

TELEKOM a.s. — DEFENCE SYSTEMS DIVISION

TF-90

KESTREL

Multirole Fighter Aircraft — Generation 4+

Pilot's Guidebook

Mach 1.4

SUPERCruise

Full Suite

ACTIVE ECM

-40% vs Gen3

RCS REDUCED

Modular

OPEN AVIONICS

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Applicable Aircraft: TF-90 Block 20 and later

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1 AIRCRAFT DESCRIPTION & DIMENSIONS

1.1 General Characteristics

The TF-90 Kestrel is a single-seat, single-engine multirole fighter aircraft developed by Telekom a.s. in cooperation with NATO allied partners. It is designed to perform air superiority, close air support, suppression of enemy air defences (SEAD), and maritime strike missions within a single airframe. Generation 4+ capability encompasses stealth shaping, supercruise, and advanced avionics absent from previous-generation platforms.

Type	Single-seat, single-engine multirole fighter, Gen 4+
Crew	1 (pilot)
Length / Wingspan / Height	15.8 m / 10.4 m / 5.1 m
Wing area / sweep	38.6 m ² / 42° leading edge
Empty weight	9,200 kg
Max takeoff weight (MTOW)	18,500 kg
Internal fuel capacity	4,800 kg (JP-8 / F-34)
Ferry range (internal fuel)	2,900 km
Combat radius (hi-lo-hi)	850 km (typical mixed stores)
Service ceiling	17,500 m (57,400 ft)
Rate of climb	> 250 m/s at sea level
g-limits	+9.0 g / -3.5 g (clean)

1.2 Airframe and Materials

Primary structure is carbon-fibre reinforced polymer (CFRP) composites with titanium alloy frames and radar-absorbent material (RAM) coatings. Low-observable shaping — edge alignment, sawtooth control surfaces, blended junctions — reduces RCS by approximately 40% versus the preceding generation benchmark aircraft.

Primary structure	CFRP 60%, titanium 28%, aluminium 12%
RAM	Iron-ball paint + structural RAM on leading edges and inlets
RCS reduction	~40% vs Generation 3/4 benchmark
Canopy	Gold-tinted polycarbonate, single-piece, radar scattering treatment
Airframe life	8,000 flight hours or 30 years (whichever first)

2 POWERPLANT

2.1 Engine Specifications

Powered by a single TK-F200 augmented turbofan with full-authority digital engine control (FADEC) and a vector-thrust nozzle ($\pm 15^\circ$ pitch) for enhanced low-speed maneuverability.

Engine	TK-F200 augmented turbofan
Bypass ratio	0.4:1
Dry thrust / With afterburner	75 kN / 120 kN
Max turbine entry temp	1,920 K (combat)
TBO	1,200 hours on-wing
FADEC	Dual-channel, automatic relight
Thrust vector control	$\pm 15^\circ$ pitch-axis nozzle
Fuel types	JP-8 (F-34), JP-5 (F-44), JET A-1 (emergency)

2.2 Supercruise Capability

The TF-90 sustains Mach 1.4 at ~12,000 m on dry thrust alone. Key operational advantages:

Extended combat radius: Up to 35% longer endurance vs afterburner-sustained Mach 1.2 flight.

Reduced IR signature: Eliminates the strong afterburner IR signature detectable byIRST systems.

Reduced acoustic signature: Lower acoustic profile improves survivability against acoustic detection.

NOTE	Mach 1.4 supercruise is achieved at ISA conditions, 11,000-13,000 m, clean configuration. External stores reduce supercruise speed — see Section 8.
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3 AVIONICS AND MISSION SYSTEMS

3.1 Radar and Sensors

Fire control radar	TK-APG-85 AESA, X-band
Detection range (1 m² target)	> 180 km look-up / > 130 km look-down
Simultaneous tracked / engaged	24 tracks / 6 engagements (TWS mode)
IRST	TK-IRST-40, forward hemisphere, RWR-cued
EO Targeting Pod (optional)	TK-EOP-3: FLIR, TV, laser designator (Station 5)
Navigation	Dual redundant GPS/INS; SAASM-compatible
Datalink	MIDS-LVT Link 16 internal; SATCOM optional
IFF	Mode 1/2/3/C/S + Mode 5 (NATO standard)

3.2 Electronic Countermeasures (ECM)

The TK-ECS-90 active ECM suite is fully embedded — no hardpoints consumed. It covers all standard threat frequencies and operates autonomously or under pilot control.

