT- - - - - 5800
" OUTSIDE AIR TEMP.	-	-
" ELEC	TWO - - - 1450	EIGHT- - - - - 5800
" OUTSIDE AIR TEMP.	-	-
" CAPILLARY	ONE - - - 725	-
" RATE OF CLIMB	ONE - - - 725	EIGHT- - - - - 5800
" TURN AND BANK	ONE - - - 725	EIGHT- - - - - 5800
MOUNTING UNIT, GYROPILOT	-	PLANE OVERHAUL - 6000
RELAY, GYROPILOT AIR	-	ONE- - - - - 725
SERVO, GYROPILOT	-	PLANE OVERHAUL - 6000
TUBE, PITOT	-	PLANE OVERHAUL - 6000
VALVE, GYROPILOT BALANCED OIL	-	PLANE OVERHAUL - 6000
" GYROPILOT SPEED	-	PLANE OVERHAUL - 6000
" VACUUM RELIEF	-	ONE- - - - - 725
VOLTAMMETER	ONE - - - 725	FOUR - - - - - 2900

SEE CURRENT ACA FORMS #512 AND #514 FOR ENGINE OVERHAUL AND PLANE OVERHAUL TIMES.

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DOUGLAS DC3-A

OVERHAUL TIME CHARTP AND W - SICG AND SIC3G ENGINES

ENGINE ACCESSORIES, PROPELLERS AND INSTRUMENTS WILL BE OVERHAULED AT THE END OF A SPECIFIED NUMBER OF NORMAL ENGINE OVERHAUL PERIODS, OR AT THE TIME OF PLANE OVERHAUL, AS FOLLOWS:*

ENGINE COMPONENTOVERHAULPERIOD - MAX. HOURS

ENGINE

ACCESSORIES:

SWITCH, IGNITION

Two- - - - - 1450

CARBURETORS

Two- - - - - 1450

MIXTURE CONTROL UNIT

One- - - - - 725

PUMP - FUEL

One- - - - - 725

PUMP - HYDRAULIC

One- - - - - 725

PUMP - VACUUM

One- - - - - 725

RADIATOR - OIL

One- - - - - 725

RING EXHAUST

One- - - - - 725

REGULATOR, OIL TEMP. (P & W)

PLANE OVERHAUL-6000

PROPELLERS:

PROPELLER

One- - - - - 725

GOVERNOR

One- - - - - 725

PUMP, FEATHERING

Two- - - - - 1450

INSTRUMENTS (ENGINE) SEE PAGE 8

FUEL AND OIL SYSTEMS:

LINES, OIL (FORWARD OF FIREWALL)

One- - - - - 725

LINES, FUEL (FORWARD OF FIREWALL)

One- - - - - 725

**OIL TANKS

THREE- - - - - 2175

*SEE CURRENT ACA FORMS #512 AND #514 FOR ENGINE OVERHAUL AND PLANE OVERHAUL TIMES.

**SEE ACCESSORIES (AIRCRAFT)

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<u>COMPONENT</u>	<u>TEST CHECK</u>		<u>OVERHAUL</u>	
	<u>PERIOD - MAX. HOURS</u>		<u>PERIOD - MAX. HOURS</u>	
COMPENSATOR, FUEL QUANTITY	-		PLANE OVERHAUL -	6000
GAGE, FUEL PRESSURE	ONE - - - - -	725	TWO - - - - -	1450
GAGE, MANIFOLD PRESSURE	TWO - - - - -	1450	EIGHT - - - - -	5800
GAGE, OIL PRESSURE	ONE - - - - -	725	TWO - - - - -	1450
INDICATOR, CARBURETOR AIR TEMP.	TWO - - - - -	1450	EIGHT - - - - -	5800
" FUEL QUANTITY	TWO - - - - -	1450	EIGHT - - - - -	5800
" OIL TEMPERATURE	TWO - - - - -	1450	EIGHT - - - - -	5800
" TACHOMETER	TWO - - - - -	1450	EIGHT - - - - -	5800
" THERMOCOUPLE	TWO - - - - -	1450	EIGHT - - - - -	5800
MAGNETO, TACHOMETER	-		ONE - - - - -	725
SWITCH, FUEL QUANTITY	TWO - - - - -	1450	FOUR - - - - -	2900
TANK UNIT, FUEL QUANTITY	-		FIVE - - - - -	3625
THERMOCOUPLE	-		ONE - - - - -	725

*SEE CURRENT ACA FORMS #512 AND #514 FOR ENGINE OVERHAUL AND PLANE OVERHAUL TIMES.

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ELECTRICAL AND RADIO COMPONENTS AND ACCESSORIES WILL BE OVERHAULED AT THE END OF A SPECIFIED NUMBER OF NORMAL ENGINE OVERHAUL PERIODS, OR AT THE TIME OF PLANE OVERHAUL, AS FOLLOWS (EXCEPTIONS AS NOTED):*

ELECTRICAL COMPONENT

STARTER
GENERATOR
GENERATOR CONTROL BOX
DE-ICER MOTOR
MOTOR-PROP. FEATHERING
MOTOR ANTI-ICER
MASTER SWITCH
AIRCRAFT ELECTRICAL
SYSTEM INCL.
JUNCTION BOXES
ELECTRICAL DISTRIBUTION PANEL
LIGHT SYSTEM, ETC.
BATTERY

OVERHAUL
PERIOD - MAXIMUM HOURS

ONE- - - - - 725
ONE- - - - - 725
ONE- - - - - 725
ONE- - - - - 725
TWO- - - - - 1450
TWO- - - - - 1450
TWO- - - - - 1450

ONE- - - - - 725
AS NEEDED

RADIO COMPONENT

COM. UNIT
REC. RANGE
REC. MARKER
REC. ADF
IND. MARKER
IND. AZIMUTH
DIRECTOR LOOP
ADF LOOP
AMPLIFIER
DYN. RECEIVER
CONTROL PANEL
HEADPHONES
MICROPHONES
RANGE FILTER
ANTENNA, TRANSFORMER ES-309-1
CARTRIDGE, ANTI-STATIC
EQUIPMENT MOUNTINGS
AIRCRAFT RADIO SYSTEM INCL.
JUNCTION BOXES
TACH SHAFTS - ANTENNA SYSTEM
TRANSMISSION LINES
CONDUITS AND WIRING, ETC.

OVERHAUL
PERIOD - MAXIMUM HOURS

ONE- - - - - 725
ONE- - - - - 725
ONE- - - - - 725
ONE- - - - - 725
PLANE OVERHAUL - - 6000
ONE- - - - - 725
ONE- - - - - 725
ONE- - - - - 725
ONE- - - - - 725
ONE- - - - - 725
ONE- - - - - 725
SIX MONTHS
ONE- - - - - 725
ONE- - - - - 725
PLANE OVERHAUL - - 6000
AS USED
ONE- - - - - 725

ONE- - - - - 725

*SEE CURRENT ACA FORMS #512 AND #514 FOR ENGINE OVERHAUL AND PLANE OVERHAUL TIMES.

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AIRCRAFT COMPONENT

WINGS

1. THE WINGS WILL BE COMPLETELY REMOVED FROM THE AIRCRAFT. ALL PARTS WILL BE THOROUGHLY INSPECTED AND CHECKED, INCLUDING THE LEADING AND TRAILING EDGES, WING FLAPS, AILERON AND TRIM TAB CONNECTIONS, WING TIPS, SPARS, RIBS, AND STATIONS. THE CONNECTING FLANGES BETWEEN THE WINGS AND CENTER SECTION WILL BE CAREFULLY CHECKED. DAMAGED OR DETERIORATED PARTS WILL BE REPAIRED OR REPLACED, AND THE WINGS WILL BE PROPERLY REINSTALLED.

FUSELAGE

2. ALL APPENDAGES NECESSARY TO A COMPLETE INSPECTION OF THE FUSELAGE WILL BE REMOVED, AND ALL PARTS OF THE FUSELAGE WILL BE THOROUGHLY CHECKED. BUCKLED OR WRINKLED SKIN WILL BE UNRIVETTED WHEN NECESSARY AND INSPECTION MADE FOR DAMAGED SUPPORTING MEMBERS. ATTACHMENT POINTS OF THE CENTER SECTION WILL BE CAREFULLY CHECKED, AND ALL DAMAGED OR DETERIORATED PARTS WILL BE REPAIRED OR REPLACED. THE COCKPIT, CABIN, CARGO AND BATTERY COMPARTMENTS WILL BE COMPLETELY CHECKED AND RENOVATED AS REQUIRED.

EMPENNAGE

3. THE EMPENNAGE COMPONENTS WILL BE THOROUGHLY INSPECTED. THE RUDDER AND ELEVATORS WILL BE REMOVED AND INSPECTED. THE FIN, FARING AND STABILIZER WILL ALSO BE CAREFULLY EXAMINED. ANY PARTS DAMAGED, UNDULY WORN, OR DETERIORATED WILL BE REPAIRED OR REPLACED. THE COMPONENTS WILL BE REASSEMBLED, AND OPERATION OF THE RUDDER, ELEVATOR AND TABS WILL BE CHECKED FOR PROPER FUNCTIONING.

LANDING GEAR

4. AXLE-BEARINGS

ALL AXLES WILL BE REMOVED FROM THE WHEELS AND WILL BE THOROUGHLY CLEANED AND INSPECTED. THE BEARINGS AND RACES WILL BE THOROUGHLY CLEANED AND INSPECTED. ANY SHOWING EXCESSIVE WEAR OR DAMAGE WILL BE REPLACED. UNITS WILL BE LUBRICATED. THE AXLE AND BEARINGS WILL BE CORRECTLY REASSEMBLED.

5. TAIL WHEEL SHOCK STRUT, OLEO SHOCK STRUTS, OLEO RETRACTING STRUTS

ALL OLEO SHOCK STRUTS INCLUDING THAT OF THE TAIL WHEEL, AND THE OLEO RETRACTING STRUTS, WILL BE REMOVED FROM THE LANDING GEAR. STRUT HOUSINGS, HINGES, OLEO CYLINDERS, PISTONS, PISTON TUBES, RODS, METERING PINS, AND PACKINGS WILL BE THOROUGHLY INSPECTED FOR LEAKS OR FAILURES. ANY DAMAGED OR EXCESSIVELY WORN PARTS WILL BE REPAIRED OR REPLACED. THE STRUTS WILL BE PROPERLY REASSEMBLED. OLEO SHOCK STRUTS WILL BE PROPERLY FILLED WITH APPROVED FLUID, AND CORRECTLY INFLATED.

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6. TRUSS ASSEMBLY, L. AND R.

IN ADDITION TO THE OLEO SHOCK AND RETRACTING STRUT AND AXLE OVERHAUL OUTLINED ABOVE, THE COMPLETE LANDING GEAR WILL BE DISMANTLED, ALL PARTS OF THE UPPER AND LOWER TRUSSES WILL BE CHECKED AND REPAIRED AS NECESSARY. FITTING OF THE UPPER TRUSS WITH THE WING SPAR AND THE REAR BRACE STRUT WITH THE DOUBLE WING RIB WILL BE CAREFULLY INSPECTED. THE BUNGEE CORDS AND MECHANISMS, TORQUE LINKS, LANDING GEAR LOCK AND RETRACTING MECHANISMS WILL ALL BE THOROUGHLY CHECKED. ANY WORN OR DETERIORATED PARTS WILL BE REPAIRED OR REPLACED. THE LANDING GEAR WILL BE PROPERLY REASSEMBLED AND TESTED FOR PROPER FUNCTIONING.

WHEELS AND BRAKES

7. WHEELS, LANDING AND TAIL

WHILE WHEELS ARE REMOVED FROM THE AIRCRAFT AND TIRES AND AXLES DISASSEMBLED, THE WHEELS AND BRAKE ASSEMBLY WILL BE DISMANTLED AND INSPECTED. WHEEL BEARINGS AND BRAKE DRUMS, AND ALL COMPONENTS OF THE BRAKE ASSEMBLY WILL BE CAREFULLY CHECKED. ANY DETERIORATED BOLTS, LININGS, SHOES, PINS, SPRINGS, TUBES OR OTHER PARTS WILL BE REPAIRED OR REPLACED. AFTER REASSEMBLY, WHEELS AND BRAKING SYSTEM WILL BE CHECKED FOR PROPER FUNCTIONING.

8. TAIL WHEEL FORK

WHILE TAIL WHEEL IS REMOVED, THE TAIL WHEEL FORK WILL BE DISASSEMBLED, REPAIRED OR REPLACED IF NECESSARY.

9. (UNASSIGNED)

10. (UNASSIGNED)

11. TAIL WHEEL SPINDLE

DURING OVERHAUL, THE TAIL WHEEL SPINDLE WILL BE REMOVED AND WILL BE CHECKED FOR CRACKS OR DEFECTS. TAIL WHEEL SPINDLE BEARINGS WILL BE PROPERLY ADJUSTED AND LUBRICATED. ANY DEFECTS WILL BE REMEDIED, AND EXCESSIVELY DAMAGED PARTS REPLACED. WHEEL WILL BE REASSEMBLED AND TAIL WHEEL LOCKING MECHANISM WILL BE CORRECTLY ADJUSTED.

12. TIRES, L. R. AND TAIL

TIRES AND TUBES WILL BE REMOVED FROM WHEELS AND TUBES AND CASINGS WILL BE THOROUGHLY INSPECTED, AND WILL BE REPAIRED OR REPLACED AS NECESSARY. VALVE CORES WILL BE CHECKED AFTER INFLATION TO ASSURE THEIR NOT LEAKING.

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PAGE-13CENTER SECTION

13. THE CENTER SECTION WILL BE THOROUGHLY CHECKED AND INSPECTED AS ASSEMBLED. SPARS, RIBS, BULKHEADS, AND CORRUGATED INNER COVERING AS WELL AS OUTER SKIN WILL BE CHECKED FOR CORROSION OR OTHER DEFECTS, AND ANY DETERIORATED OR DAMAGED PARTS WILL BE REPAIRED OR REPLACED.

NACELLES

14. THE ENGINE NACELLES WILL BE CAREFULLY INSPECTED, THE SECTION BETWEEN THE WING AND FIREWALL AS ASSEMBLED, THE ENGINE MOUNT TO ALWAYS BE REMOVED FROM THE NACELLE, AND ALL SHOCK RUBBER CONNECTIONS WILL BE CHECKED AND REPLACED AS NECESSARY. RING COWL, ACCESSORY COWL AND COWL FLAPS WILL BE REMOVED AND REPAIRED AS NECESSARY; FIREWALL AND SUPPORTING MEMBERS WILL BE CHECKED AND REPAIRED, AND EXCESSIVELY WORN COWL FASTENER SPRINGS, DZUS FASTENERS, AND LOCK PINS WILL BE REPLACED.

CONTROL SYSTEM

15. THE CONTROL SYSTEM WILL BE THOROUGHLY INSPECTED. RUDDER PEDAL TORQUE ARMS AND TORQUE TUBES, AND ALL CONNECTIONS, HINGES, BELLCRANKS, SHAFTS, BEARINGS, PINS, DRUMS AND RODS WILL BE THOROUGHLY CLEANED AND INSPECTED AS WELL AS ALL AILERON, RUDDER, ELEVATOR AND TRIM TAB CONTROL SURFACE METAL SKIN AND FABRICS. CONTROL SYSTEM WILL BE REASSEMBLED, PROPERLY LUBRICATED AND TESTED FOR CORRECT FUNCTIONING.

CONTROL CABLES

16. ALL CONTROL CABLES WILL BE THOROUGHLY INSPECTED. FLOORBOARDS AND CENTERSECTION STRESS PLATES WILL BE REMOVED, AND EXCEPTING ELEVATOR AND RUDDER CABLES AND ELEVATOR AND RUDDER TRIM TAB CABLES WHICH CAN BE INSPECTED THROUGH REGULAR INSPECTION HOLES, AND WHICH WILL ONLY BE REMOVED AS NECESSARY, ALL OTHER CONTROL CABLES WILL BE DISCONNECTED, CLEANED AND CHECKED. CLEVIS ENDS AND PINS, THIMBLES, SPLICES, PULLEYS AND BRACKETS, FAIRLEADS, BELLCRANKS, TURNBUCKLES AND ALL SWEAT CABLE CONNECTIONS WILL BE THOROUGHLY CHECKED. ANY WORN OR DAMAGED PARTS WILL BE REPAIRED OR REPLACED AS NECESSARY. CABLES WILL THEN BE REINSTALLED AND PROPERLY RIGGED AND TESTED FOR FUNCTION.

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HYDRAULIC SYSTEM

17. THE HYDRAULIC SYSTEM OF THE PLANE WILL BE COMPLETELY CHECKED AND OVERHAULED, THE MAIN PRESSURE AND REGULATING SYSTEM AS WELL AS THE LANDING GEAR RETRACTING SYSTEM, THE WING FLAP SYSTEM, THE COWL FLAP SYSTEM, THE WHEEL BRAKE SYSTEM, AND THE GYROPILOT SERVO UNIT. ALL COMPONENTS OF THE COMPLETE SYSTEM WILL BE CHECKED FOR LOOSE CONNECTIONS, CHAFING AND LEAKS. ALL VALVES WILL BE TESTED FOR PROPER FUNCTIONING. THE DIAPHRAGM IN THE PRESSURE CYLINDER OR PRESSURE ACCUMULATOR WILL BE REPLACED AS NECESSARY, AND THE AIR PRESSURE WILL BE CHECKED. THE HYDRAULIC PUMP CONNECTIONS AND THE HAND PUMP MECHANISM WILL BE CAREFULLY INSPECTED. ANY DAMAGED OR DETERIORATED PARTS OF THE HYDRAULIC SYSTEM WILL BE REPAIRED OR REPLACED. HYDRAULIC FLUID WILL BE DRAINED, AND THE SYSTEM WILL BE REFILLED WITH CLEAN, UNCONTAMINATED FLUID. THE RECONDITIONED SYSTEMS WILL BE CHECKED FOR PROPER PRESSURES, GAGE INDICATIONS AND MECHANICAL FUNCTIONING.

CONTROL SYSTEM

15. THE CONTROL SYSTEM WILL BE THOROUGHLY INSPECTED. RUBBER PISTON TORQUE ARMS AND TORQUE TUBES, AND ALL CONNECTIONS, KINKS, BELLCRANKS, SHAFTS, LEARNINGS, PINS, TRIMS AND RODS WILL BE THOROUGHLY CLEANED AND INSPECTED AS WELL AS ALL ALIGNMENT, RUBBER, ELEVATOR AND TRIM TAB CONTROL SURFACE METAL SKIN AND FABRICS. CONTROL SYSTEM WILL BE REASSEMBLED, PROPERLY LUBRICATED AND TESTED FOR CORRECT FUNCTIONING.

CONTROL CABLES

16. ALL CONTROL CABLES WILL BE THOROUGHLY INSPECTED. FLOORBOARD AND CENTERSECTION STRESS PLATES WILL BE REMOVED, AND EXCEPTING ELEVATOR AND RUBBER CABLES AND ELEVATOR AND RUBBER TRIM TAB CABLES WHICH CAN BE INSPECTED THROUGH REGULAR INSPECTION HOLES, AND WHICH WILL ONLY BE REMOVED AS NECESSARY, ALL OTHER CONTROL CABLES WILL BE DISCONNECTED, CLEANED AND CHECKED. CABLE ENDS AND PINS, THIMBLES, SPLICES, PULLEYS AND BRACKETS, FAIRLEYS, BELLCRANKS, TURNBUCKLES AND ALL SWEAT CABLE CONNECTIONS WILL BE THOROUGHLY CHECKED. ANY WORN OR DAMAGED PARTS WILL BE REPAIRED OR REPLACED AS NECESSARY. CABLES WILL THEN BE REINSTALLED AND PROPERLY RIGGED AND TESTED FOR FUNCTION.

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AIRCRAFT INSTRUMENTS

INSTRUMENT TEST CHECK

- 18. THE INSTRUMENT WILL BE INSPECTED AND TESTED FOR PROPER FUNCTIONING. ANY MALFUNCTIONING WILL BE CORRECTED BY READJUSTMENT OR REPAIR TO BRING THE PERFORMANCE OF THE INSTRUMENT WITHIN ACCEPTED TOLERANCES. THIS IS TO ASSURE CONTINUOUS PROPER FUNCTIONING OF THE INSTRUMENTS BETWEEN OVERHAULS.
19. (UNASSIGNED)
20. (UNASSIGNED)

INSTRUMENT OVERHAUL

21. THE INSTRUMENT WILL BE REMOVED FROM THE PLANE, INSPECTED AND TESTED IN THE SHOP FOR PROPER FUNCTIONING. THE INSTRUMENT WILL BE DISASSEMBLED, CLEANED AND THOROUGHLY INSPECTED. ANY PARTS DAMAGED, WORN OR DETERIORATED BEYOND ALLOWABLE TOLERANCES WILL BE REPAIRED OR REPLACED. THE INSTRUMENT WILL BE PROPERLY REASSEMBLED, LUBRICATED (WHERE REQUIRED), CALIBRATED AND ADJUSTED OR REGULATED WITHIN THE ACCEPTED TOLERANCES. THE INSTRUMENT WILL BE CORRECTLY INSTALLED AND CONNECTED IN THE PLANE TO ASSURE ITS PROPER FUNCTIONING IN SERVICE.

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PAGE - 17FUEL AND OIL SYSTEMSOIL TANKS

22. BOTH OIL TANKS WILL BE REMOVED FROM THE ENGINE NACELLES AND WILL BE COMPLETELY DRAINED AND CLEANED. ALL COVERS, COVER PLATES AND PLUGS WILL BE REMOVED FROM THE TANKS. THE TANKS WILL BE THOROUGHLY INSPECTED, AND ANY PARTS INDICATING DETERIORATION WILL BE REPAIRED OR REPLACED. THE TANK WILL BE REASSEMBLED, REINSTALLED, FILLED WITH THE PROPER LUBRICANT, AND THE INSTALLATION INSPECTED FOR LEAKS.

OIL LINES (AFT OF FIREWALL)

23. THE OIL LINES WILL BE REMOVED AND WILL BE THOROUGHLY CLEANED. THEY WILL BE INSPECTED FOR WEAR AT ALL POINTS OF CONTACT WITH CLAMPS AND CONNECTIONS. ANY LINES INDICATING EXCESSIVE WEAR WILL BE REPLACED, AND THE LINES WILL BE REINSTALLED AND CHECKED FOR LEAKS AND PROPER FLOW.

FUEL TANKS

24. ALL MAIN AND AUXILIARY FUEL TANKS WILL BE REMOVED FROM THE AIRCRAFT AND WILL BE DRAINED AND THOROUGHLY CLEANED. INSIDE OF TANKS WILL BE INSPECTED FOR CORROSION, AND WHEN NECESSARY, TANKS WILL BE OPENED FOR NECESSARY REPAIRS. FUEL AND VENT LINE CONNECTIONS WILL BE CHECKED, AS WELL AS TANK FILLER CAPS AND DUMP VALVES. ANY EXCESSIVELY WORN OR DETERIORATED PARTS WILL BE MENDED OR REPLACED, AND TANKS WILL BE PROPERLY REMOUNTED.

FUEL LINES (AFT OF FIREWALL)

25. THE FUEL LINES WILL BE THOROUGHLY INSPECTED AND CLEANED. THEY WILL BE CHECKED FOR POSSIBLE CORROSION AND LEAKS, AND ANY DETERIORATED SECTIONS WILL BE REPAIRED OR REPLACED. CONNECTIONS WITH TANKS AND VALVES WILL BE CHECKED TO ASSURE PROPER FITTINGS AND NO LEAKAGE.

VALVES, D-2, APV AND 241B (CROSSFEED)

26. THE CROSSFEED VALVES WILL BE REMOVED FROM THE AIRCRAFT AND DISASSEMBLED. THEY WILL BE CLEANED AND CHECKED FOR CORROSION AND DETERIORATION. THE CORES, VALVE DISCS AND SEATS WILL BE INSPECTED FOR GALLING. THE CASTINGS WILL BE CHECKED TO INSURE THAT THERE ARE NO CRACKS, LEAKAGE OR FAILURE. ANY EXCESSIVELY WORN PARTS WILL BE REPAIRED OR REPLACED. THE VALVE WILL BE PROPERLY REASSEMBLED, INSTALLED AND TESTED FOR PROPER FUNCTIONING.

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VALVES, K3

27. THE K3 FUEL VALVES WILL BE REMOVED FROM THE AIRCRAFT AND DISASSEMBLED. THEY WILL BE CLEANED AND CHECKED FOR CORROSION AND DETERIORATION. THE CORK WILL BE INSPECTED FOR GALLING. THE CASTING WILL BE CHECKED TO INSURE THAT THERE ARE NO CRACKS, LEAKAGE OR FAILURE. ANY EXCESSIVELY WORN PARTS WILL BE REPAIRED OR REPLACED. THE VALVE WILL BE PROPERLY REASSEMBLED, INSTALLED AND TESTED FOR PROPER FUNCTIONING.

PUMPS - D2-A WOBBLE

28. THE WOBBLE PUMP WILL BE REMOVED AND DISASSEMBLED. THE DIAPHRAGM, VALVES AND OTHER COMPONENTS WILL BE INSPECTED. ANY PARTS SHOWING UNDUE WEAR OR DETERIORATION WILL BE REPAIRED OR REPLACED. THE UNIT WILL BE REASSEMBLED, ADJUSTED FOR PROPER PRESSURE, REINSTALLED AND TESTED FOR PROPER FUNCTIONING.

FUEL LINES

29. ALL MAIN AND AUXILIARY FUEL TANKS WILL BE REMOVED FROM THE AIRCRAFT AND WILL BE CLEANED AND THOROUGHLY INSPECTED. INSIDE OF TANKS WILL BE INSPECTED FOR CORROSION, AND WHEN NECESSARY, TANKS WILL BE OBTAINED FOR NECESSARY REPAIR. FUEL AND VENT LINE CONNECTIONS WILL BE CHECKED, AS WELL AS TANK FILLER CAPS AND DUMP VALVES. ANY EXCESSIVELY WORN OR DETERIORATED PARTS WILL BE REPAIRED OR REPLACED, AND TANKS WILL BE PROPERLY REMOUNTED.

FUEL LINES (AIR OR FIREWALL)

30. THE FUEL LINES WILL BE THOROUGHLY INSPECTED AND CLEANED. THEY WILL BE CHECKED FOR POSSIBLE CORROSION AND LEAKS, AND ANY DETERIORATED SECTIONS WILL BE REPAIRED OR REPLACED. CONNECTIONS WITH TANKS AND VALVES WILL BE CHECKED TO ASSURE PROPER FITTINGS AND NO LEAKAGE.

VALVES, D-5, APV AND SP19 (CROSSFEED)

31. THE CROSSFEED VALVES WILL BE REMOVED FROM THE AIRCRAFT AND DISASSEMBLED. THEY WILL BE CLEANED AND CHECKED FOR CORROSION AND DETERIORATION. THE CORKS, VALVE DISCS AND SEATS WILL BE INSPECTED FOR GALLING. THE CASTINGS WILL BE CHECKED TO INSURE THAT THERE ARE NO CRACKS, LEAKAGE OR FAILURE. ANY EXCESSIVELY WORN PARTS WILL BE REPAIRED OR REPLACED. THE VALVE WILL BE PROPERLY REASSEMBLED, INSTALLED AND TESTED FOR PROPER FUNCTIONING.

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RETIREMENT OF PARTS

THE FOLLOWING LISTED PARTS WILL BE RETIRED AT OR PRIOR TO THE MAXIMUM TIME LIMIT AS SHOWN:

ENGINES - P AND W MODELS -- SICG, SIC3G AND
R1830-92

MAX.
SERVICE HRS.

No
FIXED TIME

PART

BOLTS, MASTER ROD-THRU -	2175
BEARINGS, BLOWER IMPELLER -	725
PINS, PISTON -	3000
RINGS, PISTON-COMPRESSION -	725
" " -DUAL OIL AND SCRAPER -	1450
→ SCREW, RETAINING - CENTER MAIN BEARING	
CRANK CASE LINER	1450
VALVES, INTAKE -	4500
" EXHAUST -	4000

PROPELLERS - H.S. MODEL 23E50

PART

HUB -	12000
BLADES -	10000

ENGINE COMPONENT

ENGINE (PRATT AND WHITNEY S1CG-S1C3-G)

1. THE ENGINE WILL BE REMOVED AND COMPLETELY OVERHAULED. THIS OVERHAUL WILL INCLUDE DISASSEMBLING THE ENGINE; MAGNAFLUXING, INSPECTING FOR WEAR AND FLAWS AND NECESSARY REPAIR OR REPLACEMENT OF PARTS AS OUTLINED IN THE PRATT AND WHITNEY OVERHAUL MANUAL. UPON COMPLETION OF OVERHAUL, ENGINE WILL BE ASSEMBLED AND RUN-IN ON TEST STAND AND IF FOUND OPERATING SATISFACTORILY IN ALL RESPECTS WILL BE REINSTALLED IN PLANE.

GENERATOR

2. THE GENERATOR WILL BE REMOVED FROM THE ENGINE AND DISASSEMBLED. ALL PARTS, INCLUDING THE ARMATURE, COMMUTATOR, BRUSHES AND BEARINGS, WILL BE INSPECTED AND CHECKED. DAMAGED OR DETERIORATED PARTS WILL BE REPAIRED OR REPLACED AS NECESSARY. UNIT WILL BE REASSEMBLED, LUBRICATED AND TESTED FOR DELIVERY OF PROPER CURRENT.

PUMP-FUEL

3. THE FUEL PUMP WILL BE REMOVED FROM THE ENGINE AND DISASSEMBLED. ALL PARTS, INCLUDING ROTOR PRESSURE RELIEF VALVE, BY-PASS VALVE, AIR VENT LINE AND CONNECTIONS, WILL BE CLEANED AND INSPECTED. DAMAGED OR WORN PARTS WILL BE REPAIRED OR REPLACED AS NECESSARY. UNIT WILL BE REASSEMBLED AND TESTED FOR PROPER FUNCTIONING.

PUMP-HYDRAULIC

4. THE HYDRAULIC PUMP WILL BE REMOVED FROM THE ENGINE AND DISASSEMBLED. ALL PARTS, INCLUDING GEARS, REGULATOR VALVE, BASE MOUNTING AND CONNECTIONS WILL BE CLEANED AND INSPECTED. DAMAGED OR WORN PARTS WILL BE REPAIRED OR REPLACED AS NECESSARY. UNIT WILL BE REASSEMBLED AND TESTED FOR PROPER FUNCTIONING.

PUMP-VACUUM

5. THE VACUUM PUMP WILL BE REMOVED FROM THE ENGINE AND DISASSEMBLED. ALL PARTS, INCLUDING ROTOR, RELIEF VALVE, RELIEF VALVE SCREENS AND FITTINGS WILL BE CLEANED AND INSPECTED. DAMAGED OR DETERIORATED PARTS WILL BE REPAIRED OR REPLACED AS NECESSARY. UNIT WILL BE REASSEMBLED AND TESTED FOR PROPER FUNCTIONING.

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RADIATOR-OIL

6. THE OIL RADIATOR WILL BE REMOVED AND DISASSEMBLED. ALL PARTS, INCLUDING COOLING TUBES, RELIEF VALVE, SHUTTERS AND CONTROL CONNECTIONS, WILL BE CLEANED AND INSPECTED. DAMAGED OR DETERIORATED PARTS WILL BE REPAIRED OR REPLACED AS NECESSARY. UNIT WILL BE REASSEMBLED AND TESTED FOR PROPER FUNCTIONING.

RING-EXHAUST

7. THE EXHAUST RING WILL BE REMOVED AND INSPECTED. NECESSARY REPAIRS OR REPLACEMENTS WILL BE MADE IF ANY INDICATION OF DETERIORATION OR DAMAGE APPEARS.

