INVESTIGATOR'S PRELIMINARY CHECKLIST

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An investigator should always operate from a check list. This is mine. It is a starting point from which to deviate. Almost immediately it will become apparent that not all facets are applicable to every accident. It reminds me what can be done. I quickly pare it down with the circumstances. I expand in the areas where relevant and probative evidence appears to exist.

GO SUITCASE partially PREPACKED

Old clothes -winter-summer.
Boots.
Leather work gloves.
Dust mask.
Zip lock bags.
Tape stickers.
Felt tip pens.
Pens and paper notebook.
Portable tape recorder (small).
Compass.
$2,000 traveler checks.
Address book of experts.
Portable telephone.
Two(2) cameras film varieties.
Close up lenses.
Tool kit, small Sears.
Swiss army knife.
Small first aid,bandage and antiseptic.
Canteen and water purification tablets.
Snake bite kit.
Pass port,current.
Tape measure.
Hand led GPS
Digital video equipment
Hazmat where required
Update shot /Vaccine record.
ALASKA,CANADA,WILDERNESS, riot 12 gauge with slugs
Before departure obtain
Flight manual, Illustrated parts breakdown for model airplane.

PRELIMINARY PREPARATION

1. Location of and status of wreckage
2. Request for help from experts (form team)

3. Formulate travel plans

PRELIMINARY INFORMATION

1. Aircraft registration
2. Flight number
3 .Accident location
4. Accident elevation MSL
5. Date of accident
6 Time Zulu and local time.
7. Airport name
8. Type of flight (IFR) (VFR)
9. Terrain map
10. Phase of flight
11. Purpose of flight
12. Altitude
13. Airspeed
14. Direction of flight
15. Controlling agency
16. AIRPORT
    a. Controlled
    b. Tower
    c. Runway
    d. Lighting
    e. Approach plates
    f. Facility check
    g. Other traffic

ARRIVAL AT SCENE

1. If still under government authority, check in with Investigator in Charge.
2. if not, do an overview survey of wreckage, as found.
(Note a lot may be already marked and moved- also it may have been moved to a salvage yard).
3. Assign your experts tasks in area of their expertise, and as preliminary scope dictates.

HISTORY of FLIGHT

ORIGIN
Destination
Scheduled flight plan
Type of flight plan (i.f.r., v.f.r.)
Clearances received
All radio tapes or transcripts.
Names addresses of all crew and passengers.

COMMUNICATION AND NAVIGATION AUDIT

Type, maker, model of all radio gear
Type, maker, model of all navigation gear
Frequencies set in
Status, on, off, standby, other mode
Indicator readings on dials and faces
Light bulb analysis of status lights

FOR AIRLINE OPERATION DISPATCHER

Weight and Balance
Manifest
Cargo distribution
Hazardous material manifest
Name and address of dispatcher
Statement given to government
Pilot dispatch briefing
Dispatch release
Aircraft logbooks-onboard and computer records obtained
Computer flight planning documents.

COMPANY OPERATION DOCUMENTS

1. Trip clearance
2. Weight and balance
3. Flight following radio
4. Refueling record
5 Aircraft logbook maintenance
6. Aircraft history
7. Component part history
8. FOQA if any.
9. ASAP if any
10 ASRs if any

F.A.A. AIR TRAFFIC CONTROL

Clearance
Radio Transmissions
Radio tapes, all controllers
Handling Facilities Records (controllers name and station)
Controller's qualification status
Facility status report
Tower status report
Lighting status report at airport runway
Navigation aid status report

AIRPORT DATA

A pictorial of airport layout
Runway lay outs

V.A.S.I. available
Instrument approaches available and operable
Printed instrument approach plates
Lighting available and status
Field elevation,
Field coordinates coordinates of instrument approach positions
Runway overruns,
Obstructions, buildings, high lines etc.
Protecting Category two approaches?
Grooved Runways,
Wet Runways, icy, slippery, slush etc.
F.A.A. Facility check, last run, subsequent to accident.
FIRE and CRASH response
E.M.S. response
Police, Security response (report -pictures)
Media response (sometimes they get the story - pictures)
DIGITAL dispatches, digital flight plans, digital approach plates

PILOTS DOCUMENTS

Licenses
Current medical
Maps and charts digital FMS and nav data.
Instrument Approach plates
S.I.D.s
Signed dispatch
Flight plan
Latest weather

AIRCRAFT TYPE

a. Make
b. Model
c. Manufacturer
d. Year
e. Serial number
f. Registration
g. Owner
h. Max weight
i. Aircraft type certificate
j. Landing gear type
k. Number engines
l. Number of passenger seats
m. Aircraft Operator
n. Aircraft lien holder if any
o. Pilot in command
p. Pilot operating controls

q. Address of owner
r. Status of flight

18 ENGINE TYPE

a. Manufacturer
c. Make
d. Model
e. Year
f. Total time
g. Time since overhaul
h. Rated power
i. Type maintenance program
j. Date of last inspection
K. Engine Type Certificate

