QUICK START-UP GUIDE

FOR THE PASSENGER PLANE

AN-24B

(Now with pictures!)

For flight simulator FlightGear

Description of the First Section
„Quick" means quick, so the first section is meant to explain how to simply put the AN from a „cold-and-dark" into a „ready-for-take-off"-state without any safety checks or similar preparations as there are in real life. Anyway, this guide is the fast way to explore this aircraft as it is in FlightGear now;
Real life checklists, instructions, restrictions and so on will be implemented over time with regard to official publications (e.g. the manuals from Interflug or the Soviet Ministry of Civil Aviation - so expect good old fashioned hierarchical „do-or-die" instructions in the future!).

Description of the Second Section (to be extended)
This is not just a „How-to" but rather a „How-the-hell-does-it-work" - Everything with the inclusion of the state of the „FlightGear AN-24B", thus systems which are not yet or only cursory implemented are only described in a short way.

For further reading, see e.g.:
http://www.aviadocs.net/RLE/An-24/ (russian)
or
http://www.interflug.biz/Flugzeuge/AN-24/FZH/FZH%20AN-24.pdf (german)

Operational Limitations

Masses

Maximum takeoff weight, kg	21000
Maximum landing weight, kg	21000
Maximum weight of commercial load, kg:	
Passenger variant	5000
Maximum number of passengers	52

Centering

Operational centering, % CoG:	
extreme forward	15
extreme backward	33
CoG at overtilting to tail	49,5

Speeds

Maximum speeds (CAS, km/h):	
Extreme descent (V_{NE})	540
Normal operation (V_{NO})	460
With gear extended (V_{LGE})	450
Throughout manual gear extension	320
Throughout normal gear extension (V_{LG})	310
Throughout flaps operating (V_{FO}) $\delta < 15°$	300
With flaps extended (V_{FE}) $\delta > 15°$	250
Critical Mach number	0.7

Engine AI-24

Maximum time (minutes/% run duration):	
Take-off power	5/3
Maximum power (UPRT > 72,5°±1)	15/3
in-flight, with one engine failure	90/3
Nominal (58° < UPRT < 69°)	60/32
Cruise	-/ -
Idle on ground	30/ -

|	
Power stages (°UPRT)	
Take-off power	87 - 100
Nominal	62±2
Cruise (N_{nom})	
0,85	52±2
0,7	41±2
0,6	34±2
0,4	22±2
Idle on ground	0

FIRST SECTION

Tips:
- **Try to use keys 1-4 and < to change views if needed**
- **Ctrl + C shows clickspots and instruments' names**
- **Tooltips available!**

A. Electricity first - as always

1. Open the hatch and close the two CIRCUIT-BREAKER SWITCHES of the BATTERIES at the fuse panel under the radio-operator/engineer's table
2. Close ALL SWITCHES on the AZS-(circuit-breaker) panel (best by clicking the "all-on"-clickspots to the right of each row)

B. Fuel next

1. Open CUT-OFF VALVES (up)
2. Turn main FUEL PUMPS ECN to „AUTO" (up)
3. Turn secondary FUEL PUMPS 463 „ON" (up)
4. Leave CROSSFEED VALVE closed
5. Turn on the RTMS FUEL FLOW COUNTERS (8.)
6. Click on the UAP-12
7. Look at the AMOUNT OF FUEL and divide by 2
8. Set this AMOUNT into each FUEL FLOW COUNTER (Left Click or Scroll Down, Shift accelerates your mouse actions)
9. Turn on the 2PPT-1 FUEL INDICATION left and right tanks,
10. Switch between „SUM" (tanks groups 1+2), „1" (tanks group 1) and „2" (guess!) while...
11. ...Checking the AMOUNT on the 2PPT-1 FUEL INDICATOR
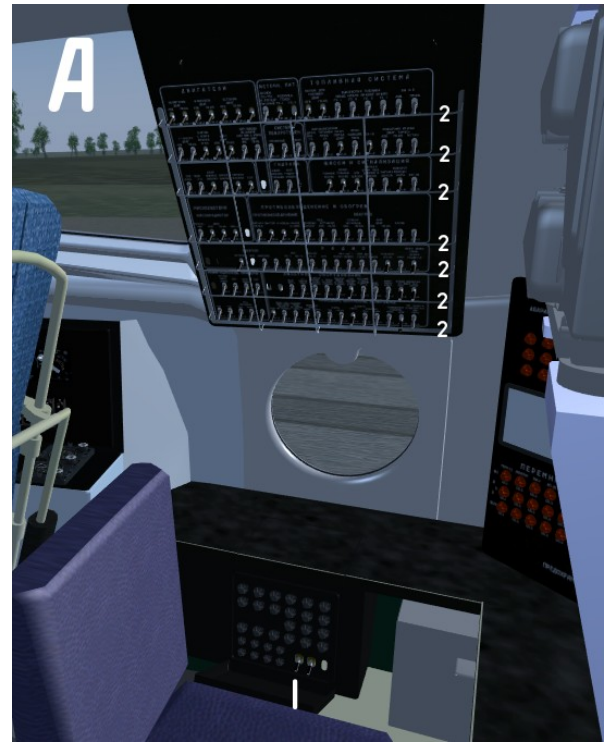
C. Engine Start

