Part 1
General

FS𝒳
Piper PA 28R Arrow III

Warning:
Highest danger! This is a toy
and may be used as such.
Must not be used to carry out exercises
or procedures as they might occur in reality
or for training purposes.

Installation
1.
Unzip and move into the main directory of your FSX.

2.
Start FSX and choose one of these:

Legal Information

1.
This aircraft is made available free of charge to the personal and private use. I want that this remains so. Hence, I expressly forbid any utilization for money in every only conceivable form. This means, for example, but not exclusively, the integration in sellable data carriers or the upload on websites which permit no free access.

2.
Repaints are expressly welcome. To support the work, I have included a paintkit. It contains the essential textures in the format *.bmp and, in addition, as *.cdr (7). If you publish repaints, I ask - also - for uploading to www.flightsim.com or www.avsim.com as well as a short notification.

3.
I have created the software provided in this parcel to the best of my knowledge and skill. Up to now on several calculators the whole ran without difficulty. Anyhow I am not responsible for anything - nothing at all! If it should come as a result of the download, the installation, the following of the provided instructions to some unpleasant results or mishaps, I am responsible in no case for it.

I take useful suggestions with pleasure under the following Emil address:

Keitel-SH@t-online.de

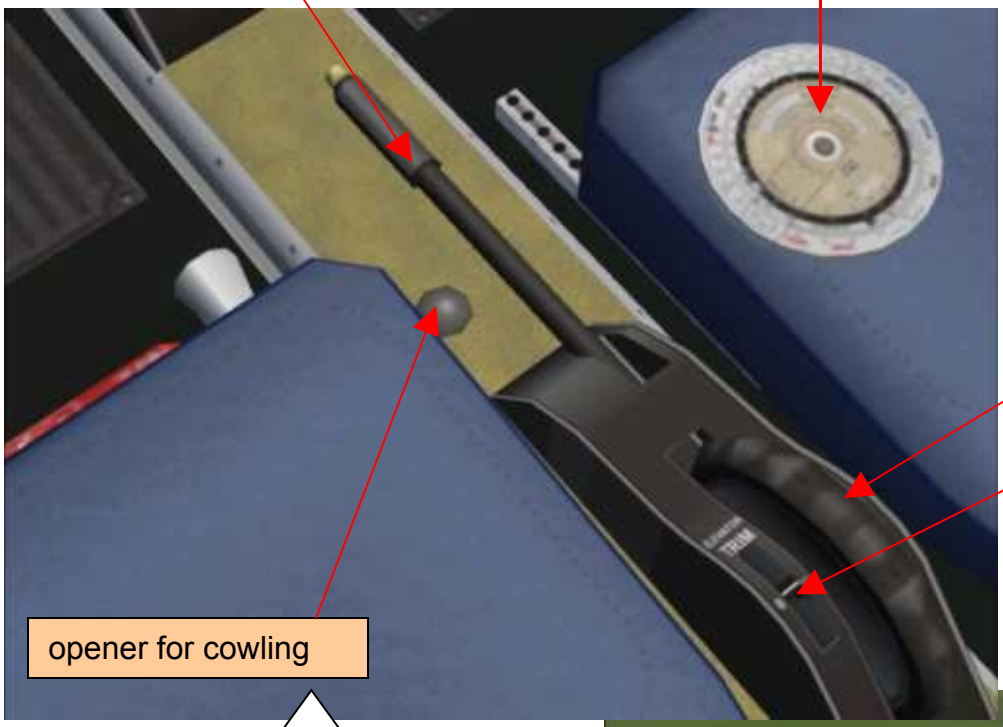
Please mention “PA28” in the headline, otherwise it may be deleted by the spamfilter. If I can develop anything or not I decide on account of the expenditure, the available time and other circumstances which only I overlook and value.

Cockpit


engine gauges
switches for beacon and Nav-GPS-mode
stall- and gear warning
switches for lights, fuel pump and battery
radios
gauges for the front seat passenger
Heating and ventilation (out of service)
Stormscope (out of service)
fuel switch
ignition
autopilot main switch
autopilot mode switch
el. elevator trim
gear switch
parking brake
microfon: ATC
Alt Air
checklists/ kneeboard
map
EGT

flaplever: 0°-10°-25°-40°

navigational calculator



elevator trim

opener for cowling

The pitot cover and the other items occur when the engine is shut down and the parking brake is set

cabindoor
shift+e
from the inside with the door levers

stormwindow

sunshield

… are operated by touching or with
ctrl + w

2D-Panel

This model should be operated exclusively from the virtual 3D cockpit. All operating elements, buttons, counters and "systems" can be supervised and operated from here.

Nevertheless, I have added an instrument panel in the traditional kind. However, this 2D-Panel is intended merely as a Hilfsausweichnotersatzreserve and can be looked as a technology bearer.

The background pictures are held simplistic. However, they can be exchanged any time easily by own small picture preferably in the size 1024x820 pixels.

This is how they look:

daytime:

(normal view)

(lowered view)

night:

(normal view)

(lowered view)