CAPTAIN, FIRST PILOT, ENGINEER

Name
Address
Next of kin
Employed by
Insured by
Pilot certificate
Type certificate
Type ratings
Time total
Time last 6 months
Time last thirty days
Last training recurrent
Time in type
Landings last 6 months
Actual instrument last 6 months
Instrument rated
Medical certificate
Current waivers or restrictions
Date of last medical
Grade of medical
All F.A.A. ratings and certificates
Line Checks, when, by whom, reports if any
All F.A.A. jump seat observations
Route qualifications.
Military experience,
Military service record
Military flight record
Promotions
Discipline

Personnel record
Training records

Flight info

Departure airport
Preflight
Flight plan
Weather brief
Taxi, checklists
Destination airport
Route of flight
Planned altitude
i.f.r. plan
Controlled airspace
Type of clearance
Type of airspace of occurrence
Type of control area i.f.r.
Route segment type i.f.r.
Communicating with
Controlled by

FUEL

Fuel onboard
Fuel purchase
Fuel sample
Additives
Correct type /octane
Contaminants
Water
Fuel icing

AIRCRAFT LOADING

Manifest weights
Fuel weights
Passenger weights
Cargo weights
Hazardous materials
Aircraft total weight at takeoff
Weight at accident
Center of gravity at take off
CG at accident
Load distribution

WEATHER

Weather briefing obtained

Hourly Sequences
Weather at takeoff
Weather forecast airborne
Actual weather airborne
Differences between expectations and experienced weather
Severe weather
Pireps
Airrmets
Sigmets
ATIS weather
Weather specials
Witness weather
Thunderstorm, icing, wind shear, lightening, snow, fog, rain, haze etc.
DO I need a weather reconstruction?
Winds aloft, at airport, gradient shift of direction and velocity.
Jet stream position
Clear air Turbulence

Propeller type

Make
Model
Year
Type certificate
Time since overhaul
Who maintained it?

THE ACCIDENT INVESTIGATION ITSELF

HUMAN FACTORS

24 hours recap
Rest
Meals
Medical History, F.A.A.
Crashworthiness
Seatbelts
Fire and rescue
Instant death
Pain and suffering
Man machine interface
Training, where, when etc.
Return to previous modes
Flight experience
30 day recap
180 day

Stress analysis, Navy point system
Hypnotic regression
Design induced errors?
Private medical history

AIRCRAFT CONFIGURATION AT IMPACT

Inventory needed parts for determinations:
In Cockpit determines, handle positions, switch positions
Gear handle, indicator, associated lights
Flaps handle, indicator, associated lights
Spoiler /speed brakes, handle indicators or lights
Trim: aileron, rudder, and elevator
Autopilots switches, lights
At component, determine positions of components.
Flap, Gear, Trim, Spoiler, Speed brakes etc. (see chapter on methodology)

WRECKAGE DISTRIBUTION CHART

Determine a datum point
Chose a method, line of bearing and distance, datum line offset distance or grid system.
Map and inventory parts on system
Aerial photo is best.
GPS locations

IMPACT CRATER

Dimension hole
Note soil type
Measure and plot all ground scars
Measure and plot all tree impacts
(From this an expert may derive estimates for: speed, dive angle, attitude of aircraft, flight path and more)

STRUCTURES GENERAL

Inventory all parts present.
Include flight controls, doors, engines, props and balance weights.
Determine condition before and after impact.

STRUCTURES

Mode of failure
First failure
Look for fatigue
Overload ground
Overload aerodynamic
Over speed

Flutter
Overpressure explosion fuel
Explosion (HiX explosive)
Relate to ground impact or before.

INSTRUMENTS

Inventory instruments found.
Inventory power source to instrument (ac may capture at electrical loss)
Inventory lights and status boards associated with instruments.
Inventory switch positions.
Inventory circuit breakers and fuses.
Inventory off flags.
List primary instrument manufacturer.
Record readings if any.
Photograph instruments. Good photos allow later analysis.
Attempt readings on all A.D.I/ instruments, H.S.I. instruments, altimeters and airspeed.
Inventory engine performance instruments.
Determine if lab or teardown needed.
Refer to chapter on instruments.

POWER PLANTS. Jet, Prop or Turboprop refer to chapter.

Inventory pieces and components.
Examine externally for pre existing failures.
Examine for impact damage.
Examine for power indications at impact.
Examine for heat indications at impact.
Examine for fire pre impact.
Determine if teardown is needed.
Lubrication system operable.
Oil pressure present.
No dramatic oil leaks.
Pump operable, not overheated.
Oil filters clean of contaminants.
Fuel system operable.
Fuel on board.
Fuel uncontaminated.
Fuel tank selected.
Fuel pumps on.
Fuel pumps operable.
Fuel valves set open.

