Bell MODEL 212

Emergency Notes

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*******THINKING TWIN ENGINE*******

- **Along with the safety of two engines comes *twice* the likelihood of having an engine failure.**

- **With this comes the possibility of moving the wrong throttle or switch in the process of dealing with an emergency.**

- ***"TWIN MEANS TIME",* and with this time through a confirmation process with yourself, you can accurately assess which engine needs to be dealt with.**

- **In cruise flight this would *include IDENTIFY & CONFIRM, SHUTDOWN & SECURE* the problem engine.**

- **During flight in the 212 a small amount of friction should be maintained on the throttles. During the handling of an emergency which requires the manipulation of only one throttle, the other throttle should be guarded to prevent a deceleration on the good engine.**

- **Near the ground and with a suitable landing area it should be noted that it might well be safest to simply land immediately without manipulating any engine controls.**

- **To attain published single engine performance, generator loads should not exceed 75 amps each during twin engine operation.**

- **Operation in the 2 1/2 minute or 30 minute OEI range is intended for emergency use only, when one engine becomes inoperative due to a malfunction. OEI ranges shall not be used in training**

- **On start up do not increase ROTOR above 80% RPM until XMSN OIL temperature is above 15 degrees Celsius.**

- **Engagement of the second engine (joining the N2 needles) should be done smoothly.**

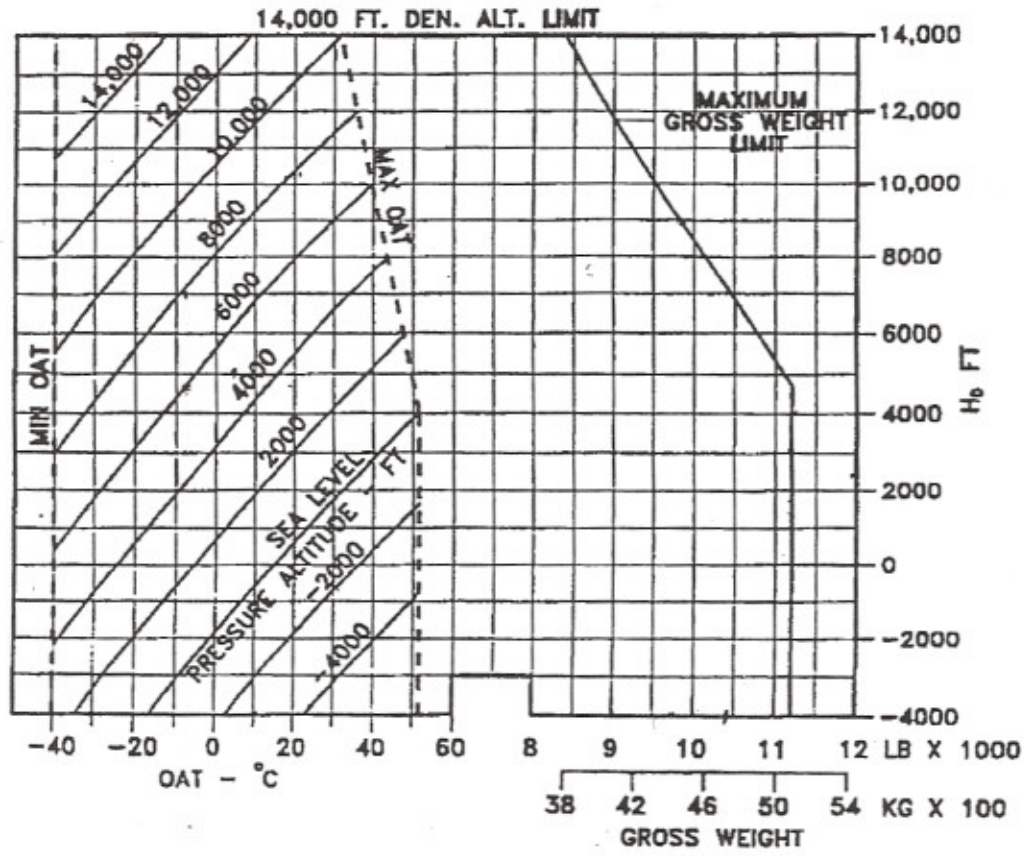
- **Best rate of climb speed is 55 KIAS**
- **OEI speed is 55-65 KIAS**
- **Minimum rate of descent in autorotation is 65 KIAS**
- **Maximum range in autorotation is 90 KIAS**

- **The following corrective action procedures assume the pilot gives first priority to helicopter control and a safe flight path.**

- **Where applicable the following should be considered during the handling of an emergency situation:**

Transmitting a Mayday
Activating ELT
Advising passengers
Shutting down fuel and electrical

NOTE : ALLOWABLE GROSS WEIGHTS OBTAINED FROM THIS CHART MAY EXCEED CONTINUOUS HOVER CAPABILITY UNDER CERTAIN AMBIENT CONDITIONS. REFER TO HOVER CEILING CHARTS IN SECTION 4



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Weight-altitude-temperature limitations for takeoff, landing and in ground effect maneuvers chart

SINGLE ENGINE HEIGHT– VELOCITY

The Height - Velocity limitations are critical In the event of a single engine failure during take-off, landing or other operation near the surface.