STARTER

8. THE STARTER WILL BE REMOVED FROM THE ENGINE AND DISASSEMBLED TO ALLOW INSPECTION OF THE MOTOR REDUCTION GEARS AND DOG CLUTCH. DAMAGED OR DETERIORATED PARTS WILL BE REPAIRED OR REPLACED AS NECESSARY. BOOSTER COIL WILL BE CHECKED FOR DELIVERY OF PROPER SPARK. UNIT WILL BE REASSEMBLED, LUBRICATED AND TESTED FOR PROPER FUNCTIONING.
9. (UNASSIGNED)
10. (UNASSIGNED)

PROPELLER

11. THE PROPELLER WILL BE REMOVED FROM THE ENGINE AND DISASSEMBLED TO ALLOW INSPECTION OF INDIVIDUAL BLADES AND THE FEATHERING MECHANISM INCLUDING PISTON, CAMS, CAM ROLLERS AND OIL PASSAGES. INDIVIDUAL BLADES WILL BE INSPECTED FOR INDICATION OF CRACKS OR OTHER DETERIORATION. BLADES WITH NICKS, DENTS, GASHES OR OTHER DETERIORATION WILL BE REPAIRED OR REPLACED AS NECESSARY. ANY PARTS OF THE FEATHERING MECHANISM INDICATING WEAR OR DETERIORATION WILL BE REPAIRED OR REPLACED AS NECESSARY.

PROPELLER GOVERNOR

12. THE PROPELLER GOVERNOR WILL BE REMOVED FROM THE ENGINE AND DISASSEMBLED. ALL PARTS, INCLUDING AUXILIARY OIL PUMP, FLYBALLS, PILOT-VALVE, COMPRESSION SPRING AND CONTROL WHEEL AND OIL PASSAGES WILL BE CLEANED AND INSPECTED. DAMAGED OR DETERIORATED PARTS WILL BE REPAIRED OR REPLACED AS NECESSARY. UNIT WILL BE REASSEMBLED AND TESTED FOR PROPER FUNCTIONING.

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PAGE - 29DOUGLAS DC3-APROPELLER FEATHERING PUMP

13. THE FEATHERING PUMP WILL BE REMOVED. ALL PARTS, INCLUDING THE MOTOR AND OIL LINE FITTINGS, WILL BE INSPECTED. ANY PARTS SHOWING DAMAGE OR WEAR WILL BE REPAIRED OR REPLACED AS NECESSARY. UNIT WILL BE REASSEMBLED AND TESTED FOR PROPER FUNCTIONING.

INSTRUMENT TEST CHECK

- 14. THE INSTRUMENT WILL BE INSPECTED AND TESTED FOR PROPER FUNCTIONING. ANY MALFUNCTIONING WILL BE CORRECTED BY READJUSTMENT OR REPAIR TO BRING THE PERFORMANCE OF THE INSTRUMENT WITHIN ACCEPTED TOLERANCES. THIS IS TO ASSURE CONTINUOUS PROPER FUNCTIONING OF THE INSTRUMENTS BETWEEN OVERHAULS.

INSTRUMENT OVERHAUL

15. THE INSTRUMENT WILL BE REMOVED FROM THE PLANE, INSPECTED AND TESTED IN THE SHOP FOR PROPER FUNCTIONING. THE INSTRUMENT WILL BE DISASSEMBLED, CLEANED AND THOROUGHLY INSPECTED. ANY PARTS DAMAGED, WORN OR DETERIORATED BEYOND ALLOWABLE TOLERANCES WILL BE REPAIRED OR REPLACED. THE INSTRUMENT WILL BE PROPERLY REASSEMBLED, LUBRICATED (WHERE REQUIRED), CALIBRATED AND ADJUSTED OR REGULATED WITHIN THE ACCEPTED TOLERANCES. THE INSTRUMENT WILL BE CORRECTLY INSTALLED AND CONNECTED IN THE PLANE TO ASSURE ITS PROPER FUNCTIONING IN SERVICE.

OIL LINES (FORWARD OF FIREWALL)

16. ALL OIL LINES IN THE NACELLE FORWARD OF THE FIREWALL WILL BE REMOVED. LINES AND CONNECTIONS WILL BE CLEANED AND INSPECTED. ANY SECTION OF THE LINES, CONNECTIONS OR PARTS SHOWING DAMAGE OR DETERIORATION WILL BE REPAIRED OR REPLACED AS NECESSARY BEFORE REINSTALLATION IN THE NACELLE.

FUEL LINES (FORWARD OF FIREWALL)

17. ALL FUEL LINES IN THE NACELLE FORWARD OF THE FIREWALL WILL BE REMOVED. LINES AND CONNECTIONS WILL BE CLEANED AND INSPECTED. ANY SECTIONS OF THE LINES, CONNECTIONS OR PARTS SHOWING DAMAGE OR DETERIORATION WILL BE REPAIRED OR REPLACED AS NECESSARY BEFORE REINSTALLATION IN THE NACELLE.

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ELECTRICAL COMPONENTGENERATOR CONTROL BOX

1. THE GENERATOR CONTROL BOX SHALL BE REMOVED, DISASSEMBLED AND CLEANED. ALL PARTS INCLUDING WIRING, CONNECTIONS, VOLTAGE REGULATOR, CURRENT LIMITATOR AND REVERSE CURRENT CUT-OUT WILL BE INSPECTED. ANY PARTS INDICATING DAMAGE OR DETERIORATION WILL BE REPAIRED OR REPLACED AS NECESSARY. UNIT WILL BE REASSEMBLED AND TEST MADE.

DE-ICER MOTOR (AND DISTRIBUTOR VALVE)

2. THE DE-ICER MOTOR WILL BE REMOVED, DISASSEMBLED, CLEANED AND INSPECTED. ANY PARTS INDICATING DAMAGE OR DETERIORATION WILL BE REPAIRED OR REPLACED AS NECESSARY. UNIT WILL BE REASSEMBLED, LUBRICATED AND TESTED FOR PROPER FUNCTIONING.

FEATHERING MOTOR

3. THE FEATHERING MOTOR WILL BE REMOVED FROM THE FEATHERING PUMP, DISASSEMBLED AND INSPECTED. ANY PARTS INDICATING WEAR WILL BE REPAIRED OR REPLACED AS NECESSARY. UNIT WILL BE REASSEMBLED, LUBRICATED AND TESTED FOR PROPER FUNCTIONING.

ANTI-ICER MOTOR

4. THE ANTI-ICER MOTOR WILL BE REMOVED, DISASSEMBLED AND INSPECTED. ANY PARTS SHOWING DAMAGE OR DETERIORATION WILL BE REPAIRED OR REPLACED AS NECESSARY. UNIT WILL BE REASSEMBLED, LUBRICATED AND TESTED FOR PROPER FUNCTIONING.

MASTER SWITCH

5. THE MASTER SWITCH WILL BE REMOVED AND DISASSEMBLED. ALL PARTS INCLUDING CONTACT POINTS AND CONNECTIONS WILL BE CLEANED AND INSPECTED, LUBRICATED AND TESTED FOR PROPER FUNCTIONING AT ALL SETTINGS.

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PAGE - 36AIRCRAFT ELECTRICAL SYSTEM INCLUDING JUNCTION BOXES,
ELECTRIC DISTRIBUTION PANEL, LIGHT SYSTEM, ETC.

6. ALL COMPONENTS IN THIS CLASSIFICATION WILL BE CAREFULLY INSPECTED AT THE ESTABLISHED OVERHAUL PERIOD INCLUDING ALL CONNECTIONS, WIRING FITTINGS, FUSES, SWITCHES, LAMP BULBS. ALL PARTS SHOWING DAMAGE OR DETERIORATION WILL BE REPAIRED OR REPLACED AS NECESSARY.

BATTERIES

7. THE BATTERY IS COMPLETELY DISMANTLED, THE CONTAINER, CELL COVER SPLASH PLATES, CONNECTOR STRAPS, AND VENT PLUGS ARE CLEANED IN A SOLVENT SOLUTION. THE POSITIVE AND NEGATIVE PLATES AND WOOD SEPARATORS ARE REPLACED. NEW PLATES ARE LEAD BURNED INTO GROUPS AND THE POSITIVE AND NEGATIVE GROUPS ARE NESTED TOGETHER, AND THEN INSULATED WITH WOOD SEPARATORS AND PERFORATED RUBBER SHEETS. THIS ELEMENT IS PLACED INTO A CELL OF THE BATTERY CONTAINER, AND BATTERY IS REASSEMBLED COMPLETE. ELECTROLYTE IS THEN ADDED BY SATURATING FOR 12 TO 18 HOURS BY THE SOAK PROCESS. THE BATTERY IS THEN PUT ON A CONSTANT CURRENT CHARGE LINE WITH A MAXIMUM OF FOUR AMPERES APPLIED TO IT FOR APPROXIMATELY 96 HOURS. AFTER CHARGING PERIOD CORRECTIONS ARE MADE TO THE ELECTROLYTE ADJUSTING IT TO READ 1.285 SP. GR.

ANTI-ICER MOTOR

1. THE ANTI-ICER MOTOR WILL BE REMOVED, DISASSEMBLED AND INSPECTED. ANY PARTS SHOWING DAMAGE OR DETERIORATION WILL BE REPAIRED OR REPLACED AS NECESSARY. UNIT WILL BE REASSEMBLED, LUBRICATED AND TESTED FOR PROPER FUNCTIONING.

MASTER SWITCH

2. THE MASTER SWITCH WILL BE REMOVED AND DISASSEMBLED. ALL PARTS INCLUDING CONTACT POINTS AND CONNECTIONS WILL BE CLEANED AND INSPECTED, LUBRICATED AND TESTED FOR PROPER FUNCTIONING AT ALL SETTINGS.

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RADIO COMPONENTCOMMUNICATIONS UNIT

1. COMMUNICATIONS UNIT WILL BE REMOVED FROM AIRCRAFT AND BE CLEANED AND INSPECTED FOR LOOSE CONNECTIONS. ALL TUBES WILL BE TESTED AND REPLACED AS NECESSARY. POWER UNIT WILL BE REMOVED, AND BOTH RECEIVING AND TRANSMITTING DYNAMOTORS WILL BE DISASSEMBLED AND INSPECTED. ANY PARTS SHOWING WEAR OR DAMAGE WILL BE REPLACED OR REPAIRED AS NECESSARY. POWER UNIT WILL BE REASSEMBLED, LUBRICATED, AND TESTED FOR PROPER OUTPUT VOLTAGE. PERFORMANCE OF RECEIVER AND TRANSMITTER WILL BOTH BE CHECKED ON ALL CHANNELS ACCORDING TO BENDIX INSTRUCTION MANUAL. NECESSARY REPAIRS OR REPLACEMENTS WILL BE MADE FOR PROPER FUNCTIONING OF UNIT.

RANGE RECEIVER

2. RANGE RECEIVER WILL BE REMOVED FROM AIRCRAFT, AND BE CLEANED AND INSPECTED FOR LOOSE MECHANICAL AND ELECTRICAL CONNECTIONS. ALL TUBES WILL BE TESTED AND REPLACED AS NECESSARY. RECEIVER WILL BE CHECKED FOR PROPER FUNCTIONING ACCORDING TO ES-265. REPAIRS OR REPLACEMENTS WILL BE MADE AS NECESSARY.

MARKER RECEIVER

3. MARKER RECEIVER WILL BE REMOVED FROM AIRCRAFT AND BE CLEANED AND INSPECTED FOR LOOSE ELECTRICAL AND MECHANICAL CONNECTIONS. ALL TUBES WILL BE TESTED AND REPLACED AS NECESSARY. SENSITIVITY WILL BE ADJUSTED SO THAT AN INPUT OF 1200 MICROVOLTS 30% MODULATED AT 3000 CYCLES WILL GIVE AN INDICATOR LAMP VOLTAGE OF 2 VOLTS. RECEIVER WILL BE CHECKED AND ALIGNED ACCORDING TO WESTERN ELECTRIC MAINTENANCE BULLETIN. NECESSARY REPAIRS OR REPLACEMENTS WILL BE MADE FOR PROPER FUNCTIONING OF UNIT.

MARKER INDICATOR

4. MARKER INDICATOR WILL BE REMOVED FROM AIRCRAFT, AND BE CLEANED AND INSPECTED FOR LOOSE ELECTRICAL AND MECHANICAL CONNECTIONS. SWITCHES WILL BE CHECKED FOR PROPER FUNCTIONING, AND ANY PARTS SHOWING WEAR OR DAMAGE WILL BE REPAIRED OR REPLACED AS NECESSARY. UNIT WILL BE GIVEN A COMPLETE OPERATIONAL CHECK IN CONJUNCTION WITH A MARKER RECEIVER.

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OVERHAUL
PAGE - 42ADF (AND AUX.) RECEIVER

5. ADF RECEIVER WILL BE REMOVED FROM AIRCRAFT, AND BE CLEANED AND INSPECTED FOR LOOSE MECHANICAL AND ELECTRICAL CONNECTIONS. ALL TUBES WILL BE TESTED AND REPLACED AS NECESSARY. RECEIVER DYNAMOTOR WILL BE REMOVED FROM CHASSIS, AND BE DISASSEMBLED AND INSPECTED. ANY PARTS SHOWING WEAR OR DAMAGE WILL BE REPAIRED OR REPLACED AS NECESSARY. DYNAMOTOR WILL BE REASSEMBLED, LUBRICATED, AND TESTED FOR PROPER OUTPUT VOLTAGE. PERFORMANCE OF RECEIVER WILL BE CHECKED ACCORDING TO BENDIX INSTRUCTION MANUAL, AND UAL SUPPLEMENTAL INSTRUCTIONS. NECESSARY REPAIRS OR REPLACEMENTS WILL BE MADE FOR PROPER FUNCTIONING OF RECEIVER.

AUTOMATIC LOOP CONTROL UNIT

6. LOOP CONTROL UNIT WILL BE REMOVED FROM AIRCRAFT, AND BE CLEANED AND INSPECTED FOR LOOSE MECHANICAL AND ELECTRICAL CONNECTIONS. ALL TUBES WILL BE TESTED AND REPLACED AS NECESSARY. INVERTER UNIT WILL BE REMOVED FROM CHASSIS AND DISASSEMBLED AND INSPECTED. ANY PARTS SHOWING WEAR OR DAMAGE WILL BE REPLACED OR REPAIRED AS NECESSARY. INVERTER WILL BE REASSEMBLED, LUBRICATED, AND TESTED FOR PROPER OUTPUT VOLTAGE. PERFORMANCE OF LOOP CONTROL UNIT WILL BE CHECKED IN CONJUNCTION WITH MN26N RECEIVER ACCORDING TO BENDIX INSTRUCTION MANUAL AND/OR ES-324. NECESSARY REPAIRS OR REPLACEMENTS WILL BE MADE FOR PROPER FUNCTIONING OF UNIT.

ADF LOOP

7. LOOP WILL BE REMOVED FROM AIRCRAFT, DISASSEMBLED AND INSPECTED. ANY PARTS SHOWING WEAR OR DAMAGE WILL BE REPLACED OR REPAIRED AS NECESSARY. UNIT WILL BE REASSEMBLED, LUBRICATED, AND CHECKED FOR PROPER PERFORMANCE ACCORDING TO BENDIX INSTRUCTION MANUAL AND SUPPLEMENTAL UAL INSTRUCTIONS.

ADF REMOTE CONTROL UNIT

8. ADF REMOTE CONTROL UNIT WILL BE REMOVED FROM AIRCRAFT, CLEANED AND INSPECTED FOR LOOSE ELECTRICAL AND MECHANICAL CONNECTIONS. GEARS WILL BE INSPECTED FOR WEAR OR DAMAGE, AND REPLACED AS NECESSARY. DIAL FACE WILL BE INSPECTED FOR LEGIBILITY OF INSCRIPTIONS, AND DIAL WINDOW CHECKED FOR SCRATCHES. CONTROL UNIT WILL BE CHECKED ON ES-324 TEST PANEL FOR PROPER FUNCTIONING.
9. (UNASSIGNED)
10. (UNASSIGNED)

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ADF BEARING INDICATOR

- ADF BEARING INDICATOR WILL BE REMOVED FROM AIRCRAFT, CHECKED FOR LOOSE ELECTRICAL AND MECHANICAL CONNECTIONS. IT WILL BE CHECKED FOR PROPER FUNCTIONING ACCORDING TO UAL ES-377 - INSTRUCTION BOOK. ANY PARTS SHOWING WEAR OR DAMAGE WILL BE REPLACED OR REPAIRED AS NECESSARY.

ENGINE CHANGE ROUTINE OF INTERPHONE AMP. AND RANGE FILTERS

- AMPLIFIER UNIT WILL BE REMOVED FROM AIRCRAFT, AND BE CLEANED AND INSPECTED FOR LOOSE MECHANICAL AND ELECTRICAL CONNECTIONS. ALL TUBES WILL BE TESTED AND REPLACED AS NECESSARY. RANGE FILTERS WILL BE CHECKED FOR PROPER FUNCTIONING. RELAY CONTACTS WILL BE BURNISHED AND CHECKED FOR PROPER OPERATION. PERFORMANCE OF UNIT WILL BE CHECKED ACCORDING TO ES-295G C.01, AND NECESSARY REPAIRS OR REPLACEMENTS MADE.

RECEIVER DYN/MOTOR

- DYNAMOTOR WILL BE REMOVED FROM AIRCRAFT, AND DISASSEMBLED AND INSPECTED. ANY PARTS SHOWING WEAR OR DAMAGE WILL BE REPLACED OR REPAIRED AS NECESSARY. UNIT WILL BE REASSEMBLED, LUBRICATED, AND TESTED FOR PROPER FUNCTIONING.

MAIN RADIO CONTROL PANEL (UAL ES-295-H-6)

- CONTROL PANEL WILL BE REMOVED FROM AIRCRAFT, CLEANED AND CHECKED FOR LOOSE MECHANICAL AND ELECTRICAL CONNECTIONS. ALL SWITCHES WILL BE CHECKED FOR PROPER FUNCTIONING, AND VOLUME CONTROLS WILL BE EXAMINED TO DETECT FOREIGN MATTER AND TO DETERMINE CONDITION OF RESISTANCE ELEMENTS. ANY PARTS SHOWING WEAR OR DAMAGE WILL BE REPLACED OR REPAIRED AS NECESSARY. UNIT WILL BE GIVEN A COMPLETE OPERATIONAL CHECK.

JACK BOXES (UAL ES-295-H-4)

- JACK BOXES WILL BE REMOVED FROM AIRCRAFT, CLEANED AND CHECKED FOR LOOSE MECHANICAL AND ELECTRICAL CONNECTIONS. SWITCHES WILL BE CHECKED FOR PROPER FUNCTIONING. ANY PARTS SHOWING WEAR OR DAMAGE WILL BE REPLACED OR REPAIRED AS NECESSARY.

CONTROL UNIT (RANGE RECEIVER TUNING)

- CONTROL UNIT WILL BE REMOVED FROM AIRCRAFT, INSPECTED FOR WEAR AND DAMAGE, AND PARTS REPAIRED OR REPLACED AS NECESSARY. DIAL WILL BE INSPECTED FOR LEGIBILITY OF INSCRIPTIONS AND UNIT WILL BE LUBRICATED.

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HEADPHONES

17. HEADPHONES WILL BE DISASSEMBLED AND CHECKED FOR LOOSE CONNECTIONS, FRAYED CARDS, AND LOOSE PLUGS. HEADPHONES WILL BE CHECKED FOR PROPER FUNCTIONING ACCORDING TO ES-337 MAINTENANCE INSTRUCTIONS. ANY PARTS SHOWING WEAR OR DAMAGE WILL BE REPAIRED OR REPLACED.

MICROPHONES

18. MICROPHONES WILL BE REMOVED FROM AIRCRAFT. ANY PARTS SHOWING WEAR OR DAMAGE WILL BE REPLACED. UNIT WILL BE GIVEN AN OPERATIONAL CHECK ON ES-337 MICROPHONE - HEADPHONE TESTER.

19. (UNASSIGNED)

20. (UNASSIGNED)

ANTENNA TRANSFORMER

21. ANTENNA TRANSFORMER WILL BE REMOVED FROM AIRCRAFT, CLEANED AND INSPECTED FOR LOOSE CONNECTIONS. TRANSFORMER WILL BE CHECKED ON "Q" METER TO INSURE PROPER FUNCTIONING, AND TO CHECK FOR LEAKAGE.

ENGINE CHANGE ROUTINE OF AIRCRAFT RADIO SYSTEM INCLUDING
JUNCTION BOXES, ANTENNA SYSTEM, TRANSMISSION LINES, CONDUITS
AND WIRING

22. CONNECTIONS IN ALL JUNCTION BOXES WILL BE INSPECTED, CLEANED AND TIGHTENED AS NECESSARY. ANTENNA SYSTEM WILL BE REMOVED AND INSPECTED, AND ALL INSULATORS CLEANED. WEAK SPRINGS AND FRAYED WIRES WILL BE REPLACED. TRANSMISSION LINES AND CABLES WILL BE CHECKED FOR LEAKAGE. ANY PARTS IN THE AIRCRAFT ELECTRICAL WIRING, AND CONDUIT SYSTEM SHOWING WEAR OR DAMAGE WILL BE REPAIRED OR REPLACED.

EQUIPMENT MOUNTINGS

23. EQUIPMENT MOUNTINGS WILL BE CLEANED AND CHECKED, AND ALL ELECTRICAL AND MECHANICAL CONNECTIONS INSPECTED. ALL EQUIPMENT "CANNON" RECEPTACLES WILL BE CHECKED TO INSURE PROPER ALIGNMENT OF CONTACTS. ANY PARTS SHOWING WEAR OR DAMAGE WILL BE REPAIRED OR REPLACED AS NECESSARY.

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ADMINISTRATION

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THE MAINTENANCE MANUAL

FOREWORD

1. This manual has been prepared with the intention of standardizing inspection, service and maintenance procedure throughout United Air Lines. With this in mind, it has been our endeavor to outline the procedure in a manner which will be easily understood by all mechanics.
2. In addition, each service station is furnished with Maintenance and Service Manuals supplied by the several manufacturers of the flying equipment, engines, propellers and accessories. These manuals are descriptive of certain phases of the equipment and are to be used in familiarizing personnel with the functioning of this equipment.
3. It has been assumed that all mechanics are fully acquainted with the high grade of workmanship required in their particular phase of work. The methods outlined were decided on after careful consideration. Particular emphasis is given to instructions on some points which may appear to be of small importance. However, extreme care has been taken not to stress anything unduly. Where small matters have been given particular attention it is because experience has dictated that these points must be given special care.
4. It is expected that all mechanics will study and follow instructions contained in this book very carefully. Where procedure or methods prescribed by this Maintenance Manual differs from the Service Manuals supplied by the various manufacturers, the Maintenance Manual will govern.
5. In order to keep mechanical personnel informed on the latest developments and service procedures, Maintenance Service Bulletins shall be issued in separate form at frequent intervals to all holders of the Maintenance Manuals. Where information and/or instructions in the Maintenance Manual differ from the Maintenance Service Bulletins those bearing the latest issue date shall govern.
6. Due to the constant improvement, added projects, installation of new devices, etc., it will be necessary to make revisions in this book quite frequently. It is expected that revisions will be read, old pages removed and new pages immediately placed in their proper position in the book so that this manual will always be up-to-date.
7. Manuals are assigned to stations and then reassigned to personnel. Each station is responsible for maintaining a given number of Manuals and they are not to be carried from the stations when personnel are transferred.
8. Any criticisms and suggestions for increasing the scope and usefulness of this manual will be appreciated.

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**CLASSIFICATION OF STATIONS
AND THEIR DUTIES**

1. The following stations will be referred to as "Service Stations":

New York
Cleveland

Chicago
Omaha

Denver
Salt Lake

Seattle
Portland

San Francisco
Burbank

2. Cheyenne will be referred to as the "Repair Base". All other stations will be referred to as "Intermediate Stations".
3. Service Stations are equipped and will have sufficient personnel to properly service and maintain the flying equipment between the engine change checks. They will perform #1, #2 and #3 checks and make any necessary repairs to keep the equipment in an air-worthy condition. They will also clean the inside and outside of the planes and engines, keeping them always in a presentable condition.
4. At time of engine change, the Repair Base will give the plane an "Engine Change Check".
5. Intermediate Stations will only regularly give #1 checks.

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RESPONSIBILITIES AND DUTIES OF SUPERVISORS AND PERSONNEL

1. Division Superintendents of Mechanical Operations are responsible to the Vice Presidents of Operations for: all phases of Mechanical Operation in the Division; Technical supervision of maintenance at all stations; they also act as liaison between the Vice President of Operations and the Superintendent of Maintenance at Chicago.

2. Chief Mechanics

(a) The Chief Mechanic is responsible to the Station Manager for the supervision and handling of the following, in accordance with methods and procedures set up by the Maintenance Department and relayed through the Division Superintendent of Mechanical Operations, or any other work assigned to him by the station manager.

1. Service and repairs to planes and engines.
2. Maintenance of the hangars, station equipment, trucks and tractors.
3. The general appearance of hangars, shops and station equipment.
4. The results of the work of all men under his supervision.

(b) The Chief Mechanic is in charge of all Crew Chiefs, Mechanics, Apprentice Mechanics' Helpers, Utility Men, Plane Cleaners and Hangar Janitors. He is also in charge of the Radio Service Men.

1. He will see that all manuals assigned to his department are kept up to date. That all personnel under his jurisdiction are familiar with all Mechanical Instructions. That they receive and understand new instructions, and that they adhere to all instructions.
2. He will assign one bulletin board at each station which shall be used to post each new issue of any regulation or instruction pertaining to maintenance. Further, a check sheet shall be attached to each issue showing the title or subject of the attachment and all the names of those at the station concerned with the instructions.

(a) Each person so listed must read the attached instructions and signify by initialing opposite his name.

(b) The Chief Mechanic shall, after all names have been initialed, file the check sheet away for a period of one year.

3. He will assign one man to a regular daily inspection of the gasoline and servicing equipment and the oil dispensing equipment.
4. At service stations other than LG, CG, CX, SL, SF, he will assign sufficient qualified radio mechanics to each shift to properly service the plane radio and electrical equipment.
5. He will supply relief for the Crew Chiefs and all hangar employees on their days off, holidays off and annual leaves.

6. He will see that only approved materials are used for cleaning the exteriors of planes, cabin upholstery and windows.
7. He will see that all inspections of the following station equipment as called for in Regulations are taken care of at the proper periods and that the necessary cleaning, servicing, repair and painting is accomplished to the following:
 - (a) Fire Extinguishers.
 - (b) Air Compressors
 - (c) Hangar Heating Plant, Plane Air Conditioners and Plane heating equipment.
 - (d) Hangars, Hangar doors, Floors, Windows and Lavatories.
 - (e) Hangar Lighting equipment and extension cords.
 - (f) Ladders, service stands, tow bars, and all other servicing equipment.
 - (g) Trucks and tractors.
8. He will see that all forms are properly signed. This includes inspection forms, Trip Record Books, etc.

3. Crew Chiefs.

- (a) The Crew Chief is responsible to the Chief Mechanic for the supervision and handling of the following, or any other work assigned to him by the Chief Mechanic.
 1. The completion of unfinished work left by the preceding crew.
 2. Servicing and repairs to planes, engines, radio and electrical equipment during his tour of duty to the end that, when planes are dispatched, all equipment is in satisfactory working condition.
 3. The results obtained by and the activities of his crew.
 4. Knowing all regulations pertaining to his work.
- (b) The Crew Chief's duties will consist of the following:
 1. Properly instructing the men under him to the end that all personnel will do their work according to current instructions.
 2. The proper assigning of his men to quickly and efficiently accomplish the above work.
 3. Seeing that planes are ready for dispatch.
 4. Giving final inspection to the plane after the service is completed and satisfying himself that all service is completed in accordance with our standard regulations; that the cabin is clean and that all items are in order.
 5. Seeing that the exterior of the plane is clean, that the tops of the wings have no marks around the fuel tank filler covers and that there are no greasy handprints on the nacelle cowlings.
 6. Supplying the relieving Crew Chief with all necessary information regarding unfinished work.
 7. Seeing that all forms are properly signed.
 8. Assisting with servicing in addition to this other duties.

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4. Service Mechanics

(a) Service Mechanics, Apprentice Mechanics and Helpers are responsible to their Crew Chief for the proper servicing of the planes, engines, radio and electrical equipment to which they have been assigned or any other work to which they may be assigned. Any work done on airplanes or engines by apprentice mechanics, helpers, helper specialists or utility men will be under the supervision of a licensed mechanic, who is classified as a mechanic and/or lead mechanic by United Air Lines. Work done will be signed for by both the man doing the work and the man supervising the work. This supervisor who signs with the man doing the work will be responsible for all work done by the man or men under him.

1. While it is practically impossible to cover every item or part of the plane in this book, it must be borne in mind that mechanics making inspection will be constantly on the alert for any defective, worn, or failed parts even though they are not mentioned in this book.
2. By a thorough inspection, equipment failures shall be anticipated and prevented rather than cured after they occur.
3. The mechanic will advise his Crew Chief immediately of any condition found which involves it considerable amount of time or labor in order that immediate steps may be taken to make the repair without unnecessary delay.
4. It will also be his duty to watch carefully for inferior workmanship by mechanics at other stations. The standard of workmanship is to be maintained on the highest possible level, and an unworkmanlike job is to be called to the attention of the Crew Chief immediately.
5. All mechanics assigned to radio maintenance at any station must hold at least a Second Class Radio-Telephone license and be qualified by reason of having sufficient technical and practical experience to properly perform the required duties.
6. Radio Maintenance instructions will be issued in the "Maintenance Manual, Radio and Electrical" or in Maintenance Service Bulletins, to those concerned at all stations.

5. Cargo Handlers

The cargo handlers are responsible to their Crew Chief for the proper loading of planes and the care of baggage, express and mail, or any other work they may be assigned to do.

6. Radio Maintenance Foremen

(a) The Radio Maintenance Foremen at LG, CG, SL and SF act in the capacity of Crew Chiefs and are responsible to their respective Chief Mechanic and Crew Chief as follows:

1. For the proper maintenance of the removable plane radio equipment, pilot's headset equipment and the installation, care and proper use of all radio shop equipment.

2. For instructing the radio mechanics assigned to the various crews in the proper maintenance of fixed plane radio and electrical equipment, and to act in an advisory capacity to the Chief Mechanic or Crew Chief in the correction of all reported irregularities or other necessary work on the plane radio and electrical equipment.
 3. For contacting and instructing the flying personnel with respect to the operation of radio equipment.
 4. For preparation of all forms and records relating to radio and electrical equipment required by Division or Operations Headquarters.
 5. To be on the alert to suggest improved methods of servicing and improving radio and electrical equipment.
 6. For assignment of radio mechanics to the various crews by agreement with the Chief Mechanic so that sufficient fully qualified men will be available for each crew to properly service the radio equipment.
 7. Arrangements should be made for the radio mechanics to rotate shifts, so that each man is permitted to spend sufficient time in the shop to keep fully familiar with all phases of the radio maintenance work.
- (b) The Radio Maintenance Foreman, at regular intervals approved by the Division Manager of Operations, is to contact other stations on his Division in order to advise and instruct the Chief Mechanics, Crew Chiefs, and Radio Mechanics at those stations in the proper inspection and servicing of radio and electrical equipment.

7. Plane Cleaners

The Plane Cleaners are responsible to their Crew Chief for the proper cleaning of the planes inside and out; also the care of the upholstery and the interior of the cabin.

8. Hangar Janitors

At stations having hangar janitors, the janitors will be responsible to the Crew Chief for the proper cleaning and general appearance of the hangar floors, windows, walls and lavatories.

NOTE: IT IS THE DUTY OF EVERY MAN ON THE SERVICE CREW TO KEEP A SHARP LOOK-OUT FOR THE APPEARANCE OF THE EQUIPMENT, WHICH IS TO BE MAINTAINED AT THE HIGHEST POSSIBLE STANDARDS.