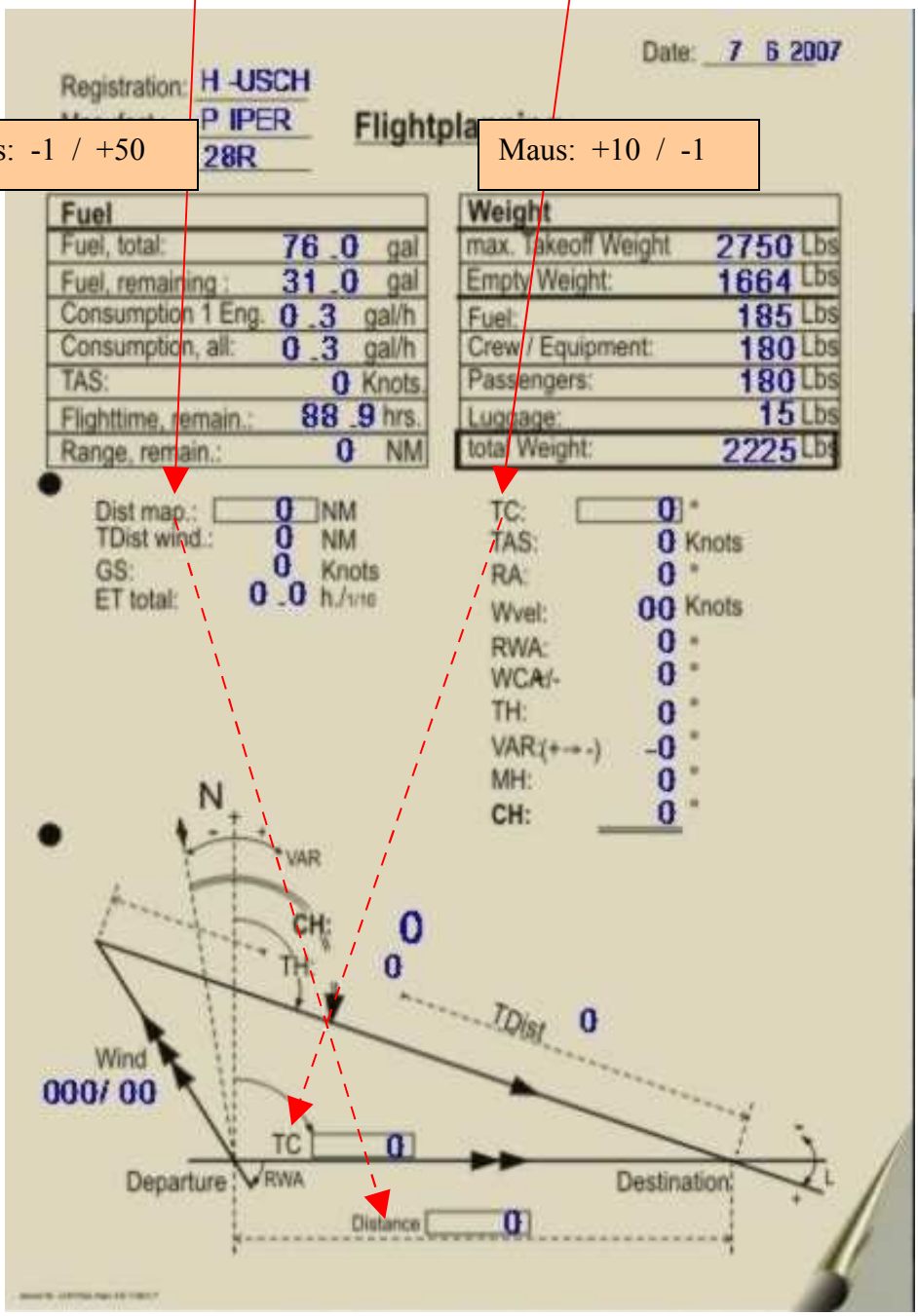
This device board is completely serveable and corresponds from the interpretation to a great extent to the model. Indeed, original instruments (gauges) are used here, which are not worse, but don’t always fit to the PA 28 perfectly.

The Navigation Sheet

... erledigt calculates for you.

You need only two informations:
The **map distance** and

the **True Course**



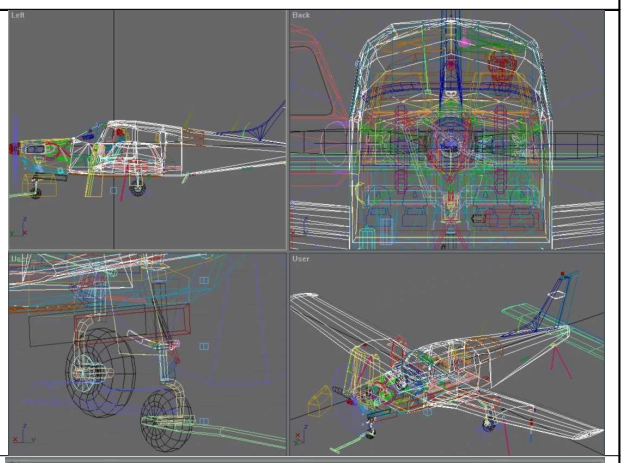
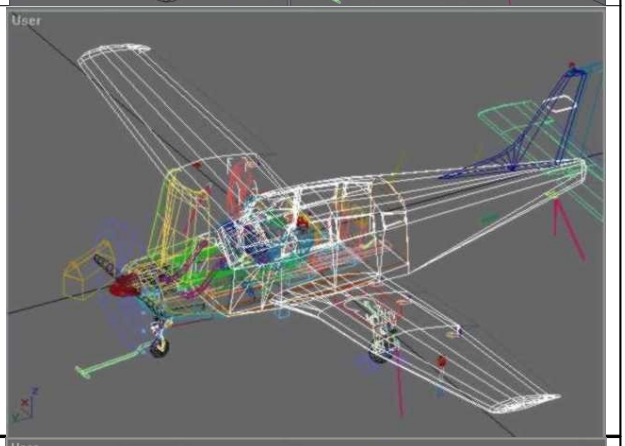
These data should be picked from a (reasonable) map. The course information from the FSX-flightplanner is usable only restricted, because here already the local magnetic variation is taken into consideration. The remaining data are covered immediately from the system.

The Model

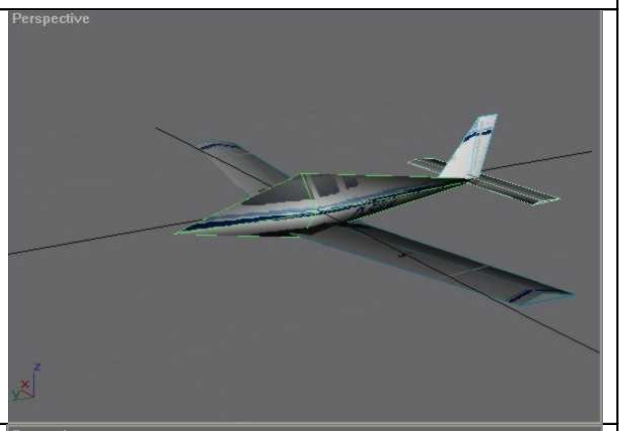
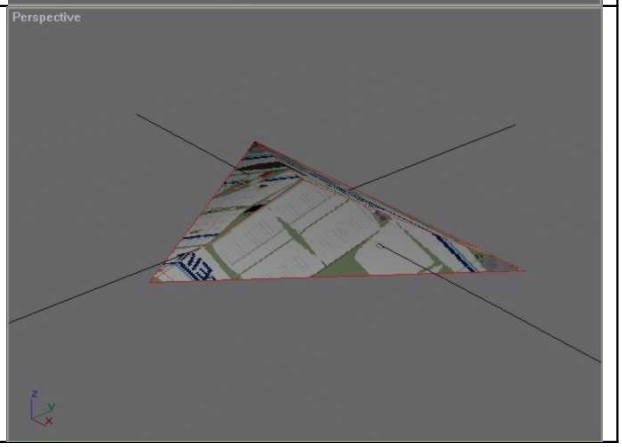
A loyal companion of the simulator airman is the worry whether the framerates are also high enough. The lines typed about this theme lined up meanwhile presumably reach the circumference length of a middle Saturn ring.