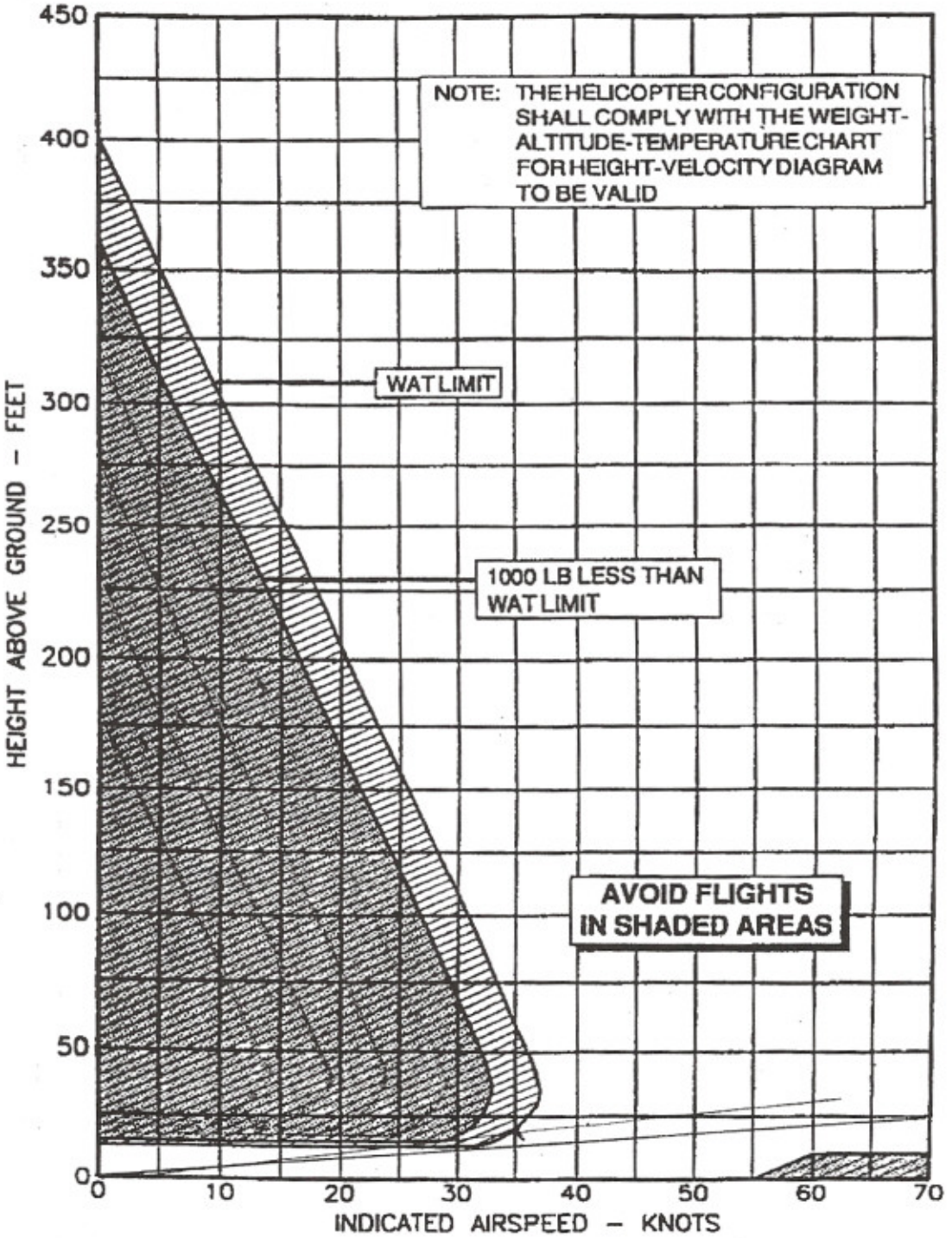
The AVOID area of the H-V Chart defines the combinations of air speed and height above ground from which a safe single engine landing on a smooth level firm surface cannot be assured.

The H-V chart is valid only when the Weight - Altitude - Temperature limitations are not exceeded. The diagram does not define the conditions which assure continued flight following an engine failure, nor the conditions from which a safe power off landing can be made.

When take-offs are made in accordance with the H-V Chart proceed as follows:

- **Determine hover torque at a four foot skid height**
- **Perform take-off with no more than 15% torque above hover power while accelerating to Take-off Climbout Speed (VTOCS)** (35 - 40K)

SINGLE ENGINE HEIGHT-VELOCITY DIAGRAM



TWIN ENGINE TAKEOFF CLIMBOUT SPEED – KIAS							
H_D – FT*	GW – LB (KG)						
	7000 (3175)	8000 (3629)	9000 (4082)	10,000 (4536)	10,500 (4763)	11,000 (4989)	11,200 (5080)
0	30	30	30	35	38	40	40
1000	30	30	30	35	38	40	40
2000	30	30	30	35	38	40	40
3000	30	30	30	36	38	40	42
4000	30	30	32	36	40	42	42
5000	30	30	32	38	40	42	–
6000	30	30	34	38	42	–	–
7000	30	30	34	40	42	–	–
8000	30	30	34	40	–	–	–
9000	30	30	36	–	–	–	–
10,000	30	32	36	–	–	–	–
11,000	30	32	38	–	–	–	–
12,000	30	34	38	–	–	–	–
13,000	30	34	–	–	–	–	–
14,000	30	36	–	–	–	–	–

* Refer to Density Altitude Chart.

- **Twin engine Takeoff Climbout Speed is that indicated airspeed which will allow takeoff distance over a 50 ft obstacle to be realized and will comply with the H-V restrictions to allow a safe landing in the event of a single engine failure.**

SINGLE ENGINE RATE OF CLIMB – PT6T-3

GW 11,200 LB (5080 KG)