PROPELLER

Power at impact.
Torque break of shaft.

Tip twist.
Prop slash marks.
Tree and brush prop cuts.
Chord wise scratches.
Bends opposite rotation.

Determine blade angles at impact
Blades broken from hub.
Hub crescent marks.
Witness marks inside piston, cylinder.
Multiple or single blade bends.
Prop spinner deformed into underneath cylinder extension.
Compare to exemplar.

FLIGHT CONTROLS AUDIT
Inventory components.
Determine integrity.
Determine type of breaks
Analyze control positions at impact.
Determine if primary or back up controls in use at impact.

TRAINING
Training completed, dates and type.
Training records obtained.
Ground Training testing obtained.
Training manual obtained.
Training syllabus obtained.
C.R.M. training completed.

FLIGHT PATH RECONSTRUCTION
1. Witness statements.
2. Flight Data recorder. *
3. Radar data obtained.*
4. Survivor statements.
5. Crater location and dimensions.
6. Flight simulator reconstruction *
7. Flight test reconstruction.
8. Other sophisticated onboard computer retrievals.
9. Expert piloting opinions.
10. Radio transcripts.
** best data obtained.
Combine and plot on map.

FLIGHT SIMULATION
Valuable tool to test possibilities, theories and probabilities.

Verify results.
Great courtroom demonstrative evidence.
Great settlement evidence.

WEATHER RECONSTRUCTION

Radar photographs (U.S. Weather, Military, of area at time (ASHEVILLE).
Satellite weather photography, time and place.
Hourly reports at airports and reporting facilities.
Pireps at time, place and altitude
Special reports,
ATIS reports.
* COMBINE AND PLOT ON SAME MAP AS FLIGHT PATH RECONSTRUCTION

MID AIR SCATTER DISTRIBUTION

Pick datum, read chapter.
Pick method (range and bearing, grid system)
Inventory parts.
Create map of part scatter.
Utilize GPS. Laser survey etc.

SWITCH POSITIONS

Inventory switches located.
Inventory position found.
Determine type of switch, open (on-off), lever latch, solenoid, covered, guarded multi position, rotational.
Inventory validity of finding (crash damage).
Determine meaning.

LIGHT BULB ANALYSIS

Inventory bulbs.
Determine their function and meaning
Bulb intact filament brittle break- off.
Bulb intact filament stretch – on.
Bulb broken oxide of filament –on.

ELECTRICAL AUDIT

Inventory parts of system.
C.S.D. operation on or disconnected, oil quantity.
Generator operation on, off, broken.
Electrical buss condition, arcing or melting.
NiCad battery condition, meltdown, charge if intact.
Battery acid, condition and charge if intact.
Wire bundle conditions. Arcing, bubbling, insulation fire, chaffing.
Light bulbs associated with system warnings.
Switch positions associated with systems.

Component failures of multiple electric driven components.
Fuse blown.
Circuit breakers popped.
Maintenance history for electrical problems.
T/R faults.

HYDRAULIC AUDIT

Inventory components.
Fluid in reservoir.
Pumps on/off.
Pump condition, operable, not overheated.
Fluid in pumps.
Fluid in actuators.
Bulged or blown actuators signify hydraulic present at impact.
Radio of problem.
Maintenance history relating to hydraulics.
Bench check actuators and pumps.
Actuator and pump teardowns.
Automatic redundant systems in use.
Redundant systems selected.

MOCK UP - old method

Whole or partial.
Useful in skin fatigue and explosions, and some fires.
Expensive.
Requires time and space to complete.
Usually a simple laying out of parts is sufficient.

PATHOLOGY

1. Coroner.
2. Autopsy.
3. Pathology.
4. Toxicology.
5. Cause of death.
6. Cause of individual injuries.
7. Who was flying?
8. Drug scan.
9. Hair drug scan.
10. Other illness.
11. Burn death/instant death.
12. Conscious awareness.
13. Incapacitation.

BIO MEDICAL

1. Injury / modality.

2. Restraint system analysis.

Flight Surgeon

1. Vertigo.
2, Spatial disorientation.
3. Vertigo.
4. Task Saturation.
5. Medicinal effects on flying.
6. Hyperventilation.
7. O2 deprivation.
8. Skin-diving /bends.
9. Altitude sickness.
10. Explosive decompression effects.
11. Medical condition re flying.
12. Effects of alcohol on flying.
13. Night vision.
14. Loss consciousness.
15. Blackout, red out, grey out.

