



AVIATION MECHANIC HANDBOOK

Based on the original text by
DALE CRANE

Edited by
TERRY MICHMERHUIZEN

**7TH
EDITION**



AVIATION MECHANIC HANDBOOK

Based on the original text by

DALE CRANE

Edited by

TERRY MICHMERHUIZEN

7TH EDITION

AVIATION SUPPLIES & ACADEMICS, INC.
Newcastle, Washington

Aviation Mechanic Handbook, Seventh Edition
(Original text by Dale Crane)
Edited by Terry Michmerhuizen

Aviation Supplies & Academics, Inc.
7005 132nd Place SE
Newcastle, Washington 98059-3153
Website: www.asa2fly.com
Email: asa@asa2fly.com

©1992–2017 Aviation Supplies & Academics, Inc.
All rights reserved. Seventh Edition 2017.

Acknowledgments: Greg Mellema/Abaris, Section 17; Champion Aviation Products, Appendix 2; Concorde Battery, Appendix 3; Michelin Aircraft Tire, Appendix 4.

ISBN 978-1-61954-495-6

ASA-MHB-7-PD

Library of Congress Cataloging-in-Publication Data:
Crane, Dale.

Aviation mechanic handbook / by Dale Crane

p. cm.

1. Airplanes — Maintenance and repair — Handbooks, manuals,
etc. I. Aviation Supplies & Academics, Inc. II. Title.

TL671.9.C6648 1992

629.134'6 — dc20

92-34331 CIP

Introduction

Even though ways to look up mechanics reference information via the internet are widely available today, there is still significant benefit to keeping a printed “quick reference” guide handy in a toolbox or workbench drawer. Your time as an aviation mechanic is too valuable to be spent looking through stacks and pages of reference books to find a particular chart, formula or diagram you need on a particular job. The editorial staff at ASA has done this job for you and compiled this *Aviation Mechanic Handbook* to be a handy toolbox source of useful information.

For your convenience, this handbook is arranged in 18 sections with a table of contents at the beginning of each section, as well as complete contents at the front of the book and index at the back.

This information has been compiled from a large number of industry and government publications, and every effort has been made to ensure its applicability and accuracy.

The *ASA Aviation Mechanic Handbook* is a companion volume to the *ASA Dictionary of Aeronautical Terms*. The two books are the core of ASA’s training materials for aircraft mechanics.

ASA is dedicated to providing quality training materials for the aviation industry. Your feedback regarding our books will help us to continue to produce the materials you need. Visit the ASA website often (www.asa2fly.com) to find updates to operations and procedures due to FAA changes that may affect this publication, downloadable from ASA’s Product Update pages.

ASA and the author wish to thank Greg Mellema of Abaris Training for his contribution of the material for Section 17, “Composites” for the Third Edition of the *Aviation Mechanic Handbook*.

Dale Crane, Editor (original text)
Terry Michmerhuizen, Editor

Contents

Introduction	iii
Section 1: General Information	1
1.1 Fraction, Decimal, and Metric Equivalents	3
1.2 Conversions.....	4
1.3 Aircraft Nomenclature.....	13
Axes of an Airplane	13
Forces Acting on an Aircraft in Flight.....	13
Types of Aircraft Structure	14
Truss.....	14
Monocoque.....	14
Semimonocoque	15
1.4 Joint Aircraft System/Component (JASC) Code.....	16
1.5 Aircraft Nationality Identification	28
1.6 Title 14 of the Code of Federal Regulations	31
1.7 Standard Taxi Signals.....	34
1.8 Troubleshooting	35
 Section 2: Physical and Chemical	 37
Periodic Table of Elements	38
2.1 Temperature Conversion	39
Absolute Temperature	44
2.2 ICAO Standard Atmosphere.....	45
2.3 Density of Various Solids and Liquids	46
Density of Various Gases	46
2.4 Hydraulic Relationships.....	47
2.5 Quantity of Liquid in a Drum.....	49
Estimating Quantity of Liquid in a Standard 55-Gallon Drum.....	49

Section 3: Mathematics	51
3.1 Measurement Systems.....	53
The International System of Units (SI)	53
The Metric System	54
U.S. – Metric Conversion.....	54
Length	54
Weight	55
Volume	55
3.2 Mathematical Constants.....	56
3.3 Mathematical Symbols	57
3.4 Squares, Square Roots, Cubes, Cube Roots of Numbers	58
3.5 Diameter, Circumference and Area of a Circle	61
3.6 Geometric Formulas.....	64
Triangle.....	64
Square.....	64
Rectangle	64
Parallelogram	64
Trapezoid.....	64
Regular Pentagon.....	65
Regular Hexagon	65
Regular Octagon	65
Circle	65
Ellipse.....	65
Sphere.....	66
Cube.....	66
Rectangular Solid	66
Cone.....	66
Cylinder	66
3.7 Trigonometric Functions	67

Section 4: Aircraft Drawings	71
4.1 Types of Aircraft Drawings.....	73
Sketches.....	73
Detail Drawings	73
Assembly Drawings.....	73
Installation Drawings	73
Sectional Drawings.....	73
Cutaway Drawing.....	73
Exploded-View Drawing	73
Schematic Diagram	74
Block Diagram	74

	Repair Drawings.....	74
	Wiring Diagrams.....	74
	Pictorial Diagrams	74
	Orthographic Projections.....	74
4.2	Meaning of Lines	75
4.3	Material Symbols.....	76
4.4	Location Identification.....	77
	Fuselage Stations.....	77
	Water Lines	77
	Butt Lines	77
	Wing and Horizontal Stabilizer Stations	77
Section 5: Aircraft Electrical Systems		79
5.1	Electrical Symbols	81
5.2	Alternating Current Terms and Values.....	89
5.3	Ohm's Law Relationships	90
5.4	Electrical Formulas.....	92
	Formulas Involving Resistance.....	92
	Formulas Involving Capacitance	93
	Formulas Involving Inductance.....	95
	Formulas Involving Both Capacitance and Inductance	98
	Resonant Frequency	98
	Total Reactance.....	98
	Impedance.....	98
5.5	Electrical System Installation.....	99
	Selection of Wire Size	99
	Notes on Wire Installation.....	104
	Switch Derating Factors	106
	Wire and Circuit Protectors	107
	MS Electrical Connectors.....	108
	Resistor Color Code	112
	Aircraft Storage Batteries	114
	Lead-Acid Batteries.....	114
	Nickel-Cadmium Batteries.....	115
Section 6: Aircraft Materials		117
6.1	Composition of Wrought Aluminum Alloys.....	119
6.2	Four-Digit Designation System for Wrought Aluminum Alloys.....	120
6.3	Weldable and Unweldable Aluminum Alloys	121
6.4	Mechanical Properties of Aluminum Alloys	122

