FAA Approved
Airplane Flight Manual Supplement

DOCUMENT NUMBER 172042

For

Cessna 172 N and P

Serial No. 17271035 thru 17276673

Serial No: 17274143 **Reg. #:** 396SK

This supplement must be attached to the Pilots Operating Handbook and the FAA Approved Airplane Flight Manual when **STC SA4428SW** which installs 180HP. Lycoming O-360 series engines and fixed pitch propellers. The information contained herein supplements or supersedes the basic Manual only in those areas outlined herein. For limitations, procedures, and performance information not contained in this supplement, consult the basic Airplane Flight Manual.

FAA Approved JM Baker
for Margaret Kline
Manager, Wichita Aircraft Certification Office
FAA Central Region,
Wichita, KS
Date: 12/2/2011

Original Date: 09/25/87

172042
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17274143

Log of Revisions

Revision	Pages	Description	Approved	Date
Orig	All	Original Issue		08/27/85
1	1-4	Added P Model Revised page numbers Revised Cover Sheet and Section 1, General Added Engine Models	G. M. Baker	9/17/87
2	All 3 & 4	Name Change Added Sensenich Model 76EM8S14	G. M. Baker	01/17/89
3	3 & 4	Added 0-360 A4N	B.L. Sorensen	3/21/90
4	All	Changed document formatting Changed maximum continuous RPM Added Sections 3 - 7	G M Baker	12/2/2011

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SECTION 1: GENERAL

The information contained in this Flight Manual Supplement is FAA Approved material, and is applicable to the operation of the airplane in accordance with STC SA4428SW which installs 180HP. Lycoming engines and fixed pitch propellers.

SECTION 2: LIMITATIONS

Powerplant Limitations

Engine Model Number: 0-360-A2F, A3A, A4A, A4M, and A4N
Engine Type: Normally aspirated, direct drive, air cooled, horizontally opposed, carburetor equipped, four cylinder engine with 360 cu. in. displacement.
Horsepower Rating and Engine Speed 180 rated BHP at 2700RPM.
Maximum Continuous RPM: 2700 RPM

Static RPM Limits: 2250 to 2450 RPM (Carb Heat Off, mixture leaned for maximum RPM)

Propellers:
Sensenich Propellers approved on installations using the O-360-A4 series engines only
Propeller Manufacturer: Sensenich Corporation
Propeller Model Number: M76EM8S14-0-60
Number of Blades: 2.
Propeller Diameter: Maximum ..... 76 inches.
Minimum..... 76 inches.
Pitch Range: 62 to 56

Propeller Manufacturer: Sensenich Corporation.
Propeller Model Number: M76EM8S-0-60 (when using MKA3.5 prop spacer).
Number of Blades: 2.
Propeller Diameter: Maximum: ..... 76 inches.
Minimum: ..... 76 inches.
Pitch Range: 62 to 56

Approved on all approved engine installations:
Propeller Manufacturer: McCauley Accessory Division.
Propeller Model Number: 1A170/CFA
1A170E/CFA
Number of Blades: 2.
Propeller Diameter: Maximum: ..... 76 inches.

Minimum: ..... 74.5 inches.
Propeller Type: Fixed Pitch
Pitch Range: 60 to 56

AIRSPEED LIMITATIONS
Unchanged from the original Cessna Owners Handbook.

AIRSPEED INDICATORS MARKINGS
Unchanged from the original Cessna Owners Handbook.

FLAP LIMITATIONS
Unchanged from the original Cessna Owners Handbook.

PLACARDS

NOTE
Only the placards listed below are changed from the FAA Approved Data

(8). On oil filler cap or clearly marked on the dipstick:

OIL **8 QTS.**

SECTION 3: EMERGENCY PROCEDURES

Unchanged from the original Cessna Owners Handbook

OPERATIONAL CHECK LISTS
Unchanged from the original Cessna Owners Handbook

SECTION 4: NORMAL PROCEDURES

SPEEDS FOR NORMAL OPERATION
Unchanged from the original Cessna Owners Handbook

SECTION 5: PERFORMANCE

Refer to the Owners Manual for descriptions of all items not contained in this section.

All performance data not contained in this section is considered to be equal to or better than the data contained in the Owners Manual.

CRUISE FUEL CONSUMPTION
(NOT FAA APPROVED)

Conditions:
2300 Lbs.
Recommended Lean Mixture.

		20°C Below Standard Temp.		Standard Temperature		20°C Above Standard Temp.	
Press. Alt Feet	RPM	% BHP	GPH	% BHP	GPH	% BHP	GPH
2000	2550	---	---	76	10.2	72	9.6
	2500	77	10.3	72	9.6	68	9.1
	2400	69	9.2	64	8.7	61	8.3
	2300	61	8.3	58	7.9	55	7.6
	2200	55	7.5	52	7.2	49	6.9
	2100	49	6.8	46	6.6	43	6.3
4000	2600	---	---	76	10.2	72	9.6
	2500	73	9.7	68	9.2	65	8.7
	2400	65	8.8	62	8.3	58	8.0
	2300	58	8.0	55	7.6	52	7.3
	2200	52	7.3	49	6.9	47	6.6
	2100	46	6.6	44	6.3	41	6.1
6000	2650	---	---	76	10.1	72	9.6
	2600	77	10.3	72	9.6	68	9.1
	2500	69	9.3	65	8.8	62	8.4
	2400	62	8.4	59	8.0	56	7.6
	2300	56	7.7	53	7.3	50	7.0
	2200	50	7.0	47	6.7	44	6.4
8000	2700	---	---	76	10.1	71	9.5
	2600	73	9.8	69	9.2	65	8.7
	2500	66	8.8	62	8.4	59	8.0
	2400	59	8.1	56	7.7	53	7.3
	2300	53	7.4	50	7.0	47	6.7
	2200	47	6.7	45	6.4	42	6.1
10,000	2700	77	10.2	72	9.6	68	9.1
	2600	69	9.3	65	8.8	62	8.4
	2500	63	8.5	59	8.1	56	7.7
	2400	57	7.8	53	7.4	50	7.0
	2300	51	7.1	48	6.8	45	6.5
12,000	2700	69	9.3	65	8.8	62	8.4
	2600	66	8.9	62	8.4	59	8.0
	2500	60	8.2	56	7.7	53	7.4
	2400	54	7.5	51	7.1	48	6.7
	2300	48	6.8	45	6.5	42	6.2

RANGE PROFILE
Compute range based on the available fuel load on the aircraft, altitude, ground speed and engine fuel consumption.

ENDURANCE PROFILE
Compute endurance based on the available fuel load on the aircraft and engine fuel consumption.

SECTION 6: WEIGHT AND BALANCE

Reference the Aircraft Weight and Balance and Equipment list Supplement.