ECM suite	TK-ECS-90 (internal, full-spectrum)
Radar warning receiver	TK-RWR-90: 360° / 2-18 GHz / 2 ms response
Missile approach warning	UV-based, 360° spherical, 4 sensors
Active jamming	DRFM-based noise + deceptive, 2-18 GHz
Chaff / Flare	2x60 chaff + 2x30 flare (standard); 4x optional
Threat library	>2,500 emitter modes, field-updatable

CAUTION	Active radar jamming may provoke hostile fire-control lock. Assess tactical situation before enabling ACTIVE JAM. Deconflict frequencies with friendly emitters in coalition ops.
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3.3 Open Avionics Architecture

Avionics are built on Modular Open Systems Architecture (MOSA) compliant with NATO STANAG 4626 and the FACE Technical Standard. Partner nations can integrate national sensors and weapon interfaces via standardized expansion slots without redesigning the core platform.

Mission Computer	Dual-redundant FACE-compliant, PCI-e expandable
Stores Management System	STANAG 3910 / MIL-STD-1760E, 10 stations
Software	DO-178C Level A certified, ARINC 653 partitioning
National sensor integration	MOSA expansion bay — plug-and-play with NATO ICD
Cyber hardening	Air-gapped mission network; secure data diode on datalink input

4 WEAPONS AND STORES

4.1 Hardpoints and Capacity

Station	Location	Max Load	Typical Stores
1 / 9	Wingtips (L/R)	120 kg ea.	Short-range AAM, ECM pod
2 / 8	Outer wing (L/R)	600 kg ea.	AAM, ASM, 600 L tank, LGB
3 / 7	Mid wing (L/R)	1,000 kg ea.	AAM, ASM, LGB, JDAM, anti-radiation
4 / 6	Inboard wing (L/R)	1,500 kg ea.	Cunda SEM-120, TAM-60, 600 L tank
5 (CL)	Centreline	1,200 kg	600 L / 1,200 L tank, recce pod

Max external stores: 5,500 kg. Internal gun: 27 mm Mauser BK-27, 150 rounds.

4.2 Certified Munitions — Cunda SEM and TAM Series

Cunda SEM-40	Short-range AAM, IR-guided, off-boresight $\pm 90^\circ$, 40 km range
Cunda SEM-120	Medium-range AAM, active radar homing, inertial mid-course, 120 km
Cunda SEM-250R	Extended-range AAM, datalink + ARH terminal, 250 km
Cunda TAM-60	Air-to-surface, GPS/INS + IIR terminal, 60 km standoff
Cunda TAM-120	Air-to-surface, turbojet, GPS/INS/datalink, 120 km standoff
Cunda TAM-AS	Anti-ship variant, GPS/IIR/active radar, sea-skimming profile
General Purpose Bombs	Mk 82/83 with Paveway IV or JDAM guidance kit
Anti-radiation (coalition)	HARM AGM-88E compatible (Stations 3/7)

5 COCKPIT AND CONTROLS

The cockpit centres on three 6x8-inch multifunction displays (MFD) and a wide-angle holographic HUD (30° x 20° FOV). All primary combat functions are accessible via HOTAS (Hands On Throttle And Stick) — 14 controls per grip — without removing hands from primary flight controls.

HUD	Wide-angle holographic, 30°x20° FOV, TK-HUD-90
MFD (x3)	6x8 in. colour: flight / radar-tactical / weapons-ECM
Up-Front Controller	Alphanumeric: frequency, waypoint, IFF, DTC management
Ejection seat	Martin-Baker Mk.16E, zero-zero, 0–630 kt operational envelope
Oxygen	OBOGS (on-board generating) + gaseous backup
Voice system	DVI (Direct Voice Input) for non-critical mode selection
NVIS compatibility	Full cockpit NVIS (Night Vision Imaging System) lighting
Pressurization	25,000 ft equivalent at service ceiling

NOTE	HOTAS switch assignments vary by software load. Always reference TF90-SW-CFG chart for the installed software version before flight.
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6 NORMAL PROCEDURES

6.1 Pre-Flight Walk-Around

Does not replace maintenance inspection — if any item unsatisfactory, do not fly.