30 MINUTE POWER
ENG RPM 97% (N2)
GENERATOR 150 AMPS EACH

58 KIAS
HEATER OFF
INOPERATIVE ENGINE SECURED

WITH ALL DOORS OPEN OR REMOVED, RATE OF CLIMB WILL DECREASE 200 FT/MIN

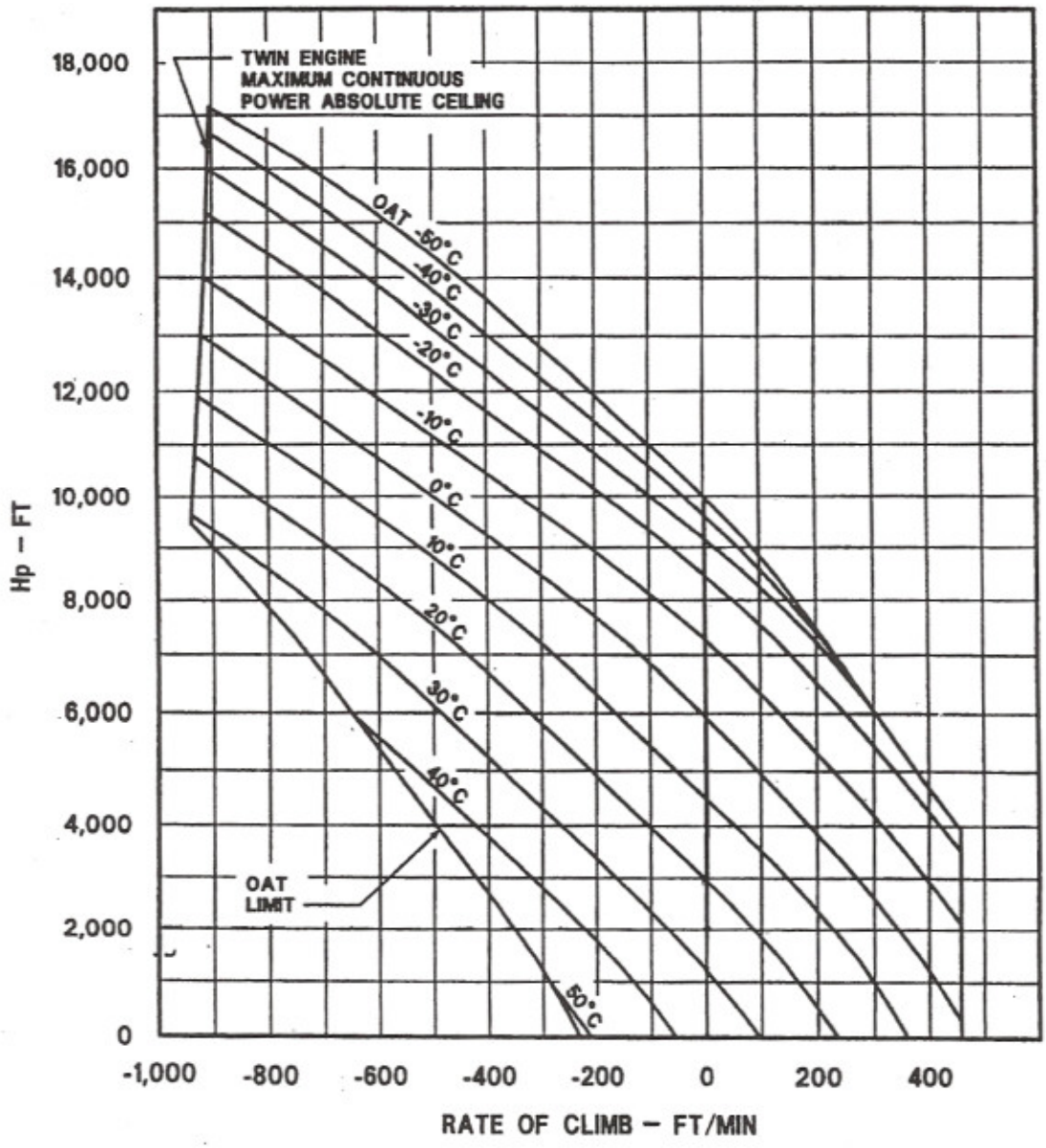


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Figure 4-11. Single engine rate of climb - PT6T-3 (Sheet 5 of 10)

SINGLE ENGINE RATE OF CLIMB — PT6T-3B

GW 11,200 LB (5080 KG)

2 1/2 MINUTE OEI POWER
ENG RPM 97% (N2)
GENERATOR 150 AMPS

58 KIAS
HEATER OFF
INOPERATIVE ENGINE SECURED

WITH ALL DOORS OPEN OR REMOVED, RATE OF CLIMB WILL DECREASE 200 FT/MIN

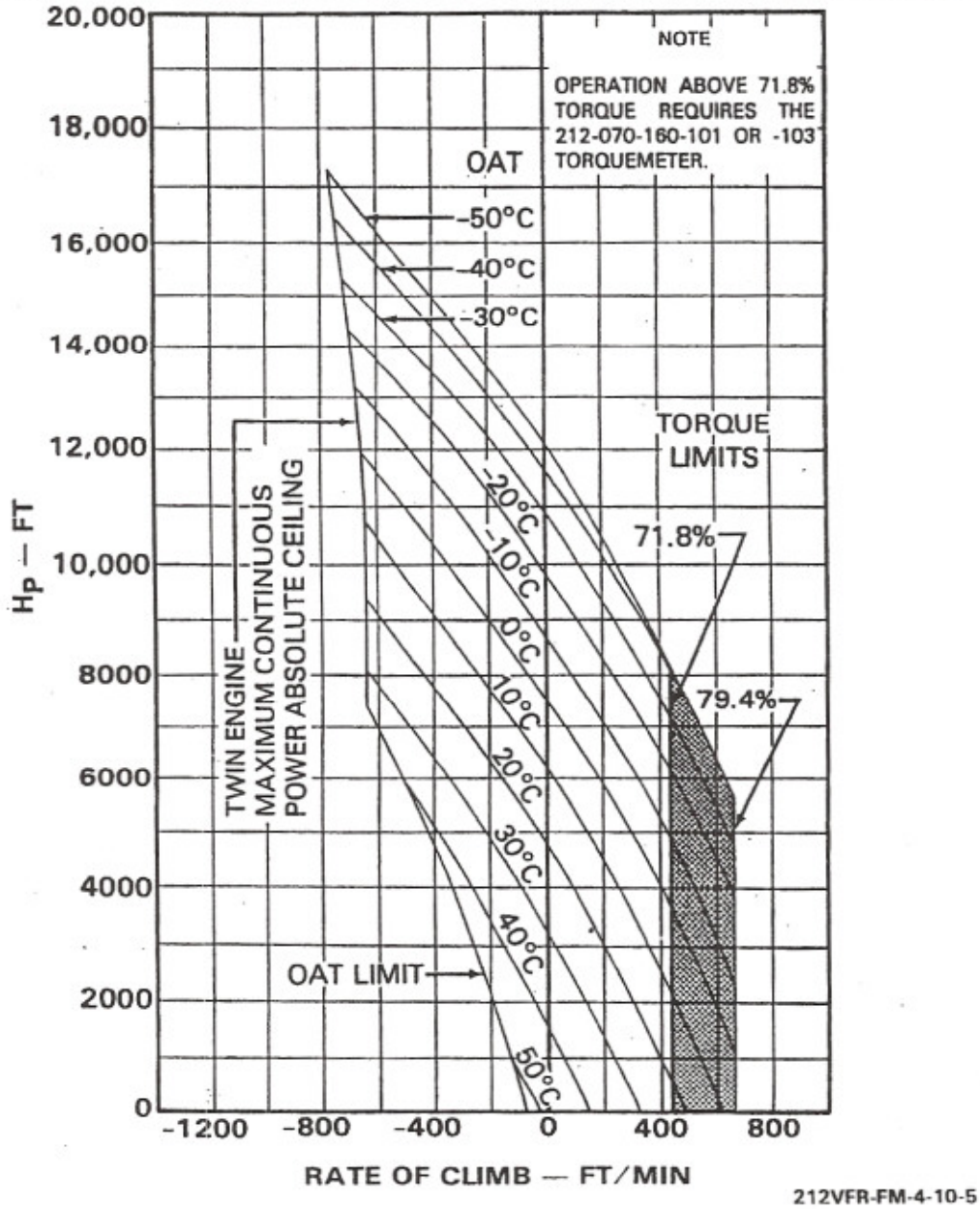

Figure 4-10. Single engine rate of climb - PT6T-3B (Sheet 5 of 10)