FIRES

Airborne:
Hotter temperatures.
Horizontal burn pattern.
Molten metal along flight path.
Burned parts along flight path.

Ground fires
Cooler temperatures.
Vertical chimney patterns.
Adjacent parts burned dissimilarly. (Wreck scattered before fire)
Kerosene ignites at about 330 degrees.
Paint discoloration at very low temperatures.
Sooting occurs at low temperature.
Aluminum skin broom straws at 900 degrees.
Comparison of materials melting points and burn temperatures.

Explosions
Fuel vapor explosions cause mild overpressures (8 atmospheres)
Hi EX explosives create massive localized overpressures, Aluminum skin curls away from blast.
It is not unusual to find the explosion area unburned while the remainder is consumed by residual fire.
In airborne explosions look for unburned parts along flight path especially, overpressure parts with one side exposed to some heat.

CRASHWORTHINESS and SURVIVABILITY

Compute, estimate g forces at impact
Audit restraint devices, shoulder harness used.
Audit restraint systems for failure.
Audit chairs for collapse and design strength.
Determine escape path and exits.
Audit exits, blocked, locked, unusable.
Audit flammability of interior materials and compare to regulation.
Determine hazardous material carriage.
Audit aircraft design for killer sharp cockpit edges.
Determine fuel system design safety.
Compare to state of Army helicopter crashworthiness.
Audit escape hatches and windows.
Consult with pathologist, and bio medical man.

AIR TRAFFIC CONTROL

Obtain current FAA Flight Controllers Manual
Review to see if violation present in accident.
Obtain all radio and land line recordings.
Obtain radar data.
Obtain all statements.
Obtain all transcripts.
Obtain tower movement log.
Obtain facility status report.
Obtain training status of all controllers.

WITNESSES

Locate valuable witnesses.
Take unbiased, legally binding statements.
Then establish aviation experience.
Then establish reliability of witness.
Allow witness an opening narrative "tell me what you saw and heard"
Then ask direct and important questions.
Do not place aviation words in their mouth that they are not familiar with.
Give them a model airplane.
Videotape is helpful.

ANALYSIS

Maintain the proposition that you will determine what did happen by determining everything that did not happen.
Investigate by elimination.
Review facts.
Determine validity of facts in **LEGAL** terms: certainty, probability, possibility.
Stack and correlate supportive facts.
Determine explanation of anomalies.

Determine producing causes of the accident.
Determine contributing causes to the accident.

After this is complete see if the results fit any theories of legal liability.

REPORTS/Pictures AVAILABLE- DO I NEED THEM?

Local police.
Local E.M.S.
Local fire department.
Local coroner report.
local medical examiners autopsy report.
All news media coverage local.
Salvage Yard clean up crew.
F.A.A. C.A.M.I. toxicology and drug screen.
F.A.A. Tower tapes.
F.A.A. departure or approach control tapes.
F.A.A. Air Route Traffic Control Tapes.
F.A.A. ATIS weather tapes.
F.A.A. Radar data for aircraft flight path.
F.A.A. tower movement logs.
F.A.A. sector manning records.
F.A.A. Facility sector log.
F.A.A. Aircraft records on registration and title.
F.A.A. Airmen records.
F.A.A. airmen medical records.
F.A.A. Facility status log.
F.A.A. facility check after accident.
F.A.A. telephonic and radio conversations from flight service.
F.A.A. training records.
F.A.A. punitive action and violation records.
F.A.A. form 337 changes.
F.A.A. Service Difficulty reports.
F.A.A. Airworthiness Directive file and history.
F.A.A. data on certification of a specific airplane.
N.T.S.B. factual accident report.
N.T.S.B. Public hearing transcript.
N.T.S.B. Public Docket documents.
N.T.S.B. data on similar accidents and incidents.
N.T.S.B. pictures.
I.C.A.O. accident reports (foreign).
U.S.A.F 110 -14 reports.
U.S.A.F 127-4 reports.
U.S.A.F. engineering tear down reports.
U.S.Army accident Reports.

U.S.Navy accident reports.
U.S.Navy accident reports.
U.S. Navy engineering teardown reports.
Military service records.
Military flight training records.
Armed Forces Pathology and Toxicology Reports.
U.S. Weather Service reports for reconstruction.
U.S. weather radar photographs.
Weather satellite photos.
EROS DATA CENTER high altitude photos.
Company simulator and flight training records.
Company aircraft maintenance records.
Company aircraft overhaul record.
Company personnel file on flight crew.
Company ground training records on flight crew.
Company check airmen records of flights with flight crew.
Company dispatch and flight planning records.
Company airborne radio reports.
Company maintenance tracking and records for a specific component part.
Bystanders
Casual Eyewitnesses
Helicopter eye in Sky news.
GOOGLE SATELITE AREA –flight path map and satellite