PRE-FLIGHT WALK-AROUND	
■ Aircraft documentation	Form 781, tech log, RFI current and signed
■ Fuel quantity / leaks	Verify vs flight plan; no visible leaks on ground
■ Fuel caps and access panels	Seated, latched, flush
■ Landing gear and brakes	Tyres — no cuts; brake assemblies — no fluid
■ Pitot / static / AOA vanes	Covers removed; free movement; unobstructed
■ Engine intakes	FOD-free; intake lips undamaged
■ Engine nozzle	Visual check from rear — no distress or FOD
■ Stores and ERUs	All correctly fitted per load manifest
■ Weapon safety pins	In or out per mission — log in Form 781
■ Control surfaces	Full and free — ailerons, tailplane, rudder, flaps
■ RAM coating	No peeling / cracks on leading edges
■ Ejection seat pins	Removed before entering cockpit; confirm with crew

6.2 Engine Start Sequence

1	Strap in / personal equipment Harness 5-point; O2 connected and checked; helmet visor down
2	Battery ON / BITE Avionics bus power; emergency systems ARMED; confirm BITE pass
3	INS alignment Select NAV on UFC; fine align 3-8 min (GPS-aided)
4	APU / GPU APU START or connect external GPU — confirm READY
5	Engine start Throttle IDLE; press ENGINE START; N2 > 15% before fuel
6	Monitor start parameters N1, N2, EGT within limits; oil pressure rise < 30 s; FADEC ACTIVE
7	Post-start checks Hydraulics 3,000 psi; generator ONLINE; RWR ON; radar STANDBY

8

Taxi

Request clearance; IFF STBY; nosewheel steering ACTIVE

6.3 Takeoff and Landing

Takeoff: Normal in MIL power. Afterburner for short-field, max-weight, or high-density altitude. Rotate at V_R (160–175 kt, weight-dependent) at 8°/s to 12° pitch. Gear UP at positive climb rate; flaps UP above 200 kt.

Landing: Drag chute mandatory for runways < 1,800 m or contaminated surface. Stabilized approach at $V_{ref} +5$ kt; aim 300 m from threshold. Flare at 10–15 ft, reduce to IDLE, maintain 3–5° nose-up. Deploy drag chute on touchdown. Anti-skid is automatic.

NOTE

V_R , V_2 , and V_{ref} vary with weight and configuration. Compute from Performance section or onboard SMS.

7 EMERGENCY PROCEDURES

WARNIN G

Emergency procedures are MEMORY ITEMS. Pilots must execute without reference to documentation. Mandatory simulator practice before first solo.

7.1 Engine Failure (Flame-Out) — Memory Items

Indications: loss of thrust, EGT rise, RPM decay, oil pressure loss, FADEC caution, fire warning.

1	Throttle	IDLE
2	Airspeed	MAINTAIN > 250 kt (relight envelope)
3	Engine relight	Press ENG RELIGHT — FADEC auto sequence x2
4	Windmill start (below 20,000 ft)	280–320 kt / throttle IDLE then advance to MIL
5	No relight — declare emergency	MAYDAY; divert nearest suitable airfield
6	Below safe relight altitude	EJECT — see 7.2

7.2 Ejection

WARNIN G

If continued flight is not possible, EJECT. Do not delay below minimum safe altitude. An aircraft can be replaced — a pilot cannot.

1	Canopy JETTISON (auto-jettisons on seat initiation)
2	Posture Head back on rest, spine straight, arms on rests, feet on footrests
3	Ejection handle Pull YELLOW-BLACK handle between legs — both hands, firm pull
4	Parachute Auto-deploy — zero-zero capable; manual backup available
5	Survival kit Auto-deploys on parachute opening; activate PLB immediately

8 PERFORMANCE DATA

ISA standard day unless stated. Use mission-specific TOLD card for each flight.

