Amateur-Built Fabrication and Assembly Checklist (2021)
Fixed Wing

Name(s)	RANS Designs Inc.
Address:	4600 U.S. 183 ALT, Hays, KS 67601
Aircraft Model:	S-21, Outbound
Date:	Tuesday, April 05, 2022
Remarks:	Configuration Control Document

Desk Audit Evalluation performed by Micheal Sloat NKET Team Lead in Fort Worth Texas. Aoruk 5, 2022

NOTE: This checklist is only applicable to fixed wing aircraft. Evaluation of other types of aircraft (i.e., rotorcraft, balloons, lighter than air) will not be accomplished with this form.

NOTE: This checklist is invalid for and will not be used to evaluate an altered or modified type certificated aircraft with the intent to issue an Experimental Amateur-built Airworthiness Certificate. Such action violates FAA policy and DOES NOT meet the intent of § 21.191(g).

Instructions For Using The Amateur-Built Fabrication and Assembly Checklist (2011):

A point (each task equals 1 point) can be divided over multiple categories (Manufacturer, Commercial Assistance, Amateur Builder Assembly and Amateur Builder Fabrication) into 1/10 fractions. A Manufacturer may be a kit manufacturer, a component manufacturer or a part(s) manufacturer. Commercial assistance (for hire or compensation) may include assistance provided by kit manufacturers, commercial assistance centers, individuals (e.g. A& P mechanics or avionics technicians).

For example, 0.5 (half point) can be assigned to the Manufacturer, 0.3 (3/10 - 3 tenths) as Commercial Assistance, 0.2 to the Amateur Builder as Fabrication, for a total of 1 point.

Enter "N/A" in any box where a listed task is not applicable to the particular aircraft being evaluated. Use the "Add item" boxes at the end of each section to add applicable unlisted tasks and award credit.

	FABRICATION AND ASSEMBLY TASKS			A Mfr Kit/Part/ Component	B Commercial Assistance	C Am-Builder Assembly	D Am-Builder Fabrication
	Task #		Fuselage – 22 Listed Tasks				
	F1	1	Cut bottom longeron to length	0.7			0.3
x	F2	1	Trim wing cuffs	0.9			0.1
x	F3	1	Prep station 4. This requires bending flanges to proper	0.8			0.2
x	F4	1	Transfer drill elevator push-pull tube and install fittings	0.8			0.2
	F5	1	Assemble and fit up forward elevator push-pull tubes	0		1.0	
	F6	1	Rivet stringers and longerons on bottom and rivet on S-4 bulkhead	0		1.0	

FABRICATION AND ASSEMBLY TASKS			A	B	C	D
			Mfr Kit/Part/ Component	Commercial Assistance	Am-Builder Assembly	Am-Builder Fabrication
F7	1	Nut plate tabs in fuselage cage	0.7			0.3
F8	1	Assemble small push pull tubes with transfer bellcrank.	0		1.0	
F9	1	Fabricate Cables	1			0.0
F10	1	Nicro press rudder system return cable	0		1.0	
F11	1	Fabricate fuel pump mount	0.5			0.5
F12	1	Assemble Fuselage Fuel System Components	1		0.0	
F13	1	Fabricate Fuselage Skin	1			0.0
F14	1	Rivet stringer to side skins	0		1.0	
F15	1	Fabricate Windshield	0.3			0.7
F16	1	Assemble Windshield to Fuselage	1		0.0	
F17	1	Debur and send edges of lexan windows and skylight	0.6			0.4
F18	1	Assemble Windows/Skylight to Fuselage	1		0.0	
F19	1	Trim and fit door glazing retention track	0.6			0.4
F20	1	Hang and test fit hinge pins	0		1.0	
F21		Fabricate Mast and Strut Assembly	N/A			
F22		Assemble Mast and Strut Assembly	N/A			
F23	1	Add Fab item: Sand and Deburr edges of Boot Cowl	0.6			0.4
F24	1	Add Assy item: Rivet air vents to Boot Cowl Side Panels	0		1.0	
F25		Add Fab item:				
F26		Add Assy item:				
Total # of Fuselage Tasks		**Fuselage Subtotal**	Mfr Kit/Part/ Component	Commercial Assistance	Am-Builder Assembly	Am-Builder Fabrication
22		**Fuselage Total Points ►**	11.5	0.0	7.0	3.5