SECTION 7: AIRPLANE & SYSTEMS DESCRIPTIONS

ENGINE

Refer to the Textron Lycoming Operators Manual #60297-12 for a description of the engine and related components.

FAA Approved
Airplane Flight Manual Supplement

DOCUMENT NUMBER 172057

For

Cessna 172 P

Serial No. 17274010 to 17276673

Serial No: 17274143 **Reg. #:** 396 SK

This supplement must be attached to the Pilots Operating Handbook and the FAA Approved Airplane Flight Manual when **STC SA2196CE** (which increases the gross weight to **2550** lbs) and **STC SA4428SW**, (which installs an O-360 Lycoming 180 HP engine), are installed.

The information contained herein supplements the information of the basic Airplane Flight Manual. For limitations, procedures, and performance information not contained in this supplement, consult the basic Airplane Flight Manual.

FAA Approved
Kent S. Lund
Manager, Central Flight Test Section, AIR-714
Federal Aviation Administration
Wichita, KS

Date: 11/22/19
Original Date: 02/16/99

LOG OF REVISIONS

Revision	Page	Description	Approved	Date
Orig	All	Original Issue	G.M Baker	10/02/87
1	3 & 4 1-10	Added O-360-A4N Changed Company Name	B.L. Sorensen	3/21/90
2	All	Revised Weight And Balance Charts Added Document Number	G. M. Baker	02/16/99
3	All	Reformatted, Added Document Number, Moved Table of Contents from Cover Page and Included Section Applicability, Added Propellers, Added Fuel Consumption Chart, Added Section 7 Handling Service And Maintenance	G. M. Baker	02/03/2012
4	8 & 10	2550lb Maximum Glide Speed is: 68 KIAS, was: 65 KIAS Sea Level Best Rate of Climb Speed Is: 73 KIAS, was: 76 KIAS	Karl Lee	11/22/19

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SECTION 1: GENERAL

The information contained in this Flight Manual Supplement is FAA Approved material, and is applicable to the operation of the airplane in accordance with STC SA2196CE which increases the max. certificated takeoff weight to 2550lbs, when the airplane has previously been modified with STC SA4428SW.

DESCRIPTIVE DATA

ENGINE

Engine Model Number: 0-360-A2F, A3A, A4A. A4M, and A4N
Engine Type: Normally aspirated, direct drive, air cooled, horizontally opposed, carburetor equipped, four cylinder engine with 360 cu. in. displacement.
Horsepower Rating and Engine Speed 180 rated BHP at 2700RPM.
Maximum Continuous RPM: 2700 RPM

MAXIMUM CERTIFICATED WEIGHTS

Takeoff,	Normal	2550 lbs.
	Utility	2100 lbs.
Landing,	Normal	2550 lbs.
	Utility	2100 lbs.

PROPELLERS:
Sensenich Propellers approved on installations using the O-360-A4 series engines only
Propeller Manufacturer: Sensenich Corporation
Propeller Model Number: 76EM8S14-0-60 *
Number of Blades: 2.
Propeller Diameter: Maximum ..... 76 inches.
Minimum: ..... 76 inches.
Pitch Range: 62" to 56 "

Propeller Manufacturer: Sensenich Corporation.
Propeller Model Number: 76EM8S-0-60 (when using MKA3.5 prop spacer).
Number of Blades: 2.
Propeller Diameter: Maximum: ..... 76 inches.
Minimum: ..... 76 inches.
Pitch Range: 62" to 56"

Approved on all approved engine installations:
Propeller Manufacturer: McCauley Accessory Division.
Propeller Model Number: 1A170/CFA
1A170E/CFA

Number of Blades: 2.

Propeller Diameter: Maximum: .....76 inches.
Minimum:.....74.5 inches.
Propeller Type: Fixed Pitch
Pitch Range: 60" to 56"

Approved on installations using the O-360-A4A, -A4M, -A4N, and A3A engines only:

Propeller Manufacturer: McCauley Accessory Division.
Propeller Model Number: 1A170/JFA

Number of Blades: 2.
Propeller Diameter: Maximum: .....76 inches.
Minimum:.....74.5 inches.
Propeller Type: Fixed Pitch
Pitch Range: 60" to 56"

SECTION 2: LIMITATIONS

AIRSPEED INDICATOR MARKINGS

Air Plains Services PN: 172861 or 172861-2 or existing airspeed indicator, marked as follows:

MARKING	KIAS VALUE OR RANGE
White Arc	40-85
Green Arc	50-127
Yellow Arc	127-158
Red Line	158

AIRSPEED LIMITATIONS

VA Maneuvering Speed:

2550 Pounds	105 KIAS
2150 Pounds	95 KIAS
1750 Pounds	85 KIAS

POWER PLANT LIMITAIONS

Engine Model Number: O-360-A2F, A3A, A4A, A4M and A4N
Maximum Power: 180 BHP rating
Maximum Continuous RPM: 2700 RPM

Static RPM Limits: 2250 to 2450 RPM

WEIGHT LIMITS

Maximum Takeoff Weight,	
Normal	2550 lbs.
Utility	2100 lbs.
Maximum Landing Weight,	
Normal	2550 lbs.
Utility	2100 lbs.

FLAP TRAVEL - Limited to 30°

CENTER OF GRAVITY LIMITS –

NORMAL CATEGORY

Center of Gravity Range:
Forward: 35.0 inches aft of datum at 1950 lbs. or less, with straight line variation to 41.0 inches aft of datum at 2550 lbs.
Aft: 47.3 inches aft of datum at all weights.

UTILITY CATEGORY

Center of Gravity:
Forward: 35 inches aft of datum at 1950lbs. or less, with straight line variation to 35.5 inches aft of datum at 2100lbs.
Aft: 40.5 inches aft of datum at all weights.

FLIGHT LOAD FACTORS

NORMAL CATEGORY

Flight Load Factors (Maximum Takeoff Weight - 2550 lbs.):
Flaps Up ..... +3.8g, -1.52g
Flaps Down..... +3.0g

PLACARDS

Near airspeed indicator:

MANEUVER SPEED - 105 KIAS

SECTION 3: EMERGENCY PROCEDURES

AIRSPEEDS FOR EMERGENCY OPERATION

Engine Failure after Takeoff:
- Wing Flaps Up ..... 70 KIAS
- Wing Flaps Down ..... 65 KIAS

Maneuvering Speed:
- 2550 lbs ..... 105 KIAS
- 2150 lbs ..... 95 KIAS
- 1750 lbs ..... 85 KIAS

Maximum Glide:
- 2550 lbs ..... 68 KIAS
- 2150 lbs ..... 62 KIAS
- 1750 lbs ..... 56 KIAS

Precautionary Landing With Engine Power ..... 65 KIAS

Landing Without Engine Power:
- Wing Flaps Up ..... 70 KIAS
- Wing Flaps Down ..... 65 KIAS

ENGINE FAILURES

ENGINE FAILURE IMMEDIATELY AFTER TAKEOFF

1. Airspeed.....70 KIAS (Flaps Up)
   65 KIAS (Flaps Down)

ENGINE FAILURE DURING FLIGHT

1. Airspeed.....75 KIAS

FORCED LANDINGS

EMERGENCY LANDING WITHOUT ENGINE POWER

1. Airspeed..... 70 KIAS (Flaps Up)
   65 KIAS (Flaps Down)
5. Wing Flaps – AS REQUIRED (30° recommended)

PRECAUTIONARY LANDING WITH ENGINE POWER

2. Airspeed..... 65 KIAS
6. Airspeed..... 65 KIAS

DITCHING

4. Wing Flaps.....20-30°

NOTE

If no power is available, approach at 70 KIAS with flaps up or at 65 KIAS with 10° flaps.