Whether every put up assertion also applies, I do not know. In any case, I have taken into consideration the concerning circumstances by the development of this model, so well I was able to and as far as it seemed to me sensible. A total of eight untermodels of decreasing delicacy (LOD - level of detail are included 400/200/100/50/20/10/3/1). The computer is thereby relieved considerably.

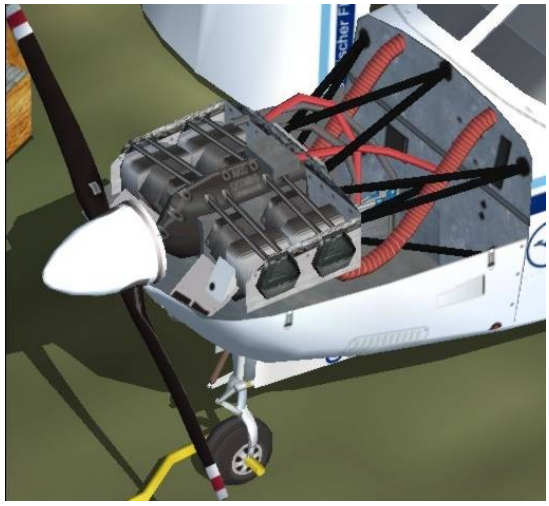
Hence, this airplane is also suited excellently as an AI-traffic-participant.

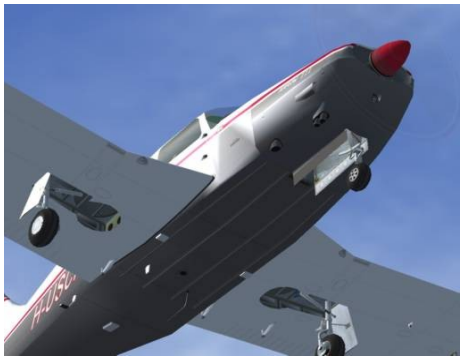
LOD	Knotenpunkte (vertices)	Oberflächen (faces)	
400	7089	11490	
300	6043	9761	
100	1866	3151	

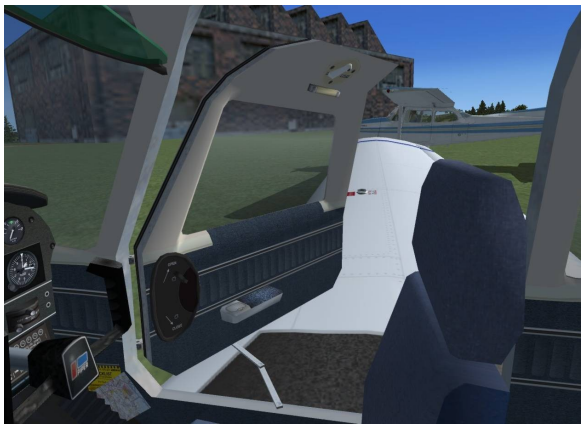
LOD	Knotenpunkte (vertices)	Oberflächen (faces)	
50	701	1090	
20	464	691	
10	83	112	

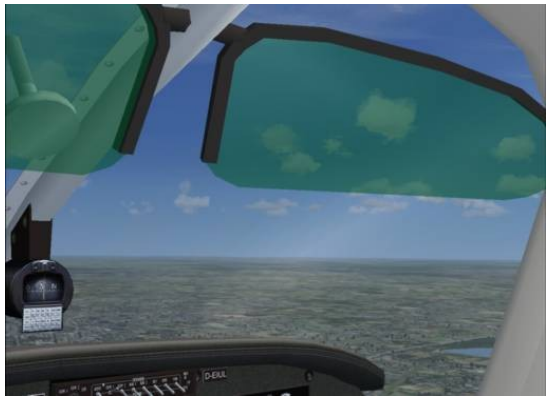
LOD	Knotenpunkte (vertices)	Oberflächen (faces)	
3	30	32	
1	4	4	

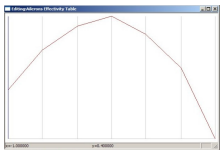
Views







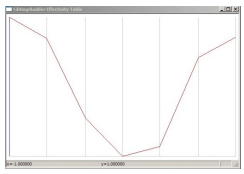




Aerodynamics – the flightmodel

The flight model for this Piper Arrow is developed completely new. Where always possible and available I have worked with data, information and values from the original manuals. In addition, the rudder curves are completely new, so that the roughly linear effectiveness of the pendulum elevator and the slightly decreasing characteristic of the other rudders should be met. The slight asymmetry caused by the rotation of the air-screw is perceptible especially with the start run and in the climb out and must be compensated with right rudder.

In reality every airplane is different. Age, surface goodness, servicing state, board equipment, actual weight and many other factors as well as the individual skill of the pilot influence the efficiency considerably. And thus this model shows only an average machine whose deserved age one can see and also feel. The performance values should be still met rather well.



Performance

Horsepower for takeoff:		200
Gross weight (lbs):		2750
Landing weight (lbs):		2750
Useful load - std. (lbs.):		960
Payload - full std. fuel (lbs.):		572
Usable fuel - std. (gals.):		72
Wing area (sq. ft.):		170
Wing loading (lbs/sq. ft.):		16.18
Power loading (lbs/hp):		13.75
Cruise speed:	75% power:	137kts.
	65% power	130kts.
Max range 9000ft.		880 nm
Fuel consumption	75% power:	10.5 gph
	65% power:	9.1 gph
	55% power:	7.7 gph
Estimated endurance (65%) (hrs.):		6.5
Stall speed (flaps up) (knots):		60
Stall speed (flaps down) (knots):		55
Best rate of climb (fpm):		831
Servicing ceiling (ft.):		16,200
Takeoff over 50-ft. obstacle (ft.):		1600
Landing over 50-ft. obstacle (ft.):		1520

Flaps 25°, 2650 Lbs: 1300ft

Flaps 0°, 2650 Lbs: 1540ft

More information can be found in part 2.