Fuselage Comments:

FABRICATION AND ASSEMBLY TASKS			A	B	C	D
			Mfr Kit/Part/ Component	Commercial Assistance	Am-Builder Assembly	Am-Builder Fabrication
Task #		**Wings – 47 Listed Tasks**				
W1	1	Remove burrs on wing spar install doublers on right wing spars	0.7			0.30
W2	1	Straighten tip and root ribs for right wing	0.8			0.20
W3	1	Assemble right wing root and tip ribs to spars	0		1.00	
W4	1	Remove burrs on wing spar install doublers on left wing spars	0.7			0.30
W5	1	Straighten tip and root ribs for left wing	0.8			0.20
W6	1	Assemble left wing root and tip ribs to spars	0		1.00	
W7		Fabricate Composite Cores	N/A			
W8		Assemble Composite Cores to Wing	N/A			
W9		Fabricate Wing Leading and Trailing Edges	N/A			
W10		Assemble Wing Leading & Trailing Edges to Wing	N/A			
W11		Fabricate Drag/Anti-drag Truss Members	N/A			
W12		Assemble Drag/Anti-drag Truss Members to Wing	N/A			
W13	1	Debur strut attach fittings that bolt to the truss	0.7			0.30
W14	1	Assemble strut attach fitting to wing truss for both wings	0.9		0.10	
W15	1	Trim wing tips and inner ribs	0.2			0.80
W16	1	Assemble wing tips to wings*	0		1.00	
W17	1	Fabricate special tools or fixtures, assemble wing cradles	0.7			0.30
W18	1	Fabricate aileron spars	0.6			0.40
W19	1	Fabricate Aileron Ribs	0.8			0.20
W20	1	Roll aileron skins	0		1.00	
W21	1	Debur aileron hinges and ribs	0.7			0.30
W22	1	Rivet hinges to aileron ribs and horn to action rib	0		1.00	
W23	1	Debur aileron skins and roll leading edges to contour	0.8			0.20
W24	1	Rivet ribs to aileron skin and rivet spar in place	0		1.00	
W25	1	Install aileron to wing	1		0.00	
W26	1	Install aileron to wing	0.6			0.40
W27	1	Debur flap ribs and hinges	0.8			0.20
W28	1	Rivet hinges and horn to flap ribs	0		1.00	
W29	1	Assemble flap lever	0.7			0.30
W30	1	Assemble flap hinge bearing to flap	0		1.00	

FABRICATION AND ASSEMBLY TASKS			A	B	C	D
			Mfr Kit/Part/ Component	Commercial Assistance	Am-Builder Assembly	Am-Builder Fabrication
W31	1	Roll flap skins	0.8			0.20
W32	1	Rivet ribs to flap skins and spar	0		1.00	
W33	1	Assemble flap to wing	1		0.00	
W34		Fabricate Wing External Lighting Components	N/A			
W35		Assemble Wing Ext Lighting Components to Wing	N/A			
W36	1	Assemble flaps and aileron to wings	1		0.00	
W37	1	Drill fuel tank withdrawal hole and install fitting	0.7			0.30
W38	1	Install fuel vent	1		0.00	
W39	1	Cut and fit fuel line	0.5			0.50
W40	1	Feed wire through rib grommet for lights	0		1.00	
W41	1	Debur wing skin and countersink holes	0.7			0.30
W42	1	Assemble Wing Skin to Wing	1		0.00	
W43	1	Fabricate Wing Struts	1			0.00
W44	1	Assemble Wing Struts	0		1.00	
W45	1	Fabricate Fuel Tanks	0.6			0.40
W46	1	Assemble Fuel Tanks to Wing	1		0.00	
W47	1	Install wings to fuselage	1		0.00	
W48	1	Debur and trim gap seal	0.9			0.10
W49		Add Assy item:				
W50		Add Fab item:				
W51		Add Assy item:				
Total # of Wing Tasks		**Wings Subtotal**	4	Commercial Assistance	Am-Builder Assembly	Am-Builder Fabrication
40		**Wings Total Points ►**	22.7	0	11.1	6.2