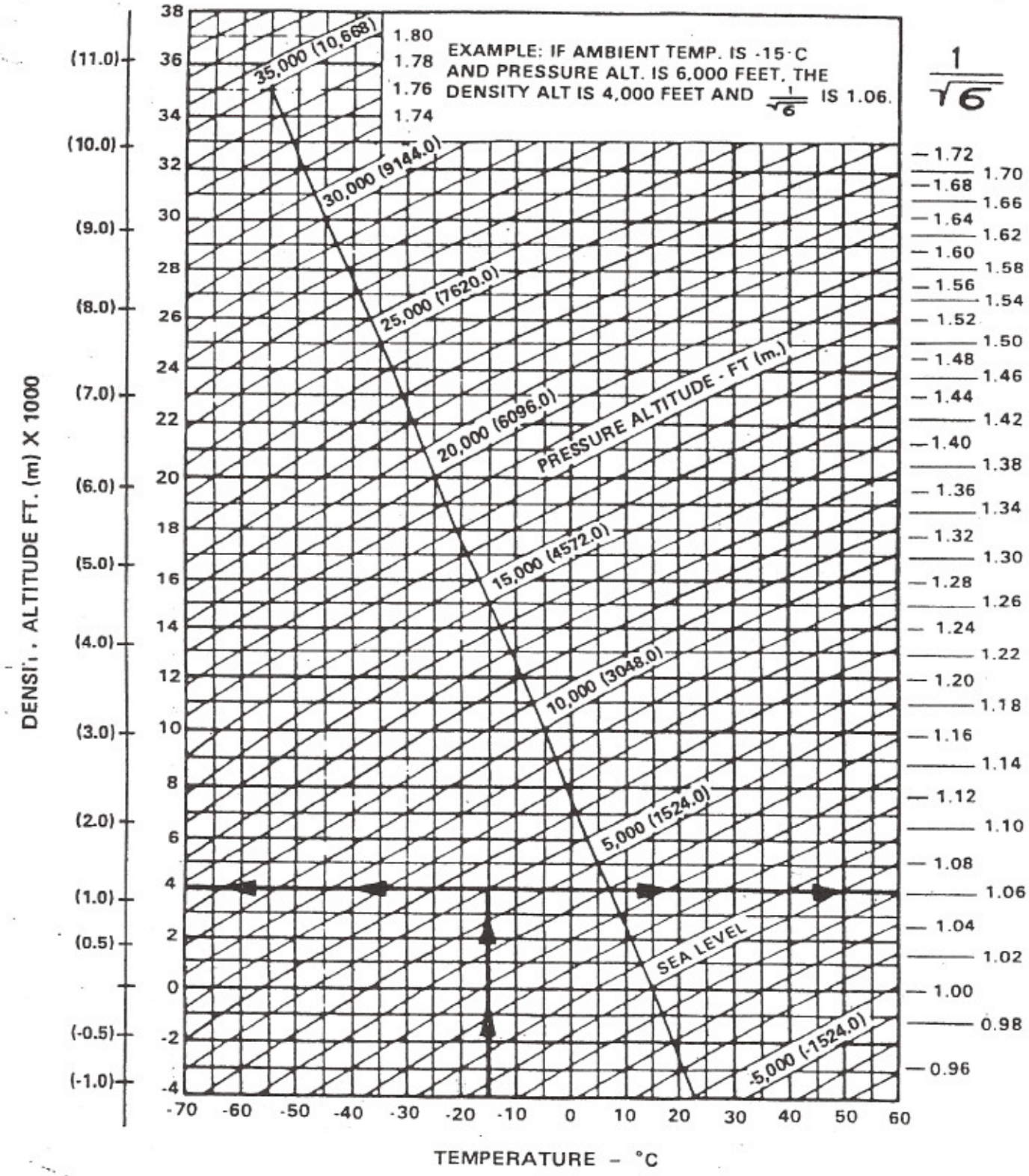

Figure 4-3. Density altitude chart.

SINGLE ENGINE FAILURE in FLIGHT

Indications: Torque split
Engine out light
N_1 below 61% decreasing
N_2 below 85% decreasing

- *CONTAIN* **TORQUE & *MAINTAIN* RRPM**
- *RESET* **MASTER CAUTION**
- *SPEED* **TO OEI**
- *TEST AND MONITOR* **FOR FIRE**
- *LAND* **AS SOON AS PRACTICAL**

If a landing area is not available in the vicinity, follow inflight engine shutdown procedure.

INFLIGHT ENGINE SHUT-DOWN PROCEDURE

- *I.D. AND CONFIRM* **AFFECTED ENGINE, THROTTLE TO** *IDLE*, **THEN** *CLOSED*
- **CROSSFEED** - *OVERRIDE CLOSE*
- **INTERCONNECT** - *OPEN*
  (unless fuel contamination suspected)
- **BOOST PUMP** - *OFF*
- *I.D. AND CONFIRM* **FUEL VALVE, THEN** *CLOSE*
- **GENERATOR, FAILED SIDE** – *OFF*
- **BATTERY, FAILED SIDE** – *OFF*
- **BATTERY, GOOD SIDE** – *ON*
- *RESET* **MASTER CAUTION**
- **INVERTOR 3** - *GOOD SIDE BUS*.

Non-essential bus may be restored by switching to manual.

AUTOROTATIONS

65 - 90K MIN (MAX RANGE)

- Autorotations will be done straight ahead and with a 180 degree turn.