Speed and Altitude

Vmax (low-level, clean)	Mach 1.2 / 740 kt IAS
Vmax (high altitude, afterburner)	Mach 1.85 @ 12,000 m
Supercruise (clean, dry thrust)	Mach 1.4 @ 11,000-13,000 m
Service ceiling	17,500 m (57,400 ft)

Takeoff and Landing

Takeoff run (MTOW, MIL power, SL ISA)	700 m
Takeoff run (MTOW, afterburner, SL ISA)	480 m
VR (max weight) / V2	175 kt / 185 kt
Landing roll (normal weight, dry runway)	520 m
Landing roll (with drag chute)	370 m
Vref (normal landing weight)	155 kt
Min runway length (normal ops)	1,200 m dry / 1,500 m wet

Fuel Consumption (approx)

Cruise (Mach 0.85, 10,000 m)	1,400 kg/h
Supercruise (Mach 1.4, 12,000 m)	2,800 kg/h
Max military power (sea level)	4,200 kg/h
Max afterburner (sea level)	9,500 kg/h
Endurance (internal fuel, cruise)	~3.4 h

9 LIMITATIONS

WARNIN G

These are HARD limits. Any exceedance must be reported to maintenance immediately after landing.

Maximum speed (Vne)	Mach 1.85 / 740 kt IAS (sea level)
Max g-load — clean	+9.0 g / -3.5 g
Max g-load — with stores	+7.0 g / -2.5 g (verify per config)
Max crosswind T/O & landing	30 kt demonstrated / 35 kt limit
Max tailwind (takeoff)	10 kt
Gear extended	300 kt / Mach 0.6 max
Flaps 20°	280 kt max
Flaps 35° (landing)	200 kt max
Drag chute deployment	220 kt max
Min airspeed — afterburner light	200 kt (below: compressor stall risk)
Engine — max continuous EGT	850 °C
Engine — max transient EGT (≤ 30 s)	920 °C
g-onset rate limit	6 g/s (above: g-LOC risk)

10 ABBREVIATIONS AND GLOSSARY

AAM	Air-to-Air Missile	ISA	International Standard Atmosphere
ACM	Air Combat Maneuvering	JDAM	Joint Direct Attack Munition
AESA	Active Electronically Scanned Array	LGB	Laser-Guided Bomb
AOA	Angle of Attack	MAW	Missile Approach Warning
ARH	Active Radar Homing	MFD	Multifunction Display
ASM	Air-to-Surface Missile	MIL	Military power (max dry thrust)
BITE	Built-In Test Equipment	MOSA	Modular Open Systems Architecture
CFRP	Carbon-Fibre Reinforced Polymer	MTOW	Maximum Takeoff Weight
DVI	Direct Voice Input	NVIS	Night Vision Imaging System
DRFM	Digital Radio Frequency Memory	OBOGS	On-Board Oxygen Generating System
ECM	Electronic Countermeasures	PLB	Personal Locator Beacon
EGT	Exhaust Gas Temperature	RAM	Radar-Absorbent Material
ERU	Ejector Release Unit	RCS	Radar Cross-Section
FADEC	Full-Authority Digital Engine Control	RWR	Radar Warning Receiver
FLIR	Forward-Looking Infrared	SEAD	Suppression of Enemy Air Defences
FOD	Foreign Object Debris/Damage	SMS	Stores Management System
g-LOC	Gravity-Induced Loss of Consciousness	TOLD	Takeoff and Landing Data
HOTAS	Hands On Throttle And Stick	TWS	Track-While-Scan
HUD	Head-Up Display	UFC	Up-Front Controller
IFF	Identification Friend or Foe	Vne	Velocity Never-Exceed
INS	Inertial Navigation System	Vref	Landing Reference Speed
IRST	Infrared Search and Track	VR	Rotation Speed

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This guidebook is a summary reference only. In all conflicts, the full Aircraft Flight Manual (DOC-TF90-AFM-EN) takes precedence.