Original and forgery:

Foto von: A. Müller (bei Airliners.net)

Shortcomings

The simulation of this airplane has lasted about 480 hours. But like all work of man this thing is also not perfect. Maybe I will still be able to put down in future the one or the other.

The **landing light beam** does not light up the ground and generates a short flashing upon the instrument panel immediately before the touch-down.

The **rear** position light does not turn with the rudder.

The **fuel tank selector** jumps when switching from the left to the right position once briefly in the OFF-notch. Because it should be operated anyway only levelled out in sufficient height and with running fuel auxiliary pump, this specific feature causes no problem. Make sure, the tanks are switched all 30 minutes to prevent one-sided load.

The **sound**: The sounds are tied to the original Cessna 172. This is due to the fact that both aircraft are driven by similar Lycoming IO-360. For my need the sounds provided by MS are completely in order and I can find nothing bad in it. In addition, I feel the additional file size of 13 MB as an unnecessary nuisance. All calls after "not loud enough", " more roar", " less rumbling ", " does not clatter enough " etc. I take note, consider them as mutual compensated and therefore satisfied. In the end, we are not in the concert hall, but want to fly.

The **Stormscope** does not function at the moment. I have done some attempts with the original gauge radarscreen, indeed, only with moderate success. Anyway, so one says, this device is only seldom used in the D-EILU.

The **transponder** has only one mode of operation available. This cannot be changed; to form only the little button swivelling without generating effect in the background, I found silly.

Part 2
Operation

Procedures

The proper service of this airplane is described in the checklists in detail:

The outside chek is not described..

Attention: This listing was put together with big care. Indeed, it is optimised on the special circumstances in the computer game MS-Flightsimulator. Hence, the test list illustrated here may be used under no circumstances for the operation a real airplane!

Piper PA 28R-201 „Arrow III“ - Operation

Pre Start		
1	Loose Items	STOWED
2	Hatches and Cabin Door	LATCHED
3	Seats and Belts	ADJUST
4	Passengers	INSTRUCT
5	Flaps	UP
6	Circuit Breakers	CHECK
7	Alternate Air	CLOSE
8	Parking Brake	SET
9	Prop	HIGH RPM
10	Gear Switch	DOWN
11	Avionics	OFF
12	Master	ON
13	Gear Lights	THREE GREEN
14	Fuel Selector	DESIRED TANK
15	Rotating Beacon	ON
16	DAY: Anti-collision Lts	ON
17	NIGHT: Nav Lts	ON
18	Throttle	½ in OPEN
19	Fuel Pump	ON
20	Mixture	RICH THEN ICO
21	Prop: shout *and* check	”*CLEAR*” or *“FREI”*
22	Starter	ENGAGE
23	Mixture	RICH
24	Warmup	800-1000 RPM
25	Oil Pressure	CHECK
26	Generator	ON
26	Avionics	ON
27	Transponder	STANDBY

Taxi		
1	Strobes	OFF for Taxi
2	Brakes	CHECK
3	Fuel Pump	OFF
4	Circuit Breakers	CHECK
5	Alternate Air	CLOSE

Run Up		
1	Park brake	ON
2	Fuel selector	CHANGE TANKS
3	Oil temp & pressure	GREEN ARC
4	Lookout	ALL CLEAR
5	Throttle	2000 RPM
6	Oil temp & pressure	GREEN ARC
7	Magnetos	LEFT, BOTH, RIGHT, **BOTH**
8	Alternate air	OPEN then CLOSE
9	Pitch Lever	bring back till drop max 500 RPM. Repeat 3 times
10	Pitch Lever	HIGH RPM
11	Ammeter	POSITIVE CHARGE
12	Suction	4.8” – 5.1” Hg
13	Slow idle	smooth running
14	Throttle	1000 rpm

Takeoff		
1	Fuel Selector	SET
2	Fuel Pump	ON
3	Engine Gauges	CHECK
4	Alt Air	CLOSE
5	Mixture	SET
6	Propeller	HIGH RPM
7	Flaps	SET
8	Trim	SET
9	Controls	FREE
10	Instruments	CHECK/ SET
11	Radios	SET/ ATIS understood
12	Clearance	RECEIVED
13	Brakes	REALEASE
14	Throttle	FULL OPEN and ***„GO!“***
15	Rotate	70-75 KIAS

After T/O		
1	Positive Climb	CHECK
2	Undercarriage	RETRACT V_{LO} 107
3	Flaps	RETRACT VF_E 103
4	Course	MAINTAIN RWY HDG
5	Power	**25/ 2500** or as required
6	Oil temp & pressure	GREEN ARC
7	Fuel pump	OFF – CHECK PRESSURE

Climb		
1	Undercarriage	CHECK UP
2	Flaps	CHECK UP
3	Initial Climb	**90** KIAS
4	Cruise Climb	**104** KIAS
5	Power	**25/ 2500**
6	Oil temp & pressure	GREEN ARC check frequently

Cruise		
1	Manifold Pressure	**23** – 25 in
2	Prop	**2300** - 2500RPM
3	Mixture	LEAN Peak at 65% 25/ 2500 > 100°F rich of peak 24/ 2400 > 50°F rich of peak
4		
5	Oil temp & pressure	GREEN ARC check frequently
6	Manoeuvre Speed	96 – 118 KIAS

Descent		
1	Fuel Selector	SET
2	Seats/Belts	ADJUST
3	Fuel Pumps	ON
4	Mixture	RICH
5	Prop	HIGH RPM
6	Gear	DOWN – # # # V_{LE} 129
7	Flaps	SET V_{FE} 103
8	Man Press	17 - 18 in
9	Landing Light	ON

Landing		
1	**G** asoline	FULLEST TANK - FUEL PUMP
2	**U** ndercarriage	DOWN – # # # - BRAKES OFF
3	**M** ixture	RICH
4	**P** rop	HIGH RPM
5	**F** laps	SET
6	**S** witches	LIGHTS ON – AUTOPILOT OFF
7	**T** rim	SET
8	*Base*	**90** KIAS
9	*Final*	**75** KIAS
10	*Threshold*	**70** KIAS
11	*Max Crosswind*	**17** KIAS