6.5	Temper Designations for Aluminum Alloys	123
	Heat-Treatable Alloys	123
	Non-Heat-Treatable Alloys.....	123
6.6	Temperatures for Heat Treatment of Aluminum Alloys.....	124
6.7	Bearing Strength (in pounds) of Aluminum Alloy Sheet	125
6.8	Shear Strength of Aluminum Alloy Rivets.....	126
	Single-Shear Strength (in pounds) of Aluminum-Alloy Rivets	126
	Double-Shear Strength (in pounds) of Aluminum-Alloy Rivets...	126
6.9	SAE Classification of Steel.....	127
6.10	Strength of Steel Related to its Hardness	128
6.11	Color of Steel for Various Temperatures	129
6.12	Color of Oxides on Steel at Various Tempering Temperatures	130

Section 7: Tools for Aircraft Maintenance 131

7.1	Measuring and Layout Tools.....	133
	Steel Rule.....	133
	Hook Rule.....	133
	Combination Set.....	133
	Dividers	134
	Outside Calipers.....	134
	Inside Calipers.....	134
	Hermaphrodite Calipers	134
	Scriber	134
	Vernier Calipers.....	134
	How to Read the Vernier Scale	135
	Micrometer Caliper	136
	How to Read the Vernier Micrometer Scale	137
	Dial Indicator	138
	Feeler Gages.....	138
	Small-Hole Gages	138
	Telescoping Gages.....	138
7.2	Holding Tools.....	139
	Vises.....	139
	Bench Vise	139
	Drill Press Vise	139
	Pliers	139
	Combination/Slip Joint Pliers.....	139
	Water Pump Pliers	140
	Vise-Grip® Pliers	140
	Needle-Nose Pliers	140

7.3	Safety Wiring Tools	141
	Diagonal Cutting Pliers	141
	Duckbill Pliers	141
	Safety Wire Twisting Tool	141
7.4	Bending and Forming Tools	142
	Tools for Making Straight Bends and Curves	142
	Cornice Brake	142
	Box Brake	142
	Press Brake	142
	Slip Roll Former	143
	Forming Compound Curves in Sheet Metal	143
	English Wheel	143
7.5	Cutting Tools	143
	Shears	143
	Throatless Shears	143
	Squaring Shears	144
	Scroll Shears	144
	Hand Shears	144
	Tin Snips	144
	Compound Shears	145
	Saws	145
	Band Saw	145
	Hacksaw	146
	Wood Saws	146
	Crosscut Saw	146
	Ripsaw	146
	Compass, or Keyhole Saw	146
	Backsaw	147
	Chisels	147
	Flat Chisel	147
	Cape Chisel	147
	Diamond Point Chisel	147
	Round Nose Chisel	147
	Files	148
7.6	Hole Cutting Tools	149
	Twist Drills	149
	Twist Drill Sizes	149
	Drill Gage	152
	Twist Drill Sharpening	152
	Drill Point Gage	153
	Large Hole Cutters	154
	Hole Saws	154
	Fly Cutter	154
	Countersink	154
	Reamers	155

	Drills for Wood and Composite Materials	155
	Auger Bits	155
	Forstner Bits	156
	Flat Wood-Boring Bits	156
	Brad-Point Drills	156
	Spade Drill	156
7.7	Threads and Threading Tools	157
	Unified and American Standard Thread Form	157
	Thread-Cutting Tools	157
	Taps	158
	Body and Tap Drill Sizes	158
	Screw Pitch Gage	159
7.8	Torque and Torque Wrenches	160
	Click-Type Torque Wrench	160
	Deflecting-Beam Torque Wrench	160
	Torque Conversions	162
	Recommended Torque Values	162
7.9	Pounding Tools	164
	Carpenter's Claw Hammer	164
	Ball Peen Hammer	164
	Metalworking Hammers	164
	Straight Peen and Cross Peen Hammers	164
	Body, or Planishing Hammer	164
	Mallets and Soft-Face Hammers	165
	Sledge Hammers	165
7.10	Punches	165
	Prick Punch	165
	Center Punch	165
	Drift, or Starting Punch	165
	Pin Punch	166
	Transfer Punch	166
	Automatic Center Punch	166
7.11	Wrenches	167
	Open End Wrench	167
	Adjustable Open End Wrench	167
	Ratcheting Open End Wrench	167
	Box End Wrench	168
	Ratcheting Box Wrench	168
	Combination Wrench	168
	Flare Nut Wrench	168
	Socket Wrenches	169
	Socket Wrench Handles	169
	Hand Impact Tool	169

Typical Socket Wrenches	170
Extension and Adapters	170
Allen Wrenches	170
7.12 Screwdrivers.....	171
Slot Screwdrivers	171
Offset Screwdriver	171
Recessed-Head Screwdrivers	171
Phillips Head Screwdriver Sizes.....	172
Screw Heads for Special Structural Screws	172
 Section 8: Aircraft Hardware	 173
8.1 Standards	175
8.2 Threaded Fasteners	175
Bolts	175
Genuine A/C Hardware AN3-AN20 Bolts	176
Hex-Head Bolts	177
Flush-Head Bolts.....	178
Drilled-Head Bolts	178
Twelve-Point, Washer-Head Bolts	178
Internal Wrenching Bolts	178
Clevis Bolts.....	179
Eye Bolts	179
Bolt Installation	179
Bolt Fits	180
Screws.....	180
Aircraft Screw Heads.....	181
Set Screws	182
Self-Tapping Sheet-Metal Screws	182
Nuts	183
Nonlocking Nuts	183
Self-Locking Nuts	184
Low-temperature locking nuts	184
High-temperature locking nuts	185
Wing Nuts.....	185
Anchor Nuts.....	185
Channel Nuts.....	186
Pressed-Steel Nuts	186
Instrument Nuts.....	187
Rivnuts	187
Threaded Fastener Safelying	188
Locking Washers	188
Cotter Pins.....	188
Safety Wire and Safety Wire Twisting	189
Safety Cable.....	191

8.3	Washers	192
8.4	Special Rivets	194
	Blind Rivets	194
	Friction-Lock Rivets	195
	Mechanical-Lock Rivets	196
	CherryMax Rivets, Olympic-Lok Rivets, Huck Rivets	197
	High-Strength Pin Rivets	197
	Hi-Shear Rivet	197
	Hi-Lok Fasteners	199
	Hi-Tigue Fasteners	200
8.5	Cowling Fasteners	201
8.6	Thread Repair Hardware	202
	Helicoil Insert	202
	Acres Sleeves	203