1. Open TG-16 APU CUT-OFF VALVE (up)
2. Put „HOT/COLD-Start" switch to the down position („HOT")
3. Start TG-16 APU
4. Wait until it has reached > 36.000rpm
5. Select LEFT AI-24 ENGINE (up)
6. Start LEFT AI-24 ENGINE - wait for it to spool until you select RIGHT AI-24 ENGINE (5. down) and Start RIGHT AI-24 ENGINE (6.)
7. Start the „FLIGHTTIMER" on the AChS-CLOCK
8. After engine start, SHUT DOWN TG-16 APU and close CUT-OFF VALVE (1)

D. During Engine Spool-Up You may already...

1. Turn up ALL THESE SWITCHES under the left panel,
2. ALL THESE SWITCHES under the right panel and
3. ALL THESE ONES under the middle panel
4. Select „TAXI" (up) or „T/O-LANDING" (down) GEAR MODE

E. Now let's Align Compasses
1. Press ALIGN GIK (Gyro Induction Compass) BUTTON until
2. Needle on KPPM STOPS MOVING; set this HEADING on the
3. GPK (Gyro Poly Compass) by
4. Clicking here left or right (Shift helps!)
5. The correct LATITUDE should already be set here
6. Set desired initial AUTOPILOT HEADING on ZK

F. Comm/Radio and Other Stuff...
1. Adjust, tune and set to your needs as described in the Second section!

G. Nearly Done!
1. Set FLAPS 15° (by keyboard, switch missing...)
2. Prepare AUTOPILOT by putting up switch and
3. Wait until ORANGE LIGHT signalizes „ready"
4. Slowly ADVANCE THROTTLE to 100%; when reached
5. Start STOPWATCH,
6. Release PARKING BRAKE (Shift + B)
7. You KNOW THE REST!
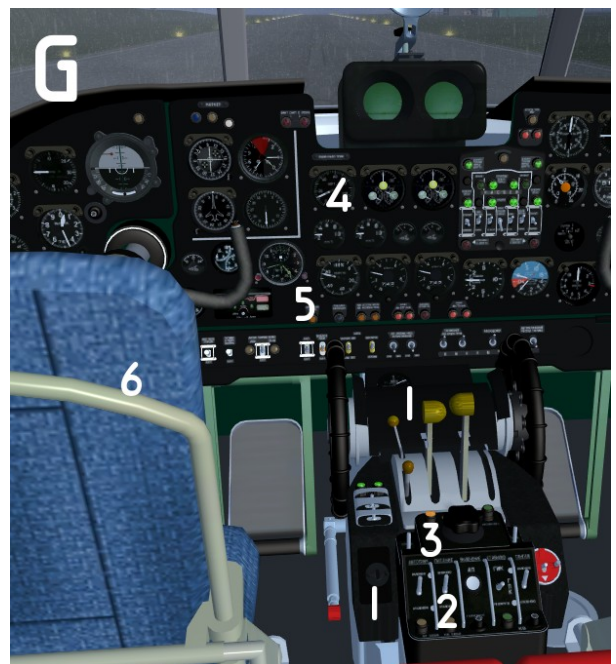
SECOND SECTION

SPU-7 Communication device:

It is located at all four workplaces and lets you communicate with your crew members and listen and/or talk to radio stations.

You can select to which radio station you want to listen/talk to by switching knob (1) to the following positions:

- "UKR": R-802 No.1; Ultra-Shortwave Radio Station; This is pretty much like what we usually know as „COMM 1"
- "SR"   : Medium-range radio station (Receiver US-8K and Transmitter SVB-5)
- "KR"   : Short-range radio station (Receiver US-8K and Transmitter R-836)
- „DR"   : Radio R-802 No.2; like „COMM 2"
- „RK1" : Radiocompass ARK-11 No.1; like „ADF 1"
- „RK2" : Radiocompass ARK-11 No.2; like „ADF 2"

„SR" and „KR" are not yet implemented, so forget about them...

The volume you hear depends on the setting of the „SPU-Radio"-switch (2). Set the „General Volume" (3) to 100% (adviced!) and „Listen Volume" (4) to, let's say 20% - With switch (2) set to „SPU" (Intercomm), you will then hear crew-communication at 100%, the radio station you have selected at 20% volume - and vice versa with switch (2) set to „Radio".
Please notice that the radio devices have volume-knobs, too, so don't forget to turn them up!