ICING

INADVERTENT ICING ENCOUNTER

11. Approach at 80 to 90 KIAS depending upon the amount of the accumulation.

SECTION 4. NORMAL PROCEDURES

NORMAL PROCEDURES

SPEEDS FOR NORMAL OPERATION

Unless otherwise noted, the following speeds are based on a maximum weight of 2550 pounds and may be used for any lesser weight.

Takeoff
- Normal Climb Out ..... 75-85 KIAS
- Short Field Takeoff, Flaps 10°, Speed at 50 Feet ..... 57 KIAS

Enroute Climb, Flaps Up:
- Normal, Sea Level ..... 75-85 KIAS
- Normal, 10,000 Feet ..... 70-80 KIAS
- Best Rate of Climb, Sea Level ..... 73 KIAS
- Best Rate of Climb, 10,000 Feet ..... 72 KIAS
- Best Angle of Climb, Sea Level ..... 62 KIAS
- Best Angle of Climb, 10,000 Feet ..... 67 KIAS

Landing Approach:
- Normal Approach, Flaps Up ..... 65-75 KIAS
- Normal Approach, Flaps 30° ..... 60-70 KIAS
- Short Field Approach, Flaps 30° ..... 62 KIAS

Balked Landing:
- Maximum Power, Flaps 20°. ..... 60 KIAS

Maximum Recommended Turbulent Air Penetration Speed:
- 2550 Lbs ..... 105 KIAS
- 2150 Lbs ..... 95 KAIS
- 1750 ..... 85 KIAS

SHORT FIELD TAKEOFF

Climb Speed ..... 57 KIAS (until all obstacles are cleared)

ENROUTE CLIMB

Airspeed ..... 75-85 KIAS

LANDING

NORMAL LANDING

1. Airspeed..... 65-75 KIAS (Flaps Up)
2. Wing Flaps..... AS DESIRED (0-10° below 110 KIAS)
   10-30° below 85 KIAS)
3. Airspeed..... 60-70 KIAS (Flaps Down)

SHORT FIELD LANDING

1. Airspeed..... 65-75 KIAS (Flaps Up)
Wing Flaps FULL DOWN (30°)
3 Airspeed..... 62 KIAS (until flare)

BALKED LANDING

5. Wing Flaps.....10° (until obstacles are cleared)
RETRACT SLOWLY after reaching a safe altitude and 65 KIAS.

SECTION 5: PERFORMANCE

LANDING DISTANCE - SHORT FIELD

CONDITIONS:
Flaps 30°
NOTES:
4. If a landing with flaps up is necessary, increase approach speed by 9 KIAS and allow for 35% longer distance.

Weight LBS	Speed At 50 Ft KIAS	Press Alt Ft	0°C		10°C		20°C		30		40°C	
			Grnd Roll Ft	Total Ft To Clear 50 Ft Obs	Grnd Roll Ft	Total Ft To Clear 50 Ft Obs	Grnd Roll Ft	Total Ft To Clear 50 Ft Obs	Grnd Roll Ft	Total Ft To Clear 50 Ft Obs	Grnd Roll Ft	Total Ft To Clear 50 Ft Obs
2550	62	S.L	545	1290	565	1320	585	1350	605	1380	625	1415
		1000	565	1320	585	1350	605	1385	625	1420	650	1450
		2000	585	1355	610	1385	630	1420	650	1455	670	1490
		3000	610	1385	630	1425	655	1460	675	1495	695	1530
		4000	630	1425	655	1460	675	1495	700	1535	725	1570
		5000	655	1460	680	1500	705	1535	725	1575	750	1615
		6000	680	1500	705	1540	730	1580	755	1620	780	1660
		7000	705	1545	730	1585	760	1625	785	1665	810	1705
		8000	735	1585	760	1630	790	1670	815	1715	840	1755

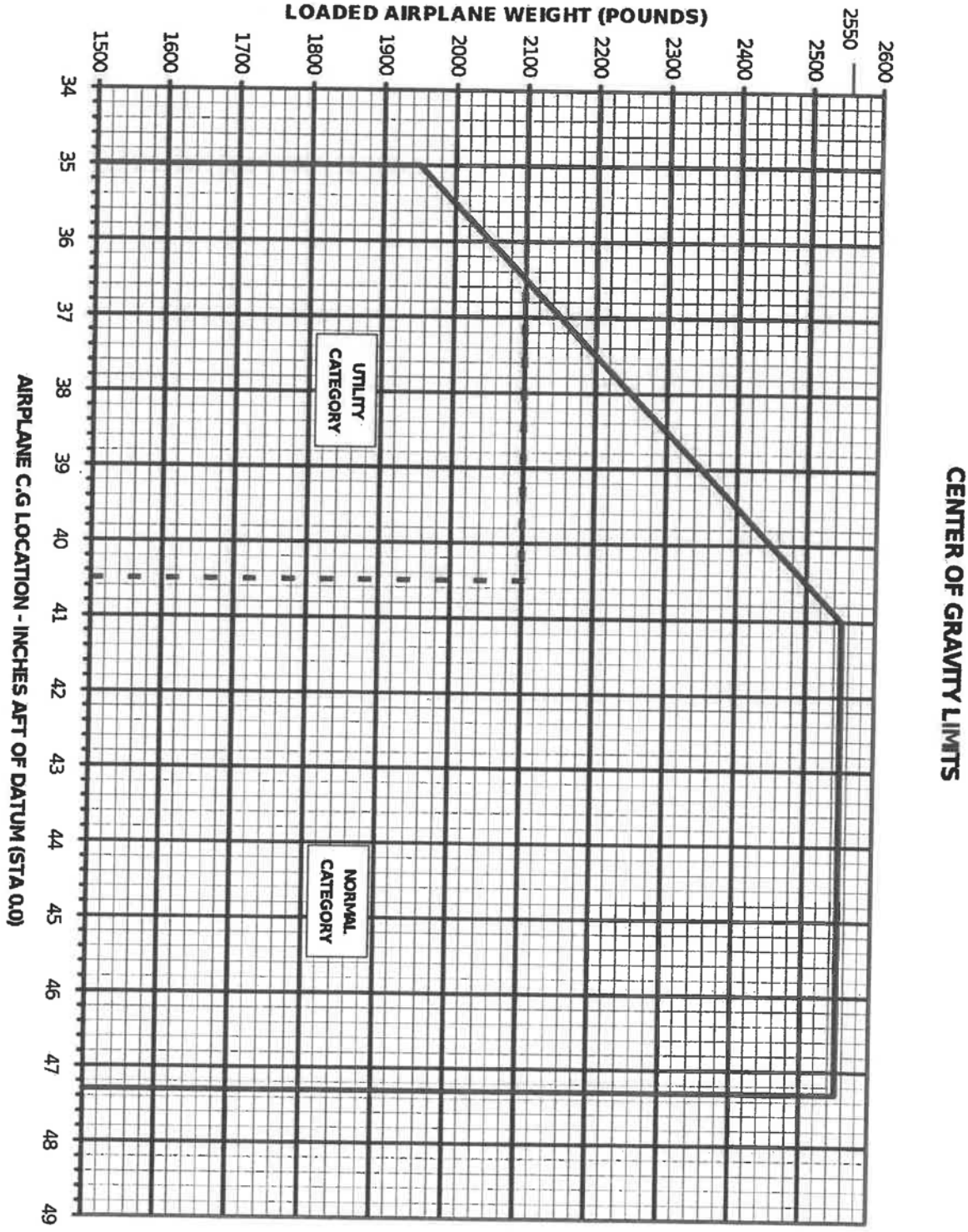
CRUISE FUEL CONSUMPTION
(Not FAA Approved)