Section 9: Metal Aircraft Fabrication205

9.1	Sheet Metal Layout and Forming	207
	Definitions	207
	Layout Procedure	208
	Example	208
	Forming	210
9.2	Minimum Bend Radii for 90° Bends in Aluminum Alloys	211
9.3	Setback	212
	Setback (K) Chart	212
9.4	Bend Allowance Chart	215
9.5	Rivets and Riveting	218
	Alternatives to Riveting	218
	Aircraft Solid Rivets	218
	Rivet Head Shapes	218
	Rivet Material	219
	Rivet Diameter	219
	Examples of Rivet Selection	223
	Rivet Length	223
	Riveting Tools	224
	Rivet Sets	224
	Bucking Bars	224
	Installing Flush Rivets	225
	Blind Rivet Code	225
	Removal of Damaged Rivets	225
	Minimum Rivet Spacing and Edge Distance	226

9.6	Aircraft Welding	227
Section 10: Aircraft Fabric Covering		229
10.1	Rib Stitch Spacing	231
10.2	Rib Stitch Knots.....	232
Section 11: Corrosion Detection and Control		235
11.1	Types of Corrosion	237
11.2	Oxidation	239
11.3	Surface and Pitting Corrosion.....	240
11.4	Intergranular Corrosion.....	241
	Exfoliation Corrosion	241
11.5	Stress Corrosion.....	242
11.6	Galvanic Corrosion	242
11.7	Concentration Cell Corrosion	243
11.8	Fretting Corrosion.....	244
11.9	Filiform Corrosion	244
11.10	Corrosion Control	245
Section 12: Nondestructive Inspection		247
12.1	Visual Inspection	249
	NDI	249
	Visual Inspection	249
	Surface Visual Inspection	249
	Internal Visual Inspection	249
12.2	Tap Testing	250
12.3	Penetrant Inspection.....	251
12.4	Magnetic Particle Inspection	252
12.5	Eddy Current Inspection.....	253
	How it works	253
	What it is suited for	254
	Method	254
	Detection of corrosion	254
12.6	Ultrasonic Inspection	255

12.7	Radiography	255
	X-Rays.....	255
	Gamma Rays	256
	Inspection—Steps	256
	Considerations	257
	Safety	257

Section 13: Aircraft Control Systems259

13.1	Types of Control Systems.....	261
	Torque Tubes	261
	Push-Pull Rods.....	261
13.2	Control Cables.....	262
13.3	Control Cable Terminals	263
13.4	Turnbuckles	264
	Turnbuckle Safelying	264
	Clip-Locking Turnbuckles.....	265
13.5	Control Cable Tension	266

Section 14: Aircraft Fluid Lines269

14.1	Rigid Fluid Lines.....	271
	Materials Recommended for Rigid Fluid Lines.....	271
14.2	Flexible Fluid Lines.....	273
	Types of Flexible Fluid Lines	273
14.3	Installation of Flexible Hose.....	275
14.4	Fluid Line Identification.....	276

Section 15: Oxygen System Servicing279

15.1	Oxygen System Servicing	281
	Filling Pressure for 1,850 PSI Oxygen Cylinders	281

Section 16: Aircraft Weight and Balance283

16.1	Locating the Center of Gravity	285
16.2	Datum Forward of the Airplane—Nose Wheel Landing Gear.....	286
16.3	Datum Aft of the Main Wheels—Nose Wheel Landing Gear	287
16.4	Datum Forward of the Main Wheels—Tail Wheel Landing Gear	288

16.5	Datum Aft of the Main Wheels—Tail Wheel Landing Gear	289
16.6	Location of CG with Respect to the Mean Aerodynamic Chord	290
Section 17: Composites		293
17.1	Resin Systems—Typical Properties	295
17.2	Resin Mix Ratios	296
17.3	Fiber/Resin Ratio Formulas	297
17.4	Reinforcing Fibers	298
17.5	Textile and Fiber Terminology	299
17.6	Yarn Part Numbering Systems	300
17.7	Fabric Weave Styles	301
17.8	Common Weave Style Numbers and Features	303
17.9	Ply Orientation Conventions	304
17.10	Damage Removal—Scarving and Stepping	304
17.11	Core Materials	306
17.12	Bleeder Schedules	307
Section 18: Turbine Engines		309
18.1	Turbine Operating Principles	311
18.2	Types of Turbine Engines	311
18.3	Turbine Engine Sections	312
Appendices		313
Appendix 1	Hydraulic Fittings	315
Appendix 2	Engines	319
Appendix 3	Lead Acid Aircraft Batteries	321
Appendix 4	Aircraft Tires	349
Index		361

Section 1: General Information

1.1	Fraction, Decimal, and Metric Equivalents	3
1.2	Conversions	4
1.3	Aircraft Nomenclature	13
1.4	Joint Aircraft System/Component (JASC) Code	16
1.5	Aircraft Nationality Identification	28
1.6	Title 14 of the Code of Federal Regulations	31
1.7	Standard Taxi Signals	34
1.8	Troubleshooting	35

1.1 Fraction, Decimal, and Metric Equivalents

Fraction	Decimal	MM	Fraction	Decimal	MM
1/64	0.0156	0.397	33/64	0.5156	13.097
1/32	0.0313	0.794	17/32	0.5313	13.494
3/64	0.0469	1.191	35/64	0.5469	13.891
1/16	0.0625	1.588	9/16	0.5625	14.287
5/64	0.0781	1.984	37/64	0.5781	14.684
3/32	0.0938	2.381	19/32	0.5938	15.081
7/64	0.1094	2.778	39/64	0.6094	15.478
1/8	0.1250	3.175	5/8	0.6250	15.875
9/64	0.1406	3.572	41/64	0.6406	16.272
5/32	0.1563	3.969	21/32	0.6563	16.669
11/64	0.1719	4.366	43/64	0.6719	17.066
3/16	0.1875	4.762	11/16	0.6875	17.463
13/64	0.2031	5.159	45/64	0.7031	17.860
7/32	0.2188	5.556	23/32	0.7188	18.256
15/64	0.2344	5.953	47/64	0.7344	18.653
1/4	0.2500	6.350	3/4	0.7500	19.049
17/64	0.2656	6.747	49/64	0.7656	19.447
9/32	0.2813	7.144	25/32	0.7813	19.844
19/64	0.2969	7.541	51/64	0.7968	20.239
5/16	0.3125	7.937	13/16	0.8125	20.638
21/64	0.3281	8.334	53/64	0.8281	21.034
11/32	0.3438	8.731	27/32	0.8438	21.431
23/64	0.3594	9.128	55/64	0.8594	21.828
3/8	0.3750	9.525	7/8	0.8750	22.225
25/64	0.3906	9.922	57/64	0.8906	22.622
13/32	0.4063	10.319	29/32	0.9063	23.018
27/64	0.4219	10.716	59/64	0.9219	23.416
7/16	0.4375	11.112	15/16	0.9375	23.812
29/64	0.4531	11.509	61/64	0.9531	24.209
15/32	0.4688	11.906	31/32	0.9688	24.606
31/64	0.4844	12.303	63/64	0.9844	25.003
1/2	0.5000	12.700	1	1.0000	25.400