After Landing		
1	Flaps	RETRACT
2	Strobes	OFF
3	Landing Light	OFF
4	Transponder	STBY
5	Trim	NEUTRAL

Shutdown		
1	Park brake	ON
2	Throttle	1000 RPM
3	Avionics off	OFF
4	Beacon off	OFF
5	Magnetos	check for RPM drop
6	Temp and pressure	GREEN ARC
7	Fuel Pump	OFF
8	Mixture	IDLE CUT OFF
9	Throttle	CLOSED
10	Magnetos	OFF, KEY OUT
11	Master off	OFF
12	Park brake	RELEASE IF TIEING DOWN

Attention: This listing was put together with big care. Indeed, it is optimised on the special circumstances in the computer game MS-Flightsimulator. Hence, the test list illustrated here may be used under no circumstances for the operation a real airplane!

Attention: This listing was put together with big care. Indeed, it is optimised on the special circumstances in the computer game MS-Flightsimulator. Hence, the test list illustrated here may be used under no circumstances for the operation a real airplane!

Emergency Procedures		
ENGINE OUT		
1	Trim	79 KIAS
2	Find Field	***S***IZE ***S***HAPE ***S***URFACE ***S***LOPE ***S***URROUNDINGS
3	Turn	TO FIELD
4	Radio Call	121.5 MHz
5	Gear Up Landing ?	DECIDE
6	Power Off Landing	EXECUTE

ENGINE TROUBLESHOOTING		
1	Fuel Flow	CHECK
2	Fuel Pump	ON
3	Fuel Selector	SET
4	Alternate Air	ON
5	Engine Gauges	CHECK
6	Starter	ENGAGE

GEAR UP LANDING		
1	Fuel Pump	OFF
2	Selector	OFF
3	Mixture	ICO
4	Magnetos	OFF
5	Master Switch	OFF
6	Door	UNLATCH - OPEN
7	Belts	TIGHT
8	Minimum Airspeed	~ 55 – 60 KIAS

LANDING GEAR EMERGENCY EXTENSION		
1	Gear Selector	DOWN
2	Master Switch	ON
3	Circuit Breakers	CHECK
4	Gear Bulbs	CHECK
5	Airspeed	< 87 KIAS
6	Manual Extension	PULL
7	Rudder	YAW ABRUPTLY
8	Gear Indicator	CHECK THREE GREEN

FIRE IN FLIGHT		
1	Fuel Selector	OFF
2	Mixture	ICO
3	Prop	FULL FWD
4	Fuel Pump	OFF
5	Magnetos	OFF
6	Alternator	OFF
7	Cabin Heat	OFF

FIRE ON GROUND		
1	Starter	ENGAGE
2	Mixture	ICO
3	Throttle	FULL OPEN
4	Fuel Selector	OFF
5	Fuel Pump	OFF

Attention: This listing was put together with big care. Indeed, it is optimised on the special circumstances in the computer game MS-Flightsimulator. Hence, the test list illustrated here may be used under no circumstances for the operation a real airplane!

	KIAS	
Vso	55	stall with flaps
Vs1	60	stall without flaps
Vx	78	shortest climb
Vldmax	79	max landing speed
Vy	90	fastest climb
VFE	103	flaps extend: max. speed
VLO	107	gear retract: max speed
VLE	129	gear lower: max. speed
VA	118-96	manoeuvre speed
VNO	146	max speed in clear air
VNE	183	never exceed

Limitations

max. positive load factor: 3,8 G
max negative load factor: *not approved!*

Aerobatics including spins: *not approved!*

Flight in icing conditions: *not approved!*

VFR and IFR flights day and night: approved

Weight and Balance

The datum used is 78.4 inches ahead of the wing leading edge at the intersection of the straight and tapered section.

	Forward Limit	Rearward Limit
under 2300 lbs:	80.0	93.0
under 2650 lbs:	87.3	93.0

The empty weight of this airplane is 1664 Lbs, is the max gross weight 2750 lbs. This means a useful load of 1086 Lbs including fuel.

item	weight (Lbs.)	arm (inch)	moment (Lbsinch)	remarks
empty weight	1664	86.63	144152.32	
fuel		95.00		1 Gal.~ 6 Lbs.
pilot		80.50		
front passenger		80.50		
rear passengers		118.10		
baggage		142.80		max. 200 Lbs.
together				max. 2750 Lbs.
resulting center of gravity:				=moment/ weight

example:

item	weight (Lbs.)	arm (inch)	moment (Lbsinch)	remarks
empty weight	1664	86.63	144152.32	
fuel	*432*	95.00	*41040.00*	1 Gal.~ 6 Lbs.
pilot	*243*	80.50	*19561.50*	
front passenger	*180*	80.50	*14490.00*	
rear passengers	*353*	118.10	*41689.30*	
baggage	*200*	142.80	*28560.00*	max. 200 Lbs.
together	*3072*		*289493.12*	max. 2750 Lbs.
resulting center of gravity:		*94.24*		=moment/ weight

Result:

1. The aircraft is too heavy by 322 Lbs..
2. The center of gravity is too far astern.

Conclusion:

You must not fly with this load..

Measure:

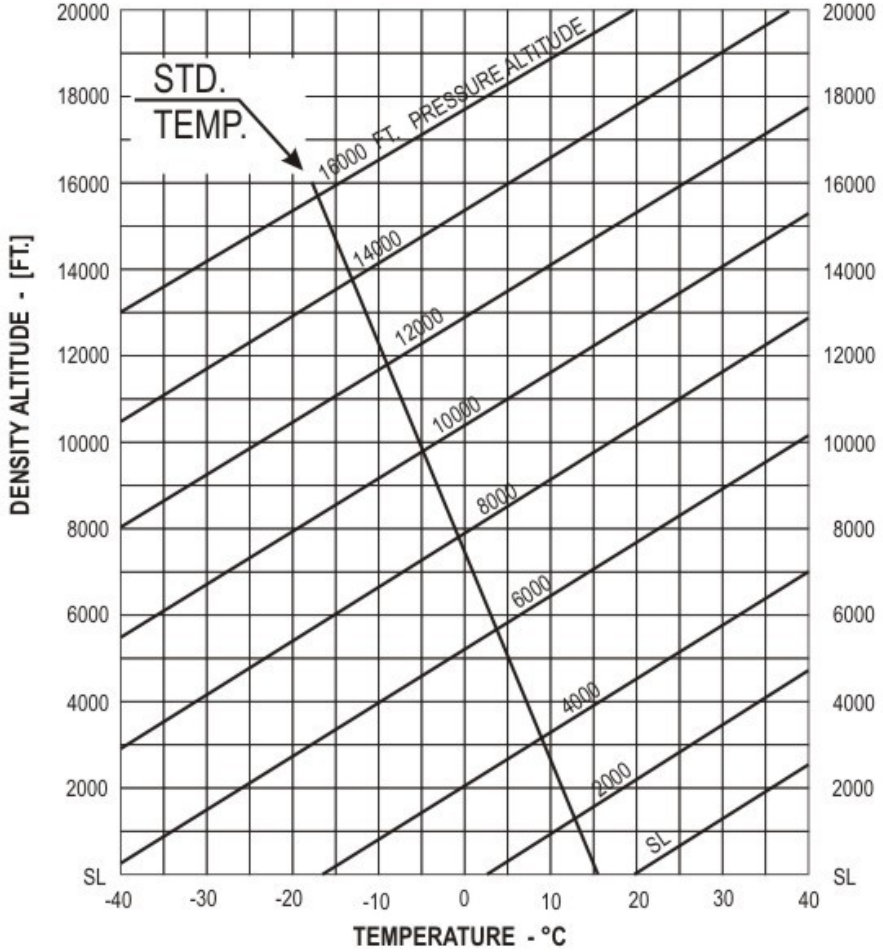
reduce weight rearward of CoG.
for example: One passenger of the back bank travels by rail.

PA-28R-201
PIPER ARROW III

SIMULATOR ONLY - DO NOT USE IN REAL LIFE!

ALTITUDE CONVERSION CHART

THIS CHART SHOULD BE USED TO DETERMINE DENSITY ALTITUDE FROM EXISTING TEMPERATURE AND PRESSURE ALTITUDE CONDITIONS FOR USE WITH PERFORMANCE CHARTS.

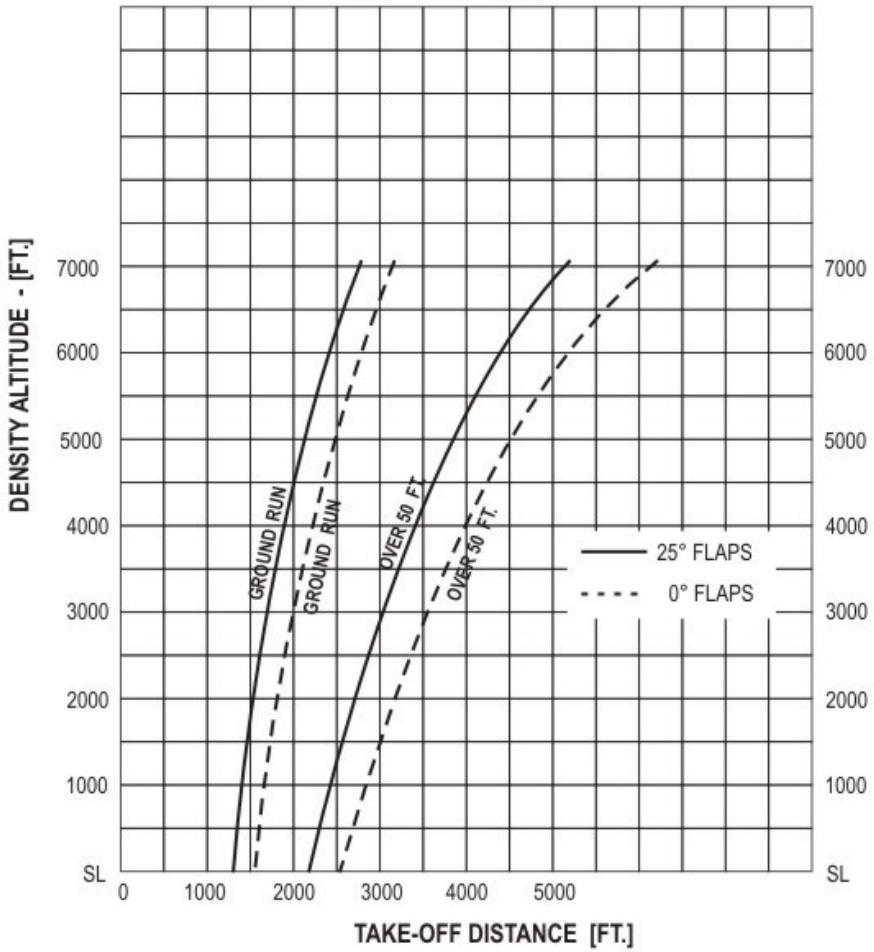


PA-28R-201
PIPER ARROW III

SIMULATOR ONLY - DO NOT USE IN REAL LIFE!