REPORTS

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FORMS

1. FORM UC-45 - RADIO INSPECTION REPORT

- A. All stations - No UC-45 reports will be made out on #1 checks if reported O.K.
- B. All stations - A single UC-45 will be made out on #2 and #3 checks if reported O.K. for station file.
- C. LG, CG, CX, SL and SF - Six copies of UC-45 will be made out if a radio irregularity is involved, or if a piece of radio equipment is removed from a plane for cause. The shop report listing cause of failure, repairs affected, and/or projects accomplished will be entered on the UC-45, thus affording complete information on one page. One copy will be sent to each R. E. Shop, one copy to Communications, and one copy be retained for their files.
- D. All other service stations shall fill out two (2) copies only when faulty equipment is found or reported. One copy is for the station file. The duplicate copy from stations west of Salt Lake shall be sent to SF. The duplicate copy from Denver and stations east shall be sent to CX.
- E. LG, CG, CX, SL and SF - A single UC-45 will be made out on ignition noise reports for your file.
- F. Service stations including LG, CG, CX, SL and SF shall fill out one (1) copy whenever removable equipment is replaced for any reason other than for complaints or faulty operation. For example - rotation of spares or project work. This copy shall be sent to CX by all stations.
- G. No UC-45s will be necessary when Anti-Static Cartridges are replaced, since the necessary information appears on the tags attached to the unit.
- H. The Crew Chief shall record radio equipment replacements and repairs in the Trip Record Books as follows:
 - 1. Note the numbers of removable plane radio equipment removed and installed in all cases.
 - 2. Note the Trip Record Book showing corrections made in all cases of faulty operation reports when corrections are made without equipment changes.
- I. The Radio Service Mechanic, after making radio inspection, will initial for same on the Form UO-78.
- J. All forms UC-45 will be signed with one initial and the full surname of the mechanic doing the work and the time spent on each repair or test will be entered in the spaces provided.

2. FORM UO-78 - AIRPLANE AND ENGINE INSPECTION REPORT

- A. Form UO-78 - Airplane and Engine Inspection Report, is designed for the specific purpose of recording all regular routine inspections, as well as any other work accomplished on a plane or its engines by any station. It serves as a record of the progress of the work while the plane is at a station, so that each mechanic and supervisor will be fully posted as to the status of the necessary service and other work on any one plane, thereby preventing the possibility of duplication or omission.
- B. Always prepare Form UO-78 in duplicate. The original is to be routed to the Division Superintendent of Mechanical Operations and the duplicate to the station files.
- C. Any station completing a #2 or #3 check shall completely fill out the UO-78 as follows:
1. All notations except initials or signatures shall be printed.
 2. Before servicing is started on a given plane, the trip record book will be examined by the Chief Mechanic, the Crew Chief or person acting in their capacity. Only supervisors are to do this work. Notations for corrections of Pilots' reports and entries made by other stations under "REMARKS" will be made under the "Work to be Done" space on this form, and a circle will be drawn around the required "Check" number. Complete all entries required on the top of the form.
 3. Entries on the Form UO-78 under "Work to be Done" are to be definite instructions. Do not copy pilots' comments such as "Left engine cutting", but rather give definite instructions such as "Replace spark plugs left engine".
 4. Initial all items given inspection or service. Do not initial items not inspected or serviced.
 5. Cleaning must be signed for by cleaner.
 6. The Crew Chief will sign for "Cleanliness Inspected By" assuring that the plane is thoroughly clean inside and outside before dispatch.
 7. The Crew Chief must see that the UO-78 is fully signed before dispatch.
- D. LG, CV, CG, OH, DV, SL, SA, PD, SF and BU must fill out the UO-78 for all through trips as well as for all other checks.
- E. Other stations need not fill out a UO-78 on through trips except when corrections are made to malfunctioning equipment or when a plane lays over at an intermediate station and the plane is given a #1 Check and engine ground test. Initial all items tested, serviced or inspected.

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- F. Whenever a check is completed on a plane, all items listed as requiring attention for that particular check in the Maintenance Manual, Maintenance Service Bulletins or other instructions in effect from Maintenance Dept. must be accomplished and signed for by the initial of the person doing the work.

3. FORM UO-87 - FAILURE REPORT

- A. When the malfunctioning or failure of any part of the radio, plane, engine, or accessories causes a delay, a Form UO-87 is to be completed in accordance with instructions contained in this Manual and in the Station Regulations. These UO-87 reports are used in filling out the Interruption Reports which are required by the CAA, and since these Interruption Reports must be in the hands of the CAA within 10 days, they must be forwarded to Superintendent of Maintenance without delay. Mechanical irregularities resulting in returns after planes have departed from the blocks, or delays after landing and before the plane reaches the block, shall all be covered on these Form UO-87 reports. Always show the number of the plane on which an irregularity occurred, not the number of the plane which was finally dispatched should planes be changed.
- B. If a mechanical delay occurs at an intermediate station where only temporary repairs are made, or where mechanical personnel are sent from a service station to make the repairs, the next service station shall submit a failure report on UO-87 covering the final repairs or adjustments made.
- C. If no delay is caused by the failure of any part of the plane, engines, or accessories, due to being broken, damaged, or worn, or due to their failure to function properly for any reason, no UO-87 report will be required. In such cases, it will only be necessary to fill in properly and attach the green tag to the part in question and to return same to the Repair Base, completely filling out the Maintenance Transcript in the Trip Record Book. All parts involved in delays will carry a notation to that effect on Form UO-83 for the information of the Repair Base. This is necessary as in the case of delays, the Repair Base is required to prepare a Form UO-87 failure report. When completing a Form UO-87 report covering a delay or a failure, the report should include the number of the shipping ticket covering disposal of failed parts. This will enable Cheyenne to readily identify the part involved with the particular failure report.
- D. These instructions are not intended to prevent stations from making out a Form UO-87 report, if in their opinion a more detailed report is warranted, or the nature of the failure is such that a sketch or more lengthy description would be beneficial.
- E. If part name or number is not known or available, a good description should be used when filling out the Failure Reports. A penciled sketch will aid in describing and locating plane parts failures.
- F. To reduce the amount of work involved, it will be satisfactory to submit failure reports made out in longhand, provided the original and all carbon copies are made out neatly and legibly.

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- G. When properly prepared and submitted, the information contained thereon is essential to satisfactory maintenance.
- H. The reports covering mechanical delays and/or failures made out on Form UO-87 shall have copies routed as called for in Station Regulations.

4. PARTS TAGS

Note:

The procedure outlined below for Forms UO-73, UO-73N, UO-83, and UO-93 will govern the filling out and handling of Parts Tags and must be adhered to carefully. These instructions, if properly followed, will eliminate confusion and give the Maintenance Department the information required for keeping records correct as to location and time on assemblies, parts, instruments, radio and accessories involved, and a record of the troubles experienced and repairs and checks made on them.

A. Form UO-73 - Yellow "Serviceable" Tag

1. The serviceable Parts Tag, Form UO-73, will be used to identify serviceable parts. It will be placed on repaired parts which have been inspected and found satisfactory for service, and will be filled out as follows:
 - (a) First line - name of part, part number and serial number.
 - (b) Second line - by whom repaired or inspected, station and the date.
The third line is used primarily by the repair base but shall be filled in by service stations when they make repairs or inspections.
 - (c) Third line - total time on the part or parts of assembly - for example: "Cylinder head - 1450 hours; barrel - new; exhaust valve - 725 hours."
 - (d) The spaces on the front, left end of the tag are used primarily by the Repair Base. One space is used for the work order on which the part is assembled or repaired and the other space is used for the plane, engine, or unit number from which the part was removed. The Stock Department is very interested in having these spaces filled in correctly; otherwise, it will be difficult for them to properly record the units.
 - (e) The back of the yellow tag is used to denote the work done to the unit together with other information covered by explanatory notes. This portion of the tag is usually filled in at the Repair Bases. There can be exceptions to this, such as the overhaul of radio equipment at the various Radio-Electric Shops.
2. The balance of the tag will be filled in as follows by the person making the installation of the part:
 - (a) Fourth line - serial number of the unit which the yellow-tagged unit replaces. It is important that this information is available; otherwise one of the advantages of the tag system, cross-checking, is destroyed.
 - (b) Fifth line - by whom installed, station, and the date.

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(c) Sixth line - Plane number, part number (pilot's name for headphones) etc., on which unit is installed plus the initials of the party authorizing installation.

The yellow tag removed from the serviceable unit must be fastened to the defective unit along with the green or red tag. If the part is installed at a Service Station, it is very important that all tags be returned to the Repair Base in order that a complete record of the equipment can be maintained.

B. Form UO-73N - White "Serviceable" New Tag

For use on new units only. Yellow tag instructions will be followed for "White" tags.

C. Form UO-83 - Green "Repairable" Tag

1. The Repairable Parts Tag, Form UO-83, will be placed on parts removed from service for defects or unsatisfactory operation. The tag will be filled out as follows by the person who removes the part:
 - (a) First line - name of part, part and serial numbers.
 - (b) Second line - by whom removed, station, and the date.
 - (c) Third line - pilot's name or station, plane, unit, etc., from which the part was removed, plus initials of person authorizing removal.
 - (d) Fourth and fifth lines - Engine numbers and/or time-same as for yellow tags.
 - (e) Sixth and seventh lines - explain reason for removal in such a manner that there will be no doubt why part was removed. If more space is needed for explanation, use back of tag. When the part in question is involved in a mechanical delay, note the green tag accordingly.
 - (f) Eighth line - serial number of the part installed. This number is very important for cross-checking purposes.
 - (g) The back of the tag will be filled in as noted by the party receiving the part for overhaul or repair. The "findings on cause of removal" and "general condition" will also be noted by the party making the repair.
 - (h) When the removed part is a test, the word "test" shall be entered following the part name on the first line.

D. Form UO-93 - Red "Condemned" Parts Tag

1. Condemned Parts Tag, UO-93, will be used only on parts which are damaged beyond repair, and it is intended that its use will be confined mainly to the Repair Base where adequate facilities are available to determine whether or not the part should be condemned.
 - (a) This tag is similar to the UO-83 Green Tag and will be filled out accordingly. The blank space on the back side of the card will be used to elaborate more fully on the reason for the part being condemned.

5. FORM UO-106 - TRIP RECORD BOOK

- A. The Trip Record Book should be a complete history of the plane, engine, and other equipment and must be kept up to date at all times. It will be carried on the plane to which it is assigned at all times.
- B. For Trip Record Book entries, concerning requirements for licensing and after repairs, see the Civil Aeronautics Authority Bulletin.
- C. Entries covering non-scheduled landings will be made by the next service station after the station at which the plane is held over. This information will include the points where the non-scheduled landings were made and the amount of gas and oil taken on.
- D. All entries are to be made in printing. Only Flight Officers, Crew Chiefs, Chief Mechanics, or those acting as such shall post these records.
- E. Engine times shall be verified over the previous two sheets.
- F. Correct the total engine times from the weekly engine times report.
- G. During each #2 or #3 check go back through the sheets to the last #2 or #3 check and see that all irregularities noted have been corrected and initialed.
- H. Pilots shall calculate flight and engine times on the front side of the sheet. These shall be rechecked by the man filling out the trip record book.
- I. When posting replacements, do not state "replace account pilot's report" because this indicates that the pilot's report was not verified, and in many cases it is possible to change the unit that is reported and not correct the cause of the trouble. To illustrate: An auxiliary horizon is reported sluggish. Do not replace the unit and say "account report". Trouble-shoot the vacuum system. See that the suction is correct--that there are no collapsed hoses or leaks, and that the installation is OK. If nothing is found wrong, then replace the horizon and enter in the Trip Record Book a report of all work done.
- J. When the pilot reports the equipment faulty in any respect whatever, it will be the duty of the Chief Mechanic or Crew Chief to make assignments which will correct the fault. When the correction has been completed, it will be his duty to see that a notation is made to that effect in the Trip Record Book under "Replacements, Repairs and Adjustments". If the work required cannot be accomplished at his station, he will note that fact for the information of the next station under "Remarks". Under no circumstances will a plane, reported as requiring attention, be permitted to depart without notation having been made in the Trip Record Book.
- K. Never use the term "report noted" in the Trip Record Book. A plane is either OK for flight, or it is not OK for flight. Many times a reported piece of equipment does not render the plane unairworthy. In these cases, at intermediate stations and on through trips, the reported piece of equipment must be inspected and a decision made if the plane is OK to continue the trip. If so, note the Trip Record Book "OK to continue trip", and advise the Captain. The station at the termination

of the trip shall be responsible for correcting the cause of such reports and to note the Trip Record Book accordingly. If an inspection shows nothing is wrong, then indicate such as being the case.

- L. Both sheets will contain the same information. Pilots' flight report and gas and oil entries are recorded on the front of the sheets. The white sheet is used as the original, and the yellow sheet is used as the carbon copy. The yellow sheet should remain attached until all entries are completed on the Maintenance Transcript; by reversing the carbon paper, the yellow sheet may be used as the original when recording maintenance information.

- M. When all pages in a Trip Record Book have been filled, all but those covering the last 100 hours should be replaced and forwarded to the Repair Base immediately.

- N. Service Stations will make the following entries and will be responsible for the forwarding of the yellow sheet to the General Office, Chicago, Attn. Supt. of Maint. least twice in each 24 hour period. These sheets shall not be allowed to accumulate at stations.

1. Quantity of gas and oil with which the plane is serviced, in spaces provided on front of the page.
2. Completing all time entries on front of sheet and on master sheet.

- O. Intermediate Stations will enter:

1. Quantity of gasoline and oil with which the plane is serviced, in spaces provided on front of the page.
2. Any repairs made which are not of a routine nature (back of both sheets). The name of the station making the entries should be included on the same line as the notation.
3. If plane is held at intermediate station, entries as noted for Service Station will be made.

- P. Chief Mechanics or Crew Chiefs at Service Stations will be responsible for the following:

1. Inserting name of station, date, and plane number at top of reverse side of both sheets.
2. Recording in the proper columns a record of all replacements, repairs, and adjustments to the plane, engines, and equipment (including radio equipment) which is not of a routine nature. All information should be written in column form whenever possible. The column headed "Name of Part" shall show part removed or serviced. The nomenclature to be used for various accessories, engine and plane parts should be exactly as is indicated in the Spare Parts Assignment Book. The column headed "Location" should be used to denote left, right, front, rear, inner, outer, cylinder number, the system of which the part in question is a unit, etc. The serial number of the units removed and installed should always be inserted if there is a serial number. The

reason for replacement, repair or adjustment, and work done should be written as clearly and in as few words as possible. It is not sufficient to state merely what the work consisted of; there should be included also the reason why the work done was necessary. If the part removed is a test, the word "test" shall be entered following reason for removal.

3. Indicate type of check by circling the proper number, and if completed. If inspections are not completed, this fact should be noted under "Remarks", and any items to be accomplished by the next service station listed. Number 1, 2, or 3 Checks are the only terms to be used in the Trip Record Book. No other expression should be used.
4. In the case of engine change, the word "Removed" should be written over the last entry of "Present total" of the engine removed. The front of the next sheet should be voided, and the time since overhaul of the engine installed should be inserted under "Present Total" and the engine number changed on the master sheet in the back of the book.
5. When an engine is replaced on the line for cause, the newly installed engine shall automatically fall in line with the checks on the balance of the airplane. This will eliminate having one type of check done on one engine and another type of check done on the other engine.
6. The Master Check Sheet will be a pink sheet placed in the back of each Trip Record Book. This form shall be used for recording the times since overhaul at each #2 and #3 Check. The time since overhaul of the engine with the highest time shall be recorded in the proper column at each #2 and #3 check without fail.
7. The Accounting Department at Chicago will furnish to all service stations a weekly report listing correct times-since-overhaul of all engines in service. It will be a standard procedure and a regular part of every #2 and #3 check for stations to compare the time-since-overhaul figures in the Trip Record Book with this weekly report, and to make any corrections necessary in the "Time" entries.
8. Show in spaces provided, the quarts of oil drained at each #3 check.

6. FORM UO-183 - STEWARDESS DETAIL AND CABIN REPORT

This form has an upper and lower portion. Stewardesses will remove the lower portion of Form UO-183 and place in the front of the Log Book at the termination of her trip. The Crew Chief should remove this lower portion of UO-183 from Trip Record Book and attach it to the Form UO-78 Airplane and Engine Inspection Report. Any necessary repairs listed on Form UO-183 must receive the same attention as any other report on irregularities. The record of the correction will be carried forward into the Trip Record Book the same as any other work accomplished on the airplane.

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7. FORM UO-205 - ENGINE CHANGE AIRPLANE AND ENGINE INSPECTION REPORT

This form will be used when making engine changes, and will be used and distributed in the same manner as specified for the Form UO-78.

8. FORM UC-406 - AIRCRAFT RADIO LOG BOOKS

This book is to be carried in the removable radio equipment, and entries will be made by the Aircraft Radio Maintenance Departments whenever any work is done on the equipment.

9. REPORTS - BIRD STRIKES

"Bird Strike Report" forms are carried in the back of each airplane log book.

These "Bird Strike Reports" shall be filled out and sent in by flying personnel whenever they strike a bird during flight or while taxiing.

CG, CX and SF shall see that three of these forms are kept in the back of each log book, replacing them as necessary.

These reports do not replace the UO-87's which are to be submitted whenever planes are damaged by bird strikes.

10. CAA REPAIR AND ALTERATION FORM 337

When preparing Repair and Alteration Form 337 (ACA 18-1) in accordance with CAR 18 covering repairs made to our planes, three copies approved by the local inspector should be submitted to the Supt. Maintenance at Chicago together with the Form UO-87 to cover.

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STATION SPARE PARTS ASSIGNMENT BOOK.

PREFACE

1. A copy of the Station Parts Assignment Book as been issued to all Station Managers and to Department Heads concerned.
2. It will be the responsibility of the holders of the Station Spare Parts Assignment Book to see that their book or books are kept in good order and that all revisions issued are properly posted therein.
3. The quantities of parts assigned as shown in the book are intended to represent the "MAXIMUM" number of items to be stocked by stations and station stocks should at no time exceed the quantities assigned.
4. Stations should endeavor to keep their stock as nearly in line with the spare parts assignment list as possible. Requisitions for parts listed on the spare parts list, providing the quantity of parts requisitioned is in line with the limitations of the assignment, may be sent direct to Cheyenne Stores for filling. Requisitions for parts not shown on the spare parts list must be handled through channels for approval.
5. The spare parts assignment list serves as an authorization to stations and to Cheyenne stores for the requisitioning and the supply of certain parts in the quantities listed, without the necessary authority through channels. Any deviations from the spare parts assignment list, whether it be an increase in parts, addition of parts, etc., must be covered by special authority from the Superintendent of Maintenance.
6. Where available, part numbers are listed in the spare parts book. In order to expedite the handling of requisitions, the part names and part numbers furnished in the assignment book are to be used on all requisitions and in all cases. In addition, the parts classification as listed in the spare parts book must also be recorded on all requisitions in the columns provided.
7. Stations should keep an accurate check on their stock and their assignment so that whenever their requirements warrant an increase or a decrease in spare parts, recommendations to cover should be made to their respective Vice President - Operations. The chief function of the spare parts assignment set up is to maintain an adequate stock of parts at stations so that planes will not be unduly kept out of service awaiting parts. To this end, it is our desire to keep spare parts so distributed that our unserviceable plane days will be kept at an absolute minimum with a minimum parts distribution over the system.
8. In requesting parts recorded in this assignment list via telegraph, or teletype, the code furnished with each part listed is to be used in all such messages. In order to aid in keeping these messages to a minimum number of words, the code used will be a letter code to designate the page number on which the part desired is recorded, followed by a dash, with the next code listing the item number. To prevent the possibility of the receiver of the message or correspondence identifying the code with the wrong part due to error in transmission of the message or in recording the wrong code

in correspondence, the part "Noun" must be used in all cases immediately following the code, such as:

AA-OE - Engine

AE-DE - Magneto

DO-CE - Gasket

FD-CO - Bungee

In addition, whenever it becomes necessary to request parts via telegraph, or teletype, stations must indicate in their message the serial number of the unit to be replaced.

9. (Unassigned)
10. (Unassigned)
11. Replacement parts will not be requested via radio.
12. When requesting parts immediately needed to complete repairs to a plane which is or may be out of service until received, the information, "Plane # _____" "out of service" should be included in the request in order that the shipment may be given preferred handling.
13. If it is found necessary to make a second request for a part via teletype or telegraph, be sure to indicate the fact that a previous request for the part has been made, stating complete reference with regard to the original request.

This information is necessary in order to eliminate duplication of shipments and so that Stores may have a means of identifying the fact that parts received by shipping ticket were previously requested by special message.
14. In order to avoid duplication of shipments, a notation shall be put on shipping tickets when parts are returned to Cheyenne, stating whether replacement was ordered by telegraph and whether received, or whether it is to be made by copy of that shipping ticket.
15. Replacement parts which are necessary to avoid the possibility of planes being held out of service may be moved to and from the repair base or wherever needed even if it is necessary to displace non-priority passengers or non-priority express. (If possible, priorities should be obtained for replacement parts necessary to return planes actually out of service). In general, if the shipment is the equivalent of the weight of a passenger, it should displace a passenger and if less it should displace non-priority express.
 - (a) When passenger and cargo loads exceed the authorized payload for any flight the following order of removal should be observed:
 1. Company material not of an emergency nature.
 2. Contingent pass passengers.
 3. Non-priority subject load passengers travelling solely on speculation basis.
 4. Half fare passengers.
 5. Non-contingent pass passengers.
 6. Non-priority passengers and/or non-priority express.

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7. Emergency plane or engine replacement parts. (This includes all parts shown on the following list or any other parts needed to return a plane to service when it is actually out of service waiting for replacement parts).

(b) Parts that will regularly be shipped as Emergency Replacement Parts:

Static Cartridges	Starters
Propeller Governors	All Instruments
Cylinders (Engine)	All Radio Equipment
Auto Mixture Controls (Aneroid)	Oxygen Cylinders
Dual Generator Control Units	Brake Assemblies
Generators	Fire Extinguishers
Vacuum pumps	Oil Radiators
Hydraulic Pumps	Boilers
Spark Plugs and Insulators	Fisher Regulators
Carburetors	Ring Cowl Flap Control Valves
Ignition Looms	Wheels
Magnetos	Tubes
Fuel Pumps	

- (c) Red "Emergency Replacement Parts" labels are to be placed on all Emergency-Replacement shipments. Do not use these tags for any other purpose.
- (d) These red labels shall be removed or completely obliterated from all shipping boxes as soon as they arrive at their destinations to eliminate any possibility of their being used for regular Company shipments.
- (e) Because emergency replacement parts shipments can replace non-priority passengers and/or non-priority express as covered above, it is extremely important that stations take every possible precaution to see that only those parts listed and/or parts needed for repairs to a plane actually out of service, are shipped in this manner.

"SURPLUS" AND "OBSOLETE" EQUIPMENT

16. Stations should make every effort to conform to the limitations on parts and equipment as set up in the Spare Parts Book. Whenever servicing equipment or any other station equipment becomes "surplus", stations will immediately so advise their respective Vice President - Operations, who in turn will furnish this information to the Maintenance Department at Chicago General Office for record. Equipment transfers, when authorized by the Vice President - Operations, will likewise be covered by advice to the Maintenance Department at General Office.
17. Whenever equipment becomes "Obsolete", this fact is to be immediately brought to the attention of the Vice President - Operations, who in turn will transmit the advice to the Maintenance Department at Chicago General Office. If there is no other need for the equipment, same will be released for resale purposes.
18. See Spare Parts Assignment Book for additional information on handling of spare parts.

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CARE OF PLANES AND ENGINES

GENERAL

1. The procedure outlined in this Manual will govern the general handling, inspections, servicing and maintenance of all planes and engines.
2. Additional instructions covering special subjects pertaining to the maintenance of aircraft and related equipment are developed from time to time and are effective only when issued through the office of the Superintendent of Maintenance or by respective Superintendents of Mechanical Operations.
3. PERIODIC INSPECTION AND OVERHAUL - FREQUENCY

Equipment Types	Overhaul	#1 Check After	#2 Check	#3 Check
Douglas DC-3 Commercial	725 hours	Each Trip	50 Hours	125 Hours
Boeing 247 - Commercial	700 "	"	40 "	100 "
Douglas - C-47 or C53 Military.	725 "	"	50 "	100 "
Douglas - C-49 Military	700 "	"	50 "	100 "
Boeing - C-73 Military.	700 "	"	40 "	100 "
Curtiss-Wright - C-46 Military.	600 "	"	50 "	100 "
Stinson	300 "	"	25 "	100 "
Waco.	313 "	"	25 "	100 "

It shall be the responsibility of the Chicago and San Francisco Dispatch offices to see that all aircraft are routed for the necessary checks and engine changes before the time limits shown are reached. The time limits for commercial aircraft will not be exceeded under any circumstances, even if it is necessary to delay or cancel a trip to complete the check or overhaul due.
4. A plane will not be dispatched with a partly completed "Check" unless it is needed for immediate service due to equipment shortage, and in no case where the entire check will not have been accomplished before expiration of the check times given above.
5. It is the duty of Chief Mechanics and Crew Chiefs to see that arrangements are made to complete the necessary Check or overhaul so that planes will not run "out of time" at a point where it is impracticable to complete the "Check" or overhaul.
6. For our purposes "Check", "Inspect" and "Test" are defined as follows:
 - (a) Check and inspect: To look upon, to view closely and critically, to scrutinize, to determine the accuracy and efficiency of, to compare with, to know standards, all to the end that our equipment will not be used unless it is in the best of condition.
 - (b) Test: To put to the test or proof, to examine or try, a procedure used to determine that any particular part or thing meets known standards. Subjection to the conditions that show the real character of a part or thing in any certain particular.
7. No. Subject Assigned.
8. Handling
 - A. Taxiing
 - (1) Qualifications of Operators

- (a) No ground personnel other than certificated A and E mechanics who have demonstrated their ability and have been approved by the Chief Mechanic or Station Manager will be permitted to taxi an airplane.
- (b) When planes are to be moved at fields where contacts with radio towers are necessary for taxi clearance, operator must have at least a third-class radiophone operator's permit.
- (c) A list of personnel so approved must be kept up-to-date and posted on the Mechanic's Bulletin Board at all times.
- (d) It will be the responsibility of the Chief Mechanic to periodically test the ability of mechanics to safely taxi our airplanes.

(2) When planes may or may not be taxied.

Planes will not be taxied by ground personnel when a tail or cross wind with wind velocity exceeding 25 miles per hour exists.

(3) Procedure for Taxiing

- (a) Prior to starting engines, the following precautionary measures must be taken:

1. Landing Gear pins installed and safetied.
2. Wheel blocks in place.
3. Battery cart connected.
4. All doors closed.
5. Attendant with fire extinguisher at engine being started.
6. Personnel and equipment clear.
7. Wing and Empennage covers securely fastened when in use.
8. Turn engines over at least two complete revolutions in direction of rotation if they have been standing one-half hour in freezing temperature or one hour in above freezing temperatures. (Caution: Be sure switches are off).

- (b) After Starting Engines:

1. Remove battery cart.
2. Warm engines sufficiently to prevent dying after taxiing has started.
3. Navigation lights on at night.
4. Hydraulic pressure 500 lbs. minimum for Douglas.

- (c) Prior to and during taxiing complete in following order:

1. Planes shall not be taxied in close quarters unless absolutely necessary, and then an employee will be stationed at each wing tip to assist in maneuvering the plane by the use of the approved hand signals.
2. The speed of an airplane while taxiing shall at all times be reasonable, taking into account the field conditions as well as obstructions in the vicinity.

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3. Do not drag brakes - operate throttles smoothly and slowly.
4. Use caution when operating throttles to prevent blasting of passengers, spectators or other airplanes.
5. Do not start taxi roll without radio clearance when tower contacts are required.
6. After clearance from tower is received, obtain signal from attendant to proceed.
7. The operator must be alert at all times for field traffic or obstructions.
8. While taxiing under control of radio tower, head phones must be worn and radio turned to tower frequency. Head phones as furnished with headbands shall be used. Phones with close-coupled jack plugs without headbands shall not be used.
9. Planes shall not be pivoted on one wheel with a locked brake.
10. When plane has come to rest, follow instructions as given under "Parking".

B. TOWING

(1) Qualified Operators

- (a) Only those who have demonstrated their ability, and have been approved by the Station Manager and/or Chief Mechanic shall be permitted to tow airplanes and/or operate airplane brakes when being towed.
- (b) A list of men so approved shall be kept up to date and at all times available on the Mechanics' Bulletin Board.

(2) General

- (a) The man on the tractor towing the airplane shall be responsible for the safety of that entire operation.
- (b) When towing in close quarters, the man on the tractor shall have two assistants, one at each wing tip. These men are to assist him with the approved hand signals. They are at all time responsible to the man on the tractor, and shall position themselves so as to be always visible to him.
- (c) It must be understood that airplanes are not designed to withstand undue stress or strain while being towed. This is especially true when tail tow bar is used.
- (d) Before moving operation is actually started, the man on the tractor must definitely determine that all equipment and personnel are clear.
- (e) Navigation lights must be on during darkness.
- (f) Planes must not be pushed by hand unless absolutely necessary. If such occasion does arise, do not push on trailing edge of wings, elevators or tail cones.

(3) When towing by tail

- (a) Only approved type towing bars in good condition shall be used.
- (b) This bar shall be properly installed and the tail wheel unlocked so that the tail wheel assembly will swing freely.
- (c) The wheel blocks shall not be removed until the tractor is securely attached to the airplane.
- (d) The man on the tractor shall not proceed at speeds which would make it impossible for him to stop quickly without subjecting the airplane to undue stress.
- (e) The airplane shall not be pulled or pushed by the tail through deep snow or mud, or up an incline greater than 15 to 1.

(4) When towing by landing gear

- (a) Whenever it is necessary to move planes through deep snow, soft ground, or up an incline greater than 15 to 1, it shall be done by pulling on the main landing gear. The approved towing bridle (#3U-173) shall be used, attaching one end to each of the landing gear axles.
- (b) When moving planes BACKWARDS under the above conditions, sufficient extra rope shall be used with the approved bridle to have the tractor clear the plane. When towed in this manner, a tow bar or steering bar will be attached to the tail wheel to help control the airplane.
- (c) A qualified employee will be in the cockpit at all times during this operation to use the brakes as necessary to prevent the plane from running up on the tractor.
- (d) Sufficient hydraulic pressure (500 lbs.) must register on pressure gauge prior to and during towing operation.

C. STORING PLANES

- (1) Any plane shall be considered to be stored when it is positioned in a hangar or loading shed.
- (2) Company owned planes shall be stored as soon as possible at the termination of a trip.
- (3) Planes shall not be tied down outside at any station when there is room for storage.
- (4) Planes shall not be tied down outside to allow storage space for planes not owned by UAL.
- (5) Stored planes must be so positioned that the planes or equipment will not be damaged in case of a landing gear tire and/or Oleo failure.
 - (a) Stored planes shall be blocked with sufficient wheel blocks to prevent them from moving due to uneven floors or wind conditions.
- (6) Stored planes which are to be raised on jacks must be positioned to allow the removal of other planes as quickly as possible should it become necessary.

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- (a) Visitors shall not be allowed in planes which are raised off the floor in any manner.
- (b) As soon as a plane has been raised, the jacks must be safetied so that they will not run down. On the Altos jack, use the safety attachment on the extension cylinder. On the Duff Norton jack, secure the handle to the jack tripod with the pawl in the same position as when raising plane.
- (7) Planes or any other equipment must not be serviced with gasoline when stored. (Loading sheds excepted).
 - (a) Plane fuel tank sumps or fuel strainers must not be drained while plane is stored.
 - (b) Plane fuel dump chute mechanisms shall not be tested while plane is stored. This must be done outside.
- (8) All stored planes must be grounded by use of the Appleton grounding plug and cable immediately after being stored.
 - (a) All grounding cables must be tested weekly for continuity of circuit and for condition.
- (9) When stored planes are not actually being worked on, cabin and cargo doors must remain locked.
 - (a) Under no circumstances shall stored planes be left unattended with cabin or cargo compartment doors unlocked.
- (10) Plane batteries shall be disconnected at all times when lights or the electrical power is not needed.
- (11) When it is necessary to store or park planes with passengers aboard, the following procedure must be strictly adhered to:
 - (a) A plane stored with passengers aboard must be positioned near the door with equipment and other planes clear so that a quick removal of the plane may be made.
 - (b) A responsible UAL employee will be stationed as a fire guard and will not leave airplane unattended at any time without relief.
 - (c) Air conditioners shall not be used on planes in hangars or loading sheds.
 - (d) If passengers are to remain aboard and it is desired to use the air conditioner, the plane shall be tied down outside and a fire guard posted before attaching air conditioner. The fire guard shall have a 50 lb. CO₂ bottle or its equivalent stationed alongside the truck.
- (12) When planes not owned by UAL are stored, they must be handled in a similar manner to UAL planes, and in addition, shall be handled in accordance with the chapter on Sales in Station Regulations.