1.2 Conversions

Multiply	By	To Get
acres.....	43,560	square feet
acres.....	4,047	square meters
acre feet.....	3.259×10^5	gallons
amperes / sq. cm.	6.452	amperes / sq. inch
amperes / sq. inch	0.1550	amperes / sq. cm.
ampere hours	3,600	coulombs
ampere hours	0.03731	faradays
ampere turns	1.257	gilberts
ampere turns / cm.....	2.540	ampere turns / inch
ampere turns / cm.....	1.257	gilberts / cm.
ampere turns / inch.....	0.4950	gilberts / centimeter
ampere turns / meter.....	0.01257	gilberts / centimeter
atmospheres.....	76.0	centimeters of mercury
atmospheres.....	33.9	feet of water
atmospheres.....	29.92	inches of mercury
atmospheres.....	10,332	kilograms / sq. meter
atmospheres.....	14.69	pounds / sq. inch
barrels of oil.....	42	gallons
bars.....	0.9869	atmospheres
bars.....	106	dynes / sq. centimeter
bars.....	14.50	pounds / sq. inch
Btu	1.0550×10^{10}	ergs
Btu	778.3	foot-pounds
Btu	252.0	gram-calories
Btu	1,054.8	joules
Btu	107.5	kilogram-meters
Btu	2.928×10^{-4}	kilowatt-hours
Btu / hour	0.2162	foot-pounds / second
Btu / hour	3.929×10^{-4}	horsepower-hours
Btu / hour	0.2931	watts
Btu / minute	12.96	foot-pounds / second
Btu / minute	0.02356	horsepower
Btu / minute	17.57	watts
bushels	1.2445	cubic feet
bushels	2,150.4	cubic inches
bushels	35.24	liters
bushels	4	pecks
bushels	64	pints (dry)

Multiply	By	To Get
centimeters	3.281×10^{-2}	feet
centimeters	0.3937	inches
centimeter-dynes	1.020×10^{-3}	centimeter-grams
centimeter-dynes	7.376×10^{-8}	pound-feet
centimeter-grams	980.7	centimeter-dynes
centimeter-grams	7.233×10^{-5}	pound-feet
cm of mercury	0.01316	atmospheres
cm of mercury	0.4461	feet of water
cm of mercury	136.0	kilograms / sq. meter
cm of mercury	27.85	pounds / sq. foot
cm of mercury	0.1934	pounds / sq. inch
cm / second	1.9685	feet / minute
cm / second	0.03281	feet / second
cm / second	0.036	kilometers / hour
cm / second	0.0194	knots
cm / second / second	0.03281	feet / second / second
cm / second / second	0.02237	miles / hour / second
circular mils	5.067×10^{-6}	square centimeters
circular mils	0.7854	square mils
circular mils	7.854×10^{-7}	square inches
coulombs	1.036×10^{-5}	faradays
cubic centimeters	3.531×10^{-5}	cubic feet
cubic centimeters	0.06102	cubic inches
cubic centimeters	10^{-6}	cubic meters
cubic centimeters	1.308×10^{-6}	cubic yards
cubic centimeters	2.642×10^{-4}	gallons (U.S.)
cubic centimeters	0.001	liters
cubic centimeters	2.113×10^{-3}	pints (U.S.)
cubic foot	0.8036	bushels
cubic foot	28,320	cubic centimeters
cubic foot	1,728	cubic inches
cubic foot	0.02832	cubic meters
cubic foot	7.48052	gallons (U.S.)
cubic foot	28.32	liters
cubic foot / minute	0.1247	gallons / second
cubic foot / minute	0.4720	liters / second
cubic foot / second	448.831	gallons / minute
cubic inches	16.39	cubic centimeters
cubic inches	5.787×10^{-4}	cubic feet
cubic inches	1.639×10^{-5}	cubic meters
cubic inches	2.143×10^{-5}	cubic yards
cubic inches	4.329×10^{-3}	gallons (U.S.)

Multiply	By	To Get
cubic inches	0.01639	liters
cubic meters	28.38	bushels
cubic meters	35.31	cubic feet
cubic meters	61,023	cubic inches
cubic meters	1.308	cubic yards
cubic meters	264.2	gallons (U.S.)
cubic yards	27	cubic feet
cubic yards	46,656	cubic inches
cubic yards	0.7646	cubic meters
cubic yards	202	gallons (U.S.)
cubic yards	764.6	liters
cubic yards / minute	3.367	gallons / second
cubic yards / minute	12.74	liters / second
days	24	hours
days	1,440	minutes
days	86,400	seconds
degrees (angular)	60	minutes
degrees (angular)	0.01111	quadrants
degrees (angular)	0.01745	radians
degrees (angular)	3,600	seconds
degrees / second	0.01745	radians / second
degrees / second	0.1667	revolutions / minute
degrees / second	2.778×10^{-3}	revolutions / second
drams	1.7718	grams
drams	0.0625	ounces
dynes	1.020×10^{-3}	grams
dynes	10^{-7}	joules / centimeter
dynes	10^{-5}	joules / meter (newtons)
dynes	7.233×10^{-5}	poundals
dynes	2.248×10^{-6}	pounds
dynes / sq. centimeter	10^{-6}	bars
ergs	9.480×10^{-11}	Btu
ergs	1.0	dyne-centimeters
ergs	7.367×10^{-8}	foot-pounds
ergs	0.2389×10^{-7}	gram-calories
ergs	3.7250×10^{-14}	horsepower-hours
ergs	10^{-7}	joules
ergs	0.2778×10^{-13}	kilowatt-hours
ergs / second	5.688×10^{-9}	Btu / minute

Multiply	By	To Get
ergs / second	1.341×10^{-10}	horsepower
ergs / second	10^{-10}	kilowatts
faradays	26.8	ampere-hours
faradays	9.649×10^4	coulombs
fathoms	6	feet
feet	30.48	centimeters
feet	0.3048	meters
feet	1.645×10^{-4}	miles (nautical)
feet	1.894×10^{-4}	miles (statute)
feet of water	0.02950	atmospheres
feet of water	0.8826	inches of mercury
feet of water	62.43	pounds / square foot
feet / minute	0.5080	centimeters / second
feet / minute	0.01667	feet / second
feet / second	1.097	kilometers / hour
feet / second	0.5921	knots
feet / second	0.6818	miles / hour
feet / second / second	0.6818	miles / hour / second
foot-pounds	1.286×10^{-3}	Btu
foot-pounds	1.356	joules
foot-pounds	3.24×10^{-4}	kilogram-calories
foot-pounds	0.1383	kilogram-meters
foot-pounds / minute	3.030×10^{-5}	horsepower
foot-pounds / minute	2.260×10^{-5}	kilowatts
furlongs	660	feet
gallons	3,785	cubic centimeters
gallons	0.1337	cubic feet
gallons	231	cubic inches
gallons	3.785	liters
gallons (Imperial)	1.20095	gallons (U.S.)
gallons (U.S.)	0.83267	gallons (Imperial)
gallons / minute	2.228×10^{-3}	cubic feet / second
gausses	6.452	lines of flux / sq. inch
gausses	10^{-8}	webers / sq. centimeter
gilberts	0.7958	ampere-turns
gilberts / centimeter	2.021	ampere-turns / inch
gills	0.1183	liters
grains (troy)	0.06480	grams
grains (troy)	2.0833×10^{-3}	ounces (avoir.)
grams	980.7	dynes