Switch (5) is used to switch between two networks, this function is rarely implemented on AN-24s, button (6) can be used as an „Emergency Call"-button - press it, and all participants will hear you at full loudness (not implementd yet).
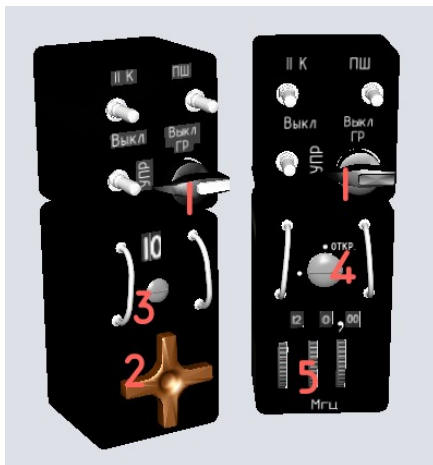
R-802 Comm Radios No.1 and 2

The control panels of this Ultra-Shortwave Radio Station are mounted on the overhead panel with the left one being No.1 and the right one No.2.
No.1 serves as Comm1, No.2 as Comm2.
To the side each of these blocks are two switches: The outer ones power the stations on, so don't forget! The inner ones change capacity and are not implemented yet, so forget!

Block No.1 can store up to ten frequencies - which are "programmed" pre-flight in real life. In FlightGear, you can store them by doing the following:
1. Set a frequency by using the three wheels (5)
2. Choose any channel by turning (2)
3. Press screw (3) - frequency will now be stored at chosen channel
4. Repeat as desired!

Change output volume by knobs (1); Pressing screw (4) makes block No.2 "recall" the frequency which is currently selected on No.1. At the moment, frequencies in between .05 steps (e.g.133.77) have to be entered via FG's Radio dialog (F12). Sorry!

ARK-11 Automatic Radiocompass (ADF)

Newer AN-24s are equipped with two sets of ARK-11s, No.1 and No.2. Set No.2 can be controlled by the remote panel No.2 at the navigator's station; Set No.1 can be controlled by the remote panel No.1 at the navigator's station or the remote panel on the pilots' overhead. Press button (1) on the respective panel to take over control (the pilots' panel has reduced functionality, so only the navigator's will be described here).

By knob (2) you can choose between the following modes:
1. OFF
2. Compass 1: Similar to known "ADF" mode
3. Antenna: Well, "antenna" mode
4. Frame: Frame/loop antenna can be turned manually by switch (8)
5. Compass II: Like Compass I, but uses two frame antennas (not related to Set No.2!)

By knob (5) you can choose between the following frequency ranges (kHz):
1. 120-280
2. 280-440
3. 420-580
4. 580-740
5. 720-880
6. 880-1040
7. 1020-1180
8. 1180-1340

To select a frequency of e.g. 563kHz, choose "420" with knob (5). Then use the "rough adjustment" knob (6) until the white OSG-text shows "560", then fine-tune (7) until it reaches "563" (The real life instrument has a disc with a helical scale ranging from 0-160kHz underneath the little display which should show "143kHz" (+ 420kHz=563kHz) in our example; here, a text shows the final sum).

To enter and store a frequency:
- Use any mode except OFF
- Press button P (3) to lock it (only locks when device is powered and selected by (1))
- Select appropriate frequency range by turning knob (5), (6) and (7)
- Press any of the knobs (4) to store the displayed frequency under that number
- Unlock button P (3) when programming is finished
- With unlocked button P (3), the stored frequency can then be recalled

The nearest NDB will be displayed on the left table with Name, frequency and range (in km).

With "Compass" mode selected, the frame antenna, represented by instrument (B), is turned automatically towards the NDB station (respectively 90° to be correct, (B) shows correct bearing anyway); In the "Frame" mode, only the frame antenna is used and can be manually turned left-right with switch (8). The indicator "A" shows the strenght of the induced current in the frame; A minimum is used for bearing. Because the non-directional antenna is not used in this mode, the reading is ambiguous, so the needle may either point directly to or directly from the station. Anyway, a higher range can be achieved in this mode under some circumstances.

Use knob (9) to adjust output volume (respectively gain in "Antenna" and "Frame" modes; not implemented yet).

The two unmarked switches are used to narrow/widen bandwidth, and to switch between "Telephone" and "Telegraph" mode (will be fun to implement that!).

Landing System SP-50/ILS

SP-50 was used in the Soviet Union and other states of the Eastern Block; it works with PRMG ground stations which are like ILS stations, with two exceptions: The frequencies (90/150Hz) of the AM signals of both glidepath and course beacons are interchanged, and the number of channels is limited to six.

To set a frequency, switch the system on (1), then choose a channel (2); if none of these channels matches your wish, just use the "cheat button" (4) - use Ctrl + c to see it.