- The aircraft should be maneuvered as necessary to arrive over a pre designated spot on the ground in a hover.

- Autorotations from forward flight will be done to a power recovery hover.

- The training pilot or check pilot will be reducing the throttles to idle at altitude and bringing them back in on final. He will notify you that "the throttles are full open".

- During practice dual engine failures in a hover the training or check pilot will be rolling the throttles to idle.

ENGINE FIRE in FLIGHT

Immediately initiate an emergency descent to land

- *I.D.* **ILLUMINATED T-HANDLE**
- *SPEED* **TO OEI** (full beep) 55
- *CONFIRM* **YOU ACTUALLY HAVE A FIRE**
- *I.D.* **AND** *CONFIRM* **AFFECTED THROTTLE-** *IDLE*
  - *CONTAIN* **TORQUE & RRPM**
- *PULL* **ILLUMINATED T-HANDLE (wait 10 seconds)**
- *SELECT* **MAIN FIRE BOTTLE**
- *CLOSE* **AFFECTED THROTTLE**
  - Fuel panel cleanup (U pattern)
- *SELECT* **RESERVE BOTTLE (If necessary)**
  - Electrical panel cleanup (as per inflight shutdown)
- *PUSH IN* **T-HANDLE**

If fire not out

- **LAND IMMEDIATELY**
- **COMPLETE SHUTDOWN & EXIT**

GOVERNOR /FUEL CONTROL MALFUNCTIONS

Indications: Torque split (proportional to power demand)
Abnormal NR
RPM Caution light
RPM Audio (low side)

- *ADJUST* **COLLECTIVE TO MAINTAIN RRPM**
  (beep if RRPM is low and check throttles full open)
- *AIRSPEED* **TO OEI** 55
- *IDENTIFY* **AFFECTED ENGINE**
  - ***HIGH NR*, HIGH TORQUE SIDE OVERSPEEDING**
  - *LOW NR*, LOW TORQUE SIDE UNDERSPEEDING
  - *GOOD ENGINE WILL FOLLOW COLLECTIVE MOVEMENTS*
- *I.D. & CONFIRM* **THROTTLE –** *IDLE*
- *CONTAIN* **TORQUE &** *MAINTAIN* **RRPM**
- *CONFIRM* **N1 AFFECTED ENGINE DECREASING**
- **GOVERNOR -** *I.D. & CONFIRM* **THEN** *SWITCH* **TO MANUAL**
- *INCREASE* **THROTTLE** *TO MAINTAIN* **TORQUE OF AFFECTED ENGINE SLIGHTLY BELOW NORMAL ENGINE**
- *RESET* **MASTER CAUTION**
- *LAND* **AS SOON AS PRACTICAL**

If AFC has malfunctioned, rolling throttle may not correct an overspeed condition. Subsequently placing governor switch in manual will allow fuel flow to be controlled with throttle.

ENGINE FIRE ON TAKE OFF OR ON APPROACH

If landing site is available, land immediately, otherwise proceed as follows:

- *AIRSPEED* **45 KIAS MINIMUM**
- *REDUCE* **COLLECTIVE**
- *PULL* **ILLUMINATED T-HANDLE**
- *SELECT* **MAIN FIRE BOTTLE**
- *BEEP* **NR FULL UP**

(If T-handle light is not out after 10 seconds)

- *SELECT* **RESERVE FIRE BOTTLE**
- *LAND* **AS SOON AS POSSIBLE**
- *COMPLETE* **ENGINE SHUTDOWN & EXIT**

MAIN DRIVESHAFT FAILURE

Indications: Left yaw
Rapid decrease in NR↓
Rapid increase in engine RPM's ↑
RPM light and audio RPM Lite
Noise from overspeeding engines↑
Noise from overspeeding CGB -
Noise from driveshaft movement ~

- *ENTER* **AUTOROTATION**
- *CLOSE* **THROTTLES**
- *COMPLETE* **AUTOROTATIVE LANDING**

Because it is not possible to simulate this emergency in training, the indications could be disorienting and unfamiliar. **Unusual noise, overspeeding engines and rapidly decreasing NR with associated warning lights and audio would not be indications previously seen together.** An occasional mental review of this scenario could [illegible]

Priority must be given to the low RRPM state here and autorotative flight established immediately.

ROTOR IS "LIFE"

Tailrotor malfunctions

- There is no "***set in stone***" procedure for handling tailrotor problems. Variations exist on the angle of approach used to land.

- Prior to performing any tailrotor emergencies during training, **it will be confirmed as to the method you plan to use.**

- **The amount of yaw experienced will depend on the** amount of ***tail rotor thrust*** being produced as a result of the malfunction, power setting at the time of the malfunction, the aircraft Gross Weight, and on landing, the ***windspeed.***

- ***Practice* tailrotor malfunctions in the hover will be done to the ground.**

- ***Practice* tailrotor malfunctions in flight will be done to an overshoot.** RIGHT

THE FOLLOWING MAY ALSO BE COVERED DURING 212 TRAINING AND PPC:

- Generator failure ✓
- Smoke in the cabin ✓
- Baggage compartment fire ✓ land ASP
- Hydraulic malfunctions ✓
- Cabin heater malfunction ✓
- Oral questions on various warning and caution lights ✓ FUEL FILTER.
- Flying in low visibility ✓
- Hover exit ✓
- Confined area operations ✓
- Off level landings ✓

ENGINE FAILURE ON APPROACH OR DEPARTURE

- **Because on approaches and departures there is a possibility of flying away after the loss of an engine (power section), it is important to have a clear understanding of at what point this is possible, and at what point it is not, with terrain taken into consideration.**

- **Attempting to fly away, when fly away is not possible would only increase the speed at ground contact.**

CATEGORY A OPERATIONS

CATEGORY A TAKEOFF

Operation of the helicopter in such a manner that if one engine fails after the start of the takeoff, you can either safely land or climb out and attain single engine forward flight.

CATEGORY A LANDING

Operation of the helicopter in such a manner that if one engine fails during the approach to land that you can safely continue with the landing or climb out from the point of failure and attain single engine forward flight.