Multiply	By	To Get
grams.....	9.807×10^{-5}	joules / centimeter
grams.....	0.03527	ounces (avoir.)
grams.....	0.07093	poundals
grams.....	2.205×10^{-3}	pounds
grams / cubic cm.....	62.43	pounds / cubic foot
grams / square cm.....	2.0481	pounds / square foot
gram-calories.....	3.9683×10^{-3}	Btu
gram-calories.....	4.1868×10^7	ergs
gram-calories.....	3.0880	foot-pounds
gram-calories.....	1.1630×10^{-6}	kilowatt-hours
gram-centimeters.....	9.297×10^{-8}	Btu
gram-centimeters.....	980.7	ergs
gram-centimeters.....	9.807×10^{-5}	joules
hectares.....	2.471	acres
horsepower.....	42.44	Btu / minute
horsepower.....	33,000	foot-pounds / minute
horsepower.....	550	foot-pounds / second
horsepower (metric).....	542.5	foot-pounds / second
horsepower (metric).....	0.9863	horsepower
horsepower.....	10.68	kilogram-calories / min.
horsepower.....	745.7	watts
hours.....	3,600	seconds
inches	2.540	centimeters
inches	8.333×10^{-2}	feet
inches	2.540×10^{-2}	meters
inches	25.40	millimeters
inches	1,000	mils
inches of mercury	3.342×10^{-2}	atmospheres
inches of mercury	1.133	feet of water
inches of mercury	345.3	kilograms / sq. meter
inches of mercury	0.4912	pounds / sq. inch
inches of mercury	33.864	millibars
inches of water	7.355×10^{-2}	inches of mercury
inches of water	3.613×10^{-2}	pounds / sq. inch
joules	9.480×10^{-4}	Btu
joules	10^7	ergs
joules	0.7376	foot-pounds
joules	2.389×10^{-4}	kilogram-calories
joules	0.1020	kilogram-meters

Multiply	By	To Get
joules	2.778×10^{-4}	watt-hours
joules / centimeter	10^7	dynes
joules / centimeter	723.3	poundals
joules / centimeter	22.48	pounds
kilograms	980,665	dynes
kilograms	9.807	joules / meter (newtons)
kilograms	70.93	poundals
kilograms	2.205	pounds
kilograms	9.842×10^{-4}	tons (long)
kilograms	1.102×10^{-3}	tons (short)
kilograms / cubic meter.....	0.06243	pounds / cubic foot
kilograms / sq. meter	9.687×10^{-5}	atmospheres
kilograms / sq. meter	0.2048	pounds / square foot
kilogram-calories	3.968	Btu
kilogram-calories	3,088	foot-pounds
kilogram-calories	4,186	joules
kilogram-meters	9.294×10^{-3}	Btu
kilogram-meters	7.233	foot-pounds
kilometers	3,281	feet
kilometers	0.6214	miles
kilometers / hour	0.9113	feet / second
kilometers / hour	0.5396	knots
kilometers / hour	0.6214	miles / hour
kilowatts	56.92	Btu / minute
kilowatts	4.426×10^4	foot-pounds / minute
kilowatts	1.341	horsepower
kilowatt-hours	3,413	Btu
kilowatt-hours	2.655×10^6	foot-pounds
kilowatt-hours	3.6×10^6	joules
knots	6,080	feet / hour
knots	1.8532	kilometers / hour
knots	1.151	miles (statute) / hour
knots	1.689	feet / second
leagues	3.0	miles
lines of flux / sq. cm.	1.0	gausses
lines of flux / sq. inch	0.1550	gausses
lines of flux / sq. inch	1.550×10^{-9}	webers / sq. centimeter
liters	1,000	cubic centimeters
liters	61.02	cubic inches
liters	0.2642	gallons (U.S.)
liters / minute	5.886×10^{-4}	cubic feet / second

Multiply	By	To Get
lumens / sq. foot	1.0	foot-candles
lux	0.0929	foot-candles
maxwells	10^{-8}	webers
meters	3.281	feet
meters	39.37	inches
meters	5.396×10^{-4}	miles (nautical)
meters	6.214×10^{-4}	miles (statute)
meters	1.094	yards
meters / second	3.6	kilometers / hour
meters / second	2.237	miles / hour
meter-kilograms	9.807×10^7	centimeter-dynes
meter-kilograms	7.233	pound-feet
miles (nautical)	6,076.103	feet
miles (nautical)	1.852	kilometers
miles (nautical)	1.1508	miles (statute)
miles (statute)	5,280	feet
miles (statute)	1.609	kilometers
miles (statute)	0.8689	miles (nautical)
miles (statute)	1,760	yards
miles / hour	1.467	feet / second
miles / hour	1.609	kilometers / hour
miles / hour	0.8684	knots
millimeters	3.281×10^{-3}	feet
millimeters	0.03937	inches
mils	2.54×10^{-3}	centimeters
mils	0.001	inches
minutes (angular)	0.01667	degrees
minutes (angular)	1.852×10^{-4}	quadrants
minutes (angular)	2.909×10^{-4}	radians
ounces	16.0	drams
ounces	437.5	grains
ounces	28.3495	grams
ounces	0.0625	pounds
ounces (fluid)	1.805	cubic inches
ounces (fluid)	0.02957	liters
ounces (troy)	1.09714	ounces (avoir.)
pint (dry)	33.60	cubic inches
pint (liquid)	0.4732	liters
poundals	13,826	dynes
poundals	14.10	grams