D. PARKING

Any plane will be considered parked when it is positioned at loading gates, on ramps or hangar aprons and is not tied down.

- (1) Ground plane with Appleton grounding plug and cable or equivalent whenever planes are being gassed or when gas is being removed. Ground plane to ground and truck to ground.
- (2) Insert landing gear safety pins on Douglas planes.

Exception: On through service stops of brief duration, when at least one flight officer remains in the cockpit, landing gear safety pins need not be inserted.

- (3) Planes shall only be parked for short periods of time prior to dispatch, storing or tie down.
- (4) Planes shall only be parked in approved parking areas.
- (5) Parked planes shall be spotted so that there will be no damage to the plane or other equipment in the event of landing gear tire and/or Oleo failure.
- (6) Parking brakes must be on.
- (7) Block main landing gear wheels fore and aft.

Exception: On through service stops when weather, traffic and field conditions are such that no hazard is involved, it will be permissible to set the brakes and block only the right main landing wheel, in front. Responsibility for determining such conditions shall rest with the man in charge of the loading ramp. The right wheel must be blocked at all times.

- (8) On airplanes using external control surface blocks, the rudder block shall be installed as soon as the airplane comes to rest and it shall remain on until the plane departs. Planes using internal control locking devices shall have these applied as soon as the airplane comes to rest and they shall remain on until the plane departs.
- (9) When winds of 20 miles per hour or more are present or expected, all control surface blocks shall be installed.
- (10) When winds of 35 miles per hour or higher are present or expected all control surface blocks shall be installed at the end of the landing roll and shall not be removed until the airplane is lined up at the end of the runway just prior to departure, where a mechanic will remove the blocks, notify the pilot that the blocks have been removed and signal the pilot to proceed.
- (11) When planes are parked during darkness they must be floodlighted. If floodlights are not effective because of weather conditions, the navigation lights must be on.
- (12) Cargo compartment doors and cabin door must be locked unless a responsible attendant is at the plane.

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- (13) Windows and ventilators must be closed during adverse weather conditions.
- (14) The heating system shall be serviced in accordance with instructions in this Manual.
- (15) Parked planes shall not be left out of sight of company personnel.

(E) TIE-DOWN

Airplanes shall be tied down whenever winds higher than 35 miles per hour are present or expected and where it is not possible or practical to store them. Where possible they shall be tied down headed into the wind.

- (1) It will be the responsibility of the Station Manager or Chief Mechanic to see that tie-down facilities as covered in tie-down diagrams of this Manual are always available and of sufficient number to cover any emergency which might arise.
 - (a) The stationary tie-down rings must be installed only in approved areas.
 - (b) This equipment must always be kept in serviceable condition for immediate use.
 - (c) Tie-down ropes shall not be used for anything but the actual tie-down of planes.
- (2) It shall be the responsibility of the Station Manager, Chief Mechanic or person in charge to see that planes are tied down in accordance with instructions following:
 - (a) When storage space is not available, and planes are to be left outside for any indefinite length of time or during any adverse weather conditions, they must be tied down.
 - (b) Landing gear pins must be in place and safetied on Douglas planes.
 - (c) Parking brakes must be on.
 - (d) Wheel blocks must be placed fore and aft of all wheels.
 - (e) Planes tied down during darkness must be floodlighted. If floodlights are not effective because of weather conditions, the navigation lights must be on.
 - (1) Plane batteries must not be allowed to go dead. Change them when necessary.
 - (g) All doors must be locked.
 - (h) Cockpit windows and all ventilators must be closed.
 - (i) All control surface blocks must be installed.
 - (j) Plane must be tied to the stationary tie-down rings as shown in the diagrams following this chapter.
 - (k) Wing and empennage covers where available must be installed prior to snow or ice.

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- (l) Service heating system in accordance with instructions in this manual.
- (m) Planes tied down shall not be left out of sight of company personnel.

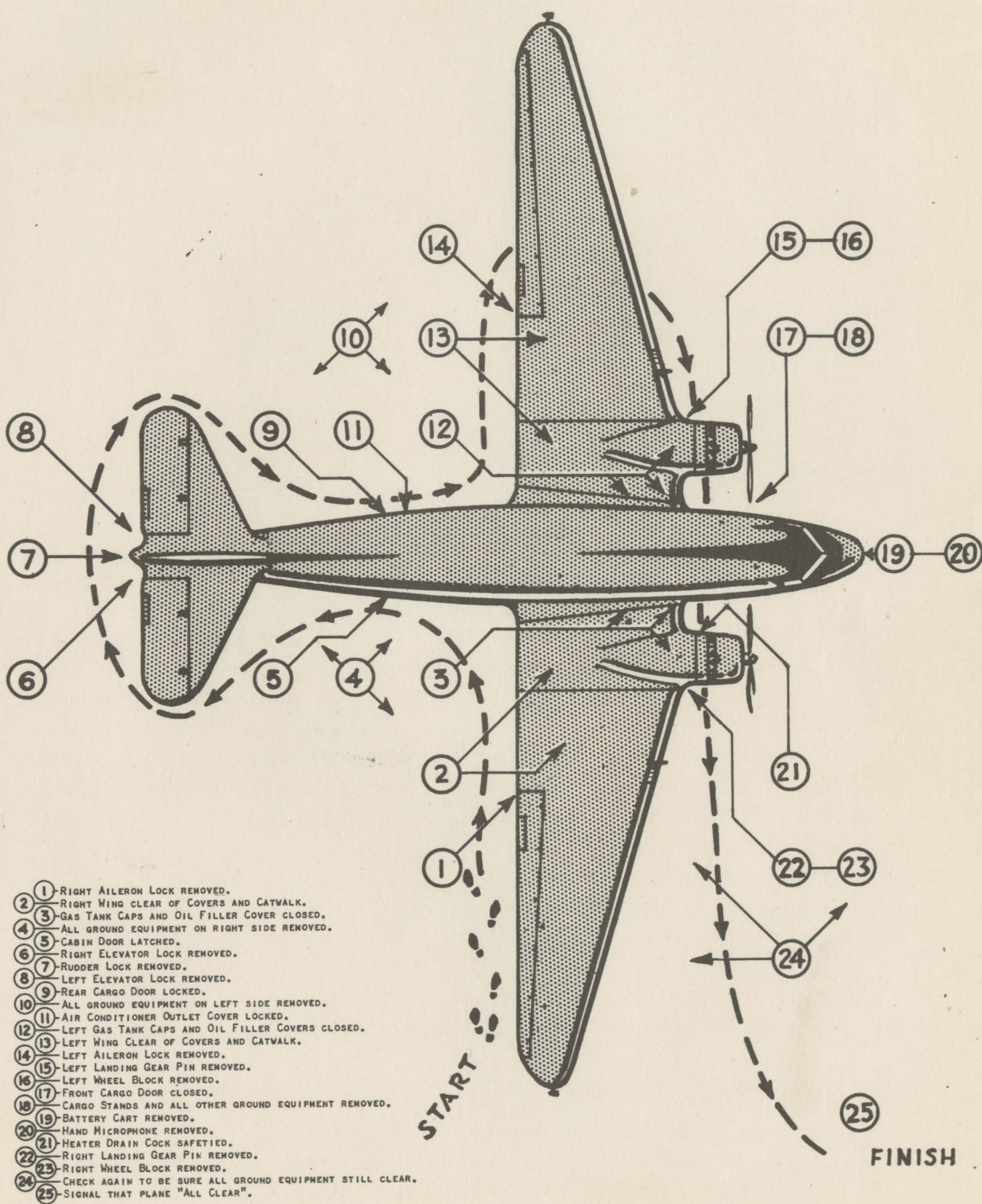
F. BEFORE ANY FLIGHT

- (1) It will be the responsibility of the man in charge of the airplane while on the ground to see that the following is completed prior to any flight.
 - (a) UO-78 Inspection Form must have been completed and initialed for. (See Chapter on Reports)
 - (b) The airplane must be properly serviced with the correct amount of gas and oil as requested by the Dispatcher. This shall be a written or printed request signed by the Dispatcher on duty.
 - (c) The Trip Record Book shall be completely filled out. Any remarks having been made by pilots on previous trips shall have been corrected or noted as OK for continuation of flight.
 - (d) The Trip Record Book shall be in the airplane.
 - (e) Engines shall have been warmed up within a half hour of dispatch.
 - (f) It shall be the responsibility of the man in charge at the loading ramp to see that all passengers and cargo are aboard.
 - (g) Whenever they are available, battery carts shall be used for starting engines. The outside hand sets shall be used for giving engine starting instructions whenever the battery cart is used, and at any other time it is possible to do so. This is necessary as mechanics may assist Captains to start engines when they are over or under primed, and give to the man starting engines other information such as exhaust stack fires, last minute changes, etc.
- (2) Just before the plane is given clearance to proceed, the man in charge of the immediate crew must circle the plane to make certain that all items listed on the following chart are completed as shown.
 - (1) When using the outside hand set for engine starting instructions from ground personnel to Captains, Ground Personnel will definitely call the Captain by name and specify the trip number of the plane which is to start its engines. Example: "Ground to (Name of Captain), Trip 2-OK to start left engine", (or "right engine", or "both engines").

Before battery cart plugs are pulled, the man on the ground by use of the interphone shall request the pilot to change to the plane battery.
Example: (change to plane battery).

(3) Procedure for dispatch at the end of the runway.

- (a) Whenever conditions exist whereby snow, ice or frost might adhere to any part of the airplane, the wing and empennage covers, where provided, shall not be removed until the airplane is at the head of the take-off runway.



- ① Right Aileron Lock removed.
- ② Right Wing clear of covers and catwalk.
- ③ Gas tank caps and oil filler cover closed.
- ④ All ground equipment on right side removed.
- ⑤ Cabin door latched.
- ⑥ Right elevator lock removed.
- ⑦ Rudder lock removed.
- ⑧ Left elevator lock removed.
- ⑨ Rear cargo door locked.
- ⑩ All ground equipment on left side removed.
- ⑪ Air conditioner outlet cover locked.
- ⑫ Left gas tank caps and oil filler covers closed.
- ⑬ Left wing clear of covers and catwalk.
- ⑭ Left aileron lock removed.
- ⑮ Left landing gear pin removed.
- ⑯ Left wheel block removed.
- ⑰ Front cargo door closed.
- ⑱ Cargo stands and all other ground equipment removed.
- ⑲ Battery cart removed.
- ⑳ Hand microphone removed.
- ㉑ Heater drain cock safetied.
- ㉒ Right landing gear pin removed.
- ㉓ Right wheel block removed.
- ㉔ Check again to be sure all ground equipment still clear.
- ㉕ Signal that plane "All Clear".

ISS 95827

BEFORE DEPARTURE CHECK CHART

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(The following complies with CAR and includes certain UAL requirements, not required by CAR).		
<div> <div> One airspeed indicator One sensitive altimeter *Tachometer for each engine Oil pressure gauge for each engine Oil temperature gauge for each engine *Manifold pressure gauge available for each engine *Fuel quantity gauge One safety belt for each person aboard Two portable fire extinguishers Landing gear position indicator or equivalent facility *Device for measuring quantity of oil in tanks First aid kit Trip record book Magnetic compass *Electrically heated pitot tube for each airspeed indicator Fixed fire extinguisher gas available for each engine *Safety belt sign #RADIO EQUIPMENT: Transmitter for two-way communication Receiver for two-way communication Radio range receiver *Set of spare fuses *Rate of climb indicator Storage batteries as the plane requires One Frieze flight analyzer Navigation lights (wings and at least a continuous white tail light) Two electric landing lights Two landing flares *Instrument lights *Cabin Lights Generator One additional airspeed indicator Turn and bank indicator Artificial horizon Directional gyro One additional sensitive altimeter Free air thermometer Clock with sweep second hand Vacuum gauge in line to instruments **RADIO EQUIPMENT: All of the radio equipment, comprising the UAL standard installation and the Dual Generator System must be in working order. A few small exceptions are noted in the footnotes. Planes equipped with two generators shall not be dispatched with one generator inoperative for instrument or over the top operation. Carburetor air temperature indicator for each engine. </div> </div>	<div> <div> Contact Day Flights Contact Night Flights Instrument (Day or Night) and Over Top Flights </div> </div>	
<div> <div> *Aircraft may be dispatched or proceed to terminate at the first point where repair facilities are available with any one of the above instruments or units of equipment marked by an asterisk (*) not in serviceable condition, provided contact flight (day or night) can be made in accordance with company regulations applicable. #Aircraft may be dispatched or proceed to terminate at the first point where repair facilities are available with any two items of radio equipment in serviceable condition, provided contact flight (day or night) can be made in accordance with company regulations applicable. **Douglas Installation (1) It is necessary that the Automatic Direction Finder work only in the Range Band. (2) Either or both audio channels in the interphone amplifier may fail and the plane be dispatched by throwing the jack box switch to the "Lo" position. (3) Static Discharge System may be inoperative. (4) In the 508A unit only the frequencies of the division into which the plane is being dispatched need be operating. </div> </div>		
<div> <div> AIRCRAFT INSTRUMENTS AND EQUIPMENT REQUIRED FOR DISPATCH </div> </div>		

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(b) It will be the responsibility of the man in charge of that immediate crew to see that the following regulations are strictly followed:

- (1) No airplane shall be dispatched with any ice or snow adhering to any of its surfaces.
- (2) No airplane shall be dispatched with frost on wings, empennage or control surface.
- (3) No airplanes shall be dispatched with any ice adhering to propeller blades.
- (4) No airplane shall be dispatched until the control surface operation has been checked visually and manually after wings and empennage covers have been removed.
- (5) To make certain that the plane is in order for flight, a final check-up by the man in charge of that crew will be made by circling the airplane just prior to giving the pilot take-off clearance.

G. USE OF WING AND EMPENNAGE COVERS

- (1) It shall be the responsibility of the Station Manager, Chief Mechanic, Crew Chief or man in immediate charge of the crew to see that wing and empennage covers, where provided, are installed whenever an airplane is left outside in snow or ice conditions. Meteorological Departments, where located, shall forecast approaching adverse weather conditions so that the covers may be installed.
 - (a) These covers must be installed on through trips when there is a possibility of ice or snow collecting on plane surface.
 - (b) These covers shall be left on as outlined under "Procedure for dispatch at end of Runway", until the airplane is at the head of the take-off strip.
 - (c) They shall be installed and removed with caution.
 - (d) They must be made secure at all times to prevent possible damage to plane and covers from excessive whipping.
 - (e) Straight Isopropyl Alcohol may be used to remove ice from airplane stabilizers when necessary. When this is done the following precautions shall be followed:
 1. Material -
Isopropyl Alcohol
 2. When to use -
Whenever ice is anticipated to prevent it from forming or to remove ice that has already formed.
 3. Application -
Apply with a hair brush or a cloth if a brush is not available. Pat it on the surface of the stabilizer using only enough to get it wet. An excessive amount is useless and wasteful.

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4. Precaution

Use only the amount needed; don't waste it. Keep the alcohol off the paint and fabric as much as possible, as it will cut the paint and/or dope if too much is applied.

- (f) Upon removal, wing and empennage covers must be thoroughly aired and dried to prevent damage and mildew while in storage.
- (g) Wing and empennage covers must be inspected regularly to see that they are in a clean and serviceable condition. They shall be fire proofed with "Blenio" flameproofing liquid over an area five feet out from the wing attaching angles and four feet back from the leading edge. This flame proofing must be done when the covers are new, after each laundering and at the start of each winter season.

H. REMOVING ICE AND SNOW FROM PLANES

- (1) Remove ice from wing, empennage, and propeller leading edges by beating with a one-foot length of garden hose. No more force than is absolutely necessary shall be used. Also see paragraph (e) under Use of Wing and Empennage Covers).
- (2) Loosen and remove ice from landing lights by turning the lights on or by washing off with Isopropyl Alcohol.
- (3) Ice on the wings and fuselage may be cracked and swept off by means of an old fashioned corn broom. Use the flat side of the broom and use no more force than is absolutely necessary.

CAUTION: Use extreme care so that skin surface will not be damaged.

- (4) Remove snow by see-sawing a long piece of muslin 2 or 3 feet wide back and forth across the skin surface or with a push broom. Remove snow at sufficiently frequent intervals to prevent its melting and freezing to the skin surface.

I. HANDLING OF AIRPLANES IN DESERT OR EXTREMELY DUSTY CONDITIONS

- (1) Specific precautions must be taken in the maintenance and servicing of aircraft in desert country. Measures to keep sand and dust from getting into vital parts of airplanes are necessary to keep them in operation.
- (2) The following steps shall be taken when extremely dusty conditions exist.
 - (a) Stop engines quickly after landing.
 - (b) Plug up all engine openings at once, to include all breathers, air vents and intakes.
 - (c) Reduce taxiing to a minimum; substitute towing.
 - (d) Never lay any article on the ground.
 - (e) Extreme care shall be used in servicing to keep sand out of containers, funnels, or strainers.
 - (f) Be sure to remove all plugs from the breathers, air vents and intakes before the plane is allowed to proceed.

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9. Operating Automotive and Air Condition Equipment

- (1) No personnel other than those who have demonstrated their ability, and have been approved by the Station Manager and/or Chief Mechanic, shall be allowed to operate trucks, automotive equipment, or air conditioners used by the company.
 - (a) A list of those so approved for operating the various types of equipment must be posted on the Mechanics' Bulletin Board, and kept up-to-date at all times.
- (2) The person approving operators for this equipment must see that a sufficient number of personnel is trained to take care of unusual conditions which may arise.

10. STORING AUTOMOTIVE EQUIPMENT

Since the operation, maintenance, and storing of all types of automotive equipment presents very definite hazards in connection with fire, it is necessary that a regu-
lative practice be set forth which must be rigidly followed:

- (a) Gasoline service trucks may be placed in the hangar for protection against weather, provided there are no UAL aircraft in the hangar or shed at the same time.
- (b) Tractors of all types may be operated in hangars as necessary to facilitate the movement of planes and equipment.
- (c) Air conditioning units, tractors and trucks (excluding gasoline trucks), power sweepers or scrubbers may be parked in a hangar providing they do not obstruct the quick removal of planes which may be in the hangar.
- (d) Air conditioners shall not be operated in hangars.
- (e) When any servicing work is done on automotive equipment inside a hangar, either a 40-gallon foamite or a 50 lb. CO₂ extinguisher shall be placed immediately adjacent to the equipment being serviced. Under no circumstances shall gasoline trucks be serviced inside a hangar. This must be done either in a separate garage or outside.
- (f) Private automobiles shall not be permitted in the hangar. When necessary to bring delivery or shipping trucks into the hangar, they shall remain only long enough to pick up or discharge shipments.

11. HANDLING EQUIPMENT AROUND AIRPLANES

Every precaution shall be taken when handling equipment around airplanes to prevent damage to the skin and structure.

- (a) Passenger loading steps shall be placed a sufficient distance from the plane to prevent the fuselage from rubbing on the steps when the plane is loaded or unloaded.
- (b) Cargo loading stands shall be placed a sufficient distance from the plane to prevent the fuselage from rubbing on these stands when the plane is loaded or unloaded.
- (c) Care shall be used when moving equipment around airplanes to prevent damage to skin or structure.

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<p>12. <u>REMOVING SPILLED ACID</u></p> <p>The following procedures shall be used in all instances where it is necessary to clean up acids spilled on our equipment:</p> <p>(a) Wipe up acid with rags, using sufficiently large wads to prevent contact of absorbed acid with the fingers or any other parts of the skin. (Use rubber gloves if they are immediately available).</p> <p>(b) Flood area with running water. If the acid is in such a place that the water would flush it into cracks or crevices or run down to other parts, use rags soaked with water and mop continually with fresh water until all acid is removed.</p> <p>(c) If further assurance of complete removal of the acid is desirable, the area should be washed with ordinary laundry soap. The soap must then be thoroughly rinsed off.</p> <p>13. <u>LIGHTNING STRIKES</u></p> <p>(a) When the Captain experiences a lightning strike or what is believed to be a lightning strike, he shall make a report in the Trip Record Book, and upon arrival at the next station the Dispatcher shall be given a verbal report following which a visual inspection shall be made of the control surfaces, propellers, upper and lower skin of the wing tips, tail cone and tail wheel fork. If control surface fabric is found to be burned to such an extent that its strength is doubtful, the damage shall be repaired before the plane is allowed to proceed. If fused metal or puddle marks or any effects of the strike are found, the Division office shall be notified immediately by Telegraph or Telemeter and a note shall be made in the Trip Record Book stating the extent of damage found. (Check engines for damaged bearings - if propellers show fused metal at propeller tips).</p> <p>(b) Upon arrival at a Terminal Station the Captain shall advise the Dispatcher of the lightning strike. The Chief Mechanic or Crew Chief on duty, after being so advised, shall examine the Trip Record Book and if any notation of damage was made by the previous station, a more comprehensive inspection shall be made for further effects of lightning strike, such as damaged control hinges, control surfaces, or skin.</p> <p>(c) If the plane lands at a Terminal Station following the lightning strike, the inspections as noted in paragraphs (a) and (b) above shall be made and the Trip Record Book shall be noted as to the extent of damage, if any, and if no effects are found, the notation shall so state.</p>		
<p>14. <u>TEST FLIGHTS</u></p> <p>(a) After each engine change or after completion of major repairs to the plane structure and before any passenger may be carried, a plane must be test flown, as covered by current requirements in C.A.R.</p> <p>(b) This paragraph is to be interpreted literally and applies only to newly installed engines and major repairs to the plane structure. The regulation was evolved</p>		

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originally as a test of the engine installation, including: Piping, wiring, accessory operation, etc. and not for the functioning of the engine itself which has previously been tested on a test stand. When cylinders are replaced, or other corrections of a like nature are made, the engine is to be test run on the ground for a sufficient length of time to insure its satisfactory operation.

- (c) A plane under test will be flown for at least 10 minutes.
- (d) When in the judgment of the Station Manager, Chief Mechanic or Crew Chief safety will be promoted by a flight test, such a test shall be arranged.

15. CHARTER FLIGHTS

- (a) All charter flights to off-line points shall carry a kit consisting of the following items:
 - (1) One CO₂ Fire Extinguisher equipped with a quick disconnect device for use on nacelle coupling.
 - (2) One Set of Spark Plugs, including insulators.
 - (3) One Spark Plug Socket Wrench.
 - (4) One Gooseneck Wrench.
- (b) At the completion of the charter flight, the kit shall be returned immediately to the station originating the charter flight.

16. TESTS and TEST EQUIPMENT

- (a) When test devices are installed on our planes and spares are carried with the plane for the duration of the test, the packages or boxes which carry spare test equipment in planes shall be painted International Orange. This will mean - "Do not remove from plane unless necessary to use parts".
- (b) The inside front cover of the Trip Record Books of any plane on which a test is installed shall carry a note explaining the test and giving any special instructions necessary.
- (c) All test equipment removed from our planes must be immediately returned to the Cheyenne Repair Base. Unless otherwise specified, this shall always be the case. It shall then be the problem of the Repair Base to see that a replacement part (or parts) is placed in the orange spare parts box in the rear mail pit, if such a box is carried with the plane. If test parts are shipped by surface or air to Cheyenne in the orange test box, be sure to wrap the box with brown paper.

17. APPROVED HAND SIGNALS

No hand signals other than those indicated in the following diagrams shall be used to assist operators in maneuvering aircraft on the ground or in starting or stopping engines.

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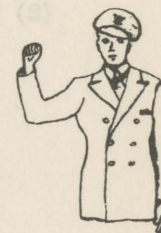
1. SIGNAL MAN

A. Designation of Signaller

One man only shall be designated to give signals thus avoiding possible confusion.

B. To attract Operator's Attention

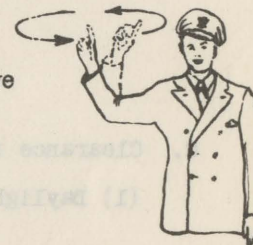
- (1) Daylight - Signaller shall stand in full view of one of the operators of the plane or the operator of the tractor. To signify that he is the signaller, right hand shall be held even with the head-level, and forearm shall be parallel to the body.
- (2) Darkness - Same as above with flashlight in hand giving series of short flashes.



2. STARTING AND PROCEEDING

A. To Start Engines

- (1) Daylight - A circular motion of the right hand extended above level of the shoulders.
- (2) Darkness - Same as above, using flashlight.



B. Clearance to Depart from Ramp

- (1) Daylight - A right hand military salute.
- (2) Darkness - Same as above.



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3. STOPPING

A. To Stop Plane

- (1) Daylight - Bend elbows and cross forearms at face level, palms forward toward the plane, and make a wig-wag motion, scissors fashion.



- (2) Darkness - Same as above using flashlight.



B. To Stop Engines

- (1) Daylight - Pass hand across throat.
- (2) Darkness - Same as above using flashlight.



C. Clearance from Pilot to Move Propeller

- (1) Daylight - Attract operator's attention and pass hand across throat (same as for stopping engines). The pilot shall immediately ascertain if master ignition switch and individual ignition switches are in the "Off" position. He shall then repeat the ground man's signal indicating that the switches are off.



- (2) Darkness - Same as above using flashlight.

CAUTION: A propeller shall never be rotated by hand immediately after coming to rest. Always allow sufficient time to make sure that the engine is not going to backfire.



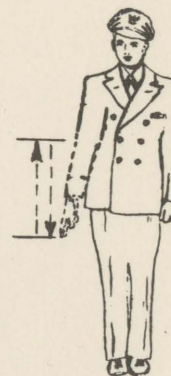
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4. MOVE PLANE

- (1) Daylight -- With the elbow held near the side, the right forearm and hand shall be moved up and down following a definite vertical line.
- (2) Darkness -- Same as above using flashlight.



5. MOVING IN RESTRICTED AREA

A. Move plane forward

Move both forearms and hands back and forth towards face.



B. Move left wing forward

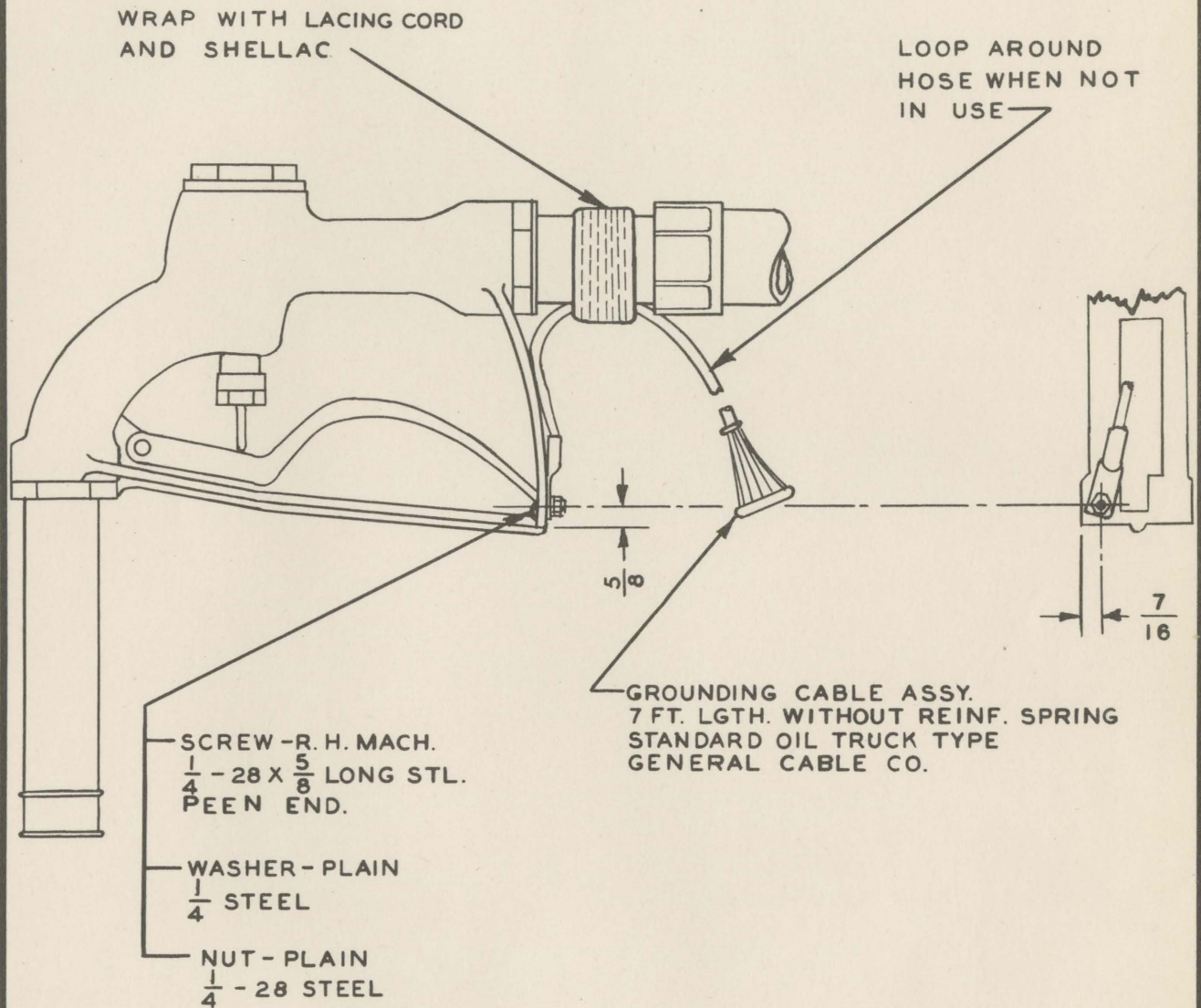
Hold left hand stationary and move right hand and forearm back and forth towards face.



C. Move right wing forward

Hold right hand stationary and move left hand and forearm back and forth towards face.