Wing Comments:

FABRICATION AND ASSEMBLY TASKS			A	B	C	D
			Mfr Kit/Part/ Component	Commercial Assistance	Am-Builder Assembly	Am-Builder Fabrication
Task #		**Empennage – 42 Listed Tasks**				
E1	1	Debur horizontal stabilizer spar	0.8			0.2
E2	1	Debur H-Stab ribs	0.7			0.3
E3	1	Rivet the H-Stab spars and ribs	0		1.0	
E4	1	Debur incidence adjustment fittings	0.7			0.3
E5	1	Rivet hinges to H-Stab spar	0		1.0	
E6		Fabricate Horizontal Stabilizer Lead/Trailing Edges	N/A			
E7		Assemble Horizontal Stabilizer Lead/Trailing Edges to Stabilizer	N/A			
E8		Fabricate Horizontal Stabilizer Cables, Wires and Lines	N/A			
E9		Assemble Horizontal Stabilizer Cables, Wires and Lines to stabilizer	N/A			
E10	1	Debur H-Stab root fairing	0.8			0.2
E11	1	Rivet skins to H-Stab frame	0		1.0	
E12	1	Assemble H-Stab to fuselage	1		0.0	
E13	1	Debur elevator spars	0.9			0.1
E14	1	Debur elevator ribs	0.9			0.1
E15	1	Rivet elevator ribs to spar	0		1.0	
E16	1	Debur elevator hinges	0.7			0.3
E17	1	Rivet hinges to elevator spar	0		1.0	
E18	1	Debur elevator skins	0.6			0.4
E19	1	Rivet skins to elevator	0		1.0	
E20	1	Debur trim tab parts	0.6			0.4
E21	1	Install trim tab to elevator	1		0.0	
E22	1	Assemble elevator to H-Stab	1		0.0	
E23	1	Debur vertical stab spars	0.9			0.1
E24	1	Debur vertical stab ribs	0.5			0.5
E25	1	Rivet doublers to V-Stab spars	0		1.0	
E26	1	Debur V-Stab ribs	0.9			0.1
E27	1	Install hinges to V-Stab spar	0		1.0	
E28		Fabricate Vertical Stabilizer Cables, Wires and Lines	N/A			
E29		Assemble Cables, Wires, Lines to Vertical Stabilizer	N/A			
E30	1	Debur V-Stab leading edge skin	0.7			0.3

FABRICATION AND ASSEMBLY TASKS			A	B	C	D
			Mfr Kit/Part/ Component	Commercial Assistance	Am-Builder Assembly	Am-Builder Fabrication
E31	1	Rivet aft skin to aft spar	0		1.0	
E32	1	Install V-Stab to fuselage	1		0.0	
E33	1	Debur rudder spar	0.9			0.1
E34	1	Debur rudder ribs	0.6			0.4
E35	1	Debur rudder skin	0		1.0	
E36	1	Debur rudder hinges	0.5			0.5
E37	1	Rivet hinges and bolt horn to rudder spar	0		1.0	
E38	1	Roll rudder skin	0.8			0.2
E39	1	Rivet rudder skin to spar and ribs	0		1.0	
E40		fabricate rudder trim tab N/A	N/A			
E41		Install rudder trim tab N/A	N/A			
E42	1	Assemble rudder to V-Stab	1		0.0	
E43	1	Trim and Fit V-Stab tip	0.2			0.8
E44	1	Rivet V-Stab tip to V-Stab	0		1.0	
E45	1	Trim and fit H-Stab tip	0.2			0.8
E46	1	Install H- Stab tip	0		1.0	
Total # of Empennage Tasks		**Empennage Subtotal**	Mfr Kit/Part/ Component	Commercial Assistance	Am-Builder Assembly	Am-Builder Fabrication
38		**Empennage Total Points ►**	17.9	0	14	6.1

Empennage Comments:.