Multiply	By	To Get
poundals	0.1383	joules / meter (newtons)
poundals	0.01410	kilograms
poundals	0.03108	pounds
pounds	453.5924	grams
pounds	4.448	joules / meter (newtons)
pounds	0.4536	kilograms
pounds	16	ounces
pounds	32.17	poundals
pounds	0.0005	tons (short)
pounds of water	0.1198	gallons
pounds / cubic foot	16.02	kilograms / cubic meter
pounds / cubic inch	27.68	grams / cubic centimeter
pounds / square inch	0.06804	atmospheres
pounds / square inch	2.307	feet of water
pounds / square inch	2.036	inches of mercury
quadrants (angular)	90	degrees
quadrants (angular)	5,400	minutes
quadrants (angular)	1.571	radians
quarts (liquid)	57.75	cubic inches
quarts (liquid)	0.9463	liters
radians	57.30	degrees
radians	3,438	minutes
radians	0.6366	quadrants
radians / second	9.549	revolutions / minute
revolutions / minute	6.0	degrees / second
revolutions / minute	0.1047	radians / second
rods	16.5	feet
square centimeters	1.973×10^5	circular mils
square centimeters	0.1550	square inches
square inches	1.273×10^6	circular mils
square inches	6.452	square centimeters
square meters	10.76	square feet
square meters	1.196	square yards
square miles	640	acres
square millimeters	1,973	circular mils
square mils	1.273	circular mils
tons (long)	1,016	kilograms
tons (long)	2,240	pounds
tons (metric)	1,000	kilograms
tons (metric)	2,205	pounds

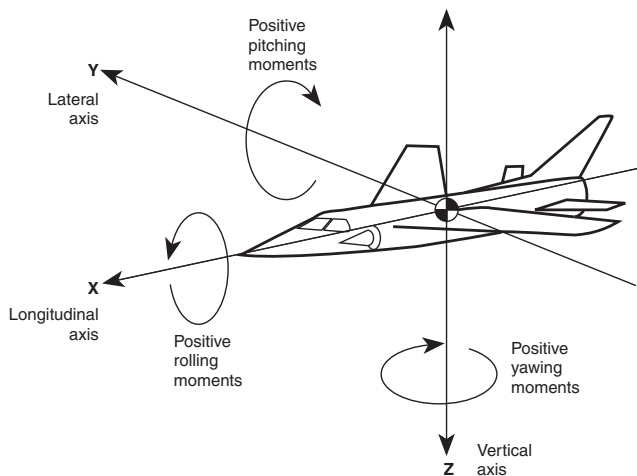
Multiply	By	To Get
tons (short)	907.185	kilograms
tons (short)	2,000	pounds
watts	3.413	Btu / hour
watts	10^7	ergs / second
watts	44.27	foot-pounds / minute
watts	1.341×10^{-3}	horsepower
watt-hours	3.413	Btu
watt-hours	2,656	foot-pounds
watt-hours	367.2	kilogram-meters
webers	10^8	maxwells
webers / sq. inch	1.55×10^7	gausses
yards	36	inches
yards	0.9144	meters

Notes

1.3 Aircraft Nomenclature

Axes of an Airplane

An airplane in flight is free to rotate about three axes: horizontal, longitudinal and vertical. Each axis is perpendicular to the others and each passes through the center of gravity.

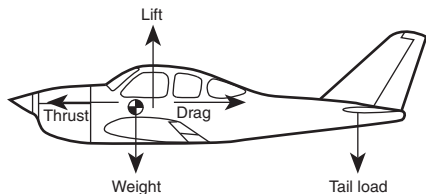


The three axes of an aircraft are mutually perpendicular, and all pass through the center of gravity of the aircraft.

Forces Acting on an Aircraft in Flight

In straight-and-level, unaccelerated flight the forces about the aircraft center of gravity are balanced. Lift acts upward and is opposed by weight and the aerodynamic tail load which act downward. Thrust acting forward is opposed by drag which acts rearward.

In straight-and-level, unaccelerated flight the forces about the center of gravity are balanced.



In straight-and-level, unaccelerated flight, the forces about the center of gravity are balanced.

Types of Aircraft Structure

Truss

A type of structure made up of longitudinal beams and cross braces. Compression loads between the main beams are carried by rigid cross braces called compression struts. Tension loads are carried by stays, or wires, that go from one main beam to the other and cross between the compression struts.

Most fabric-covered wings are constructed with a Pratt truss. The spars are the main beams and the cross braces are the compression struts or compression ribs. The stays are the drag and antidrag wires. The drag wires run from the front spar inboard to the rear spar outboard, and oppose the drag forces that try to move the wing tips backward. The antidrag wires run from the rear spar inboard to the front spar outboard. They oppose the aerodynamic forces that try to move the wing tips forward.

The Warren truss is used for the fuselage of most steel tube and fabric aircraft. The main beams are the longerons and the cross braces are steel tube diagonals which carry both compression and tension loads.

Monocoque

A single-shell that carries all of the flight loads in its outer surface. A chicken egg is a perfect example of a natural monocoque structure.

Metal monocoque aircraft fuselages have a minimum of internal structure, usually with just formers to provide the shape. Thin sheets of metal (called skins) riveted to the formers provide a rigid, strong, streamlined structure. Dents in the skins destroy the integrity of a monocoque structure.

Wooden monocoque aircraft structures are similar to those of metal. Thin sheets of aircraft plywood are glued to the formers to provide a strong, lightweight structure.

Modern composite structures are made of resins reinforced with special fabrics and formed in molds or over patterns; these provide a shell sufficiently strong to carry all the flight loads.

Semimonocoque

Most larger metal aircraft have a semimonocoque structure. This differs from the monocoque by having a series of longerons and stringers between the formers to support the skins and provide additional strength.

1.4 Joint Aircraft System/Component (JASC) Code

Based on ATA-100 and ATA-2200 Systems of Identification

The Joint Aircraft System/Component (JASC) Code table is a modified version of the Air Transport Association of America (ATA) Specification 100 code, developed by the FAA's Regulatory Support Division (AFS-600). Over the years, the JASC Code format of the ATA-100 Specifications has gained widespread industry acceptance. In a harmonized effort, the FAA's counterparts in Australia and Canada have adopted the JASC Code with only a few exceptions. Some Canadian aircraft manufacturers have also adopted this new standard.

This table can be used as a quick reference chart, to assist in the coding and review of aircraft structures or systems data. It uses the new JASC code four (4) digit format, in which the first two digits represent the code "chapter" title. The titles have been modified in some cases to clarify the intended use of the accompanying code.

Note: The JASC Code divides the engine-related codes into two groups to separate turbine and reciprocating engines. The codes for the turbine engines are in JASC Code Chapter 72, Turbine/Turboprop Engine. The codes for the reciprocating engines are now exclusively found in Chapter 85, Reciprocating Engine.