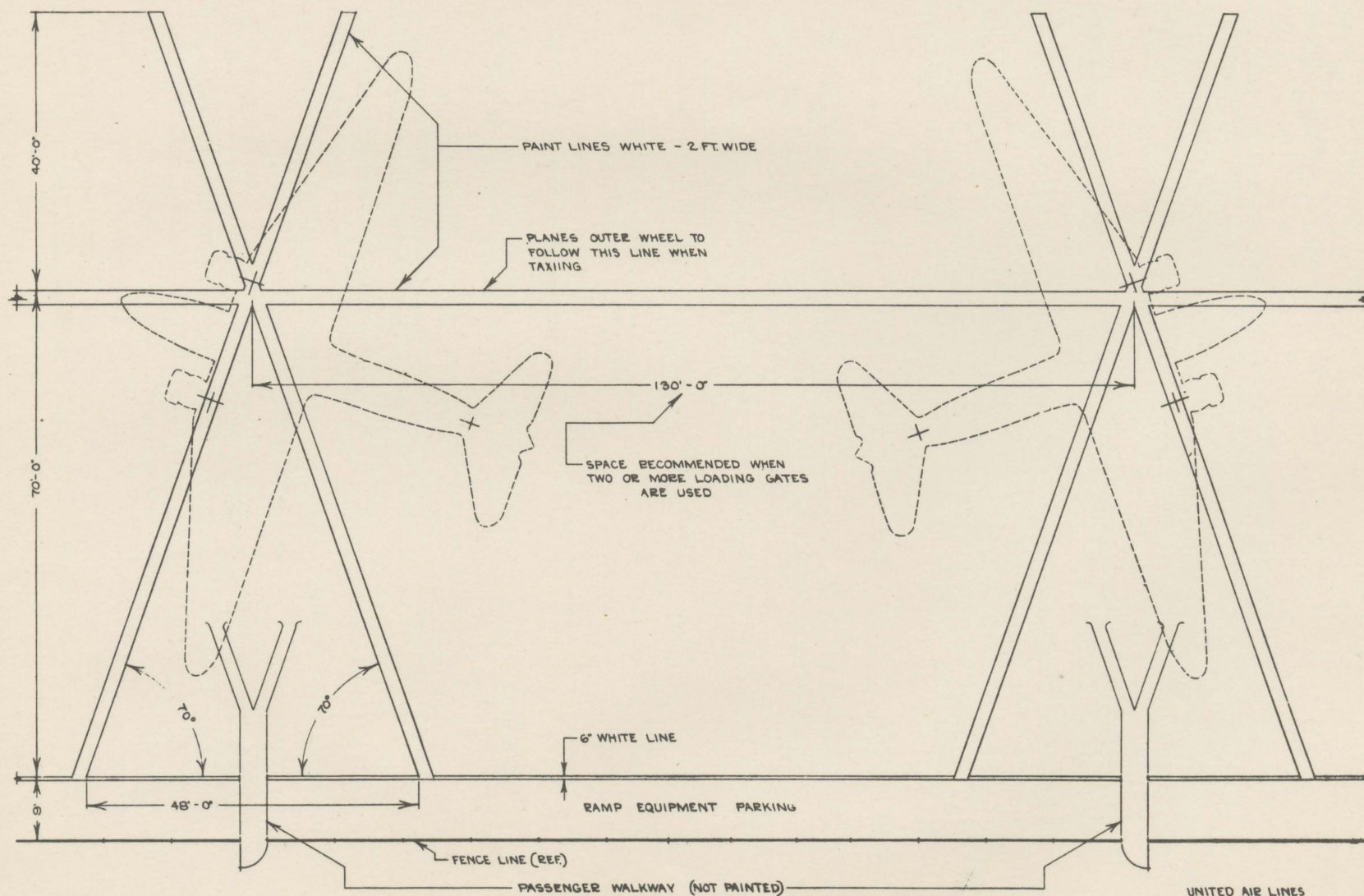




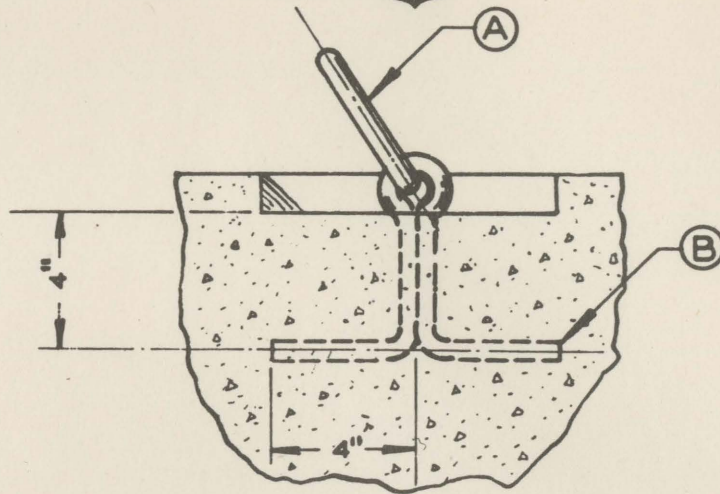
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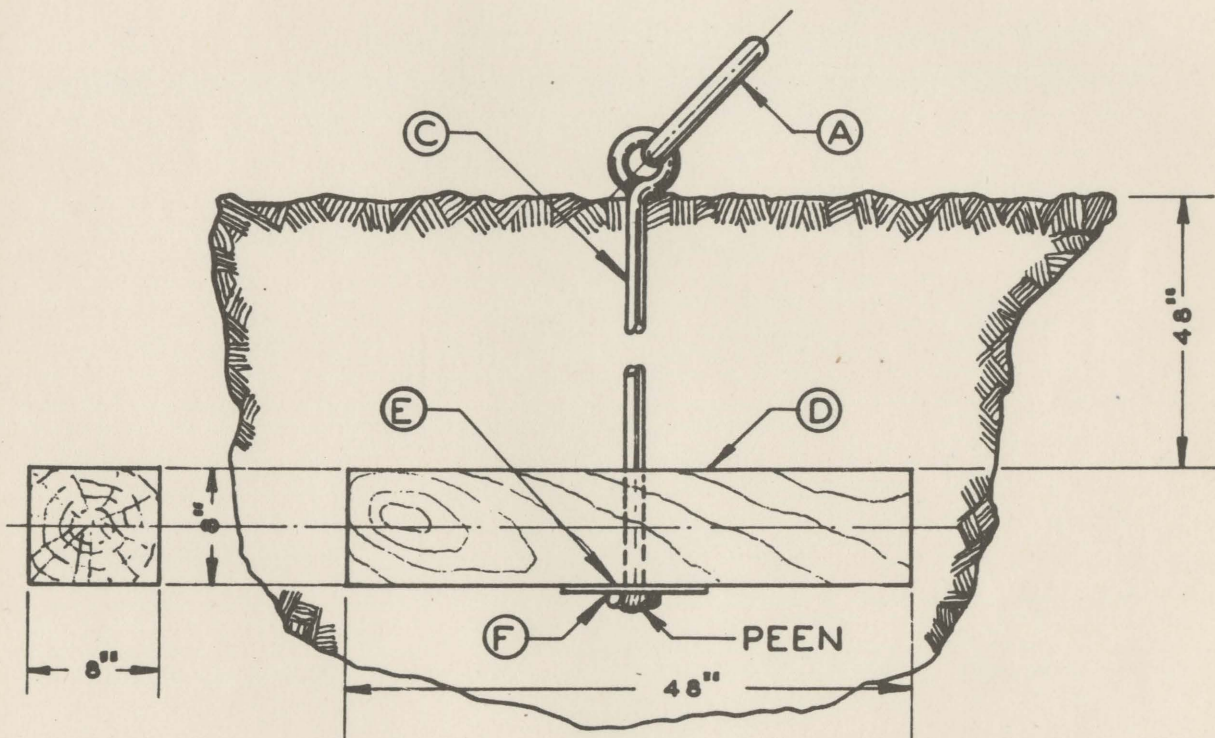
INSTALLATION OF THE GROUNDING PLUG ON GAS NOZZLE



TYPICAL RAMP MARKINGS



CONCRETE INSTALLATION



DIRT, ETC, INSTALLATION

(A) SEE DET. B - PAGE NO.

(B) ROD, STEEL 1/2" DIA.

(C) ROD STEEL 1/2" DIA.

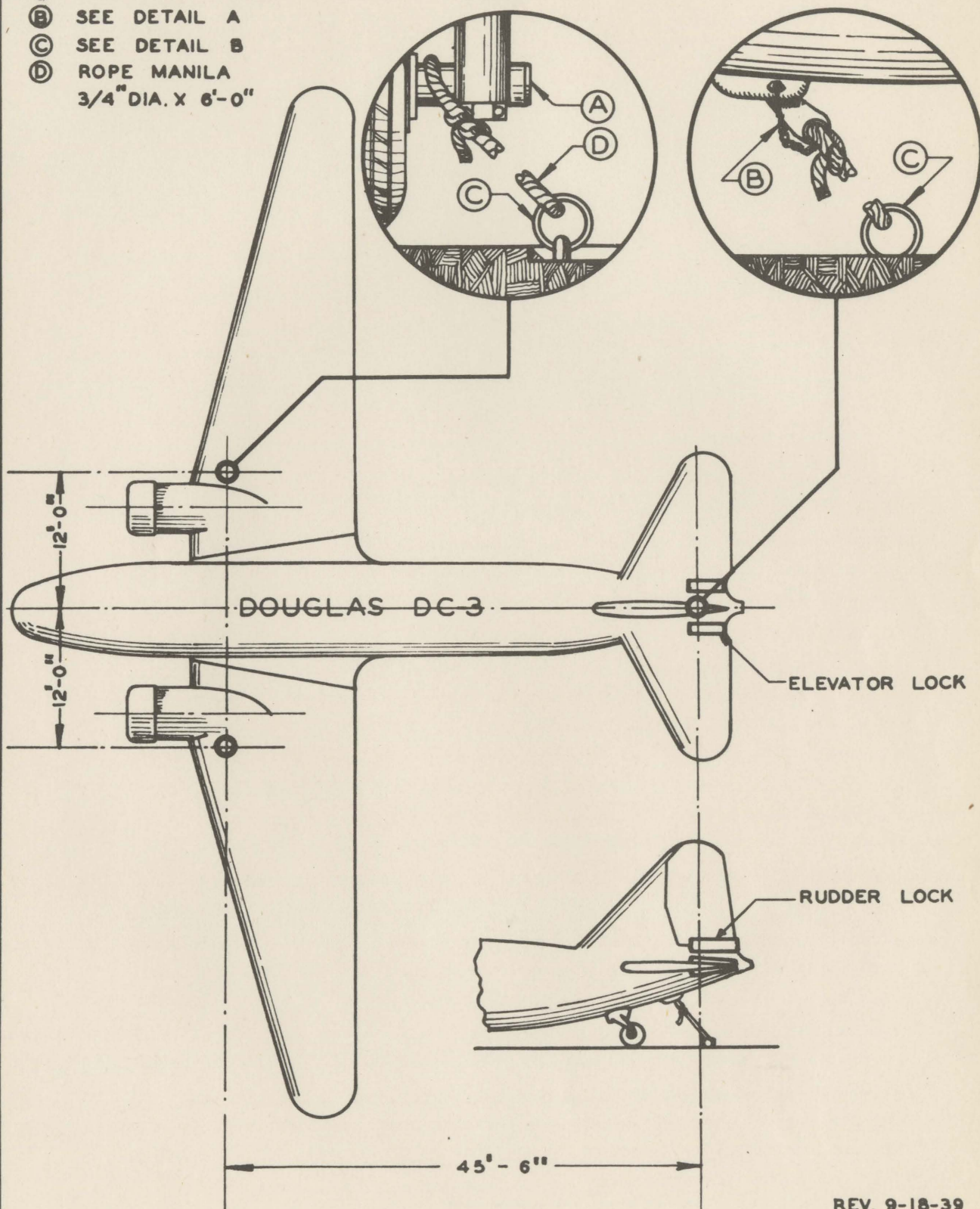
(D) YELLOW PINE - CREOSOTED

(E) PLATE STL.-1/4" X 8" X 8"

(F) NUT STEEL-1/2 X 20



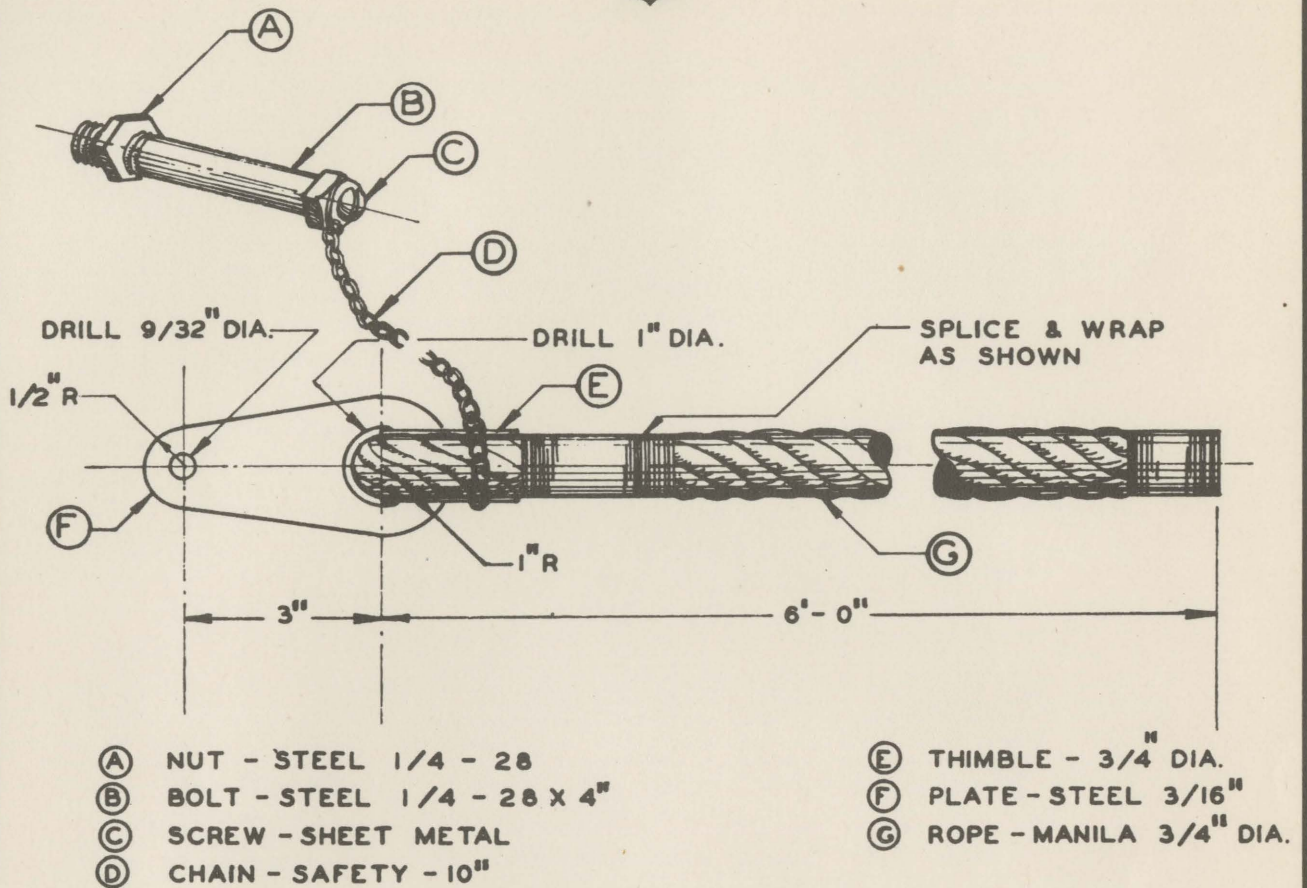
- (A) OUTBOARD AXLE
- (B) SEE DETAIL A
- (C) SEE DETAIL B
- (D) ROPE MANILA
3/4" DIA. X 6'-0"



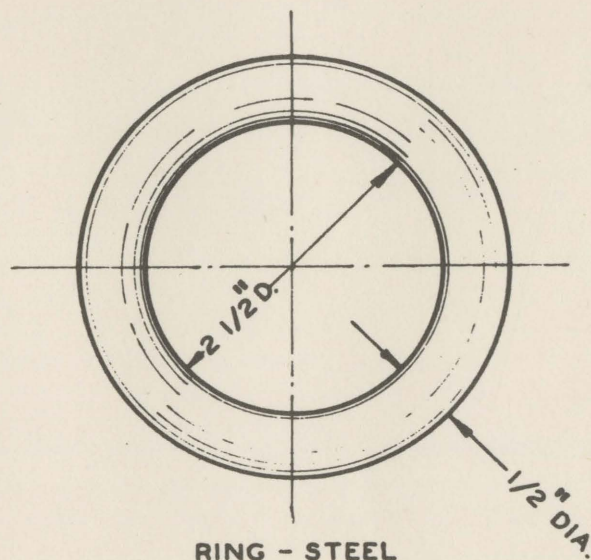
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DC-3 TIE-DOWN DIAGRAM—A



DETAIL A



RING - STEEL DETAIL B

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DC-3 TIE-DOWN DIAGRAM - B

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LUBRICATION

PLANE PARTS

- (1) Plane parts shall be lubricated as outlined in the Manual, unless it is found on inspection that a particular part requires lubrication, or unless otherwise specified in individual instructions.
 - (a) All planes are to be lubricated thoroughly at each #3 Check.
- (2) While these time periods are to be adhered to, it is to be understood that lubricated parts are to be inspected at #2 Check periods.
- (3) Where controls pass through fairleads or bearing surfaces, neither grease nor light oil shall be used for lubricating.
- (4) Do not use an excessive amount of lubricant. Be sure that the bearing surfaces are supplied with just enough grease or oil to operate freely. Any lubricant in excess of this amount serves no purpose. On the contrary, it will collect dust and dirt, will run down over exposed surfaces and present a decidedly unsightly appearance.
- (5) After lubricating a part, wipe off all excess oil or grease.

STANDARD LUBRICANTS

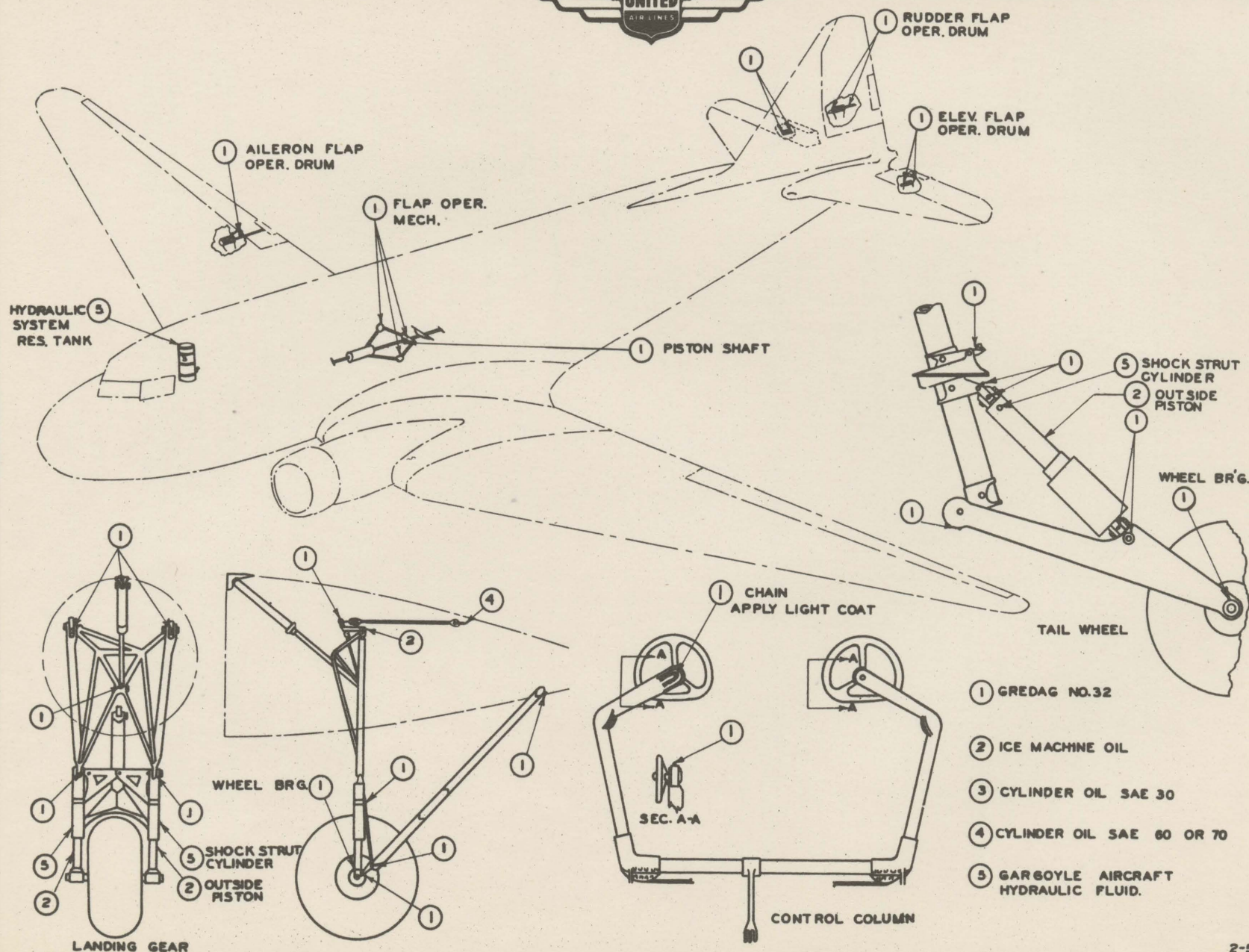
- (1) DC-3
 - (a) Pennzoil Oil 60 SAE shall be used for engine lubrication.
 - (b) Gredag #32 will be used for landing gear wheel bearings, for zerk fittings on landing gear, bungee mechanism, tail wheel, elevator, rudder and aileron flap operating drum, flap operating mechanism, and all plane zerk fittings.
 - (c) The following types of hydraulic fluids are approved for use in UAL planes - only these shall be used:

Gargoyle CG - Hydraulic Fluid

Mobile HF - Hydraulic Fluid

Pegasus Aircraft Hydraulic Fluid
 - (d) Ice machine oil shall be used on the landing gear shock strut extension cylinders and the wing flap indicator line.
 - (e) Only approved Hydraulic Fluid is to be used in the Douglas landing gear and tail wheel shock struts. (Paragraph C for approved hydraulic fluids)
 - (f) Pennzoil 60 SAE oil shall be used on the battery sliding mechanism.
 - (g) Regular #32 Gredag grease spark plug shall be the standard lubricant for all spark plug threads.

NOTE: Mix thoroughly before using.
 - (h) Dixon's graphite lubricating pencil shall be used for landing gear wheel removable flanges and tire beads.
 - (i) Paraffin shall be used to lubricate sliding window.



- ① GREDAG NO.32
- ② ICE MACHINE OIL
- ③ CYLINDER OIL SAE 30
- ④ CYLINDER OIL SAE 60 OR 70
- ⑤ GARGOYLE AIRCRAFT HYDRAULIC FLUID.

LUBRICATION DIAGRAM DC3-A AND DST-A

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STANDARD GASKET CEMENTS

- (1) TITSEAL "LIGHT" grade cement shall be standard on accessory connections for air, gas, oil or steam connections, hydraulic systems, and for any other application wherein the temperature does not exceed 250° F. This applies to machine parting surfaces, thin flange gaskets, and thread fittings in every instance, except on threads of Dural, Aluminum or Dow Metal.
- (2) TITSEAL "MEDIUM" grade cement shall be used for fuel system strainer gaskets.
- (3) "ALCOA THREAD LUBE" shall be used on all threaded fittings made of Dural, Aluminum or Dow metal.

STANDARD FLUIDS

- (1) Propeller Anti-Icer Fluid - Straight Isopropyl Alcohol
- (2) Aircraft Fuel - Standard Oil Company aviation gasoline, 91 octane shall be used for all planes.
 - (a) "Aromatic Fuel" of the proper octane rating may be used in any plane which is marked "Suitable for the use of Aromatic Fuel" next to the fuel tank filler necks.
 - (b) In an emergency we may use fuel from any company making and supplying aircraft fuel at 91 octane to domestic airlines. (Note - Under these circumstances, the fuel to be used must be inspected for water before delivery into the airplane tanks, and grounding wires must be used to ground the nozzle to the plane, the plane to ground, and if a gas truck is used it must also be grounded.
 - (c) Attendants at small stations where gasoline is delivered to storage tanks in drums shall check each drum by odor and sight to make sure that it contains gasoline before it is dumped into the storage tank.

A. The following is the proper color code to use in painting fluid containers:

- (1) Water Containers - Paint Solid Aluminum*
Containers should be labeled "Water" in Black 1" block lettering on two sides of the can.
- (2) Hydraulic Fluid Containers - Paint Solid Black
Containers should be labeled "Hydraulic Fluid" in Aluminum* 1" block lettering on two sides of the can.
- (3) Isopropyl Alcohol Containers - Paint Solid Green
Containers should be labeled "Isopropyl Alcohol" in Aluminum* 1" block lettering on two sides of the can.
- (4) Benzol Containers - Paint Solid Red
Containers should be labeled "Benzol" in white 1" block lettering on two sides of the can.

* Where Aluminum is not available, white should be used.

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B. Oil cans and grease guns shall be labeled as follows:

- (1) Stamp the name of the oil or grease to be used in any can or gun in a small brass or copper plate.
- (2) Solder the stamped identification plate to the oil can or grease gun to eliminate any possibility of the wrong type of oil or grease being used in any container.
- (3) Window cleaner - Stynamite (Note - to be mixed 5 parts water to 1 part stynamite before using)
- (4) Heating System - Use only clean tap water.
- (5) Wing Covers - Blenion Material (For fire proofing. Store only in glass jugs or oak barrels.
- (6) Fire Extinguishers - Carbon tetrachloride, dyed red.
- (7) Cleaning - Carbon tetrachloride, clear commercial grade.
- (8) Standard Fluids shall only be left in containers properly marked for that particular fluid to eliminate any possibility of using an improper fluid.

MISCELLANEOUS

- (1) Ignition Sealer - Corning Dow #4 sealing compound.
- (2) Deodorant - National powder - (See instructions under cleaning in this manual for procedure for mixing)

BONDING

- (1) Gas and Oil hose Bonding - Part No. S-1028422 strip bonding.

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SEALS

1. Throughout the airplane there are many parts which are sealed as a matter of regular practice. Occasionally new or experimental assemblies are also sealed. Seals are used for two reasons:
 - A. To prevent unauthorized personnel from tampering with the equipment.
 - B. To obtain a complete report as to
 - (1) Reason servicing necessary.
 - (2) Exactly what servicing was done.
2. Do not break seals unless certain that the sealed part is faulty.
3. When it is found necessary to break a seal, the unit will be resealed with a station seal, as listed below.
4. A complete record will be made in the Trip Record Book giving the reason the seal is broken and the work necessary to make the correction.
5. If, during an inspection, a seal is found broken or removed from a part that is regularly sealed, the part should be carefully inspected and resealed, noting in the Trip Record Book that the part arrived with the seal missing, and that the part was inspected and resealed.
6. The approved seals are:
 - A. Flares - #28 soft copper wire.
 - B. First Aid Kits - #35 white cotton sewing thread and lead seal.
 - C. Douglas Brake Control Valve - Twisted iron wire and lead seal.
 - D. All magnetos - twisted iron wire and lead seal.
 - E. The envelope containing the spare oxygen mouth pieces will be kept sealed with #35 white cotton sewing thread.
 - F. Auto Pilot Balanced Oil Valves - iron wire and lead seal.
 - G. Pyrene Extinguishers - #28 soft copper wire and lead seal.

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INTERCHANGE LIST

I. Air System

- A. Pump, vacuum
- B. Valve, relief (Eclipse)
- C. Valve, relief (Sperry)

II. Carburetor System

- A. Carburetors
- B. Control auto mixture
- C. Float vapor
- D. Valve, air scoop
- E. Valve, primer

III. Deicer System

- A. Pump anti-icer autopulse
- B. Separator, oil can type
- C. Separator, pressure relief type
- D. Valve, deicer distributor, 5 part

IV. Electrical System

- A. Control Box
- B. Generator
- C. Starter, direct electric
- D. Magneto, tachometer weston

V. Engine

- A. Cylinders
- B. Nose section, rigid drive
- C. Nose section, flex.
- D. Pistons and pins
- E. Push rods
- F. Engines

VI. Fuel System

- A. Pump, fuel
- B. Pump, wobble
- C. Strainer
- D. Valve, cross-feed
- E. Valve, dump
- F. Valve, tank selector

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VII. Hydraulic System

- A. Pump, hydraulic
- B. Plug, filler-press cyl. and oleos.
- C. Tank, pressure and sphere pressure
- D. Valves, hydraulic system

VIII. Ignition System

- A. Booster
- B. Loom, ignition
- C. Magnetos
- D. Spark Plugs
- E. Switch, master

IX. Instruments

- A. Indicator airspeed
- B. Altimeters
- C. Compass
- D. Gauge, oil and gyro pilot press.

X. Mechanical

- A. Brakes

XI. Oil System

- A. Regulator auto, temp.
- B. Radiators
- C. Oil tanks

XII. Propellers and Accessories

- A. Propellers
- B. Governors
- C. Pump, hydromatic

XIII. Stem System

- A. Valve, regulator
- B. Valve, relief (25 lb.)
- C. Valve, safety relief (38 lb.)
- D. Valve, globe

XIV. Control Surfaces

- A. Wing Tips
- B. Elevators

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INTERCHANGEABLE LIST			
I. Air System			
	For	For	
	DC-3	DC-3	
	SIC-G	SIC3-G	
A. Pump, vacuum	Model 207-D	Model 207-D	
		Model 207-J	
(a) Model 207-D, which is a tongue drive pump, is used on the SIC-G engine. Model 207-D may be used on an SIC3-G engine by installing adapter drive Pratt and Whitney Part #32817 in the Engine Drive Gear Shaft. Model 207-J, which is a spline drive pump, is used on the SIC3-G engine only. Type B-7, which is a spline drive pump, is directly interchangeable with the 207-J pump, (Type B-3).			
B. Valve, relief (Eclipse)	M-3258	M-3258	
(a) Relief valve, Eclipse Model M-3258, located in nacelles only.			
C. Valve, relief (Sperry)	641240	641240	
(a) Sperry 641240 relief valve is mounted behind instrument board only, in line to auxiliary horizon, Douglas planes.			
II. Carburetor System			
A. Carburetor	PD-B8-5	PD 12-B8-5	
	PD-B6-5	PD 12-B6-5	
(a) Either type injection carburetor PD 12-B6-5 or PD 12-B8-5 may be used on a plane provided control rigging instructions as given in Maintenance Manual are adhered to. (See chart following S and M 6 Page 4.)			
(b) If at any time we should have any PD 12-H1-1 carburetor for service, it will require a different aneroid. Aneroids for these carburetors will have a - 1 in red stamped on flange.			
B. Control, auto mixture	A30041-1R	A30041-1R	
C. Float, vapor	70052	70052	
	Stainless steel	Stainless steel	
D. Valve, air scoop	5042812	5042812	
(a) Valve #5042812 - interchangeable on either type car. PD 12-B6-5 or PD 12-B8-5.			
E. Valve, primer	EX 1403-98	EX 1403-98	
III. Deicer System			
A. Pump, propeller	12-A	12-A	
Anti-Icer Autopulse		All interchangeable	

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	For	For
	DC-3	DC-3
	S1C-G	S1C3-G
B. Separator, oil can type	3372	3372
C. Separator, pressure relief type	3356	3356
D. Valve, deicer distributor, 5 port	3348	3348

(a) Only 5-port deicer distributor valves used on DC-3 planes. All interchangeable but lines need careful fitting and/or shimming between valve base and support bracket to line up valve and deicer lines before fittings are tightened up.

IV. Electrical System

A. Control box	ES 296	ES 296
B. Generator	E7 or 310	E7 or 310
C. Starter, direct electric	2611-C Model 2 and 6	2611-C Model 2 and 6

All DC-3 direct electric starters are painted gray.

D. Magneto, tachometer weston	DC-724-C AC-752	DC-724-C AC-752
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(a) Some airplanes are equipped with Model 752 Weston AC Tachometers. These magnetos and indicators are not interchangeable with the standard equipment and if either unit is changed, both the magneto and the indicator for that engine must be replaced. Additional wiring is provided for the new type indicators, the standard wiring being left available in case of replacement. The standard wiring and terminal plug at the magneto fits either the standard 724-C or new model 752 magnetos. All of these units will be plainly marked "Weston AC."

V. Engine

A. Cylinders	C-1 No washers C-3 Use spherical washers	C-1 No washers C-3 Use spherical washers
B. Nose sections. Rigid drive	Interchangeable between C-1 engines only	Interchangeable between C-3 engines only
C. Nose sections Flex	If necessary to replace order from CX, giving engine number to be replaced-on Recommend CX mechanic be requested to assist with replacement unless station has personnel familiar with this work.	

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	For	For
	DC-3	DC-3
	S1C-G	S1C3-G
D. Pistons and pins	All interchangeable on all engines-keep pins with pistons.	
E. Push rods	Use only heavy type on exhaust side. Most all engines now have heavy type on both exhaust and intake. Heavy type has <u>5/16</u> -inch I.D.	
F. Engines	Prefer to keep similar types paired but OKay to pair any types if necessary.	

VI. Fuel System

A. Pump, fuel	R-600-CWB R-600-CEB	R-600-CWB R-600-CEB
B. Pump, wobble	UAL Left and Right Douglas Left and Right	UAL Left and Right Douglas Left and Right
(a) Interchangeable with corresponding type of unit only as UAL and Douglas types use a different kind of tube fitting, also the Left and Rights of each type have different fitting alignment. Fittings should not be changed.		
C. Strainer	C-3 Left and Right	C-3 Left and Right
(a) On some C-3 strainers only the narrow type gasket can be used. These strainers are identified by a red band painted around the body and strainer cover adjacent to the gasket. C-3 strainers of opposite type may be interchanged in an emergency by relocating position of fittings.		
D. Valve, cross-feed	Following types used: Acro Cork D-2, 241BA, Pesco Left and Right, APV Left - 94083 and Right APV - 94084. Different types are not interchangeable.	
(a) When ordering replacements, be sure to give <u>plane number</u> , whether <u>Left</u> or <u>Right</u> , and <u>type</u> valve removed.		
E. Valve, dump Right main and left aux.	These valves not interchangeable from Left to Right and require removal of tanks and special fitting to install.	
F. Valve, tank selector	K3-UAL Left and Right. K3-Douglas Left and Right Planes 379, 621 and 622 use Parker APV valves.	
(a) Left and rights are different and Douglas and UAL types use different type of tube fittings. When ordering replacement, be sure to give <u>plane number</u> , whether <u>left</u> or <u>right</u> , and <u>type</u> valve removed. Fittings should not be changed.		