FABRICATION AND ASSEMBLY TASKS			A	B	C	D
			Mfr Kit/Part/ Component	Commercial Assistance	Am-Builder Assembly	Am-Builder Fabrication
Task #		Landing Gear – 14 Listed Tasks				
LG1	1	Fabricate Landing Gear Struts or Major Components	1			0.0
LG2	1	Assemble landing gear components, wheels, brakes, nose gear, or tailwheel.	0		1.0	
LG3	1	Assemble blade fork to fork for trike or bolt up tailspring for tailwheel	0		1.0	
LG4		Fabricate Brake System Components	N/A			
LG5		Assemble Brake System Components to Wheels/Gear	N/A			
LG6		Assemble Wheels and Tires to Landing Gear	N/A			
LG7	1	Make lexan shims for main gear clamps. Ream or drill gear leg and cockpit bushings to fit bolts.	0.5			0.5
LG8		Assemble Landing Gear Bracket and Fittings to Landing Gear	N/A			
LG9		Fabricate Landing Gear Actuation System Components	N/A			
LG10		Assemble Landing Gear Actuation System Components to Next Higher Structure	N/A			
LG11		Fabricate Landing Gear System Cables, Wires and Lines	N/A			
LG12		Assemble Landing Gear Cables, Wires and Lines to Next Level Structure	N/A			
LG13		Fabricate Landing Gear Fairings/Gear Doors	N/A			
LG14		Assemble Landing Gear Fairings/Gear Doors to Next Level Structure	N/A			
LG15		Add Fab item:				
LG16		Add Assy item:				
Total # of Land Gear Tasks		**Landing Gear Subtotal**	Mfr Kit/Part/ Component	Commercial Assistance	Am-Builder Assembly	Am-Builder Fabrication
4		**Landing Gear Total Points ►**	1.5	0	2	0.5

Landing Gear Comments: Evaluated tail wheel and nose wheel configuration.

FABRICATION AND ASSEMBLY TASKS			A	B	C	D
			Mfr Kit/Part/ Component	Commercial Assistance	Am-Builder Assembly	Am-Builder Fabrication
Task #		**Propulsion – 26 Listed Tasks**				
P1		Fabricate Engine Mounts	N/A			
P2		Assemble Engine Mounts to Next Level Structure	N/A			
P3		Fabricate Engine Cooling System/Baffles	N/A			
P4		Assemble Engine Cooling System Baffles to Engine	N/A			
P5		Fabricate Engine Compartment Overheat/Fire Detection System	N/A			
P6		Assemble Engine Compartment Overheat/Fire Detection System to Engine Compartment	N/A			
P7		Fabricate Induction System	N/A			
P8		Assemble Induction System to Engine	N/A			
P9		Fabricate Exhaust System	N/A			
P10		Assemble Exhaust System to Engine	N/A			
P11		Fabricate Engine Control Installation Brackets	N/A			
P12		Assemble Engine Controls to Next Level Structure	N/A			
P13		Fabricate Brackets and Fittings	N/A			
P14		Assemble Brackets and Fittings to Next Level Structure	N/A			
P15		Fabricate Cables, Wires and Lines	N/A			
P16		Assemble Cables, Wires and Lines to next Level Structure	N/A			
P17		Assemble Engine (Likely N/A)	N/A			
P18		Assemble Engine to Engine Mount	N/A			
P19		Fabricate Engine Propeller (Likely N/A)	N/A			
P20		Fabricate Propeller Spinner Components	N/A			
P21		Assemble Propeller and Spinner to Engine	N/A			
P22		Fabricate Engine Cowling	N/A			
P23		Assemble Engine Cowling to Airframe	N/A			
P24	1	Deburr firewall	0		1.0	
P25	1	Fabricate Firewall	0.6			0.4
P26	1	Assemble Firewall To Next Level Structure	0		1.0	
P27		Add Fab item:	N/A			
P28	1	Add Assy item: Rivet Firewall together	0		1.0	
P29		Add Fab item:	N/A			
P30		Add Assy item: Assemble Propellor	N/A			
Total # of Propulsion Tasks		**Propulsion Subtotal**	Mfr Kit/Part/ Component	Commercial Assistance	Am-Builder Assembly	Am-Builder Fabrication
4		**Propulsion Total Points ►**	0.6	0	3	0.4