11 Placards And Markings

1100 Placards And Markings

12 Servicing

1210 Fuel Servicing

1220 Oil Servicing

1230 Hydraulic Fluid Servicing

1240 Coolant Servicing

14 Hardware

1400 Miscellaneous Hardware

1410 Hoses And Tubes

1420 Electrical Connectors

1430 Fasteners

1497 Miscellaneous Wiring

18 Helicopter Vibration

1800 Helicopter Vib/Noise
Analysis

1810 Helicopter Vibration
Analysis

1820 Helicopter Noise Analysis

1897 Helicopter Vibration System
Wiring

21 Air Conditioning

2100 Air Conditioning System

2110 Cabin Compressor System

2120 Air Distribution System

2121 Air Distribution Fan

2130 Cabin Pressure Control
System

2131 Cabin Pressure Controller

- 2132 Cabin Pressure Indicator
- 2133 Pressure Regul/Outflow Valve
- 2134 Cabin Pressure Sensor
- 2140 Heating System
- 2150 Cabin Cooling System
- 2160 Cabin Temperature Control System
- 2161 Cabin Temperature Controller
- 2162 Cabin Temperature Indicator
- 2163 Cabin Temperature Sensor
- 2170 Humidity Control System
- 2197 Air Conditioning System Wiring

22 Auto Flight

- 2200 Auto Flight System
- 2210 Autopilot System
- 2211 Autopilot Computer
- 2212 Altitude Controller
- 2213 Flight Controller
- 2214 Autopilot Trim Indicator
- 2215 Autopilot Main Servo
- 2216 Autopilot Trim Servo
- 2220 Speed-Attitude Correction System
- 2230 Auto Throttle System
- 2250 Aerodynamic Load Alleviating
- 2297 Autoflight System Wiring

23 Communications

- 2300 Communications System
- 2310 HF Communication System
- 2311 UHF Communication System
- 2312 VHF Communication System

- 2320 Data Transmission Auto Call
- 2330 Entertainment System
- 2340 Interphone/Passenger Pa System
- 2350 Audio Integrating System
- 2360 Static Discharge System
- 2370 Audio/Video Monitoring
- 2397 Communication System Wiring

24 Electrical Power

- 2400 Electrical Power System
- 2410 Alternator-Generator Drive
- 2420 AC Generation System
- 2421 AC Generator-Alternator
- 2422 AC Inverter
- 2423 Phase Adapter
- 2424 AC Regulator
- 2425 AC Indicating System
- 2430 DC Generating System
- 2431 Battery Overheat Warning System
- 2432 Battery/Charger System
- 2433 DC Rectifier/Converter
- 2434 DC Generator-Alternator
- 2435 Starter-Generator
- 2436 DC Regulator
- 2437 DC Indicating System
- 2440 External Power System
- 2450 AC Power Distribution System
- 2460 DC Power/Distribution System
- 2497 Electrical Power System Wiring

25 Equipment/Furnishings

- 2500 Cabin Equipment/Furnishings

2510 Flight Compartment Equipment
2520 Passenger Compartment Equipment
2530 Buffet/Galleys
2540 Lavatories
2550 Cargo Compartments
2551 Agricultural Spray System
2560 Emergency Equipment
2561 Life Jacket
2562 Emergency Locator Beacon
2563 Parachute
2564 Life Raft
2565 Escape Slide
2570 Accessory Compartment
2571 Battery Box Structure
2572 Electronic Shelf Section
2597 Equip/Furnishing System Wiring

26 Fire Protection

2600 Fire Protection System
2610 Detection System
2611 Smoke Detection
2612 Fire Detection
2613 Overheat Detection
2620 Extinguishing System
2621 Fire Bottle, Fixed
2622 Fire Bottle, Portable
2697 Fire Protection System Wiring

27 Flight Controls

2700 Flight Control System
2701 Control Column Section
2710 Aileron Control System
2711 Aileron Tab Control System
2720 Rudder Control System

2721 Rudder Tab Control System
2722 Rudder Actuator
2730 Elevator Control System
2731 Elevator Tab Control System
2740 Stabilizer Control System
2741 Stabilizer Position Indicating
2742 Stabilizer Actuator
2750 TE Flap Control System
2751 TE Flap Position Ind. System
2752 TE Flap Actuator
2760 Drag Control System
2761 Drag Control Actuator
2770 Gust Lock/Damper System
2780 LE Slat Control System
2781 LE Slat Position Ind. System
2782 LE Slat Actuator
2797 Flight Control System Wiring

28 Fuel

2800 Aircraft Fuel System
2810 Fuel Storage
2820 Aircraft Fuel Distrib. System
2821 Aircraft Fuel Filter/Strainer
2822 Fuel Boost Pump
2823 Fuel Selector/Shut-Off Valve
2824 Fuel Transfer Valve
2830 Fuel Dump System
2840 Aircraft Fuel Indicating System
2841 Fuel Quantity Indicator
2842 Fuel Quantity Sensor
2843 Fuel Temperature Indicator
2844 Fuel Pressure Indicator
2897 Fuel System Wiring

29 Hydraulic Power

- 2900 Hydraulic Power System
- 2910 Hydraulic System, Main
- 2911 Hydraulic Power Accumulator, Main
- 2912 Hydraulic Filter, Main
- 2913 Hydraulic Pump, (Electric/ Engine, Main
- 2914 Hydraulic Handpump, Main
- 2915 Hydraulic Pressure Relief Valve, Main
- 2916 Hydraulic Reservoir, Main
- 2917 Hydraulic Pressure Regulator, Main
- 2920 Hydraulic System, Auxiliary
- 2921 Hydraulic Accumulator, Auxiliary
- 2922 Hydraulic Filter, Auxiliary
- 2923 Hydraulic Pump, Auxiliary
- 2925 Hydraulic Pressure Relief, Auxiliary
- 2926 Hydraulic Reservoir, Auxiliary
- 2927 Hydraulic Pressure Regulator, Auxiliary
- 2930 Hydraulic Indicating System
- 2931 Hydraulic Pressure Indicator
- 2932 Hydraulic Pressure Sensor
- 2933 Hydraulic Quantity Indicator
- 2934 Hydraulic Quantity Sensor
- 2997 Hydraulic Power System Wiring

30 Ice And Rain Protection

- 3000 Ice/Rain Protection System
- 3010 Airfoil Anti/De-Ice System
- 3020 Air Intake Anti/De-Ice System
- 3030 Pitot/Static Anti-Ice System

- 3040 Windshield/Door Rain/Ice Removal
- 3050 Antenna/Radome Anti-Ice/De-Ice System
- 3060 Prop/Rotor Anti-Ice/De-Ice System
- 3070 Water Line Anti-Ice System
- 3080 Ice Detection
- 3097 Ice/Rain Protection System Wiring

31 Instruments

- 3100 Indicating/Recording System
- 3110 Instrument Panel
- 3120 Independent Instruments (Clock, etc.)
- 3130 Data Recorders (Flt/Maint)
- 3140 Central Computers (EICAS)
- 3150 Central Warning
- 3160 Central Display
- 3170 Automatic Data
- 3197 Instrument System Wiring