Take-OFF DISTANCE Vs DENSITY ALTITUDE

PAVED LEVEL DRY RUNWAY
GROSS WT. 2650 LBS

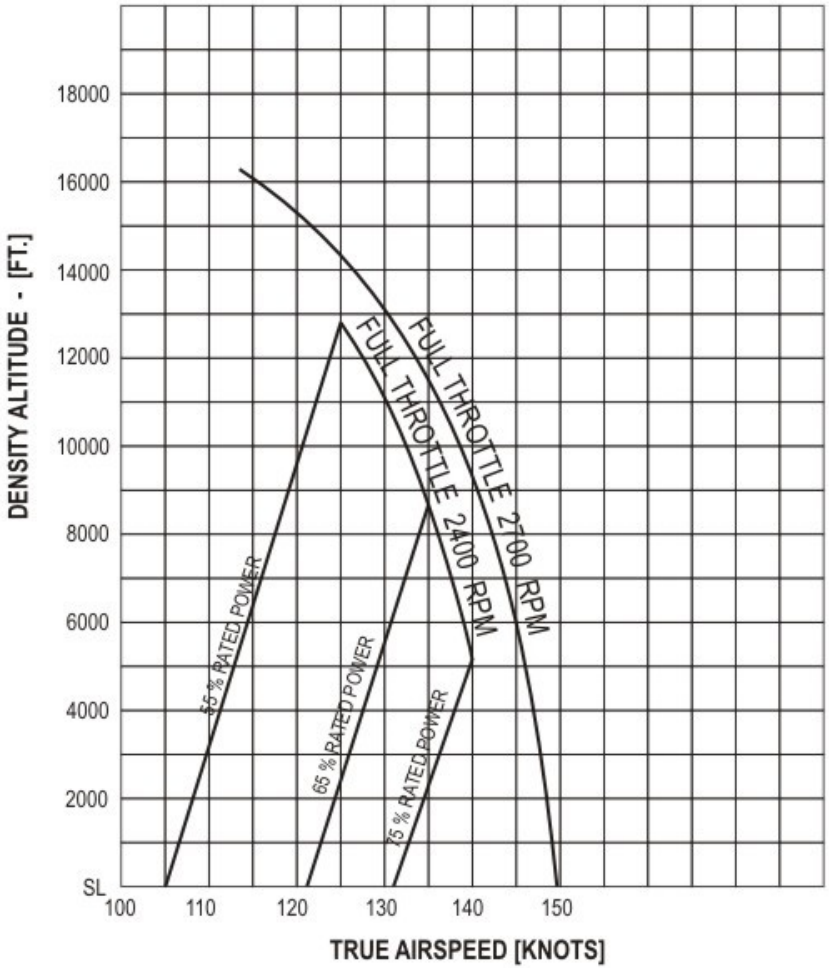


PA-28R-201
PIPER ARROW III

SIMULATOR ONLY - DO NOT USE IN REAL LIFE!

TRUE AIRSPEED
Vs
DENSITY ALTITUDE

GROSS WT. 2650 LBS

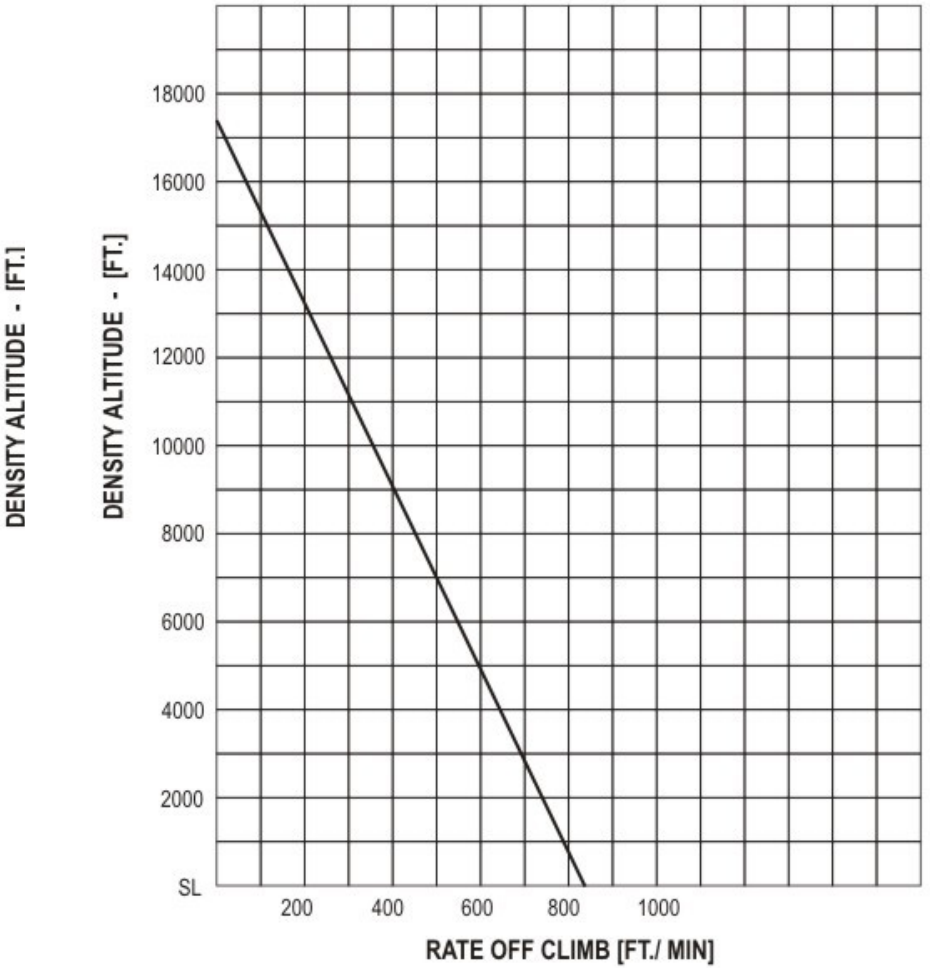


PA-28R-201
PIPER ARROW III

SIMULATOR ONLY - DO NOT USE IN REAL LIFE!