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	For	For
	DC-3	DC-3
	SLC-G	SLC3-G

VII. Hydraulic System

A. Pump, hydraulic	#214-U	#214-U
B. Plug, filler, pressure Cylinder and oleo filler	#53047	#53047
C. Tank, pressure	#5006364	#5006364
Sphere, pressure	#5077430	#5077430

(a) Tank and sphere interchangeable only with corresponding types.

D. Valves, hyd. system

Pump selector	#4006985	#4006985
Flap control	#4005050	#4005050
Landing gear retract	#4005050	#4005050
Wing flap relief	#1011655	#1011655

(a) Wing Flap control valve and landing gear retract valve are interchangeable. Pump selector valve is different type.

VIII. Ignition System

A. Booster	#2455-A	#2455-A
B. Loom, Ignition	The following ignition looms are used: C-1, C-3 Bosch-6 and 7.	

(a) C-1 looms are shipped to fields for spares. C-1 looms directly interchangeable with other C-1 looms. C-1 looms may be used to replace C-3 loom if an adapter is used. This adapter is a ring one-half inch long, Part #1C-1316, and goes between the loom conduit and the ring. C-1 or C-3 looms are not interchangeable with Bosch looms. Bosch -6 and -7 looms are interchangeable if the magneto block cover and loom elbow is replaced with the one from the loom being removed. Any extra unused adapters Part #1C-1316 should be returned to CX at once.

C. Magnetos, Scintilla and Bosch	For SLC-G Scintilla-4	For SLC3-G Scintilla-3 Bosch-6, -7
-------------------------------------	--------------------------	--

(a) -3 and -4 magnetos should be replaced with similar types. In an emergency a -4 magneto may be replaced with a -3 magneto. The breaker point opening of the replacement magneto shall be synchronized with the good magneto on #1 cylinder. If this is done, a telegram should be sent to the next service station having a -4 magneto, giving this information and arrangements made to replace the magneto with a matched type.

(b) Bosch and Scintilla magnetos cannot be paired.

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	For	For
	DC-3	DC-3
	SLC-G	SLC3-G
D. Plugs, spark	AN-Types 7S-2, Ls3AB and C-34S Standard type - 7KL-S	
(a) AN and standard plugs are not interchangeable.		
E. Switch, master	A-2a	A-2a

IX. Instruments

A. Airspeed indicator	Type 1402-Pioneer	Type 1402-Pioneer
(1) Type 1402 may replace any other type used either left or right.		
B. Altimeters -	Pioneer #1109 Kollsman #176	Pioneer #1109 Kollsman #176
(1) Pioneer with speedometer type scale to be used on left hand side of instrument panel. Kollsman to be used on right hand side. If necessary to use incorrect type in either location the log book should be noted in order that the next station having parts can install correct type		
C. Compasses		
Two new type compasses have been installed one each in planes 938 and 941 in place of the regular magnetic compass. This unit is nothing more than a magnetic compass having a stationary vertical dial and a rotating pointer as a means of indicating direction in place of the customary rotating card and lubbers line with which our standard compasses are equipped. The test instruments are so installed as to be directly interchangeable with the standard magnetic compass. The electrical lead to the compass light is somewhat longer than standard to allow for this interchangeability. The electrical lead from the light of each test compass is provided with an adapter into which the standard compass electrical lead is inserted. Thus in the event replacement is necessitated, the standard compass may be installed and connected with the electrical lead in the customary manner.		
D. Gauge oil pressure (200 lbs.)	3C-407-14	3C-407-14
(1) This gauge may be used for engine oil pressure or gyro-pilot oil pressure.		
E. Bulb resistance thermometer.		
(1) This bulb may be used for left carb. air outside air and oil temperature.		

X. Mechanical

A. Brakes -- Outboard Hayes	H-2-78	H-2-78
Inboard Hayes	H-2-78	H-2-78
Hayes Brakes are built up as rights and lefts for each wheel, right and left being determined by position of Brake hose guard. They may be interchanged by changing the location of the brake hose guard.		

For

DC-3

S1C-G

For

DC-3

S1C3-G

XI. Oil System

- A. Regulator, automatic temperature

27959

27959

- B. Radiators

Standard 11" and
Harrison

Standard 11" and
Harrison

(1) Standard 11" radiators and harrison radiators are not interchangeable. Harrison radiators have integral temp. controls.

- C. Oil Tanks

All DC-3's have 29 gallon capacity tanks - lefts or right inter. on their respective sides only. Oil tanks equipped with hoppers for use with Harrison oil radiators are not interchangeable with regular oil tanks.

XII. Propellers and Accessories

- A. Propellers

All propellers are interchangeable as complete units. Domes on 23-E50-23 are interchangeable between other 23-E50-23 domes, but this should not be done except in emergency. Domes on 23-E50-33 and up to 23-E50-287 propellers are not interchangeable due to the difference in preloading of gears.

- B. Governors

(1) 4B6-EOA - Requires long, mounting studs, old type UAL convexed pulley part #1U-436, removable external stop bracket. Can be used on either "C" or "C-3" engines. Preference should be given, where possible, to installation on "C-3" engines.

(2) 4B6-GOA - Requires long mounting studs, flat pulley part #2083773, and integral high speed stop on head. Can be used only on "C-3" engines because the loom of the "C" engines prevents installation of this governor. This governor can be used with a modified convexed pulley part #3C-624. All "C-3" engines eventually will have the flat pulley.

(3) 4K13-EOA - Requires short mounting studs, flat pulley part #2083773, and integral high speed stop on head. This governor with flat pulley can be used on "C-3" engines only. If equipped with a modified convexed pulley part #3C-624, governor can be used on "C" engine.

(4) 4K13-FOA - Identical to the 4K13-EOA. With flat pulley can be used on "C-3" engines. With modified convexed pulley part #3C-624 can be used on "C" engines. Short mounting studs required.

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	<div> <div>For</div> <div>DC-3</div> <div>SLC-G</div> </div>	<div> <div>For</div> <div>DC-3</div> <div>SLC3-G</div> </div>
	(5) 4K13-GOA " Same as 4K13-EAO. When using flat pulley can be installed on "C-3" engines only. By using modified convexed pulley, can use on "C" engines.	
	C. Pump, hydromatic	238-K
		238-K
	XIII. Steam System	
	A. Valve, regulator	Fisher R
	B. Valve, relief 25 lb.	Fisher R
		Douglas or Roberts Type
	C. Valve, safety relief (38 lb)	Douglas or Roberts type
		Douglas or Roberts type
	D. Valve, globe lunkenheimer	200 pound models B and G
	(1) All DC-3 planes, 200 lb 3/8" globe valves - female fittings. Interchangeable in position D, B and E. Refer to Maintenance Manual diagram. Two types are used: model B and G replace with identical part whenever possible as valve bodies are usually twisted if the fittings are changed.	
	XIV. Wing Tips	
	A. Planes #NC-25681 and subsequent is equipped with interchangeable wing tips. When at all possible, the wing tips of these planes should not be used on planes of a lower number if other types are available. In the future, when possible, stations holding wing tips as spares will receive reworked tips with blank attaching strips, in which case it will be necessary for stations installing these tips to locate and drill the attaching holes.	
	The blank portion of these tips are equipped with skin which equals the combined thickness of the original doubler strip and the wing tip skin. It will not be necessary to locate the holes directly in the center of the original wing tip attaching holes, due to the additional strength of the doubler strips on wing tips as reworked by the Repair Base.	
	B. Elevators - Interchangeable left and right	#5014021-500

PERIODIC INSPECTION

FOREWORD

The "Periodic Inspection" Chapter of this manual deals with the items to be tested and inspected and the work to be accomplished during the various "checks". In brief it lists what is to be checked, inspected or tested.

While this chapter lists quite completely the items that must be covered, it does not limit in any way the responsibility of the mechanic to this manual. This section is intended as a guide and it is only by constant attention to the details that our airplanes will approach mechanical perfection.

Service and Maintenance instructions on all electrical equipment is contained in the Maintenance instructions on all electrical equipment is contained in the "Maintenance Manual - Radio and Electrical".

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REFUELING AND OIL

1. #1 CHECK

- A. Refuel tanks, in correct order, to the amount specified in writing by the dispatcher.
- B. Fill each oil tank to the proper level. (NOTE: Oil level is to be checked whenever fuel is added.)
- C. Make sure that fuel and oil filler caps and gaskets are properly installed.

2. #2 CHECK

Same as for #1 Check.

3. #3 CHECK

- A. Refuel tanks, in correct order, to the amount specified in writing by the dispatcher.
- B. Drain oil and refill each tank to the proper level. Replenish oil to the specified level after engine test run.
- C. Replace oil and fuel filler cap gaskets as necessary.

(NOTE: Planes equipped with Hopper Oil Tanks and Harrison Oil Radiators do not require oil changes between engine change periods)

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HYDROMATIC PROPELLERS

1. #1 CHECK

- A. Visually inspect the hubs, domes, and blades for cracks or other damage and prop for throwing oil.
- B. Fill the propeller anti-icer tank with the approved fluid.

2. #2 CHECK

- A. Same as #1 Check.
- B. Inspect phenolic chafing rings for tightness, on propeller on which they show.
- C. Inspect hub and blade packing for leaks.
- D. Remove dents, nicks, and abrasions in accordance with instructions in this manual.

NOTE: If there are any signs of failure, cracks, or scratches of a suspicious nature, a careful examination of them will be made with a 4X reading glass.

- E. Inspect safety lock rings, lock screws, and cotter pins.
- F. Jerk a prop blade fore and aft by hand to test propeller for possible looseness on shaft.
- G. Inspect anti-icer slinger installation and propeller blade feed shoes.
- H. Wipe off propeller, using a rag dampened in oleum spirits.
(CAUTION: Keep solvents off blade anti-icer shoes).

3. #3 CHECK

- A. Follow procedure as outlined for #2 Check.
- B. At each second, fourth and sixth #3 Check, or approximately 200, 400 and 600 hours of service, the feathering mechanism will be tested by actual operation.

ENGINE NACELLE

1. #1 CHECK

- A. Give engine nacelle and cowl a quick inspection for loose or torn cowl.
- B. Wipe off any oil as necessary.

2. #2 CHECK

- A. Inspect nacelle for torn or buckled skin.
- B. Remove ring cowl and inspect supporting pads and brackets and replace or repair as necessary. Inspect ring cowl flaps, operating mechanism and control.
- C. Remove all cowl necessary to inspect engine mount, engine mount fittings and accessory supports to engine mount. Inspect cowl. Make repairs as necessary. Inspect cowl supports for cracks and broken members.
- D. Proper tools will be used cautiously while removing and installing cowl so that injuries to personnel and damage to cowl will be kept to a minimum.
- E. When cowl is removed from the nacelle, lay it on the floor where it will not be damaged, with the inside of the cowl toward the floor.
- F. Replace any broken cowl fastener springs, as well as DZUS fasteners when worn to the extent that fastening is difficult.
- G. After installing cowl, inspect all DZUS fasteners, lock pins, ring cowl flap actuating rod connectors and ring cowl bonding to insure their proper installation.
- H. Inspect cowl flap hydraulic cylinder and connecting hoses under pressure in both closed and open position for oil leaks.
- I. Wipe all greasy finger prints from cowl.

3. #3 CHECK

Follow procedure as outlined for #2 Check.

ENGINES

1. #1 CHECK

No work will be done unless it is self-evident that an engine is in need of attention or unless a pilot's report indicates that repairs are necessary.

2. #2 CHECK

- A. It will not be necessary to ground test engines on arrival when a plane terminates at a station and is reported OK. However, a mechanic should not hesitate to ground test engines if the equipment is reported by the pilot as requiring attention, and if such a test would simplify locating the trouble.
- B. Give engine installation a quick inspection to determine if there is anything in need of extensive repair, so that steps may be taken to correct same. If nothing of a serious nature is found, wash down engine and installation with oleum spirits, using spray gun. Do not direct the spray on engine control rod bearings, boosters, magnetos, generators, feathering motors, starters, or any other electrical equipment. Wipe off electrical units with a rag.
- C. Remove the oil sump drain plug and main oil screen drain plug and inspect them carefully for evidence of failed parts in the engine. This practice will, in many cases, reveal failure of parts, which if not found and corrected might result in serious damage to the engine. Tighten and safety plugs when re-installed using new gaskets. This oil must be strained through a #20 mesh .025 screen and not be allowed to drain directly to the engine work stand drain pan.
- D. Carefully inspect the cylinders for any signs of cracks or looseness. Visually inspect all hold-down studs, nuts and safeties.
- E. Inspect ignition shielding for breaks and nuts for tightness. (Do not use wrench unless found loose.)
- F. Replace any leaking rocker box cover gaskets.
- G. Tighten, or replace when necessary any leaking pushrod housing gaskets.
- H. Inspect intake, pipes, tighten if necessary.
- I. Inspect the exhaust manifolds and supports for cracks or other damage. Carefully examine exhaust pipe system for leaks. Inspect clamps, bolts, nuts and connections for looseness. Make sure the four expansion links between sections are free to move.
- J. Thoroughly inspect all engine cases for cracks or other damage.
- K. Inspect the following items visually:
 1. Thermocouples for proper installation and connections.
 2. Rocker box scavenger lines and oil sumps.
 3. All accessories and connections.
 4. Engine mounting.

- L. Have a man operate engine controls from the cockpit and test operation of the following: Boosters (have personnel and equipment clear of both propellers), throttles, mixture controls, propeller controls, air-scoop valves, oil cooler valves. Pump up gasoline pressure to at least 15 lbs. and inspect gasoline system in engine nacelle for leaks; have mixture controls in idle cut-off for pressure test. (NOTE: When inspecting control rods, special attention shall be paid to threaded portion of the rod next to the main body to find any cracks that may have started).
- M. If any of the rubber engine ring mount washers are found to be badly worn, they must be replaced or a notation made in the Trip Record Book for another station to accomplish same.
- N. Inspect visually the nozzle adapter housing between the injection carburetor and the engine for cracks in the housing which may have developed in service.
- O. Correct any items found to be in need of repair.

3. #3 CHECK

- A. In addition to the work listed for the #2 Check, accomplish the following:

- 1. Remove, inspect and clean the main oil screen. Replace cover gasket.
(NOTE: See sketch in engine section of service and maintenance for proper installation procedure).
- 2. Change spark plugs - lubricate threads on spark plugs with regular #32 Gredag spark plug lubricant. Place a small amount on threads, using care not to get any on the spark plug electrodes. Make sure plugs are down firmly against the gaskets but do not use extreme force. (NOTE: Tighten spark plugs to the torque setting specified under Service & Maintenance Engine Adjustments.

Seal spark plugs and insulators with Corning Dow #4 compound on all spark plugs except where ceramic insulators are used with ceramic spark plugs. These shall be installed with gaskets only.

- 3. Test the Tachometer magneto adapter fillister head screws for being tight.
 - a. Check the gaskets for being in good condition.
 - b. If the adapter is found loose, remove the screws to determine if they are worn. Use only screws that are in good condition.
 - c. Tighten both fillister head screws.

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ENGINE ACCESSORIES

1. #1 CHECK

No work shall be done unless an item is reported to be in need of attention.

2. #2 CHECK

- Fuel System*
- A. Inspect all engine and accessory controls in nacelles, cockpit and center section, where readily accessible to visual inspection. Abnormal play, lost motion, or wear in the guides, rods or cables where found, must be corrected.
 - B. On injection carburetors, visually inspect the complete assembly in the nacelle, including control rods, bell cranks and bearings.
 - C. Inspect the carburetor air intake ducts for cracks or loose clamps.
 - D. Inspect fuel lines and fuel pressure lines for defects, chafing or improper supporting, fuel pump, and hose connections from fire-wall to engine. Replace any doubtful hoses; inspect hose clamps. Do not tighten clamps at each inspection.
 - E. Inspect the hydromatic propeller feathering motor and high pressure pump. Inspect fittings and connections. Inspect lines for leaks, chafing or maladjustment.
 - F. Inspect magnetos for any signs of looseness, cracks or other damage. Push magneto breaker cam oil device in once and release; magnetos not equipped with this device will not be oiled.
 - G. Inspect, and repair when necessary, all bonding in engine section. The .005 tin copper strip bonding will be used.
 - H. Inspect the following items visually/ for condition and/or being loose in mounting:
 - 1. Governor, and controls where accessible.
 - 2. Vacuum pump, and connecting lines from firewall.
 - 3. Manifold pressure lines, where visible.
 - 4. Hydraulic pump, and flexible connecting lines.
 - 5. Generator and connections.
 - 6. Electric starter and connections.
 - 7. Tachometer magneto and connections.
 - 8. Booster and connections.
 - 9. Carburetor and mounting.
 - 10. Spark plug leads.
 - 11. Windshield wiper acuatorque.

3. #3 CHECK

- A. In addition to the work listed under #2 Check above, accomplish the following:
 - 1. Oil carburetor air scoop valve bearings.
 - 2. At the third #3 Check, remove the can type oil separator from the nacelle and clean thoroughly by flushing out with oleum spirits and blowing air into the oil drain at the bottom of the can, making sure that the drain orifices are open and clean.

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3. When floor boards are removed, inspect the bellcrank directly below the wobble pump handle under the floor for looseness on the shaft and see that the taper pins are tight.
4. Check spark plug shielding leads for continuity with ohmmeter.
5. Megger entire ignition loom with low voltage megger.

1. CHECK

2. CHECK

3. CHECK

4. CHECK

5. CHECK

6. CHECK

7. CHECK

8. CHECK

9. CHECK

10. CHECK

11. CHECK

12. CHECK

13. CHECK

14. CHECK

15. CHECK

16. CHECK

17. CHECK

18. CHECK

19. CHECK

20. CHECK

21. CHECK

22. CHECK

23. CHECK

24. CHECK

25. CHECK

26. CHECK

27. CHECK

28. CHECK

29. CHECK

30. CHECK

31. CHECK

32. CHECK

33. CHECK

34. CHECK

35. CHECK

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ENGINE OIL SYSTEM

1. #1 CHECK

- A. Replenish oil in tank to proper level. Inspect filler cap and gasket if oil is added. Inspect covers over tank cap and measuring stick for proper fastening.

2. #2 CHECK.

- A. Same as for #1 Check.
- B. Inspect oil radiator, automatic temperature regulator, and tank installation, and inspect for oil leaks.
- C. Inspect all oil drain plugs and valves for being properly safetied.
- D. Inspect all oil lines and oil pressure lines, hoses, clamps, and supports where accessible to visual inspection. Replace any doubtful hoses or clamps. Do not tighten clamps unless found loose. Test clamps by applying a moderate rotating force with the fingers. Do not rely on visual inspection to locate loose clamps.
- E. Inspect condition of DZUS fasteners on oil tank filler neck covers.

3. #3 CHECK

- A. Drain and measure oil.
- B. Remove drain plug in tank to completely drain oil.
- C. Remove radiator drain plug and drain radiator.
- D. Remove engine main oil screen. Inspect and clean.
- E. Inspect all safeties after installation of drain plugs and screens
- F. Refill to specified level with Pennzoil XX (60 SAE) oil. After engine ground test, replenish to specified level.
- G. Same as B and D, & E in #2 Check.

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BATTERIES

1. #1 CHECK

- A. It will not be necessary to replace the batteries unless they have been used extensively on the ground, reported by the pilot, or it is deemed advisable to do so.

2. #2 CHECK

- A. Replace batteries prior to dispatch.

3. #3 CHECK

Same as #2 Check.

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ELECTRICAL SYSTEM

1. #1 CHECK (SEE MAINTENANCE MANUAL - RADIO AND ELECTRICAL FOR SERVICE INFORMATION)

- A. Repair or replace any lights reported out and replace any fuses or light globes which have failed in flight, being sure to use lights and fuses of the proper specifications.
- B. Test all cabin lights including call system. On night trips, test warning navigation landing and passing lights. Replace as necessary.

2. #2 CHECK

- A. Test all lights for operation and repair or replace as needed. (Be sure to use proper type).
- B. Examine supply and types of spare light globes due to be carried in the plane and replace as necessary.
- C. Inspect fuse panel for loose clips, loose wing nuts and connections, and for corrosion.
- D. Inspect all fuses in use and in the spare fuse panel for proper rating and see that none are blown. See that fuses are positioned in the clips so that the rating is visible without rotating the fuse. Replace as necessary.
- E. Test switches and replace any found to have questionable operating characteristics.
- F. Test operation of electrically operated instruments, such as gasoline quantity gauges and electric temperature gauges.
- G. Test operation of Klaxon warning horn by closing the throttles with the landing gear valve handle in the down position.
- H. Test operation of stewardess' signal buzzer.
- I. Test operation of Prop Anti-icers. See that fluid runs out of both discharge tubes, that both pumps operate, and that packing glands on valves are tight.
- J. Inspect generator control box for proper mounting. See that electrical disconnect plug is properly installed.

3. #3 CHECK

- A. Same as #2 Check.
- B. Test operation of electric razor, if carried.

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RADIO

1. #1 CHECK (SEE MAINTANENANCE MANUAL - RADIO & ELECTRICAL FOR INFORMATION)

- A. Correct any malfunctioning of equipment reported by pilots.
- B. Replace any discharged static cartridges.
- C. Glance over all external parts of the antenna systems for any damage which may have occurred during take-off or landing, or have been caused by striking an object in flight.
- D. On all originating trips and on through trips at LG, CG, CX, SL and SF make an operational check of all receivers. Check the 508A unit on the outgoing frequencies to determine if the plate and grid current and receiver operation is normal. It is not necessary to call ground stations when making this check.

2. #2 CHECK

- A. Same as items A and B for #1 Check.
- B. EXTERNAL
 - (1) Inspect all antennas, insulators, stubs, lead-ins, loops, springs, and lugs. Clean insulators if necessary.
- C. RADIO COMPARTMENT
 - (1) Inspect external condition of all exposed equipment, including covers, hold-downs, plugs, flexes, lead-ins, antenna posts, external switching systems, and shock-mounts.
- D. COCKPIT
 - (1) Visually inspect exterior of all cockpit radio equipment for evidence of physical damage.
 - (2) Operate all controls and note all indications and combinations including such non-radio components as Interphone System.

NOTE: The foregoing inspections are what might be termed qualitative. The "Tests" following are quantitative and shall be made during the customary pre-flight ground test of the plane.
- E. OPERATIONAL TEST
 - (1) Test short wave receiver and transmitter on dispatch frequencies and on frequencies of adjacent division. Test transmitter on 3105 KC. Tune transmitter if necessary. Transmitter testing and tuning must be done outside hangar. It is not necessary to call ground station.
 - (2) Test ES-198 long wave receiver on several stations on both "V" antenna and anti-static loop.

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JUNE 1, 1943	<p>(3) Test for background of 278 fixed tuning. Listen for control tower contacts with other ships.</p> <p>(4) Test ADF for proper operation on all frequency bands and all positions of function switch.</p> <p>(5) Test operation of marker receiver light.</p> <p>(6) Test all receivers individually for noise, including ignition and electrical, by running the gain up until a fair level of background noise is heard while the engines are running.</p> <p>(7) Test operation of both captain and first officer receiver and transmitter selector switches and interphone from both sides of cockpit by using headphones of one side of cockpit and microphone on the other and vice versa.</p> <p>(8) Test all volume controls for proper action.</p>	
3. #3 CHECK		
Same as #2 Check.		

INSTRUMENTS INCLUDING AUTOMATIC PILOT

1. #1 CHECK

- A. Correct any malfunctioning of instruments if found or reported by pilots.

2. #2 CHECK

- A. Note pilot's report (taken from Trip Record Book) for failures or improper instrument performance. Analyze the difficulty and correct as required, taking care NOT to change instruments unless it is reasonably certain that the trouble cannot be elsewhere.
- B. Make a visual inspection of each individual instrument for evidence of such items as listed below and correct as required.
1. Oil or fuel leaks.
 2. Evidence of rain leakage onto instruments or panel.
 3. Dirty cover glasses or unsightly panel.
 4. Cracked cover glasses.
 5. Improper installation.
 6. Zero reading of indicator hand on instruments so designed.
- C. Test operation of pitot-heaters. Visually inspect pitot-static tubes. Clean out pitot-static tube drain holes.
- D. Compare altimeter barometer settings.
- E. Inspect compass mounting and light connections.
- F. Inspect the card of incoming barograph to determine if its operation has been satisfactory and also that all information called for is noted in the proper spaces.
- G. Inspect auto-pilot servo "On" and "Off" valve handle located on the pilot's control pedestal. Test operation to make sure it will lock in the "Off" position.

3. #3 CHECK

- A. Same as #2 Check above.
- B. Inspect connections, tubing, mountings, and installation behind the instrument panel.
- C. Inspect auto-pilot piping and fittings, including flexible hoses where accessible to visual inspection. Tighten or replace fittings, hoses, or pipes where found, when necessary to stop leaks.
- D. On Auto-pilot, inspect cable connections and pulleys where visible. Main and follow up cables, and servo "Off" and "On" cables must be free working.
- E. Inspect servo cylinder mounting and supports. Observe if any excess hydraulic oil is found around servo unit.
- F. Inspect connections of cables and oil lines at servo cylinders.

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FUEL SYSTEM

1. #1 CHECK

- A. When a plane originates from any station, the gas tank sumps and gas screens shall be drained and inspected for water, after completing gasoline servicing and as close to scheduled departure time as practicable. The K-3 valve for the strainer being drained shall be turned on the main tank for that side.
- B. Other than A above, no work will be done unless difficulty is reported.

2. #2 CHECK

- A. Same as #1 Check.
- B. Inspect all fuel lines, fuel pressure lines, hose connections and supports when visible through apertures or by removing cowlings.
- C. Inspect hose clamps and replace any doubtful hoses or clamps. Do not tighten clamps at each inspection unless found loose. Test clamps by trying to slip each clamp around the hose. Do not rely upon visual inspection to locate loose clamps. The fuel lines where accessible to visual inspection must be inspected for defects, chafing, or improper supporting which may have developed in service.
- D. Inspect dump chute and mechanism where visible, and through apertures. Make sure cover over release handles does not fly open when fire extinguisher door is opened.
- E. Inspect tank filler necks, caps, and gaskets. Replace cap gaskets when and if necessary.
- F. Inspect tank and engine selector valves, and their operating mechanism, where readily accessible to visual inspection. Frayed cables, worn pins, splines, or excessive play in the control where found must be corrected.
- G. Inspect the cross feed valves and control mechanism.
- H. Operate the fuel selector valves and make certain they drop into the notches for each tank and that the indicator dial so indicates.
- I. Test operation of wobble pumps and inspect operating mechanism where visible.

3. #3 CHECK

- A. Same as #2 Check.
- B. Drain fuel tank sumps and remove and clean C-3 strainers. The C-3 strainers shall be cleaned prior to engine ground test. Replace the gasket each time the screen is removed. The tank sumps shall be drained after refueling and as close to departure time as practicable. Any water found in the gas tank sumps shall necessitate immediate draining of the C-3 strainers to remove any water.
- C. Test operation and indication of fuel indicator system. See Maintenance Manual-Radio and Electrical Section B-5 for instructions.

FUSELAGE

1. #1 CHECK

- A. Glance over the fuselage for any damage which may have been done during landing or take-off at a previous station.

2. #2 CHECK

- A. Visually inspect fuselage for buckled or wrinkled skin, especially near attachment points of the center section and forward of the leading edge of the stabilizer.
- B. Inspect control cables, pulleys, guides and brackets, where visible and through apertures.
- C. Inspect both battery compartments, battery terminal receptacles, slides, stops, locking mechanism, and covers. Lubricate slides with Pennzoil XX oil (60 SAE) as necessary.
- D. Inspect doors, hinges and locks of cargo compartments, cockpit, and cabin regular and emergency exits. Inspect rubber stripping around doors and replace as necessary. The locks, shock cord and rear bolts on the cockpit emergency hatch shall be carefully inspected to insure that this hatch will not blow off in flight.
- E. Inspect front and rear cargo compartments. Any part of the cargo compartment lining or floor that may cause damage to the cargo should be repaired.
- F. Inspect the cabin air supply nose valve and its operating mechanism for damage due to possible overstraining.
- G. During winter operations, apply a coat of propeller anti-icer fluid to the rubbers of the air supply nose valve. This is to prevent the ice from causing a stuck valve.
- H. Inspect cockpit sliding windows for free movement.
- I. Inspect double windshield for condition and proper setting of controls.

3. #3 CHECK

- A. Same as #2 check.
- B. Oil external door locks with ice machine oil.
- C. Test the operation of pilot's seat adjustments.
- D. Remove floor boards in front companionway.
 - 1. Inspect and clean when necessary the control cables, turnbuckles, orackets, supports, pulleys and fairleads where readily accessible to visual inspection.
 - 2. Wipe out any accumulated oil, dirt, or water where found during inspection.
- E. Clean cannon plug receptacles of battery compartments.
- F. Clean battery cart cannon plug connections.

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CABIN

1. #1 CHECK

- A. Fill water tank.
- B. No work to be done except such as may be called to attention by the stewardess.
- C. When time permits inspect cabin for broken seats or other damage and repair as necessary.

2. #2 CHECK

- A. Same as A above.
 - 1. Correct all items on Stewardess Detail Report.
 - 2. Inspect all seats and seat belts including stewardess seat and belt. The reclining mechanism on the passenger seats should be tested, making sure that the seats recline to the full extent of their travel and that the locks work properly. Return the seat backs to the upright position with care to prevent damage to the stop mechanism. Inspect cabin for loose screws and any other protruding objects which may be the cause of damage to clothing, including center ash trays which may have sharp protruding edges.
 - 3. Inspect crew nameplate holders for proper fastening.
 - 4. Inspect all cabin fresh and foul air ventilators for operation.
 - 5. Inspect operation and condition of all food containers.
 - 6. Inspect coat hangers and hat racks. Pilots coat hangers to be wood with rubber covered hooks.
 - 7. Inspect tables and holders.
 - 8. Inspect condition of buffet, buffet door spring clips, and equipment.
 - 9. Inspect lavatory, wash basin and drain, toilet cover, soap dispenser, water supply tank and operation of faucet.
 - 10. Inspect cabin window frost shields and replace any shields found torn or badly scratched.
 - 11. Inspect window curtains and snaps; repair or replace as necessary.
 - 12. Make sure the stewardess' interphone handset is in place.
 - 13. Inspect all cabin rungs and fasten down any found to be loose or out of place.
 - 14. Inspect cockpit seat covers and replace as necessary.
 - 15. Inspect and see that there are (8) cargo tiedown straps stored in the valuables compartment.

3. #3 CHECK

Same as for #2 Check.

- (a) Inspect observers jump seat and mount in rear cargo compartment for condition of seat cables and strap. Repair as necessary.

WINGS**1. #1 CHECK**

- A. Visually inspect the wings for any damage that may have been incurred during a previous take-off or landing.

2. #2 CHECK

- A. Inspect the wings and center section externally for loose or missing rivets, cracked, deeply scratched, or buckled skin.
- B. Inspect aileron hinges and covering, especially outer aileron-hinge bracket for cracking at the flange,. Inspect drain holes in ailerons for being open.
- C. Inspect aileron tab, hinges and hinge fittings.
- D. Inspect the operation and condition of the wing flaps and operating mechanism where visible or through apertures. Inspect wing flap indicator to make certain it shows correct position of flaps.
- E. Inspect all fairing and wing attaching angle covers.
- F. Visually inspect wing tip attaching screws and center section screws for any signs of looseness.

3. #3 CHECK

- A. Same as #2 Check.
- B. Remove wing attaching angle fairings. Inspect angles for cracks and corrosion, using not less than a 4-power magnifying glass.
- C. During the first #3 Check, after engine change, remove fairing from attaching angles on fuel tank cover plates. Inspect for cracks and corrosion using not less than a 4-power magnifying glass. Inspect bolts for tightness.
- D. During the first #3 Check after engine change, while the fairing is removed, try all wing attaching angle bolts for tightness.