- ***Category A operations require that you are operating to and from specific size heliports or runways with a firm level surface for landing.***

75 DUAL
55 SINGLE

- **Critical decision point (CDP)** ✓

  That point on a departure which prior to reaching, the helicopter would have to return to the ground in the event of an engine failure, and that point after which passing through the helicopter would be capable of single engine forward flight.

- **Landing decision point (LDP)**

  That point on an approach to land which prior to reaching the helicopter would be capable of single engine forward flight, and that point which after passing through the helicopter would be committed to land.

VTOSS- *Takeoff safety speed.* This is the speed in CATEGORY A operations combined with a specific height AGL that makes up CDP and LDP. Each one of these CATEGORY A parts requires a specific size heliport for takeoff and landing, and also gives a maximum takeoff weight. Part C in particular has it's own WAT chart which must be complied with in order to attain CAT A performance . Each of the three parts also gives specific heights AGL and airspeeds for CDP and LDP.

FLIGHT MANUAL SUPPLEMENT 7 SEPARATES CATEGORY A OPERATIONS INTO:

- **PART A**
  - Vertical takeoffs and landing operations
  - Heliport size 150'x72'
  - 10,000 lbs. Maximum GW
  - VTOSS = 30 KIAS + headwind (max. 55)
  - [redacted]
  - [redacted]
- **PART B**
  - Operations to and from a 550' runway
  - 10,000 lbs. Maximum GW
  - VTOSS = 30 KIAS + headwind (max. 55)
  - [redacted]
  - [redacted]
- **PARTC**
  - Operations to and from a 2300' runway
  - 11,200 lbs. Maximum GW
  - VTOSS = 55 KIAS
  - [redacted]

ALL OPERATIONS THAT DO NOT FALL UNDER THE DEFINITIONS OF CATEGORY A, ARE CATEGORY B

- Given that 90%+ of our 212 operations are to and from areas other than heliports and runways it would follow that these CATEGORY A, PARTS A, B, and C do not regularly apply, and we would be CATEGORY B.

- The CAT A section does however provide us with single engine ROC performance charts at a speed of 30 KIAS, up to 10,000 lbs. GW. This information could be useful in determining a fly away and a landing point in our varied operations. It should be noted that these 30 KIAS Single engine ROC charts are only good up to a pressure altitude of 2000 feet.

- During CATEGORY B operations the combined use of the WAT chart, the height velocity diagram, the VTOCS chart, and experience operating a helicopter at high gross weights and high density altitudes, should provide a pilot with enough information to determine for themselves at what point they are capable of flying away after a single engine failure and at what point they will have to land.

- Remember that fall away terrain would assist in an attempted flyaway situation.