To calibrate the course receiver, switch off the variable phase by pressing the balance knob (3) with the left mouse button - then turn the knob until the KPPM shows 0° deviation (coming soon).
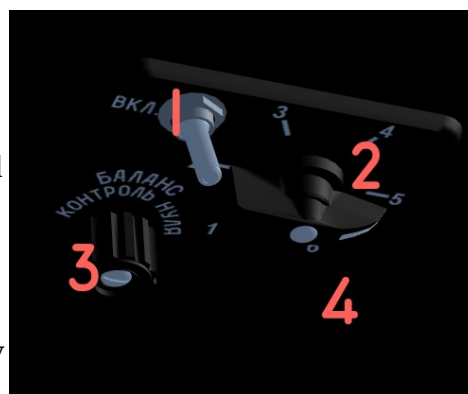
Autopilot AP-28L1

The electric autopilot AP-28L1 is designed to automatically stabilize and control the flight of the aircraft on a given trajectory.
It provides:
- Stabilization of the position of the aircraft around the center of gravity relative to the three main axes (longitudinal, vertical and transverse)
- Automatic flight of the aircraft by orthodromy (according to the signals of GPK-52AP) and by loxodromy (according to the signals of GIK-1) with switching from GPK-52AP to GIK-1 and back without disabling the autopilot
- Flight altitude stabilization;
- Automatic turning angles up to 120° from ZK-2 course setting
- Making coordinated turns with roll angles up to ± 30°
- Adjusting pitch angle and holding pressure altitude
- Automatic trim of the elevator
- Bringing the aircraft to a horizontal position from roll angles up to ± 30° and pitch up to ± 20°

So, how to achieve all those graceful things? Easier than you might think, as not all restrictions are implemented yet...

1. Pitch adjustor switches pilot and F/O
2. Signal lamp "Ready"
3. Signal lamp "Engage"
4. Autotrim switch
5. Power switch
6. "Engage" button
7. Course mode selector switch
8. Vertical channel on/off switch
9. Warning lights "Plane trimmed nose-   heavy" (left), "tail-heavy" (right)
10. "Horizon" button
11. Altitude Hold button and signal light
12. Roll knob

Switch (5) powers the AP, after 5-15s (up to 100s in real life, but we were kind), light (2) should indicate that the AP is ready. If not, check for neutral position of controls.

To engage, either
- press (6) (plane goes to wing-level at given pitch) or
- press (10) (plane goes to wing-level at 0° pitch) or
- press key"d" (like (6))
To disengage
- press "d" (the real plane has disengage-switches on yokes)

Vertical channel:
- Use the pitch switches (1) to control pitch, then say "pitch switch" three times fast in a row, or press F3 (pitch up) or F4 (pitch down)

- Pressing button "KV" (11) holds the plane at given (pressure) altitude, using (1) again gets you back to pitch control
- Button "Horizon" (10) puts the plane into horizontal flight with zero pitch (and bank), after 10s, "KV" ("Altitude Hold") is engaged, too
- Turn-off the vertical channel completely by turning down switch (8)
- Lights (9) indicate that you can expect the plane to be nose-heavy (left light) or tail-heavy (right light) when AP is turned off
- Switch (4) up turns autotrim on

Horizontal channel:

Button (7) lets you select between three modes: GIK (up), GPK (middle) and Roll (down). Under some conditions, knob (6) has to be pressed to change modes properly.

GIK mode
- Keeps the heading which is set at the "ZK" instrument and thereby the **G**yro **I**ndication **K**ompass ("loxodromic course")
- Turns are made at a bank angle of 15°
- Max. deviation from current heading is 120° (no restriction here)

GPK mode
- To follow the current course of the **G**yro **P**oly **K**ompass ("orthodromic course")

Roll mode:
- Use the roll knob (12) with mouse-scroll for bank angles up to 30°
- Left-click on it to put bank angle back to 0°

AChS-Clock

It's a mechanical clock with a wind-up mechanism (three days run duration). The flighttimer is usually used to e.g. determine overall flighttime or to control fuel consumption, the stopwatch is e.g. used at engine start (spool-up) or climb (engine throttle restrictions).

Left (red) knob:

Controls needles of clock face (A) and flighttimer face (B)
- Push (left mouse button): Toggles flighttimer between Started (white)/ Stopped (red)/ Resetted (red-white flag (1))
- Pulled (middle mouse button): Set clock time with scroll-wheel (with red flag, flighttimer needles move as well*)
- Neutral: Use scroll-wheel to wind up (counter-clockwise only)

Right (grey) knob:

Controls stopwatch (C)
- Push (left mouse button): Toggles stopwatch between Started/Stopped/Resetted
- Turn (scroll-wheel): Intermediate stop (stops second needle of clock, too*)

* Whyever... Anyway, as the real thing.