NOTE: Mechanics should just feel these nuts with a wrench having a 4" handle. They should not be tightened or pulled up unless they are actually found loose. Any bolts found loose must be replaced, including the elastic stop nut.

- E. On subsequent #3 Checks, it will not be necessary to inspect these bolts for tightness unless there is reason to doubt their condition.
- F. Lubricate wing flap operating mechanism.
- G. Inspect outer aileron hinge ribs for cracks by removing the inspection plate on the upper surface of the wing just out bound of the outer aileron hinge.
- H. Inspect rivets on wings just back of landing lights and replace those found defective.

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EMPENNAGE

1. #1 CHECK

- A. This check will consist of only a quick visual external inspection of the tail sections to make certain that there are no holes or dents therein.

2. #2 CHECK

- A. Inspect skin and fabric coverings; wrinkled or distorted skin may indicate a structural failure.
- B. Inspect stabilizer, fin, and fairing.
- C. Inspect operation and condition of rudder and elevator hinges, and tab hinges.
- D. Inspect rudder and elevator torque tubes and torque arms where accessible to visual inspection.
- E. Inspect drain holes in elevators and rudder for being open.
- F. When deicers are not installed, inspect leading edge abrasion shoes for being properly secured.

3. #3 CHECK

- A. Accomplish the work listed under #2 Check.
- B. Visually inspect the center bolts on the stabilizer for any signs of looseness or failure.

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FLIGHT CONTROLS

1. #1 CHECK

- A. Inspect cockpit to see that all removable objects are in their proper place and properly secured.

2. #2 CHECK

- A. Same as #1 Check.
- B. Inspect all control cables, sheaves, and guides where readily accessible, control columns, wheels, rudder pedals and adjusting mechanism.
- C. Inspect actuating arms, bearings where accessible to visual inspection, and covering of all control surfaces.
- D. Inspect the operation of the control surfaces from the cockpit to make sure that the rudder, elevator, and ailerons are free and do not bind.
- E. Operate the aileron, elevator and rudder tabs in both directions from the cockpit - testing for free movement, and inspect the indicating mechanisms where visible. Return all tab controls to zero.
- F. Inspect stop plugs on front end of rudder pedal spline shafts for signs of looseness.
- G. Inspect elevator horn stop bracket and rubber stop bumpers.
- H. Inspect rudder stop cables, fittings and springs.

3. #3 CHECK

- A. In addition to the work listed under #1 and #2 Checks, accomplish the following:
 - 1. Inspect control cables where accessible to visual inspection, especially where they go over a sheave or through a guide. Inspect turnbuckles and safeties where visible or through apertures.
 - 2. Lubricate aileron, elevator and rudder flap controls.

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HYDRAULIC SYSTEM

1. #1 CHECK

- A. Inspect fluid level in hydraulic system. Refill if below upper marking at the sight gauge with pressure at 500 lbs. or more on the hydraulic pressure gauge.

NOTE: Use only approved hydraulic fluids.

2. #2 CHECK

- A. Accomplish work as listed for #1 Check.
- B. Where accessible or through apertures, inspect lines, valves, hand pump, operating and control mechanisms for leaks, loose connections or chafing.
- C. Where accessible or through apertures, inspect supports and grommets where the lines pass through bulkheads, or skin.
- D. Inspect pressure accumulator and supply tank for leaks and check initial air pressure of accumulator carefully.
- E. Check operation of acrotorque windshield wiper, refer to S & M 15 (Hyd.). (Wet windshield before operating wiper).

3. #3 CHECK

- A. Same as outlined above for #1 and #2 Checks.
- B. Test blade pressure of acrotorque windshield wiper blade with scale.

LANDING GEAR

1. #1 CHECK

- A. Visually inspect tires for broken fabric, blisters, or cuts. Any tire found in a questionable condition shall be replaced before the plane is permitted to proceed.
- B. Remove cause of leak, refill with approved fluid, and inflate to proper height any oleo which is found to be flat. (NOTE: Use only approved fluids in oleos).
- C. Remove oil and grease from tires.

2. #2 CHECK

- A. Same as A - #1 Check.
- B. See that oleos are inflated to proper height, $4\frac{1}{2}$ " of piston exposed when plane is loaded with gas and oil only.
- C. Externally inspect wheels. Test tire valve cores for tightness and leaks. See that 17 x 16 tires are inflated to 45 lbs. and tail wheel tire to 60 lbs. air pressure. Cheyenne, Denver and Salt Lake only will inflate 17 x 16 tires to 48 lbs. This is because of higher altitudes.
- D. Inspect landing gear, fittings, bolts and locking mechanism.
- E. Inspect landing gear retracting mechanism where accessible to visual inspection.
- F. See that tail oleo is inflated to proper height ($9\frac{1}{2}$ " between center of filler plug and upper face of cylinder on the old type. On the new type, inflate strut until the measurement between the lower edge of the red stripe and upper shelf of the main cylinder body is 1-1/4" when plane is loaded with gas and oil only.)
- G. Inspect tail wheel lock and operation.
- H. Inspect tail wheel lock cable for proper tension.
- I. Inspect the tail wheel shear pin indicator marks; one located on the tail wheel spindle and the other on the lower bearing thrust collar. These marks should be up; any found otherwise will indicate a partly sheared pin.
- J. Inspect tail wheel fork assembly for cracks or broken members.
- K. Inspect flight wheel brakes.
- L. Test operation of foot and parking brakes.
- M. Inspect Bungee cords and their operating mechanisms.

3. #3 CHECK

- A. Complete work as outlined for #2 Check.
- B. Inspect landing gear indicating switches on bulkhead at rear of each wheel well for proper adjustment. Lubricate with ice machine oil.

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- C. Raise plane clear of floor with jacks provided. Remove wheels, inspect brake tubes and fittings for leaks.

NOTE: Whenever any work is to be done on the landing gear wheels or tail wheel, such as removing brake drums, axles, or replacing bolts, the air must be released from the tire before the work is started.

- D. Test bearings for being loose or worn by working the axle in the wheel.

- E. Remove tires and tubes from wheels and carefully inspect the tubes and casings, and wheels for cracks both inside and out. Make sure that only SCHRADER #4000 type valve cores are used in all tires, including tail wheel. Test valve for air leak after tire is inflated. (Note: Use only valve cores that are in good condition).

- F. Inspect brake lining; if lining is worn to the extent it is doubtful of lasting until the next #3 Check, it shall be replaced.

- G. Inspect springs and backing plate assembly. Inspect brake drums for cracks and warping.

- H. The retracting mechanism shall be tested by operating the hydraulic hand retracting device. Note if gear raises and lowers freely. Inspect flight wheel brakes while gear is retracted.

- I. Test indicating lights and horn with throttles when wheels are retracted.

- J. Inspect oleos for leaks.

- K. Inspect spring loaded safety latches and operating mechanism.

- L. Inspect landing gear and tail wheel assembly for cracked or broken members.

- M. Lubricate landing gear parts as called for on lubrication chart in this manual.

HEATING SYSTEM**1. #1 CHECK**

- A. Replenish water supply in reserve can.
- B. When the water can has been removed for summer operation, the water is to be trapped prior to landing. When the plane is serviced the water level should be checked and refilled to the three inch level in the sight gauge if necessary. If the water has not been trapped prior to landing, the system must be drained and refilled to the proper level. (System holds 4 quarts).
- C. On plane's arrival, visually observe if there is any steam escaping from the boiler, or from the lines in the engine nacelle before the pressure drops or is released.
- D. When ground temperatures are below those specified in the Service and Maintenance section of this manual, heating systems shall be drained completely including stop-overs and through dispatches.
- E. If a trip terminates at a station, the heating system shall be drained immediately, or before freezing can occur. (See instructions in manual).
- F. Filling the heating system will be done in accordance with instructions in this Manual.
- G. When freezing temperatures prevail, the surge tank relief valve vent line (opening beneath fuselage) shall be inspected for any restrictions due to ice, - prior to Dispatch.

2. #2 CHECK

- A. Accomplish the work outlined for #1 Check.
- B. Inspect globe valves for proper operation.
- C. Inspect controls and ducts where visible or through apertures.
- D. Test operation of cockpit and cabin heater controls and lock.

3. #3 CHECK

- A. Same as #2 Check above.
- B. Pressure test heating system in accordance with instructions in this Manual.

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DEICERS

1. #1 CHECK

- A. Inspect the deicer boots for any abnormal condition, such as cuts or tears, or the loosening of the boots from their attachments. Any cut or tear found must be repaired before the plane is allowed to proceed.

2. #2 CHECK

- A. Same as #1 Check.
- B. Where visible, inspect the prop anti-icer pumps, tank, connecting lines, and flowmeters. Test operation of pumps individually.
- C. Test wing deicer distributor valve and motor for operation.
- D. Drain the deicer system sump on planes so equipped.
- E. Check to be sure double windshield valves are functioning properly, and the windshield itself is effectively sealed.

3. #3 CHECK

Same as work and inspections outlined for #2 Check.

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EMERGENCY EQUIPMENT

1. #1 CHECK

- A. Inspect the pressure on the oxygen bottle tank gauge, and if less than 1600 lbs. at 70° F registers on the gauge, the bottle should be changed or filled.

2. #2 CHECK

- A. Visually inspect the oxygen bottle for any cuts, dents or nicks which may have occurred since installation. Refill or replace bottle if pressure is below 1600 lbs. at 70° F.
- B. Inspect the bottle supports, gauges and fittings, for any sign of failure or maladjustment.
- C. Visually inspect the low pressure valves, (and lines where visible), in the cockpit and stewardess' compartment for signs of failure.
- D. See that all Pyrene extinguishers assigned to plane are full and in thier proper places.
- E. Inspect the tell-tale on top of the plane's Lux extinguisher to see that the bottle has not been discharged, and the red indicating disk on right side of fuselage to see if bottle has been prematurely discharged.
- F. Inspect first aid kit for being sealed, if kit is not sealed contents must be checked and replaced as needed. Inspect parachute flares, port covers, slide retainers and springs, safeties, and visible portion of cables. Inspect 10-minute fusee and container.
- G. Check for blind flying hood being in place behind 1st officers seat.
- H. Clean D/F plotting boards.
- I. Inspect all navigational aids for being in proper place.
- J. Blow clean air into CO₂ fire extinguisher coupling at side of nacelle to make sure ball check is properly installed and operating.
- K. Check landing gear pins for being in place and sealed in kit in rear baggage compartment.

3. #3 CHECK

- A. Same as #2 Check.
- B. Whenever they have been used as indicated by removal from their container, wash metallic part of the "Lorgnette" type inhalation apparatus masks.
- C. Move selector handle on the Lux control to each engine to be sure that the valve is free.
- D. Test operation of Pyrene extinguishers. Test odor of contents and make certain that extinguishers are filled with the proper fluid.

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CLEANING - INTERIOR

1. #1 CHECK

- A. Arrange cabin in good order.
- B. Replace refuse container in toilet compartment if necessary.
- C. Clean cabin and cockpit windows inside and out.
- D. Check cabin window curtains for condition, repair or replace if necessary.
- E. Replace used refuse cartons.
- F. Sweep or vacuum floor.
- G. See that double windshield is thoroughly clean.

2. #2 CHECK

- A. Complete all items under #1 Check.
- B. Pilots' cockpit: Dust instrument board, empty ash trays, clean floor, cushions, and control columns. Replace pilots' seat covers if soiled.
- C. Passengers' Cabin: Clean cabin lining, chairs, behind chair arms next to cabin wall, cushions, ash trays, refuse cans, curtains, and stewardess' buffet equipment. Replace soiled removable equipment whenever condition warrants. Replenish supply of drinking cups. Replace used refuse cartons.
- D. Washroom: Clean fixtures, basin, mirror and toilet container. Replenish supply of toilet paper, Kotex, Kleenex, and soap.
- E. Cargo Compartments: Clean front and rear cargo compartments.
- F. Replenish supply of the deodorant solution in the DeVilbiss atomizer as necessary.
- G. Wash out interior of cabinets with soap and water.

3. #3 CHECK

- A. Same as work outlined above for #1 and #2 Checks.

CLEANING - EXTERIOR

1. #1 CHECK

- A. Wipe oil and dirt from cowlings and wings as necessary.

2. #2 CHECK

- A. Remove all oil and dirt from wings, fuselage, empennage, and landing gear in accordance with the instructions covering.
- B. After the cleaning operations have been completed inside and out, the Crew Chief shall inspect the plane for cleanliness and initial the form UO-78.

3. #3 CHECK

- A. Same as #2 Check.
- B. Wash exterior of plane.

"C" OR "C-3" ENGINES - INJECTION CARBURETORS

	<u>Start</u>	<u>Warm-Up</u>	<u>Run-Up Min.</u>	<u>Run-Up Normal</u>	<u>Run-Up Max.</u>	<u>Idling</u>	<u>Stop</u>
<u>CONTROLS - POSITION OF</u>							
Parking Brakes	on	on	on	on	on	on	on
Cowl Flaps	open	open	open	open	open	open	open
Cross Feed	off	off	off	off	off	off	off
Propeller	TO	TO	TO	TO	TO	TO	TO
Mixture	idle cut-off then TO & CL.	TO & CL	TO & CL	TO & CL	TO & CL	TO & CL	idle cut-off
Throttle	1/4 open	as req.	as req.	as req.	as req.	closed	1/4 open
Carb. Air	cold	*cold	cold	cold	cold	cold	cold
<u>READINGS - INSTRUMENTS</u>							
Hydraulic Press.	500 lbs. or +	600 +	600 to 800	600 to 800	600 to 800	600 +	500 or +
Fuel Press	3 to 4	12 or +	14	15	16	12 or +	0
Fuel Press. Warning Light on at.	--	10 or-	--	--	--	10 or -	--
Oil Press.	Ind. 30 sec.	200 to 70	**70	90	125	15 or +	0
Oil Press. Warning Light on at.	--	50 & -	--	--	--	50 & -	--
RPM	--	800 to 1000	2250	***	2500	400	0
Manifold Press.	Bar Press.	Ind.	30	30	30	Ind.	Bar. Press.
Cyl. Temp.	Ind.	350 or -	200	300	375	375 or -	Ind.
Oil Temp	Ind.	Ind.	100	150	170	170 or -	Ind.
Generator Planes' Voltmeter.	--	--	13 to 14	13 to 14	13 to 14	--	--
Generator Planes' Ammeter.	--	--	Ind.	Ind.	Ind.	--	--
Vacuum Each Pump	--	Ind.	3	4	5	Ind.	0
Vacuum Each Pump Aux. Horizon.	--	Ind.	3	3-3/4	4	Ind.	0
Deicer Press. Each Pump.	--	Ind.	5	5 to 7	7	Ind.	0
****Deicer Press. Both Pumps RPM 1500	--	Ind.	7	8 to 9	9	Ind.	0
Deicer Tube Inflation Cycle Approx. 45 Sec..	--	--	--	--	--	--	--
Steam Press.	--	Ind.	12	15	17	Ind.	--
Steam Press Warning Light on at.	--	5 or -	--	20 or +	5 or -	--	--
Gyro-Pilot Oil Press. Speed Valves Closed Each Pump.	--	Ind.	80	85	90	Ind.	0

* Use 90 F. Carb. Air during any precipitation.
 ** Minimum Oil Press. in regular flight 70 P.S.I.
 " " to continue to next station 65 P.S.I.
 *** Drop in each Magneto not over 100 RPM.
 RPM varies with altitude from approx. 2300 sea level to 2450 6,000 ft.
 **** Do not allow tail of plane to leave the ground.

NOTES: Ind. = Indication - = Below + = Above

7-25-41

ALLOWABLE-LIMITS-- GROUND-RUN-UP ENGINE AND INSTRUMENT READINGS

PRE-FLIGHT TEST ENGINES AND EQUIPMENT

1. Regardless of the type of check done, when a plane lays over at a station, the engines and equipment shall be tested before the plane is released for dispatch. (NOTE: Engines shall not be run-up on the ground without the ring cowl installed).
2. During warm-up and ground testing of engines, the readings on the instruments at the various RPM shall not exceed the maximums and minimums as set forth in the chart on "Allowable Limits - Ground Run-Up - Engine and Instrument Readings". Any deviation from these limits must be corrected before the plane is released for service.
 - A. Start engines as outlined under Service and Maintenance, in this manual.
 1. Make engine run-ups on a clear area where there is no loose ice, stones or other loose material directly beneath the propellers.
 - B. During warm-up, test operation of:
 - (1) Each engine on all tanks containing fuel.
 - (2) Cross-feed fuel valve - Return to "off" position.
 - (3) Fuel level gauges.
 - (4) Vacuum operated instruments and vacuum on each pump.
 - (5) Each hydraulic pump on both systems.
 - (6) Engine boosters - booster switch "on", ignition switch "off" at 800 RPM.
 - (7) Deicers on each and both pumps. (When deicers installed).
 - (8) Deicer pressure.
 - (9) Time of deicer boot inflation cycle. (Approximately 45 seconds).
 - (10) Visual inspection - (inflation and deflation) all deicer boots.
 - (11) Electrically operated instruments.
 - (12) After oil temperature is 100° F or higher, test prop governors and bleed props several times to work air and cold oil out and warm oil into the domes.
 - (13) Make "OPERATIONAL TEST" of radio as itemized under Radio #2 Check".
 - (14) Make "OPERATIONAL TEST" of auto pilot as outlined in this manual.
 - (15) During warm-up frequently note instruments to ascertain that all units are functioning properly.
 - C. During engine run-up at 30"MP, inspect or test:
 - (1) RPM. (Both and individual magnetos).
 - (2) Oil pressure.
 - (3) Oil temperature.
 - (4) Cylinder head temperature.

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<div> <ul style="list-style-type: none"> (5) Fuel pressure. (6) Engine smoothness. (7) Back off M.P. to 25" and test with mixture control in "cruise" and "Emergency". Note generator voltage and amperage. </div> <div> <p>D. Engine shut down. Note the following:</p> </div> <div> <ul style="list-style-type: none"> (1) Steam pressure. (2) Idling RPM. (3) Idling fuel pressure. (4) Idling oil pressure. (5) Oil warning units. (6) Fuel warning units. (7) Bleed manifold gauges at idling RPM. (8) Shut down engine as specified under service and Maintenance 5. </div> <div> <p>E. Place controls as follows before leaving cockpit:</p> </div> <div> <ul style="list-style-type: none"> (1) Prop controls "take-off" position. (2) Ignition switches "off". (3) Landing gear valve "down". (4) Flap valve "Up". (5) Gas "Off". (6) Battery switch "off" (Daylight). <ul style="list-style-type: none"> 1. All switches "off" except battery and navigation lights during darkness. (7) Windows closed (inclement weather); doors closed and locked. (8) Heating system as required. (9) All tab controls "neutral." (10) Control surfaces locked by gyro-pilot. (11) Parking brakes "on". (12) Manifold gauges set for respective engines. (13) Hydraulic star valve "closed". </div>		

SERVICE AND
MAINTENANCE SECTION

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FOREWORD

1. The "Service and Maintenance" section of this Manual Outlines the methods in which service and repairs are to be accomplished on our airplanes. It is desired to arrange this information in order most accessible to service personnel. The various chapters follow the same sequence as the items listed on the form UO78, and in addition, where possible, they will be broken down into the following order:
 1. Service
 2. Replacement
 - A. Removal
 - B. Assembly
 - C. Installation
 3. Adjustment
 4. Repairs
2. The primary purpose of our mechanical organization is to have our equipment kept in as nearly perfect mechanical condition as possible.
3. Our secondary purpose is that the appearance of our equipment should, in all respects, represent its mechanical condition.
4. Cleanliness not only improves the appearance of our equipment, but convinces the public and passenger that our planes are well maintained.
5. Service men should be careful while working in and around our planes and bear in mind that grease and dirt on hands and coveralls is very easily transferred to cabin interiors and may cause more cleaning expense than the soiling by passengers.
6. For the purpose of brevity and simplicity, in the following instructions our aircraft engines will be referred to as follows:

S1C-3G Engines as "C-3"

S1C-G Engines as "C"
7. Service and maintenance on batteries and electrical equipment circuits is contained in the "Maintenance Manual Radio and Electrical".

REFUELING AND
OILING

2

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REFUELING AND OILING

1. General

- (a) No man under any circumstances shall leave unattended a truck or plane that is being refueled.
- (b) Fuel hose nozzles shall have all notches removed, and the man doing the refueling shall hold the nozzle open. These nozzles shall never be held open with a block, tool, or by any other means except the hand.

2. Refueling and Oiling

- (1) By the use of the Appleton plug, ground airplane to a point of zero potential. When gassing with a truck, the truck also shall be grounded.
- (2) Install approved type gassing ladder against the wing and secure to airplane by means provided. Use cat walks at all times when refueling planes.
- (3) Ground wire on the nozzle must be connected to the special plug provided on the top of the wing before the gas cap covers are removed and left connected until fuel tank covers on that side of the plane are reinstalled.
- (4) The man in charge of the crew preparing the airplane for dispatch shall obtain a written notice from the Dispatcher as to the amount of fuel to be carried on that trip.
 - (a) He shall then designate the responsibility to one man to see that the specified amount of fuel is aboard the plane. This man shall visually check all tanks and definitely determine the amount of fuel in partially filled tanks with the use of the approved measuring stick.
 - (b) The person who refuels the airplane shall advise the dispatcher of the total gas in each tank for entry on the clearance.
- (5) The man who makes the final check on the amount of gasoline carried in the airplane shall be responsible for properly installing oil tank caps and covers.
- (6) The written notice that is received from dispatch as to the amount of fuel requested shall be kept on file for a period of at least 24 hours.
- (7) When refueling from a pit or an overhead system, a 15-pound CO₂ bottle of its equivalent shall be stationed in the immediate vicinity of the gassing ladder.
- (8) When gassing from a truck, the door that houses the large fire extinguisher shall remain open.
- (9) Do not connect or disconnect the battery cart during refueling operations.
- (10) During refueling operations, the batteries of our planes shall not be changed unless at least one battery is connected to the load at all times.
- (11) The radio transmitter shall not be used or tested during refueling operations.
- (12) The gasoline truck must at all times be maneuvered very slowly when approaching or leaving an airplane.

- (a) The truck must never be headed into or backed toward an airplane preparatory to refueling. Always turn parallel to the wings and stop parallel to the wings when servicing, so that the truck is always under control and far enough away from the airplane so that no damage will be incurred in case of a brake failure or other irregularities.
 - (b) The engine shall be kept running until the truck has come to a full stop. (Trucks equipped with vacuum brake systems are of no use if engine has stopped.)
 - (c) Throttles must be operated smoothly and slowly to reduce the possibility of back-firing.
- (13) If any gasoline is spilled on the airplane, equipment or ground, the man in charge of the crew shall be responsible to see that the following is done immediately:
- (a) Stop the engines of all automotive equipment.
 - (b) A fire guard must be appointed to establish a restricted area around the spilled fuel.
 - (c) Spray fuel with generous amount of carbon-tet.
 - (d) All automotive equipment possible must be pushed clear of the area by hand.
 - (e) Push plane clear of spilled gasoline so that there will be no danger of fire when starting the engines or by engine exhaust when plane is taxied away.
 - (f) The fire guard must restrict the affected area from operations by any company until all of the gasoline has completely dissipated.
- (14) Plane oil tanks will be filled to the following levels each time the fuel tanks are serviced:
- (a) DC3-A
16 gallons of oil will be carried in each tank regardless of the amount of fuel carried. The oil stick shall be removed and wiped off and reinserted before taking a reading of the oil level.
- (15) Fuel tanks shall always be serviced in the following order:
- (a) DC3-A
 - (1) With total load of less than 420 gallons, the order of filling tanks shall be as follows:

When 260 gallons or more are to be carried, the load may be split evenly between the left and right main tanks; or, where the load is from 350 to 420 gallons the left main may be filled with the remainder placed in the right main tank. IN NO CASE WHERE THE PLANE IS LOADED TO PROVISIONAL GROSS LOAD SHALL THERE BE LESS THAN 130 GALLONS IN THE RIGHT MAIN TANK.
 - (2) With total gasoline load of more than 420 gallons, the order of filling tanks is as follows:

First - both main tanks, second - Left Auxiliary, Third - Right auxiliary.

PROPELLERS 3

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PROPELLERS - HYDROMATIC

1. **Service** (see Maintenance Manual - Radio and Electrical for information in control circuit (see Accessories for Governor)

A. Feathering - (Procedure for testing feathering mechanism and operation)

1. Oil temperature must be 70° F. or warmer.
2. Position one man at the propeller to be tested, and the other in the cockpit.
3. Feather propeller by holding down feathering switch. Observe when the blades have reached their full feathered position. The propeller blade will be in the full feathered position when the index marks on the blade shanks are 1/8" from the parting surface of the hub. Unfeather blades and the man at the propeller will observe when they have reached the 30° position. Then signal the man in the cockpit to stop the operation. This will prevent the blades from striking the low pitch stops.
4. If, for some reason, it is necessary to feather and unfeather two or three times, the main sump oil drain plug shall be removed and excess oil drained from the engine. If this is done at other than a #3 Check, the oil may be returned to the oil tank.
5. Careful observation should be made for leaks in the feathering pump and lines during the operation of the pump.

CAUTION: A. Always see to it that men and equipment are clear of both propellers before an attempt is made to feather or unfeather, as it is possible that the propeller will start to turn slightly before the blades begin to change pitch. Also, if the solenoid switch (Leach #5039) fails to operate, the starter will turn the engine over.

B. The propellers shall never be unfeathered with the engines running while on the ground, as it is difficult to ascertain the position of the blades with the engines running, and damage might result if the propeller mechanism strikes the low pitch stops while under unfeathering oil pressure.

B. Removing Air From Domes

1. Should reports on hydromatic propeller read "Unable to synchronize", or "over-revving on take-off", the trouble is probably caused by air in the dome. Ground test engine, operating the propeller governor control from extreme low to high pitch and extreme high to low pitch, four or five times, to free the dome assembly of air. (Caution: Avoid excessively high manifold pressures or over-revving during this operation.) If this has been done previously with no result--feather and unfeather the propeller.

2. Replacement

- A. CAUTION: Do not rest the blade tip on the work stand while tightening or loosening the crankshaft nut; support it on a ladder at least eighteen inches in from the tip. Do not rest the weight of the propeller on the tips after it is removed or before installing on the engine. Have sufficient men to handle it both for the protection of the man and the propeller.

B. Removal

1. Remove the anti-icer distributor tube and attaching bracket.
2. Remove the plug and seal in the front of the dome.
3. Remove the lock screw and the dome retaining nut.
4. Remove the dome.

NOTE: To facilitate removal of the dome on -23 propellers, screw the puller and extension sleeve provided into the hole in the front end of the dome and pull dome assembly straight forward, being careful to support the weight of the dome assembly so it will not drop and harm either personnel or equipment. On propellers with dash numbers higher than dash 23 the dome is jacked off as the retaining nut is unscrewed.

5. Remove the locking pin from the propeller retaining nut and unscrew the valve assembly with the proper open end wrench.
6. Move all three blades to the negative pitch stops. This moves the blade and gear segments out of the way and reduces the possibility of damage to the gear teeth when loosening the propeller retaining nut.

CAUTION: Move the blades slowly when going toward the negative pitch position to avoid damage to the blade gear segments, negative pitch stop pins, and Micarta barrel-spider supports, which will be the case if the blades are turned with considerable force.

7. Loosen the prop retaining nut and remove the propeller.

C. Assembly - Hub and Blade Packings

1. General

- (a) It is to be understood that these seals hold oil by virtue of the edges being held tightly against their respective walls by oil pressure. It follows then that there must be definite clearance between the rings in order to affect the proper seal. The Packing rings will not hold oil pressure properly if they are tightly forced one against the other.
- (b) Before an attempt is made to remove the blade packing nuts and packing rings, loosen the hub bolts to give .010" to .020" clearance between the barrel halves.

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- (c) Due to the light construction of the sealing rings, it is imperative that care be exercised during installation. Seals should be inspected before installation to be sure the chevron edges are sharp and free from cuts or gashes.
- (d) Thoroughly coat each ring with oil and using a piece of heavy oiled paper as a skid to prevent the rings from being cut on the propeller blade, slide all four rings down over the blade shank. Insert the header ring first (the one with the triangular cross section) and seat the ring evenly. Next slide the two rubber lip rings, one at a time and Chevron edge first, into the recess in the housing. Care should be used to insure proper seating of edges on the ring ahead and to guard against turned or twisted edges. Install the follower ring, chevron edge first, with the flat side toward the packing nut.
- (e) Split the packing nut and assemble the halves around the blade shank. Be sure the numbers on both halves of the nut correspond as these nuts are manufactured in units and will not fit properly unless they are matched.

2. Adjusting Packing Nuts - 23 props

- (a) The required clearance between rings is obtained when the blade packing nut is set flush with the barrel. The -23 propeller barrels have the stop shoulder in the packing cavity to prevent tightening the packing nuts beyond the desired point. This step is solder and the nuts should only be snugged up.
- (b) Line up the nearest locking hole and tighten and safety hub bolts and safety packing nuts.

3. Adjusting Packing Nuts - 33 and later propellers

These propellers have a stop shoulder in each barrel and it is only necessary to screw down the packing nut until it bottoms and back it up to the first locking hole. Insert locks in locking holes and tighten and safety hub bolts.

D. Installation

- 1. Clean hub and stub shaft splines and coat lightly with Pennzoil 60 SAE engine oil. Install and inspect rear cone for fit against crankshaft thrust nut.
- 2. Install the propeller on the engine shaft, sliding it back only far enough at first to engage the threads of the propeller retaining nut with those of the shaft.
- 3. Move all blades to the negative pitch stops.

CAUTION: Move the blades slowly when going toward the negative pitch position to avoid damage to the blade gear segments, negative pitch stop pins and Micarta barrel and spider supports, which will be the case if the blades are turned with considerable force.