Conditions:

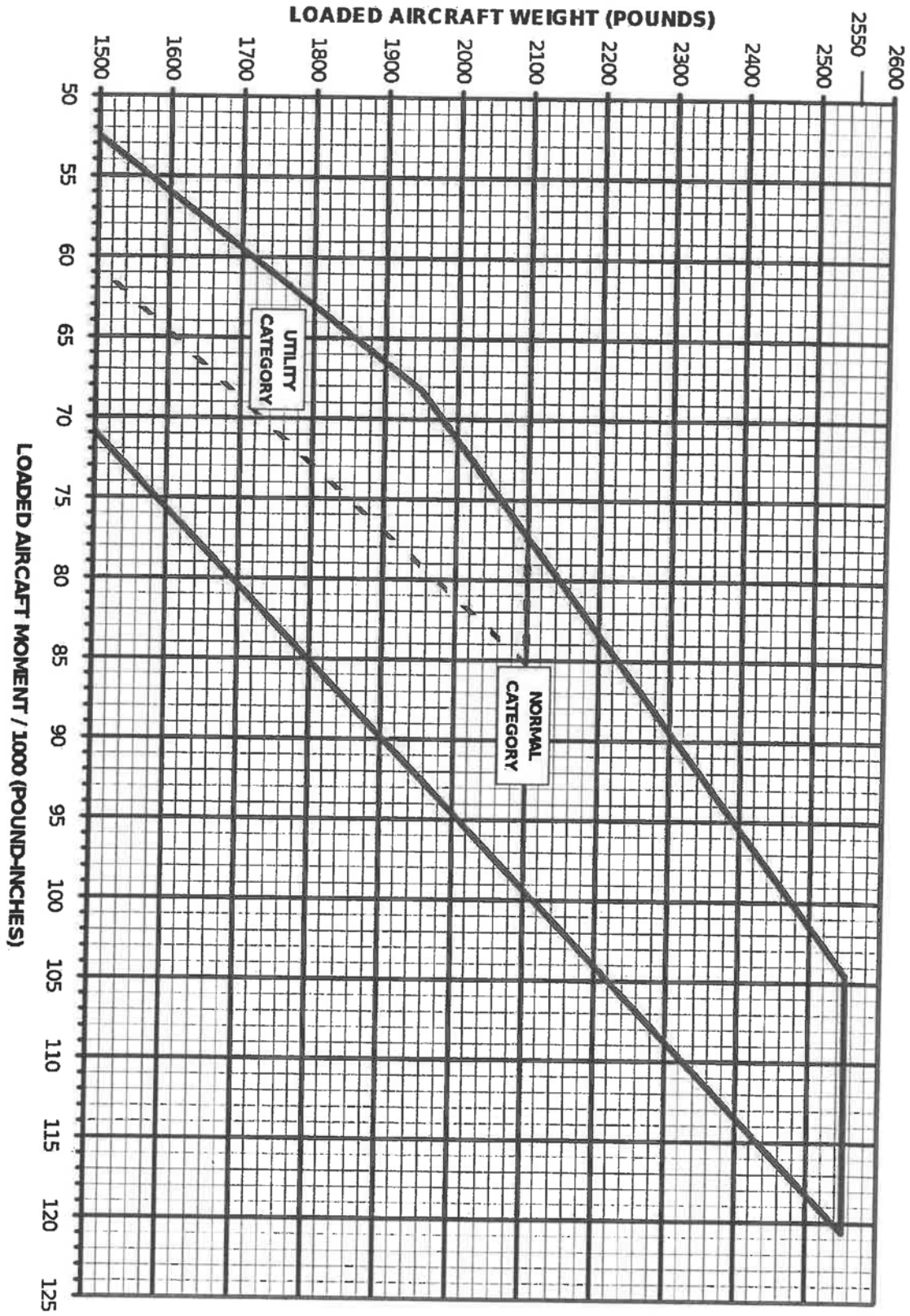
2550 Pounds

Recommended Lean Mixture		20°C Below Standard Temp.		Standard Temperature		20°C Above Standard Temp.	
Press. Alt Feet	RPM	% BHP	GPH	% BHP	GPH	% BHP	GPH
2000	**2550**	---	---	**76**	**10.2**	**72**	**9.6**
	2500	77	10.3	72	9.6	68	9.1
	2400	69	9.2	64	8.7	61	8.3
	2300	61	8.3	58	7.9	55	7.6
	2200	55	7.5	52	7.2	49	6.9
	2100	49	6.8	46	6.6	43	6.3
4000	**2600**	---	---	**76**	**10.2**	**72**	**9.6**
	2500	73	9.7	68	9.2	65	8.7
	2400	65	8.8	62	8.3	58	8.0
	2300	58	8.0	55	7.6	52	7.3
	2200	52	7.3	49	6.9	47	6.6
	2100	46	6.6	44	6.3	41	6.1
6000	**2650**	---	---	**76**	**10.1**	**72**	**9.6**
	2600	77	10.3	72	9.6	68	9.1
	2500	69	9.3	65	8.8	62	8.4
	2400	62	8.4	59	8.0	56	7.6
	2300	56	7.7	53	7.3	50	7.0
	2200	50	7.0	47	6.7	44	6.4
8000	**2700**	---	---	**76**	**10.1**	**71**	**9.5**
	2600	73	9.8	69	9.2	65	8.7
	2500	66	8.8	62	8.4	59	8.0
	2400	59	8.1	56	7.7	53	7.3
	2300	53	7.4	50	7.0	47	6.7
	2200	47	6.7	45	6.4	42	6.1
10,000	**2700**	**77**	**10.2**	**72**	**9.6**	**68**	**9.1**
	2600	69	9.3	65	8.8	62	8.4
	2500	63	8.5	59	8.1	56	7.7
	2400	57	7.8	53	7.4	50	7.0
	2300	51	7.1	48	6.8	45	6.5
12,000	**2700**	**69**	**9.3**	**65**	**8.8**	**62**	**8.4**
	2600	66	8.9	62	8.4	59	8.0
	2500	60	8.2	56	7.7	53	7.4
	2400	54	7.5	51	7.1	48	6.7
	2300	48	6.8	45	6.5	42	6.2

SECTION 6: WEIGHT AND BALANCE



CENTER OF GRAVITY MOMENT ENVELOPE



SECTION 7: HANDLING, SERVICE AND MAINTENANCE

To operate at the 2550 gross weight, the aircraft must be equipped with 6 or more ply tires on both the main wheels and nose wheel on all models.

- Tire Pressure should be:
  - Nose Gear .....45 psi
  - Main Gear .....38 psi

TANIS
AIRCRAFT PRODUCTS

INSTRUCTIONS FOR CONTINUED AIRWORTHINESS

Subject: TANIS INSTRUCTIONS FOR CONTINUED AIRWORTHINESS (ICA)

Document No: TCA1000
Revision: D
Date: AUG-07-2023

AIRCRAFT RECORD

Record and retain documents as indicated below and in Section 3

Aircraft Make and Model: Cessna 172P **Registration No:** N396SK

Installed Preheat Kit Part No: TA2925-1 Serial No: 250362

Supplemental Type Certificate (when applicable): SE03232CH

RECORD OF REVISIONS

When revised this document is changed in its entirety.

REV	DATE	DESCRIPTION	BY	CKD
D	AUG-07-2023	Add plug inspection, dielectric TU03126, kit removal info	DNE	MFHB
C	OCT-05-2022	Format, add descriptions, remove ohms table	DNE	JAL
B	AUG-10-2020	Add statement § 1 for replacing kit-specific ICA	DNE	GDO

Current revision approval: Dirk Ellis

Digitally signed by Dirk Ellis
DN: cn=Dirk Ellis, o=Tanis, ou=Eng, email=dirk@tanisaircraft.com, c=US
Date: 2023.08.07 14:48:50 -05'00'

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1. INTRODUCTION

1.1 Purpose

This document together with the information recorded and retained in Section (§) 3, is the Instructions for Continued Airworthiness (ICA) manual for the Tanis Aircraft Products preconditioning (preheat) kit(s) recorded on the cover page.

This manual is in response to Code of Federal Regulation (CFR) Title 14 Part 23, 25, 27, and 29, § .1529 and/or Part 33 A33.1, as applicable. For consistency, it has been formatted with guidance from Order 8110.54A.

Note: This ICA may be used to supersede and/or replace an existing Tanis Preheat Kit/System ICA when completed as noted, refer to the cover page and § 3.

1.2 Airworthiness Limitation Section

There are no additional Airworthiness Limitations that result from this modification.

The Airworthiness Limitations section of this manual is FAA approved and specifies inspections and other maintenance required under 14 CFR Sections 43.16 and 91.403 of the Federal Aviation Regulations unless an alternative program has been approved.