RATE OFF CLIMB
Vs
DENSITY ALTITUDE

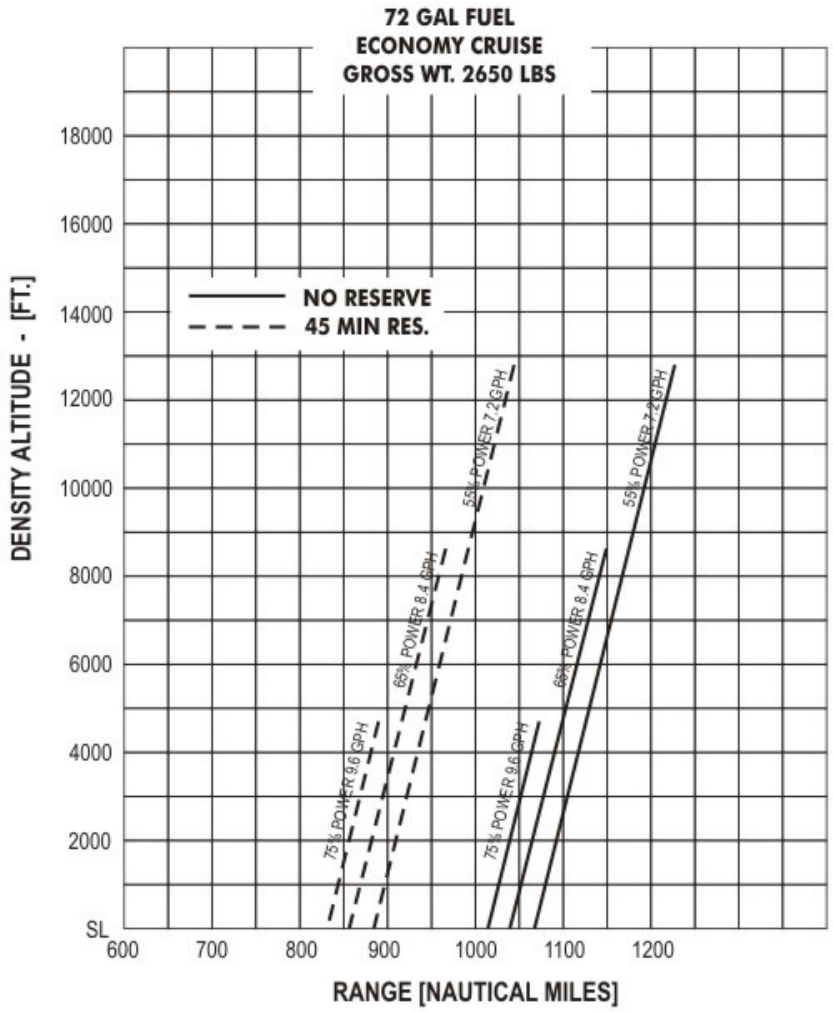
GEAR AND FLAPS RETRACTED
GROSS WT. 2650 LBS



PA-28R-201
PIPER ARROW III

SIMULATOR ONLY - DO NOT USE IN REAL LIFE!

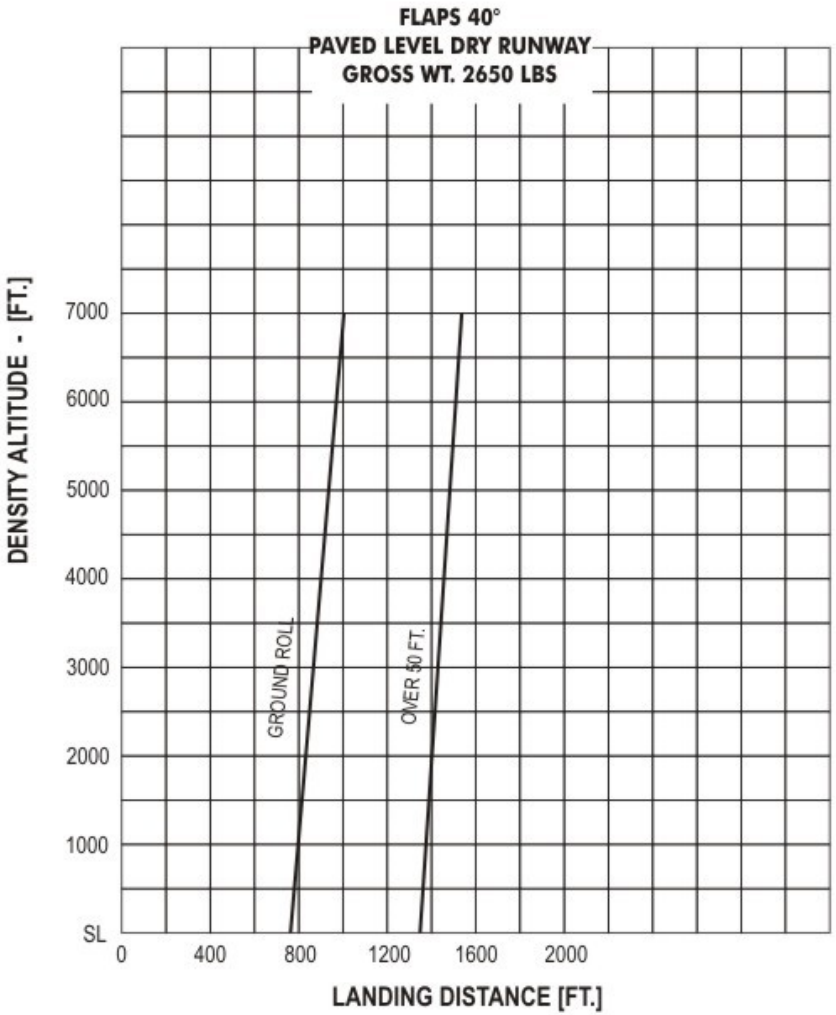
RANGE
Vs
DENSITY ALTITUDE



PA-28R-201
PIPER ARROW III

SIMULATOR ONLY - DO NOT USE IN REAL LIFE!

LANDING DISTANCE
Vs
DENSITY ALTITUDE



SIMULATOR ONLY – DO NOT USE IN REAL LIFE!

Power Setting Table - Lycoming Model IO-360-C Series, 200 HP

Pressure Altitude Feet	Std. Alt. Temp. °C	110 HP -55 % Rated RPM & Man. Press.		130 HP -65 % Rated RPM & Man. Press.		150 HP -75 % Rated RPM & Man. Press.	Pressure Altitude Feet
		2100	2400	2100	2400	2400	
SL	15	22.9	20.4	25.9	22.9	25.5	SL
1000	13	22.7	20.2	25.6	22.7	25.2	1000
2000	11	22.4	20.0	25.4	22.5	25.0	2000
3000	9	22.2	19.8	25.1	22.2	24.7	3000
4000	7	21.9	19.5	24.8	22.0	24.4	4000
5000	5	21.7	19.3	FT	21.7	FT	5000
6000	3	21.4	19.1	-	21.5	-	6000
7000	1	21.2	18.9	-	21.3	-	7000
8000	-1	21.0	18.7	-	21.0	-	8000
9000	-3	FT	18.5	-	FT	-	9000
10000	-5	-	18.3	-	-	-	10000
11000	-7	-	18.1	-	-	-	11000
12000	-9	-	17.8	-	-	-	12000
13000	-11	-	17.6	-	-	-	13000
14000	-13	-	FT	-	-	-	14000

To maintain constant power, correct manifold pressure approximately 0.3" Hg for each 10°C variation in inlet air temperature from standard altitude temperature. Add manifold pressure for air temperature above standard; subtract for temperatures below standard.
Full throttle manifold pressure values may not be obtainable when atmospheric conditions are non-standard.