Propulsion Comments: Items P3 - P24 were not evaluated. The engine and components are not included in the basic kit.

FABRICATION AND ASSEMBLY TASKS			A	B	C	D
			Mfr Kit/Part/ Component	Commercial Assistance	Am-Builder Assembly	Am-Builder Fabrication
Task #		Cockpit Interior – 23 Listed Tasks				
C1	1	Debur panel and nut plate support frame	0.2			0.8
C2	1	Rivet throttle/mixture reinforcement to sub panel	0.9			0.1
C3	1	Test fit panel to cockpit cage	0		1.0	
C4		Assemble Avionics to Instrument Panel	N/A			
C5	1	Rivet seat pans to bottom seat frame	0.4			0.6
C6	1	Debur seat side plates and countersink	0.5			0.5
C7	1	Install seats into cockpit	0		1.0	
C8		Fabricate Seat Belts and Shoulder Harness Fittings and Brackets	N/A			
C9	1	Assemble seat belts and shoulder harness to cockpit	0		1.0	
C10	1	Prepare control sticks for wiring	0.8			0.2
C11	1	Install wiring in tailcone for trim system	0		1.0	
C12	1	Install control sticks onto torque tube	0.8			0.2
C13	1	Assemble control sticks and the two small push-pull tubes	0		1.0	
C14		Fabricate All Flight Control Push Pull Tubes and/or Cables	N/A			
C15	1	Install pulleys to cockpit cage at S2	0		1.0	
C16	1	Rivet together rudder pedals	0.6			0.4
C17	1	Install rudder pedals to torque tubes	0		1.0	
C18	1	Debur bump trim and cut VHB to length	0			1.0
C19	1	Attach trim tab to rudder and aileron	0		1.0	
C20	1	Assemble flap lever	0.3			0.7
C21	1	Install flap lever to cage	0		1.0	
C22		Fabricate Closeout Panels/Floor Panels	N/A			
C23	1	Deburr and transfer drill, and cleco floorboard in place	0		1.0	
C24		Add Fab item:				
C25		Add Assy item:				
Total # of Cockpit Tasks		**Cockpit Interior Subtotal**	Mfr Kit/Part/ Component	Commercial Assistance	Am-Builder Assembly	Am-Builder Fabrication
19		**Cockpit Interior Total Points ►**	4.5	0	10	4.5

Cockpit Comments:

Total # of Aircraft Tasks	
127	**◄ SUM #1**

▶ TOTAL TASKS AND LINE ITEMS ↓ ↓ ↓ ↓

FABRICATION AND ASSEMBLY SUMMARY	**A**	**B**	**C**	**D**
	Mfr Kit/Part/ Component	Commercial Assistance	Am Builder Assembly	Am Builder Fabrication
1. Total Number of Aircraft Tasks (Note 1)	**(SUM#1)**		**127**	
2. Total Points for Each Category. (Note 2)	**58.7**	**0.0**	**47.1**	**21.2**
3. Total Points for Complete Aircraft Construction (SUM # 2 should equal SUM # 1 above). (Note3)	**(SUM #2) ►**		**127.0**	
4. Percentage of Each Category as Part of Total Aircraft Construction. (Note 4)	**46.22%**	**0.00%**	**37.09%**	**16.69%**
5. Total Percentages for Complete Aircraft Construction (Add all percentages in row 4) Total should equal 100% (± . 5%). (Note 5)		**100.0%**		
6. Total Builder Points – Add points in row 2, column C and D only, together. (Note 6)			**68.3**	
7. Total Builder Percentage – Add percentages in row 4, columns C and D only, together. (Note 7)			**53.78%**	

NOTES: Instructions For Completing Fabrication and Assembly Checklist Summary

1. TOTAL NUMBER OF AIRCRAFT TASKS (Sum #1): To find the total points awarded for all tasks, add together the six individual "Total # of Tasks" blocks located at the bottom left of each aircraft tasks section.