32 Landing Gear

- 3200 Landing Gear System
- 3201 Landing Gear/Wheel Fairing
- 3210 Main Landing Gear
- 3211 Main Landing Gear Attach Section
- 3212 Emergency Flotation Section
- 3213 Main Landing Gear Strut/Axle/Truck
- 3220 Nose/Tail Landing Gear
- 3221 Nose/Tail Landing Gear AttachSection
- 3222 Nose/Tail Landing Gear Strut/Axle

3230 Landing Gear Retract/
Extend System
3231 Landing Gear Door Retract
Section
3232 Landing Gear Door Actuator
3233 Landing Gear Actuator
3234 Landing Gear Selector
3240 Landing Gear Brake System
3241 Brake Anti-Skid Section
3242 Brake
3243 Master Cylinder/Brake Valve
3244 Tire
3245 Tire Tube
3246 Wheel/Ski/Float
3250 Landing Gear Steering
System
3251 Steering Unit
3252 Shimmy Damper
3260 Landing Gear Position And
Warning
3270 Auxiliary Gear (Tail Skid)
3297 Landing Gear System
Wiring

33 Lights

3300 Lighting System
3310 Flight Compartment
Lighting
3320 Passenger Compartment
Lighting
3330 Cargo Compartment
Lighting
3340 Exterior Lighting
3350 Emergency Lighting
3397 Light System Wiring

34 Navigation

3400 Navigation System
3410 Flight Environment Data

3411 Pitot/Static System
3412 Outside Air Temperature
Indicator Sensor
3413 Rate of Climb Indicator
3414 Airspeed/Mach Indicator
3415 High Speed Warning
3416 Altimeter, Barometric/
Encoder
3417 Air Data Computer
3418 Stall Warning System
3420 Attitude and Direction Data
System
3421 Attitude Gyro and Indicator
System
3422 Directional Gyro and
Indicator System
3423 Magnetic Compass
3424 Turn and Bank/Rate of Turn
Indicator
3425 Integrated Flight Director
System
3430 Landing and Taxi Aids
3431 Localizer/VOR System
3432 Glide Slope System
3433 Microwave Landing System
3434 Marker Beacon System
3435 Heads Up Display System
3436 Wind Shear Detection
System
3440 Independent Position
Determining System
3441 Inertial Guidance System
3442 Weather Radar System
3443 Doppler System
3444 Ground Proximity System
3445 Air Collision Avoidance
System (TCAS)
3446 Non Radar Weather System
3450 Dependent Position
Determining System

- 3451 DME/TACAN System
- 3452 ATC Transponder System
- 3453 LORAN System
- 3454 VOR System
- 3455 ADF System
- 3456 Omega Navigation System
- 3457 Global Positioning System
- 3460 Flt Management Computing Hardware System
- 3461 Flight Manage. Computing Software System
- 3497 Navigation System Wiring

35 Oxygen

- 3500 Oxygen System
- 3510 Crew Oxygen System
- 3520 Passenger Oxygen System
- 3530 Portable Oxygen System
- 3597 Oxygen System Wiring

36 Pneumatic

- 3600 Pneumatic System
- 3610 Pneumatic Distribution System
- 3620 Pneumatic Indicating System
- 3697 Pneumatic System Wiring

37 Vacuum

- 3700 Vacuum System
- 3710 Vacuum Distribution System
- 3720 Vacuum Indicating System
- 3797 Vacuum System Wiring

38 Water/Waste

- 3800 Water And Waste System
- 3810 Potable Water System

- 3820 Wash Water System
- 3830 Waste Disposal System
- 3840 Air Supply (Water Press. System)
- 3897 Water/Waste System Wiring

45 Central Maint. System

- 4500 Central Maint. Computer
- 4597 Central Maint. System Wiring

49 Airborne Auxiliary Power

- 4900 Airborne APU System
- 4910 APU Cowling/Containment
- 4920 APU Core Engine
- 4930 APU Engine Fuel and Control
- 4940 APU Start/Ignition System
- 4950 APU Bleed Air System
- 4960 APU Controls
- 4970 APU Indicating System
- 4980 APU Exhaust System
- 4990 APU Oil System
- 4997 APU System Wiring

51 Standard Practices/Structures

- 5100 Standard Practices/Structures
- 5101 Aircraft Structures
- 5102 Balloon Reports

52 Doors

- 5200 Doors
- 5210 Passenger/Crew Doors
- 5220 Emergency Exits
- 5230 Cargo/Baggage Doors

5240 Service Doors
5241 Galley Doors
5242 E/E Compartment Doors
5243 Hydraulic Compartment Doors
5244 Accessory Compartment Doors
5245 Air Conditioning Compart. Doors
5246 Fluid Service Doors
5247 APU Doors
5248 Tail Cone Doors
5250 Fixed Inner Doors
5260 Entrance Stairs
5270 Door Warning System
5280 Landing Gear Doors
5297 Door System Wiring

53 Fuselage

5300 Fuselage Structure (General)
5301 Aerial Tow Equipment
5302 Rotorcraft Tail Boom
5310 Fuselage Main, Structure
5311 Fuselage Main, Frame
5312 Fuselage Main, Bulkhead
5313 Fuselage Main, Longerons/ Stringer
5314 Fuselage Main, Keel
5315 Fuselage Main, Floor Beam
5320 Fuselage Miscellaneous Structure
5321 Fuselage Floor Panel
5322 Fuselage Internal Mount Structure
5323 Fuselage Internal Stairs
5324 Fuselage Fixed Partitions
5330 Fuselage Main, Plate/Skin

5340 Fuselage Main, Attach Fittings
5341 Fuselage, Wing Attach Fittings
5342 Fuselage, Stabilizer Attach Fittings
5343 Landing Gear Attach Fittings
5344 Fuselage Door Hinges
5345 Fuselage Equipment Attach Fittings
5346 Powerplant Attach Fittings
5347 Seat/Cargo Attach Fittings
5350 Aerodynamic Fairings
5397 Fuselage Wiring

54 Nacelles/Pylons

5400 Nacelle/Pylon Structure
5410 Nacelle/Pylon, Main Frame
5411 Nacelle/Pylon, Frame/Spar/Rib
5412 Nacelle/Pylon, Bulkhead/Firewall
5413 Nacelle/Pylon, Longerons/ Stringer
5414 Nacelle/Pylon, Plate Skin
5415 Nacelle/Pylon, Attach Fittings
5420 Nacelle/Pylon Miscellaneous Structure
5497 Nacelle/Pylon System Wiring

55 Stabilizers

5500 Empennage Structure
5510 Horizontal Stabilizer Structure
5511 Horizontal Stabilizer, Spar/Rib