1.3 Documents

It is the user's responsibility to complete the cover page and record and retain documents as indicated in § 3.

When updating or replacing the ICA transfer recorded information from page one and any retained information to the new manual.

For acronyms, regulatory guidance, and fundamental technical procedures refer to Installation Guide: TNG1000.

To access current document revisions, go to the Tanis Technical Data library at http://www.tanisaircraft.com/ or contact Tanis Aircraft Products' customer support.

2. INSTRUCTIONS FOR CONTINUED AIRWORTHINESS

2.1 Introduction

Content, Scope, Purpose, and Arrangement:	This document identifies the Instructions for Continued Airworthiness for the modification of the aircraft and/or engine by the installation of a Tanis preheat kit by providing documentation of recommended methods, inspections, processes, and procedures. Information specific to the kit installed is required to be recorded on the cover page of this document and recorded and retained in § 3 as part of this document.
Applicability:	This applies to aircraft altered by the installation of a Tanis Aircraft Products preheat kit recorded on the cover page of this document.

Reference documentation:	Related Documents recorded in § 3 Installation Guide: TNG1000 Rev H Operating Guide: TPG1000 Rev F (or later FAA-approved revisions).
Retention:	This document, or the information contained within, will be included in the aircraft's permanent records.

2.2 Description of Alteration

Preconditioning, or "Preheating" as it is referred to in colder climates, is a Best Practice safety procedure that warms up critical mechanical parts, fluids, and systems when the aircraft is not running, on the ground, and connected to external power. Kits are permanently installed independent of aircraft systems. Available in 115V and 230V configurations.

A complete preheat system uses a combination of Pad and/or Threaded type heat elements to heat engine(s), gearboxes, accessories, and fluids. Small self-contained forced air heater(s) heat avionics. Belt-type pad heat element(s) heat battery(s).

Systems with dedicated plug door(s) may include a micro switch wired into Crew Alerting System (CAS) circuit for open door annunciation.

Tanis preheat systems are easily identified. All parts are labeled per 14 CFR Part 45 § 45.15. Electrical harnesses are made from red jacketed cabling with surface print and yellow labels. Heating elements have red leads and yellow labels. For kit-specific description refer to Preheat Kit Installation Instruction recorded in § 3 of this document.

2.3 Control and Operation

For system operation, power, and extension cord requirements refer to the Operating Guide listed under the Reference documentation in § 2.1 of this document.

2.4 Periodic Maintenance Instructions

Before the winter season or once in a 12-month cycle, an inspection that includes the application of dielectric grease on shore power plug contacts, and a Functional System Check are recommended refer to §§ 2.5, 2.6, and 2.7.

2.5 Inspection

Start with a review of kit-specific Installation Instructions recorded in § 3. Visually inspect the shore power plug, indicator light, and circuit-protection device (CPD). From there, following the red harness leads to individual components, inspect cabling, junctions, connectors, and heat elements for the security of attachment, fluid incursion, damage, and wear. In addition, look for signs of fatigue, chafing, vibration, flexing, and heat damage.