DROP OFF

SINGLE ENGINE RATE OF CLIMB

10,000 LB. GROSS WEIGHT

30 MIN. POWER	VTOSS = 30 KIAS ✓
ENGINE RPM 97%	HEATER OFF
GENERATOR 150 AMPS	INOPERATIVE ENGINE SECURED

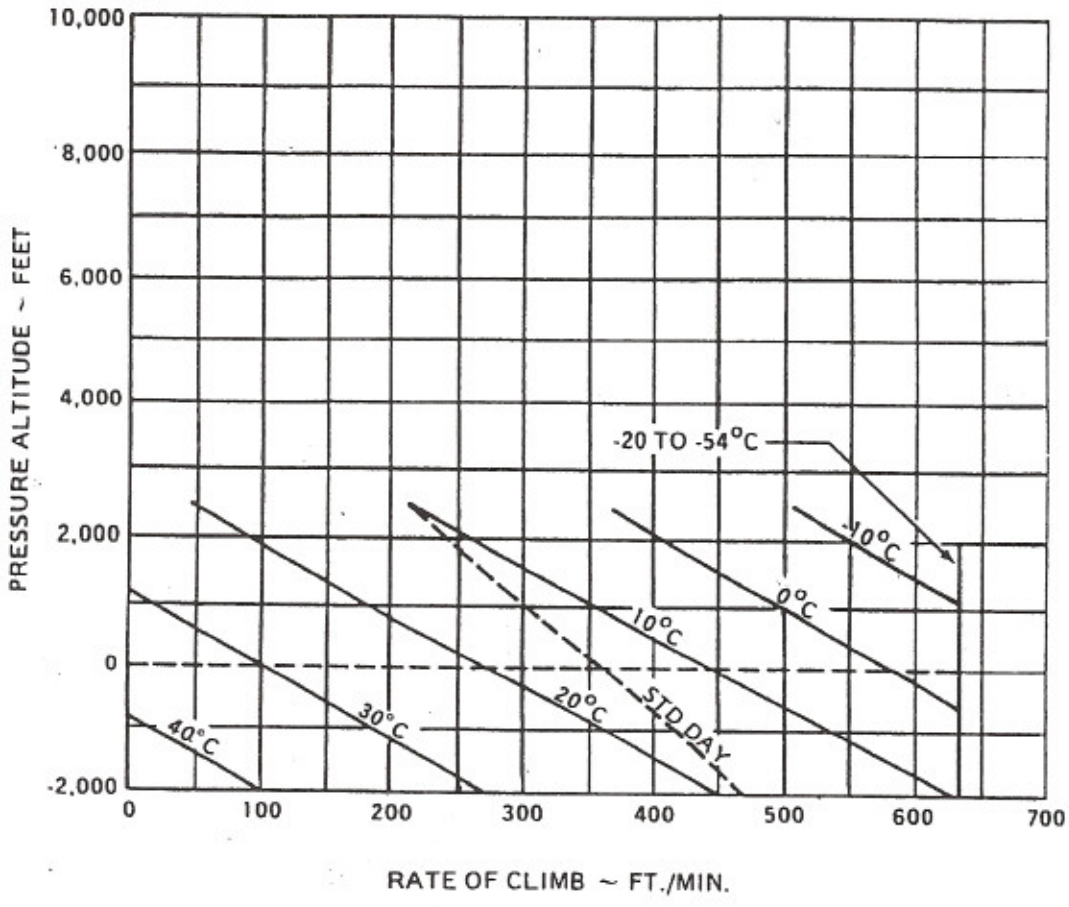

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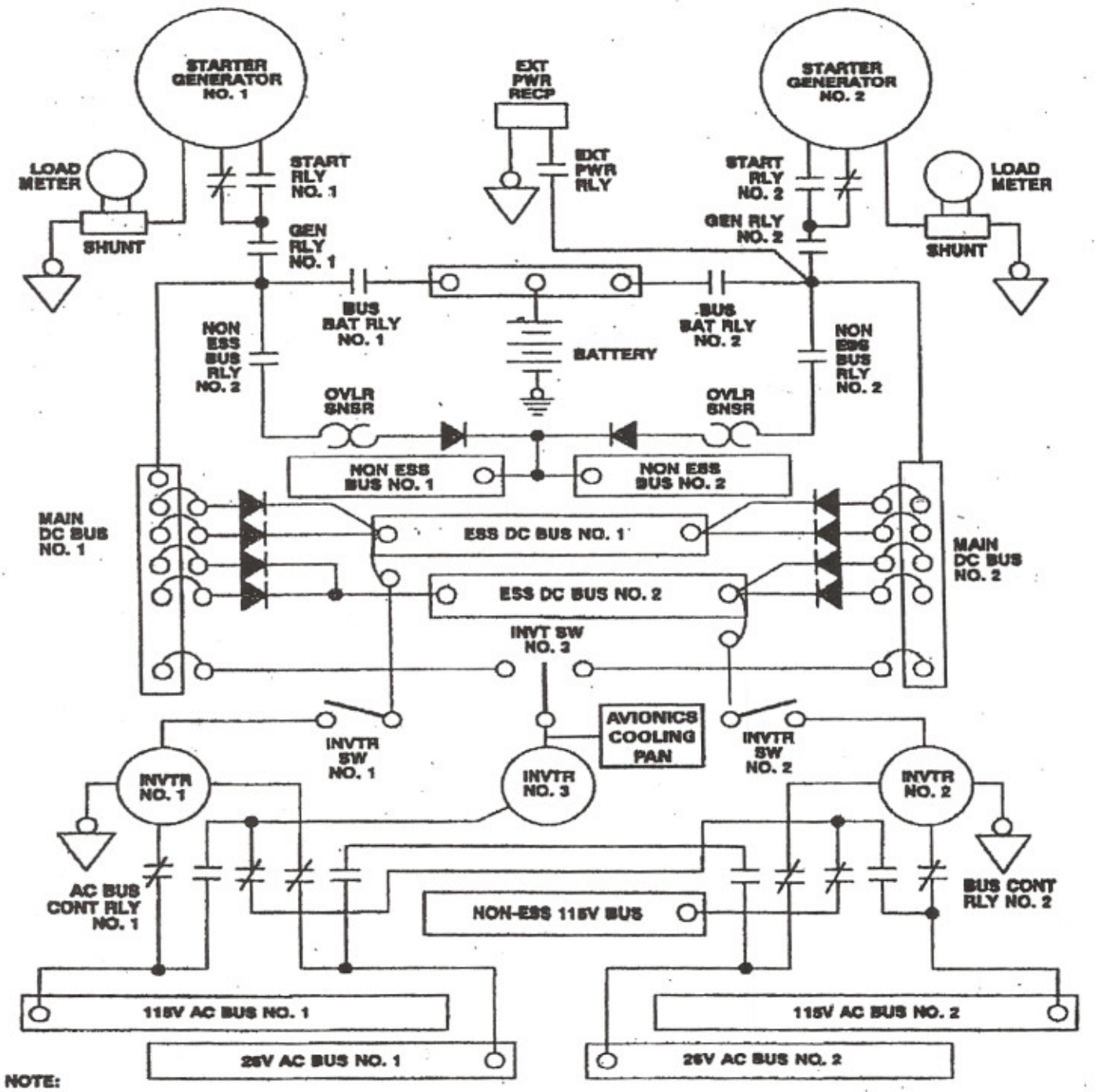
Figure 4B-5. Single engine rate of climb (Sheet 4 of 4)



NOTE:

SIMPLIFIED SCHEMATICS ARE TO BE UTILIZED AS A GENERAL OVERVIEW ONLY. FOR TROUBLE SHOOTING AND SYSTEM TRACING REFER TO PERTINENT WIRING SCHEMATIC.

212-MD-1-5

Figure 1-5. Electrical system schematic — SN 30554 and subsequent.

A/C INVERTORS PUT OUT BOTH 115 VOLTS & 26 VOLTS. SMALL ENG GAUGES ARE RUN ON 26 VOLTS. IF THE 26V SIDE FAILS THE ONLY INDICATION WILL BE GAUGES DROPPING TO 0. ONLY BY SHUTTING OFF THE APPROPRIATE INVERTOR WOULD THE 26V GAUGES COME BACK ON, AS INVERTOR 3 WOULD THEN TAKE OVER.