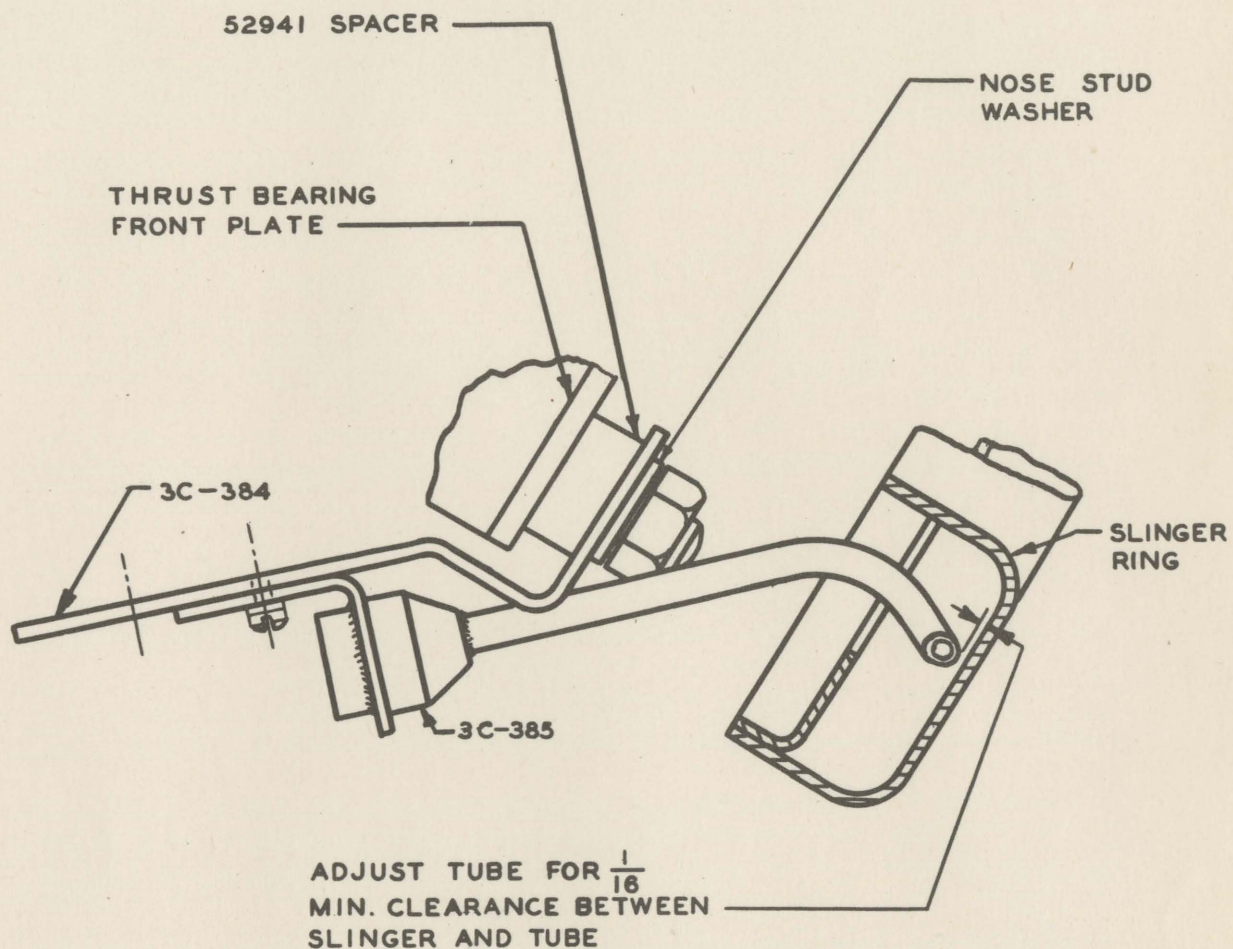
4. Tighten the propeller retaining nut with a force equal to 300 pounds at the end of a 30" bar, and line up one of the slots with a hole in the engine stub shaft.
5. Make sure that the 1/32" copper gasket is in place against the adapter flange inside the Engine Stub shaft.
6. Inspect the valve housing oil transfer plate on the base of distributor valve assembly to be sure that it is properly in place with the 1/32" copper gasket between it and the valve housing.
7. Oil the threads on the valve assembly; screw into the shaft; tighten with the 15" wrench provided with a force equal to 150 pounds. Line up a locking slot in the valve housing with the safety hole in the shaft. Under no circumstances should the valve housing be backed off even slightly in order to obtain slot and hole alignment. If alignment cannot be obtained, a new gasket should be used.
8. Install the locking ring with the pin through the retaining nut slot, propeller shaft hole, and into the valve housing slot, locking all three. Snap the wire into position in the groove provided for it in the nut.
9. Make certain that the dome and barrel oil seal is in good condition and installed properly. The round rubber seal is used for the domes of -23 propellers and the flat rubber seal is used for the domes of the -33 or later propellers.
10. Move the piston in the dome assembly to the extreme forward position, high pitch.

NOTE: When installing the dome assembly, it is absolutely essential that the piston is fully forward and the blades are against their full feather stops to insure that the blades are correctly timed with the dome. Be sure that the high pitch stop ring does not drop out during handling or installation of the dome.

11. With the blades against their feathered stops, slide the dome assembly over the end of the valve assembly, making sure that the four piston rings on the valve assembly enter properly into the sleeve inside the piston. Turn the dome assembly counter-clockwise until the dowels in the barrel shelf engage with the aligning holes in the base of the dome assembly and push the dome straight back.

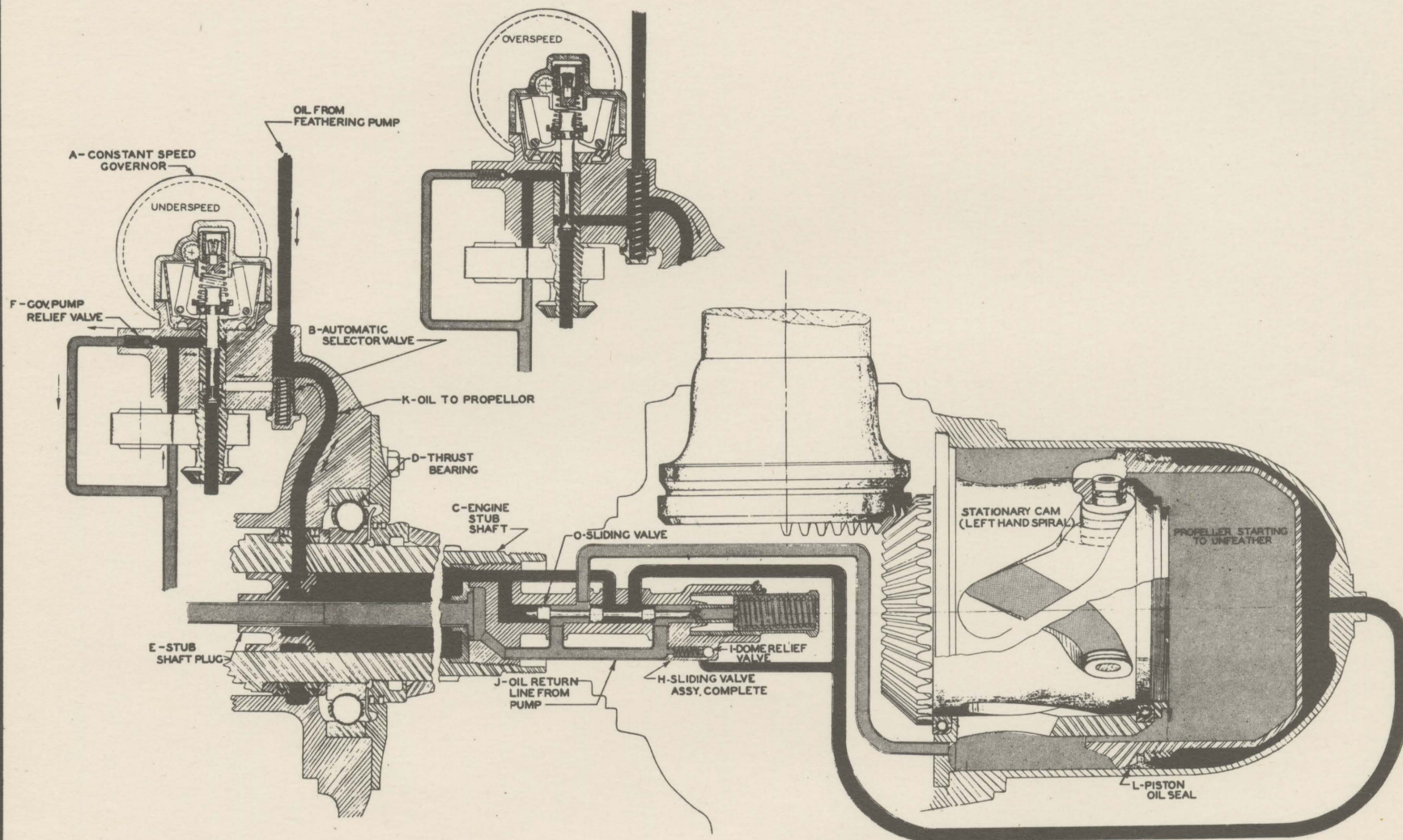
NOTE: The dome unit may be installed in any of the three possible positions which are 120 degrees apart.

12. Screw down the dome retaining nut and tighten it, using a one-foot pipe extension over the handle of the regular service station wrench and using a force equal to 150 pounds. When starting dome into place, do not back it up because a portion of the flat rubber dome seal may catch on the hub threads and slip over the rear end of the dome unnoticed:



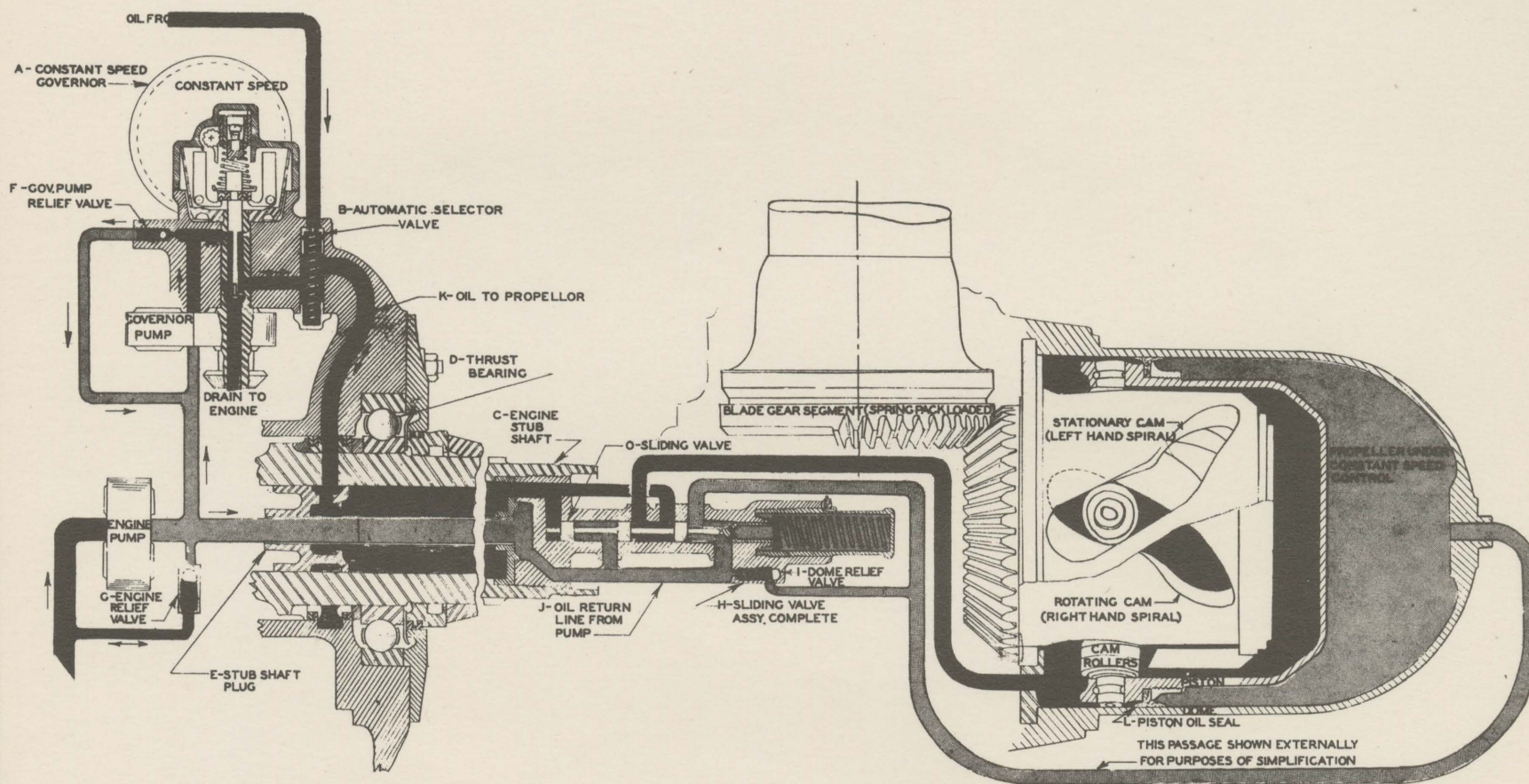
1. INSTALLATION ON ENGINE WITH -23 PROPELLERS AS SHOWN.
2. INSTALLATION ON ENGINE WITH -33 OR LATER PROPELLERS SAME AS SHOWN EXCEPT HAMILTON STD. SPACERS ARE REPLACED WITH NOSE STUD WASHERS.

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June 1, 1943	<p>13. Install the dome retaining nut lock screw, and safety.</p> <p>14. Install the packing and plug in the front end of the dome, tighten, and safety with lock wire.</p> <p>15. Inspect all external lock wires and safeties.</p> <p>16. Whenever a Hydromatic Propeller has been completely assembled or the dome assembly removed and re-installed by a Station, the blades shall be rotated to their full low pitch position by hand and the marks observed to make certain that all three blades are properly positioned. <u>This precaution must be taken after each assembly and prior to ground test</u> to insure that the blade gear teeth are properly positioned with the gear teeth on the dome assembly.</p> <p>17. Install anti-icer distributor tube and attaching bracket.</p> <p>(a) When installing a -23 propeller on a "C" or "C-3" engine, install spacers #52941 on the two studs under bracket 3C-384 and adjust distributor tube to 1/16" clearance on the slinger ring wall, using the upper screw holes. (See propeller anti-icer distributor drawing following)</p> <p>(b) To install a -33 or later Hydromatic Propeller on a "C" or "C-3" engine, install two regular thrust plate stud washers under bracket slinger wall, using the lower screw holes. (See propeller anti-icer distributor drawing following)</p> <p>18. After installing a propeller dome and prior to ground testing, move all three blades by hand to the low pitch stops. Operate the feathering pump until the blades have reached approximately the 30 degree pitch position. The reason for this is that if the engine were started with the blades above low pitch without oil behind the dome piston, the blades might return to low pitch due to the centrifugal twisting movement with such force (depending on engine speed) that damage to the stops might result.</p> <p>E. <u>Domes - Hydromatic Propellers - Interchangeability</u></p> <p>(Note: See page 2 of this section for removing air from domes.)</p> <p>1. The domes of our -23 propellers are directly interchangeable with those of other -23 propellers.</p> <p>2. The domes of the -33 and later propellers are not directly interchangeable from one propeller to the other due to the fact that the number of gear preload shims between the stationary cam and stop plate of the domes may vary. Calculation of the gear preload requires complete disassembly of the dome and the use of micrometers; therefore, a dome of a -33 or above propeller will be kept with its respective hub and blade assembly.</p> <p>3. Adjustment - Pitch Stops - "C" or "C-3" Engine</p> <p>A. First, remove the outer stop ring (H1 Pitch Stop Ring) and set the inner stop ring to 18 degrees. Second, set the high pitch stop ring to 88 degrees.</p>	



7-27-38

HYDROMATIC PROPELLER—DIAGRAM A



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HYDROMATIC PROPELLER—DIAGRAM B

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B. The rings can be easily removed by use of two 10-32 screws in the tapped holes.

C. Propeller Balancing

Comment: It so happens that the control column on ad DC3-A is resonant to propeller-engine unbalance at certain RPM's. The RPM which is most satisfactory for use with our procedure is from 1900 to 2050 depending on where the greatest indication appears.

The so-called propeller unbalance may be the accumulation of any one of various items: reduction gear assembly dynamic unbalance, propeller shaft runout from true center, thrust bearing runout, propeller out of static balance, and propeller dome out of dynamic balance. So far, in our experience, the following relatively simple procedure will effectively correct for any combination of the above in our service.

Required Equipment:

1. Vibration wedge indicator
2. 1" width adhesive tape
3. Unbalance correction means:
 - (a) Amberry Dull Propeller Paint and Spray Gun (Berry Brothers)

CAUTION: Before a decision is made to dynamic balance a propeller by means of the following method, personnel should be absolutely certain that the engine or propeller vibration is not being caused by faulty operation of the engine such as misfiring of spark plugs, shorting high tension leads, or carburetion difficulties.

Procedure:

1. (a) Clean propeller blades of all oil traces; thinner may be used.
 - (b) Note blade numbers on hub of propeller and mark this number with pencil on the propeller blade where it can be easily seen.
2. Install vibration wedge indicator on Douglas control column (Fig. 1 attached sketch).
3. Engine Runs: Propeller control full forward and the other engine stopped.
 - (a) Unloaded run: Very gradually increase the RPM from 1900 to 2050 and observe the greatest consistent indication on the indicator. Example, Fig. 2 which reads .09 as indicated by the tip of the white wedge forming down between the two black wedges which appear when the control column is vibrating. It is a practice at the Repair Base to correct and balance any propeller which indicates more than .05" unbalance on left engine and .04 unbalance on the right engine.
 - (b) Loaded run #1 blade: Load #1 blade with three turns of 1" adhesive tape if unloaded reading "a" is below .10 amplitude. Use four turns of tape if unloaded indication is greater than .10 amplitude. Wrap

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tape around outer edge of white paint strip and always break tape when it is advancing toward the trailing edge so air flow will not loosen it (Fig. #3).

Start and very gradually operate engine from 1900 to 2050. Record greatest consistent vibration indication. Example, Figure #4, reading is .15".

- (c) #2 Blade: Remove tape from blade #1 and apply the same or an equal length of tape at the same location as on blade #1. (Extreme of white paint mark).

Run engine gradually from 1900 to 2050 and record greatest consistent reading. Example, Figure #5, reading .03" amplitude.

- (d) #3 Blade: Remove tape from #2 blade and apply same amount of tape at same location as on Blades #1 and #2. Run engine from 1900 to 2050 and record greatest consistent reading. Example, Fig. #6, reading .12" amplitude.

4. Analysis of Readings:

Balance No. Tape, L. Prop., Ind. .09 RPM 1920

" 3 turns, Blade #1, " .15 " "

" " " " #2, " .03 " "

" " " " #3, " .12 " "

A comparison of these readings shows Blade 1 and 3 to be heavy, with #1 slightly the heavier; therefore, weight must be added to #2 blade and a slight amount to #3 blade.

5. ADDING WEIGHT TO THE BLADES: UNDER NO CIRCUMSTANCES SHALL METAL BE REMOVED FROM THE BLADES THEMSELVES FOR BALANCING PURPOSES. THERE WILL BE NO GRINDING OF BLADES FOR THIS PURPOSE.

(a) Paint Method:

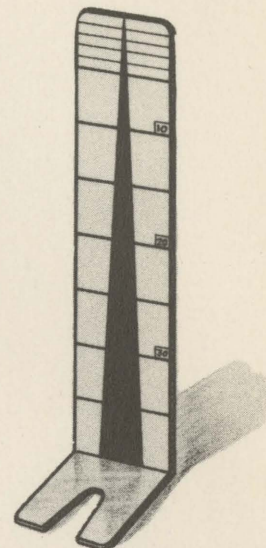
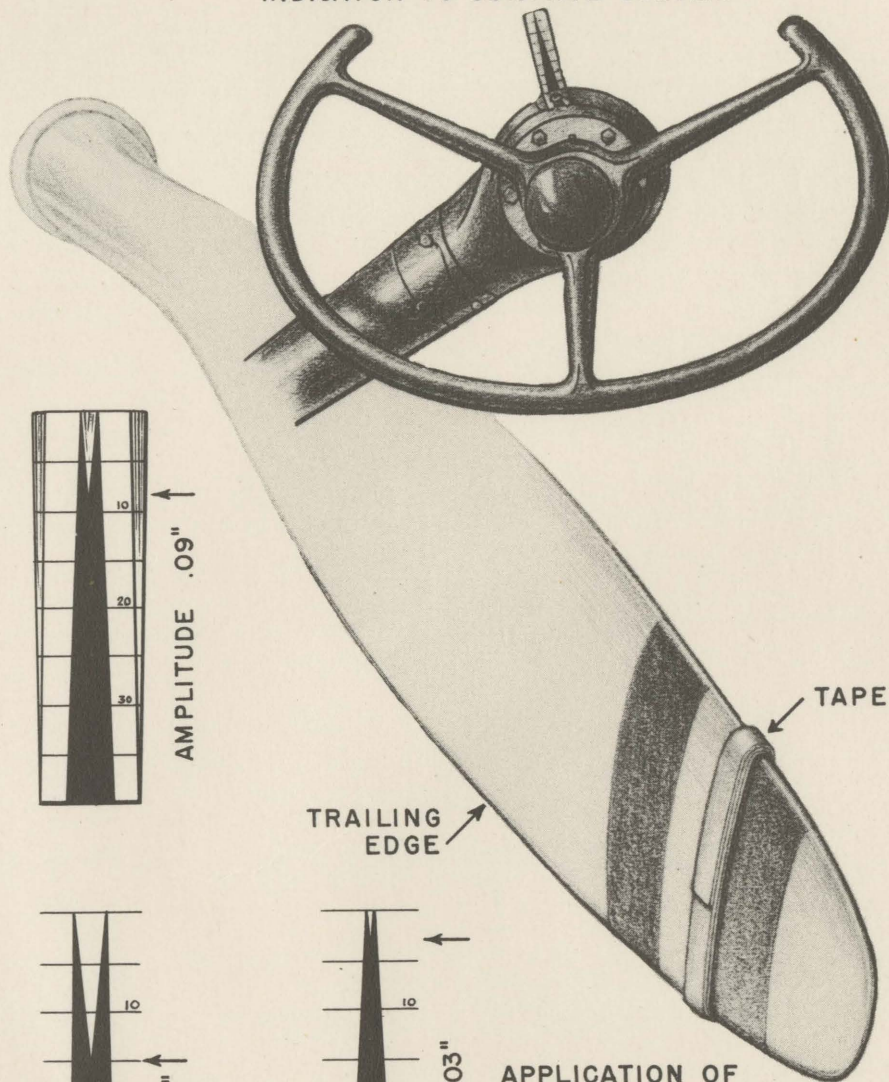
- (1) By means of a spray gun, cover the back surfaces of all blades with a service coat of Amberry dull paint. Install the fibre masks 17½ inches from the hub of the propeller, Fig. #7. Allow to dry thoroughly. This coat of paint tends to assist in retaining propeller balance in service by allowing equal abrasion of paint on all three blades.

The proper mixture of paint for spraying requires the addition of 20% by volume of Toluol Thinner.

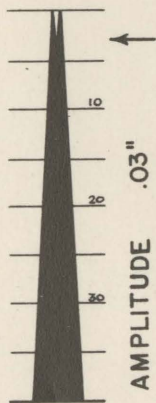
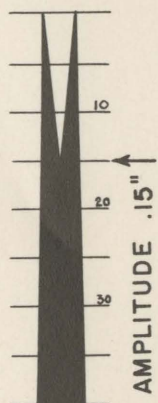
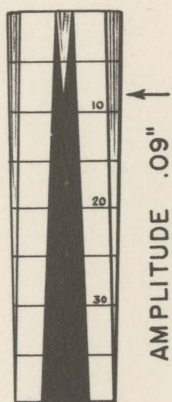
Correct for unbalance by spraying additional coats of paint on the light blades in the proportion indicated by the analysis of unbalance 4. Spray the lightest blade first to assist in drying time. For example, we would suggest two additional coats of paint on #2 blade and one light coat additional on #3 blade. Allow paint to dry before testing the result.



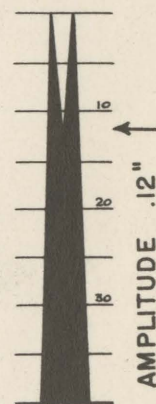
APPLICATION OF INDICATOR TO CONTROL COLUMN



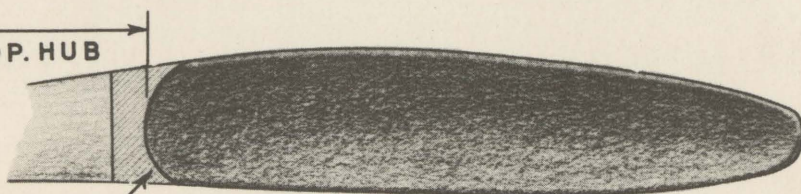
VIBRATION WEDGE INDICATOR



APPLICATION OF TAPE TO PROPELLER ON WHITE BAND, EDGE AGAINST RED BAND. STOP TAPE WHEN HEADED TOWARDS TRAILING EDGE.



17 1/2" TO PROP. HUB



FIBRE MASK

PAINT ON BACK SIDE OF BLADE

ISS 95827

5-24-43 E.W.E

DOUGLAS PROPELLER BALANCING PROCEDURE

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June 1, 1943

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If the amount of unbalance is still beyond limits, apply one turn of tape to the indicated lightest blade (Example #2) and test for indication to see if more paint is necessary.

4. Repairs

- A. Service stations are properly equipped to remove nicks, dents, and abrasions and it is desirable to concentrate this work at these stations. Should a propeller be found with a bad nick by any station, it is permissible to repair, provided instructions contained in this manual are closely followed.
- B. Nicks, gashes and sharp dents are particularly dangerous as they greatly reduce the fatigue strength at the damaged point and must be removed promptly to avoid failures. Nicks should be removed locally without the necessity for reworking the entire blade surface. A Hand-ee Grinder #3 $\frac{1}{2}$ A with assorted emery wheels and four steel cutters #5903, 5905, 5915 and 5917 shall be used in removing the sharp base of the nicks and gashes on pitch and camber faces. Fine emery or crocus cloth should be used in polishing out the grinder marks. Care should be taken in removing nicks from the blade face to insure that the thickness is not reduced more than necessary. Remove nicks and dents on leading and trailing edges by means of a fine half-round file. At no time will a hammer be used to peen or smooth up nicks or dents, or straighten bent leading or trailing edges, as this practice will cause further concentration of the stress and reduce the fatigue strength. See diagram titled "Typical Nicks and Methods of Repair".
- C. After removing the nicks by grinding or filing, and then polishing, the blade shall be examined with a 4X magnifying glass to insure that the nick is entirely removed and that a crack has not started. If there is any question as to the possibility of a crack having started, the blade shall also be etched locally and examined with a 4X magnifying glass.
- D. A metal template is furnished to all Service Stations and the width of the blade will not be reduced below that specified on the template for the blade station in question. If it is necessary to reduce this width below the allowable minimums, the propeller must be replaced.
- E. To repair a leak in the spider packing part #53626 of propellers 23E50-109 up to and including 23E50-287, it will be necessary to remove the propeller and pull the rear half of the barrel assembly.
- (CAUTION: If the barrel support blocks become dislocated, the front half of the barrel will have to be removed to reseal the blocks. Do not try to drive blocks back in place if they slip. Be careful to keep the brass shims from falling out from under the blocks. They must be retained in their original position.)
- F. To repair a leak in the blade packings part #52791 of propellers 23E50-181 up to and including 23E50-287, it will be necessary to remove the propeller and part the barrel halves enough to remove the old packing and reinstall new.

Note CAUTION in "E" above.

- G. The angular setting of the anti-icer tube and bracket assembly part #3C-389 on the propeller blades should be 31° as shown in following sketch with a minimum clearance of $1/16"$ and a maximum of $3/32"$ between the fluid outlet end of nozzle and the propeller blade feed shoe.

5. Etching

1. After a nick has been removed, cleanse the area around the point for approximately two inches in all directions with a caustic soda solution to the ration of one pint of water to $1/4$ pound of commercial caustic soda.
2. After this solution has remained in contact with the metal for one or two minutes, rinse off with clear water; then wash with a nitric acid solution to the ratio of one part of commercial nitric acid to five parts of water, until the area in question is bright and all traces of the black deposit are removed. The blade will be thoroughly rinsed with running water or washed with hot water to insure that all traces of acid are removed. This operation is to be repeated until the desired dull silver finish is obtained.
3. A propeller that has been properly etched will have a dull silver finish in contrast to the smooth polished surface of the unetched blade. It should be understood that the etching effect is produced by the caustic soda solution. The nitric acid solution simply brightens and cleans the surface and stops the action of the soda solution.

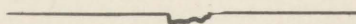


LEAD. EDGE NICKS

WRONG

REPAIR

CORRECT



TOO SMALL AN AREA. RE-ENTRANT CURVES TOO SMALL & SHARP.



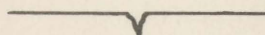
RADIUS SHOULD BE AT LEAST 6 TIMES THE DEPTH, SMOOTH & WITH GOOD RE-ENTRANT CURVES AT EDGES.



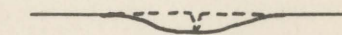
TOO SMALL A RADIUS AT ENDS - NO RE-ENTRANT CURVE.



FLAT LARGE SMOOTH RADII AT ENDS OF FLAT.



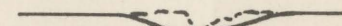
TOO SMALL AN AREA FOR DEPTH OF NICK. NO LONG RE-ENTRANT CURVES.



NOTE LONG RE-ENTRANT CURVES.

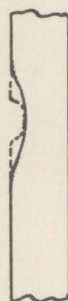
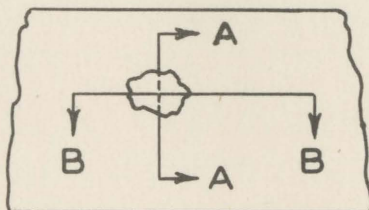


FORMS NOTCH ITSELF.



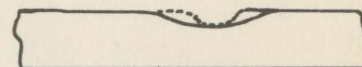
RADIUS SHOULD BE EVEN.

FACE NICKS

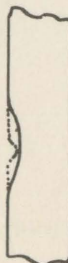
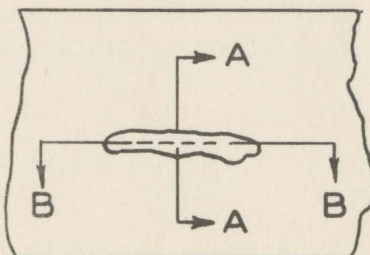


SECTION A-A

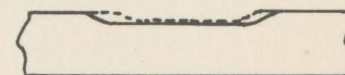
REPAIRS



SECTION B-B



SECTION A-A



SECTION B-B

JSS 95827

6-27-41

ENGINE
NACELLE

4

Date
JUNE 1, 1943

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ENGINE NACELLE

1. Repairs

A. Engine mounts

1. Cracked or broken engine mount members shall be repaired in accordance with Civil Air Regulations, Part #18.

B. Cowling Field Method

1. Normally the cowling shall be patched and repaired at the repair base.
2. If a repair is necessary in the field, metal of the same material and thickness shall be used and the patch shall be placed on the outside of the cowling and riveted to it with the rivet heads toward the outside.
3. The patch will be large enough to cover the hole or crack and extend one inch or more if possible on all sides.
4. Sufficient number of rivets shall be installed to insure against wind getting between patch and cowling proper and tearing or loosening the cowling.
5. At no time shall the center line of an outer rivet be closer to the edge of the sheet than twice the diameter of the rivet.
6. Care shall be used in handling cowling to prevent damage.
7. Care must be used so that the various bolts and clamps on ring cowl flaps will not be tightened too tight. Extreme tightening causes too much friction and overloads the operating cylinder and will not allow the flaps to go into trail position. Worn parts shall be replaced.
8. Ring cowls shall not be interchanged from right to left or from plane to plane unless absolutely necessary, and then the numbers shall be recorded in the Trip Record Book.

ENGINES

5

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ENGINES

1. Service

A. Starting - General - All Engines

- (1) Engines which have been standing idle for $\frac{1}{2}$ hour in freezing temperatures or one hour in above freezing temperatures shall be turned over by hand two full revolutions of the propeller in direction of rotation before starting is attempted.

(NOTE: Do not use the engine starter for this).

- (2) Before engines are started, the plane should be so positioned that the propeller blast will not blow into hangars, buildings, people, automobiles within range, or other planes either in flight or on the ground. If possible, engines shall be started where concrete, grass, or hard dirt without loose gravel, is directly beneath the propellers.
- (3) The wheels must be securely blocked fore and aft and the plane nosed directly into the wind whenever possible. If it is not possible to nose the plane directly into the wind, the tail shall be secured to the ground with a tie-down.
- (4) Engines shall never be started until all equipment such as passenger loading stands, workstands, ladders, carts, trucks, and personnel are clear of the plane and the operator has received the proper starting signal.
- (5) A man familiar with starting operations shall be at the plane with an approved CO₂ bottle having a quick connect coupling for attaching to the nacelle CO₂ connection and carbon-tetrachloride fire extinguishers, and larger extinguishers shall be immediately available.
- (6) Engines shall not be started immediately after gassing the plane if the tanks have been overflowed or gas spilled about. To prevent a fire hazard, if gas is spilled on the ground, the plane shall be moved backward or forward clear of the area.
- (7) Only a certificated pilot or certificated A & E mechanic familiar with the controls (provided such mechanic is approved by the station Chief Mechanic or Station Manager) shall be allowed to start or run up an engine and pronounce it OK for service. If only one person is in the cockpit, he shall sit on the left hand side.
- (8) CAUTION: Always move throttles and propeller pitch controls slowly, causing a gradual change in RPM and reducing the stress on the impeller assembly and the engine. This is an important rule, as practice to the contrary may result in unnecessary damage to the engine and possible future engine failure. Never operate an engine at over 20" H.G. when propeller control is in high pitch.
- (9) Unnecessary idling of engines for long periods of time is not approved. When necessary to run engines at a low speed, run them at 500 to 600 RPM and in addition, open throttles slowly about half way at frequent intervals to clear the cylinders of excess oil.