2: TOTAL POINTS FOR EACH CATEGORY: [Columns A, B, C and D]. Each columns' total points are tallied by adding the sum of the points awarded in each respective column for each of the tasks in the section (Fuselage, Wings, Empennage, Landing Gear, Propulsion and Cockpit). Include points assigned to 'Additional Items' at the end of each section. Boxes with a N/A (not applicable) or an asterisk, have zero points.

3: TOTAL POINTS FOR COMPLETE AIRCRAFT CONSTRUCTION: (SUM#2) In row 3 of the Summary section, add together the numbers in each block on row2, tallied from each of the four column category totals, (Columns A+B+C+D). Compare SUM #1 to SUM #2. SUM #1 should be equal to SUM #2, (Verify the two sums are equal within a deviation of ± 0.5). Total points will vary from aircraft to aircraft depending on number of add items and N/As (Not Applicable) applied. (e.g., 133 listed task points, plus 5 Add items, minus 22 N/As = 116 tasks)

4: PERCENTAGE OF EACH CATEGORY AS PART OF TOTAL AIRCRAFT CONSTRUCTION: To compute category percentages, divide the number in each individual block found on row 2 by Sum #2 on row 3. For example if the total points of Mfr Kit/Part/Component category (Column A) = 40 and Sum #2 = 120, then divide 40 by 120 to reach 33.3%. Do this for each individual block on row 4 for each column. Percentages may be rounded to the nearest tenth, (22.86% is rounded to 22.9%).

5: TOTAL PERCENTAGES FOR COMPLETE AIRCRAFT CONSTRUCTION: Add up the percentages of each of the four categories (Columns A+B+C+D) found on row 4. Total must be equal to 100% with a (±) deviation limited to ½ % (0.5%). Example; a derived percentage between 99.5% and 100.5% is acceptable. If this computation falls outside the accepted deviation then an error has occurred in row 2, 3 or 4.

6: TOTAL BUILDER POINTS: Add together the two point tallies from row 2, Columns C and D blocks only. Total will vary from aircraft to aircraft depending on number of N/As applied.

7. TOTAL BUILDER PERCENTAGE: Add together the two percentage tallies from row 4 Columns C and D blocks only. Total must exceed 50% to be eligible for amateur built status and to meet major portion requirement under 14 CFR, Part 21.191(g) Operating amateur-built aircraft.

EXPLANATIONS AND EXAMPLES

► All Points are added at the end of the form in the Summary section under their respective categories. The point total is comprised of all the credits awarded for primary delineated tasks plus any credits given for 'Additional

► "Additional Items" may be assigned points the same as primary listed tasks if work or parts not reflected in the main entries need to be credited.

► The applicants completion of tasks can be documented in a number of ways and may include

(1) Builder's logs.
(2) Photographs/video/DVD.
(3) Drawings.
(4) Engineering data when necessary.
(5) Relevant documentation (e.g., plans) and references (e.g., handbooks) used.
(6) Documentation concerning any commercial assist
(7) Documentation concerning any non-commercial assistance used.
(8) Part inventories and histories.
(9) Receipts, Catalogs.
(10) Log book entries

In addition to using this checklist, the builder should document the entire fabrication and assembly process. To issue an airworthiness certificate the FAA must make a major portion determination (the major portion of an aircraft was fabricated and assembled by an amateur builder (s)). Making this finding requires sufficient, credible and adequate documentation.