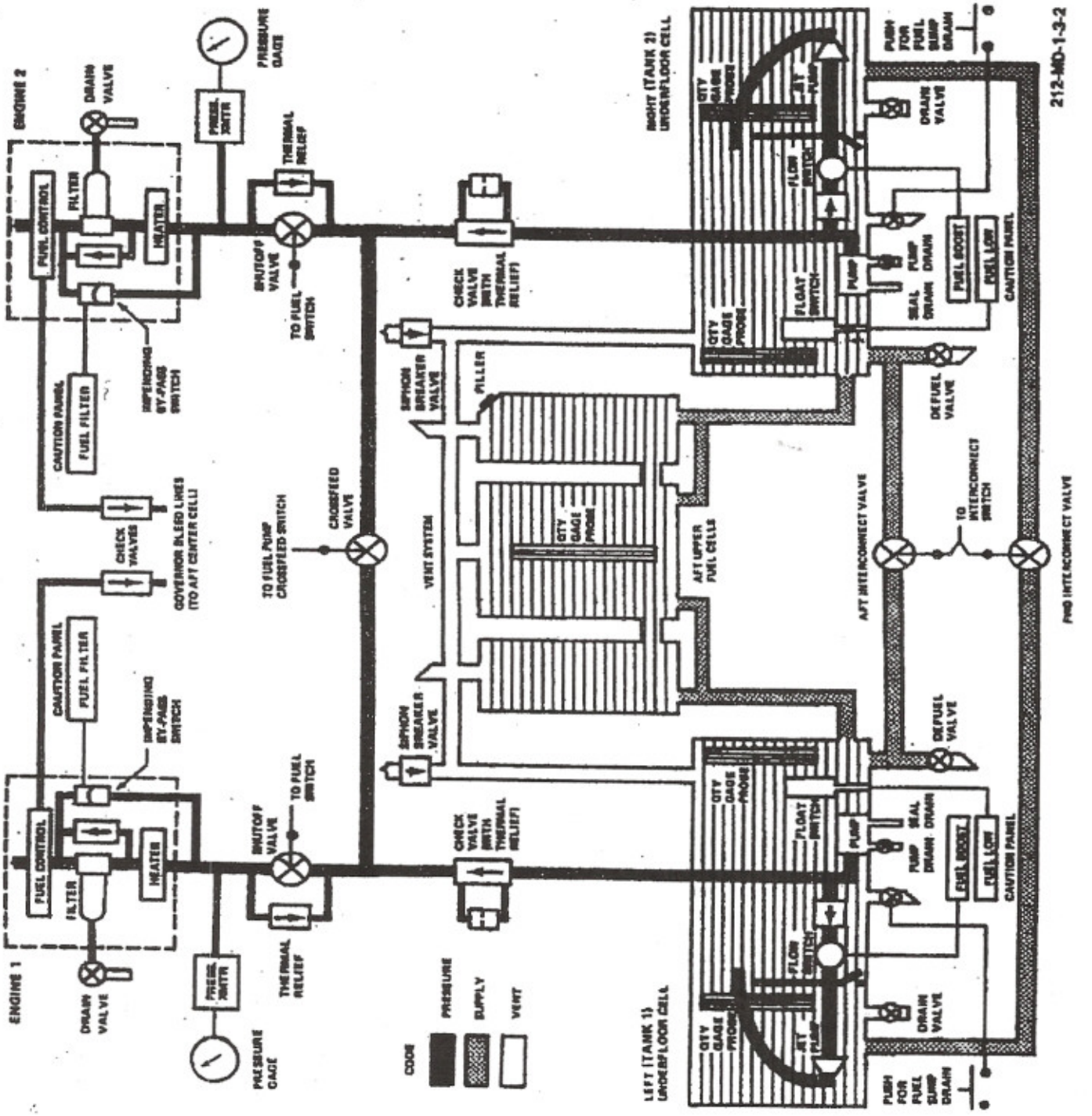


Figure 1-3. Fuel system (Sheet 2 of 2)

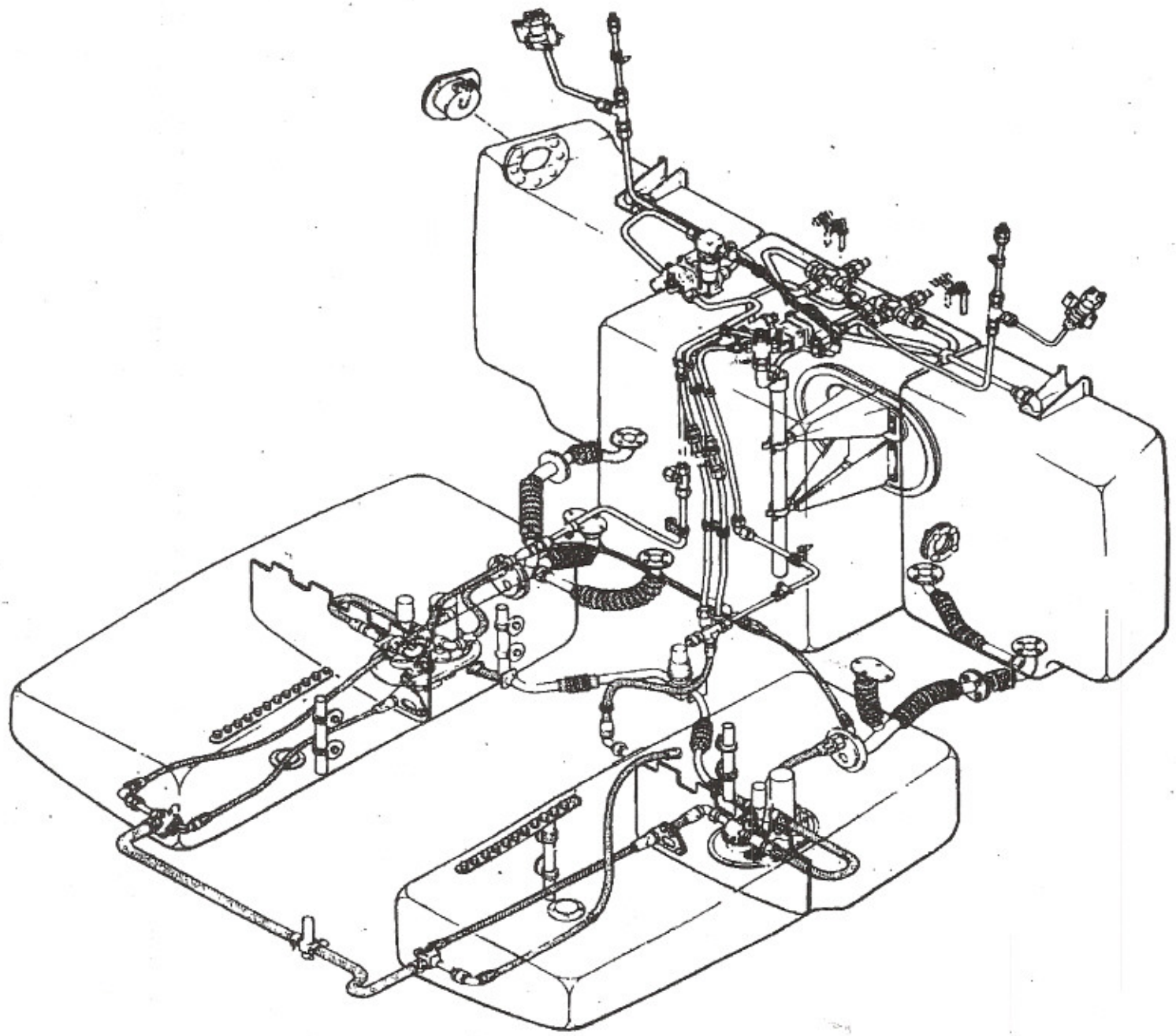


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Figure 1-3. Fuel system (Sheet 1 of 2)