In addition, systems with dedicated plug door(s) may include a micro switch wired into Crew Alerting System (CAS) circuit for open-door annunciation. To verify open the door and look for the button head of the switch, it will be centered at the hinge or located near the door latch. When operating properly the switch will trigger the door annunciation in the cockpit display. To verify

operation, refer to the applicable aircraft Flight and/or Maintenance Manual (FMS/MM) and/or kit-specific Preheat Kit Installation Instructions and Top-Level Drawing recorded in § 3.

Inspect as installed:

(a) Shore Power Plug (inlet): Inspect the plug on the aircraft for signs of arcing, carbon deposits and/or corrosion, loose or missing plug blades or ground pin (contacts), overheating, discoloration, burning, pitting, cracking, or foreign object debris (FOD) in or around the plug.

If plug contacts show signs of deposits of any kind, carbon, corrosion, or otherwise, Abrasive Crocus Cloth may be used to clean up light deposits.

After inspection and/or cleaning apply dielectric grease to plug contacts, refer to § 2.6.

If there are any questions about the integrity of the plug replace it. For part replacement refer to § 2.8.

(b) Cable Kit: Inspect the security of attachment, appropriate routing, exposed wires, signs, discoloration, overheating, arcing, or cracks in the insulation. Ensure the Indicator light functions as expected (when installed). To repair, refer to the kit-specific cable kit drawing recorded in § 3 and/or Tanis Installation Guide: TPG1000.

(c) AV/Cabin Heater (forced air PTC type heater): Inspect for the security of attachment and integrity of the mounting structure, air intake, and exhaust ports for FOD and obstructions. Clear as required. There are no approved repairs for this heater only replacement.

(d) Battery Heater: Inspect the battery heat element(s) for the security of attachment, signs of abrasion, broken or missing lacing or grommets, oil damage, or exposed heating wire. There are no approved repairs for this heater only replacement.

(e) Pad Heat Elements: Inspect for the security of attachment, and bonding on the substrate. Should any portion of the pad heat element come loose from the substrate, it may be re-bonded. Also, inspect for signs of abrasion, oil damage, exposed wire, delamination, or developing areas of gray/yellow. These are indicators the pad element requires replacement. There are no approved repairs for these elements only replacements.

(f) Threaded Heat Elements: Inspect for security of installation and inspect element lead transition, where lead exits the element body, for signs of heat damage or broken wires. There are no approved repairs for these elements only replacements.

(g) In cases of extreme or adverse failure outside the realm of normal use, contact Tanis Aircraft Products' customer support.

2.6 Dielectric Grease Application

After inspecting, cleaning, or replacing an aircraft shore power plug (inlet), the application of a thin layer of Dielectric Grease p/n: TU03126, DC 4, or equivalent that meets MIL-S-8660C, ASTM D-149, is recommended. Dielectric grease may be applied using a cotton-tipped swab or equivalent applicator completely coat the plug contacts (blades and ground pin). Dielectric grease helps to ensure the integrity of the connection by reducing electrical arcing, corrosion, and the formation of conductive paths at electrical interface points.

2.7 Functional System Check

⚠ **Warning:** Energized elements can cause 2nd and 3rd-degree burns.

Thermal imaging cameras and/or infrared devices may be used for the validation of elements and system operation. Due to variation in target emissivity reflected temperature values will vary from actual temperatures.

If a discrepancy is noted, correct it before proceeding to the next step. For Troubleshooting refer to § 2.14. For control and operation see § 2.3. * Skip when not installed or test separately.

(a) Plug the system into an appropriate power source, and verify * red indicator light is on (illuminated). Then in about 30 minutes, the area next to each element should feel warm.

(b) * AV/Cabin Heater: Check for audible fan and warm air circulation. When equipped with a controller verify operation based on the controller type below.

Adjustable Thermostat: Test by dialing the temperature selector above ambient and the heater should switch on.

Preset Controller: Test with the controller at a temperature below its setpoint (25°C / 77°F) and the heater should be on. When required, cool the controller with an ice pack and/or general-purpose freeze spray (circuit chiller); MicroCare p/n: MCC-FRZ, Chemtronics p/n: ES1052 Freeze Spray, or equivalent.

(c) * Battery heater: Test with the controller at a temperature below its setpoint (+5°C / 41°F) and the battery element should be on and start to feel warm after a short period. When required, cool the controller with an ice pack and/or general-purpose freeze spray (circuit chiller); MicroCare p/n: MCC-FRZ, Chemtronics p/n: ES1052 Freeze Spray, or equivalent.

2.8 Removal and Replacement

If a part requires removal and/or replacement, refer to the kit-specific Preheat Kit Installation Instruction and Top-Level Drawing recorded in § 3 of this document for an itemized listing of the part(s) and related instructions. Once the part is removed cap and secure wiring. Placard system as "inoperative" IAW applicable regulations if eligible or defer IAW approved Minimum Equipment List / Nonessential Equipment Furnishings (MEL/NEF).

To remove an entire system/kit refer to kit-specific Preheat Kit Installation Instruction recorded in § 3. Identify and remove parts and subassemblies using common aviation tools. Inspect, reseal, and secure as needed any aircraft components that supported the kit when installed. Remove the shore power plug(s) and placard(s), and update aircraft records accordingly to reflect the change.

2.9 Servicing Information

For recommended periodic maintenance instructions refer to § 2.4. In the event of suspected system or component failure refer to § 2.15.

2.10 Special Tools

Standard aviation hand tools are all that is required for maintenance and repairs. Special tools are not required.

2.11 Special Inspection Requirements

In addition to special inspection events as defined by the aircraft maintenance manual inspect in the event of a hard landing, lightning strike, or water immersion. For inspection procedures refer to § 2.5.

2.12 Overhaul Intervals

No overhaul intervals exist for this system. There are no life-limited parts. Part life is based on condition per inspection. Parts are to be replaced upon failure or damage.

2.13 Commuter and Transport Category Aircraft

No changes are required.

2.14 Application of Protective Treatments

No protective treatments are required.

2.15 Troubleshooting

⚠ **Warning:** Troubleshooting *should be conducted by a qualified technician* with the system disconnected/unplugged from the power source.

The first step in the process of troubleshooting is to access the kit-specific Preheat Kit Installation Instruction and Cable Kit Drawing recorded in § 3 of this document. Additional Troubleshooting information is located in a dedicated section of the Installation Guide: TNG1000 refer to Reference documentation in § 2.1.

With the system unplugged, start troubleshooting using an ohmmeter. Connect ohmmeter leads to plug blade contacts and verify the system is not shorted. If the circuit is open replace CPD fuses or reset the breaker and recheck the circuit with a meter. Ohm's (Ω) of resistance should be consistent with values in the Electrical Values Table located in kit-specific Preheat Kit Installation Instructions recorded and retained in § 3. If the circuit is shorted, refer to the Cable Kit Drawing and troubleshooting section of the Installation Guide: TNG1000 to trace down the short. Remove and replace the suspect part as needed, there are no approved repairs for parts or elements only replacements. For electrical system wire/cable repair, splice, etc., refer to the kit-specific Cable Kit Drawing.

2.16 Diagram

The system's electrical wiring diagram is contained in the Cable Kit drawing recorded in § 3 of this document

2.17 ICA Revision and Distribution

To revise this ICA, a letter must be submitted to the ACO along with the revised ICA. The ACO will obtain Aircraft Evaluation Division (AED) acceptance and approve any revision to the Airworthiness Limitation Section 1.2 of this document.

2.18 Assistance

Flight Standards Inspectors or the certificate holder's Primary Manufacturing Inspector (PMI) have the required resources to respond to questions regarding this ICA. In addition, the customer may refer questions regarding this system and its installation to the manufacturer. Contact Tanis Aircraft Products' customer service at https://www.tanisaircraft.com/contact/ or email info@tanisaircraft.com.

2.19 Implementation and Record-Keeping

Modification of an aircraft by the installation of a Tanis preheat kit or Supplemental Type Certificate (STC) obligates the aircraft operator to include the maintenance information provided by this document in the operator's aircraft maintenance manual and/or the operator's aircraft scheduled maintenance program.

3. INSTALLATION RECORD

Installation Record

Installation Date: 05-07-2025

Installed Kit Part No: TA2925-1 Serial No: 250362

3.1 Related Documents

Record and retain (printed or electronic) as indicated below.

Kit Top-Level Drawing (TLD) No:_____ Revision:_____

Preheat Kit Installation Instruction:_____ Revision:_____

Cable Kit Drawing:_____ Revision:_____

3.2 Attached/Retained Documents

Related Documents recorded in § 3.1. are to be attached/retained and included as Section 3.2. of this document.

TANIS AIRCRAFT PRODUCTS

OPERATING GUIDE

Subject: PREHEAT OPERATION INSTRUCTIONS

Document No: TPG1000

Revision: F

Date: AUG-07-2023

AIRCRAFT RECORD

Record as indicated below

Aircraft Make and Model: Cessna 172P **Registration No:** N396SK

Installed Preheat/Preconditioning Kit Part No: TA2925-1

Voltage: 115V Wattage: _____ Amperage: _____

Plug location: Pilot side Front Baffle

AV/Cabin Heater installed: ☐ Yes ☒ No

Battery Heater installed: ☐ Yes ☒ No

RECORD OF REVISIONS

When revised this document is changed in its entirety.

REV	DATE	DESCRIPTION	BY	CKD
F	AUG-07-2023	Update Warnings, add §§ 6.3 and 6.4, remove AC 91-13c	DNE	MFHB
E	OCT-29-2020	§ 5 Typo, correct rise over ambient 33°C	DNE	GDO
D	JAN-15-2020	Rev corrects date discrepancy adds statement § 1	DNE	GDO

Current revision approval: Dirk Ellis

Digitally signed by Dirk Ellis
DN: cn=Dirk Ellis, o=Tanis, ou=Eng, email=dirk@tanisaircraft.com, c=US
Date: 2023.08.07 14:48:05 -05'00'

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1. PURPOSE

This manual is for use by operators of Tanis Aircraft Products preconditioning (preheat) kit(s) recorded on the cover page. It contains the necessary information for their safe operation, and cannot be substituted for the airplane, rotorcraft or engine, flight manual, or operating handbook (AFM/POH).

This manual is in response to the Code of Federal Regulation (CFR) Title 14 Part 25, 27, and 29, § .1581 and Part 33.5 (b), as applicable. For consistency, it has been formatted with guidance from AC 25.1581.

This Operating Guide may be used to supersede and/or replace existing Tanis Preheat Kit/System operating instructions or Tanis FMS when completed as indicated on page 1 of this document.

2. MALFUNCTION PROCEDURES

⚠ **Warning**: Should malfunction be detected, such as tripped circuit protection device (DPD), breaker or blown fuse, smoke, or lack of heat, disconnect the system from power. Placard (flag) as inoperative In Accordance With (IAW) applicable regulations if eligible, and/or defer IAW approved Minimum Equipment List and/or Non-Essential Equipment and Furnishings MEL/NEF as applicable.

Before replacing fuses or resetting breakers disconnect from power, and refer to Instructions for Continued Airworthiness (ICA): TCA1000.

Common system fuse p/n: TU02848, 12-Amp 1.25 x. 25 ceramic tube fuse. Acceptable alternates: Bussmann ABC-12 ceramic tube fuse or AGC-12 glass tube fuse.

3. DOCUMENT

It is the user's responsibility to complete the cover page as indicated.

When updating or replacing this manual, transfer recorded information from the cover page to the new manual.

For acronyms, regulatory guidance, and fundamental technical procedures refer to Installation Guide: TNG1000.

To access current revisions and related documents go to the Technical Data library at http://www.tanisaircraft.com/ or contact Tanis Aircraft Products' customer support.

4. AIRWORTHINESS LIMITATIONS

This system does not change existing environmental flight restrictions.

- For specific instructions relating to engine starting and cold weather operations refer to the applicable Pilots Operating Handbook (POH), Airplane Flight Manual (AFM), and/or Engine Operations Manual.
- Instructional reference to other cold weather modifications such as covers, and cowl plugs are not included in this Operating Guide.
- Weather planning and aircraft preparation is the responsibility of the operator.

5. GENERAL INFORMATION AND DESCRIPTION

Preconditioning, or "Preheating" as it is referred to in colder climates, is a Best Practice safety procedure that warms up critical mechanical parts, fluids, and systems when the aircraft is not running, on the ground, and connected to external power.

As a rule, preheated components reach thermal saturation at 6 hours with an approximate temperature rise (delta) over ambient of 33°C (±5°C) / 60°F (±10°F). In Avionics, crew, and passenger cabins the temperature delta over ambient varies. When additional heat is required insulated engine cowl and/or aircraft covers are used. With the addition of insulated covers, you may expect an increase in the delta of between 40 to 60%.

a) Operation and regular use increase engine and battery life, reliability, and safety of operations. It also reduces torque oscillations, thermal stress, warm-up, and launch times.

b) Primary systems Do Not use controllers or thermostats; however, avionics, battery, and cabin heaters may incorporate controllers and/or thermostats.

c) AV/Cabin Heaters precondition avionics and helps clear windows of frost, snow, and ice.

d) Battery Heaters reduce freeze point depression and allow for higher amperage output and proper charging.

5.1 Best Practices

> ⚠ **Warning:** **Do Not** operate when outside air temperature (OAT) is above +38°C / +100°F.
> **Do Not** operate with insulated covers when OAT is above +21°C / +70°F.

The system may be connected to power immediately after engine shutdown. It is designed to be operated continually between flights and/or plugged in 6 or more hours before departure.

Best Practice Guidelines for When to Precondition/Preheat.

- +4.5°C / +40°F OAT and below preheat is recommended.
- -6.5°C / +20°F OAT and below (ambient or windchill) industry established requirement.
- -12°C / +10°F OAT and below preheat and use insulated cowl cover(s) and/or cowl plugs.

5.2 Plug and Placard

The power plug (inlet) is placarded with the voltage requirement. Location and type of placard vary. Refer to the cover page and Figure 5.2.

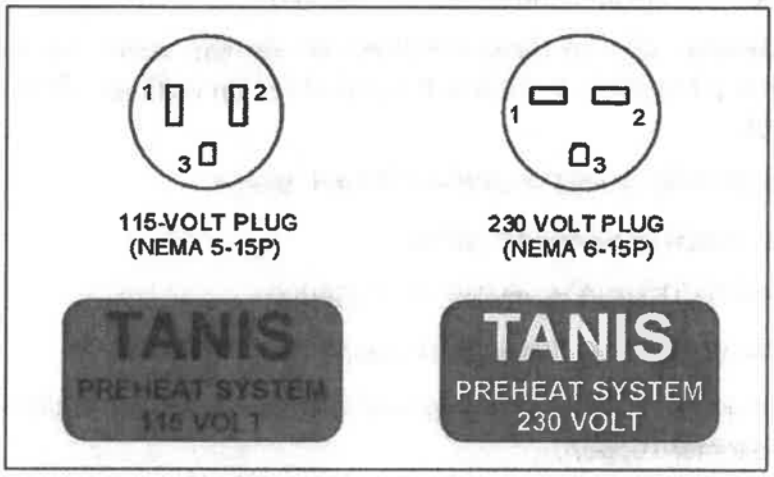

Figure 5.2. Plug and placard configurations. An alternate placard may be field fabricated stating: *Tanis Preheat* and *voltage requirement* (*115 Volt* or *230 Volt*).

5.3 Plug Locations:

Refer to the cover page of this manual for recorded plug location.

- Fixed-wing: The plug is commonly mounted on the engine, accessed through an engine oil door, cowl opening, or dedicated plug door located on the pilot side of the aircraft.
- Rotor-wing: The plug is commonly accessed through a dedicated plug door located near the pilot door, aft right side, or upper transmission deck.

6. REQUIREMENTS

- The cover page with completed Aircraft Record.
- Power, extension cord, and installed preheat system.
- Only operate preheat system with aircraft fluids at operational levels.
- Use fluids and oils recommended by the manufacturer for conditions of flight.

6.1 Power

External/shore power source capable of supplying rated voltage and load for the time of operation. Refer to the cover page for recorded power requirements.

6.2 Extension Cord

Only use Hard Service rated extension cord in good condition and adequate gauge rated for required amperage loads and environment conditions. When in doubt, use the next heavier gauge. The smaller the gauge number heavier the cord.

A 12-gauge extension cord is recommended for system loads up to 12-Amps. Voltage requirement at end of the cord, +/- 10% of placarded system voltage. Stringing cords together is not recommended.

Minimum requirements by extension cord length and gauge:

- 50 ft. / 15 m or less, minimum 16 gauge.
- 50 to 100 feet ft. / 15 to 30 m, minimum 14-gauge.
- 100 to 200 ft. / 30 to 60 m, minimum 12 gauge.
- 200 ft. / 60 m and over, refer to the regional coding requirement and/or contact Tanis Aircraft Products' customer support.

Proper use of extension cords is critical to your safety. Always refer to electrical coding requirements for the country and/or region of operation. The use of an undersized cord is unsafe and may result in loss of power, drop-in line voltage, and overheating of plugs and extension cords.

6.3 Extension Cord Inspection

Before each use inspect the extension cord and its plugs. Check the gauge of the cord (§ 6.2) and look for cracks, damaged insulation, discoloration, loose or missing plug blades, and any indications of overheating or burning, especially on the power outlet end (the aircraft end that plugs into the preheat system plug (inlet) on the aircraft).

Note: For recommended Hard Service extension cord replacement plugs, contact Tanis Aircraft Products' customer support.

6.4 Aircraft Plug (inlet) Inspection

Before each use inspect the aircraft power plug (inlet). Look for signs of arcing, carbon deposits and/or corrosion, loose or missing plug blades, overheating, discoloration, burning, or cracking. The extension cord outlet should fit positively and firmly on the aircraft preheat system plug (inlet) and should not be a "forced fit".

Note: The presents of clear dielectric grease on the plug is normal. Periodic maintenance recommends the application of a dielectric on the aircraft plug contacts (blades, and ground pin).

7. OPERATION INSTRUCTIONS

⚠ **Warning: Do Not** connect or disconnect a "**live**" extension cord with the aircraft preheat plug.

Before connecting or disconnecting preheat system or any other device, disconnect the extension cord from the power source. This reduces the chance of electrical arcing at the connection point on the aircraft.

Do Not fuel aircraft or operate engine(s) with preheat system connected to power.

7.1 Plug It In - Post Flight/Standby

The system may be operated immediately after engine shutdown and continuously between flights. This may include extended periods of hours, days, weeks, or months.

Use of insulated cowl cover(s) and/or cowl plugs is recommended when operating in windy conditions and/or in temperatures of -12°C / +10°F and below.

(a) Check to see that the extension cord (inlet end) is unplugged from the power source.

(b) Plug the extension cord (outlet end) into the preheat system plug (inlet) on the aircraft.

Do Not Force and/or rock the plug into place. It should be a firm fit not a "forced fit".

(c) Plug the extension cord (inlet end) into the shore power source.

(d) Return to the aircraft and verify preheat system power indicator light is on and illuminated (when installed).

7.2 Unplug It - Preflight

Follow applicable aircraft preflight checklists and add the following:

(a) Verify power indicator light is on (when installed) and heated components are warm.

(b) Unplug the extension cord from the power source. **Note:** This is done before disconnecting the extension cord from the aircraft preheat system plug.

(c) After unplugging the extension cord from the power source, disconnect it from the aircraft preheat system plug.

(d) Latch any open-access doors.

(e) Stow the extension cord in an appropriate location.

(f) Start aircraft following normal procedures.

8. WEIGHT AND BALANCE

The equipment List and Weight & Balance figures were recalculated at the time of system installation.

9. HANDLING, SERVICING, AND MAINTENANCE

For detailed information regarding maintenance and installation refer to applicable installation instructions and Instructions for Continued Airworthiness, TCA1000, or ICA supplied with the kit.

******* NOTHING FOLLOWS *******