



TPS-75

MODERNIZATION



We've Got Your Track™

AN/TPS-75 at a Glance

Description:

The USAF's premier tactical, transportable 3D radar system, designed to detect, identify, and track airborne targets.

Range: Capable of detecting aircraft at ranges of up to 240 nautical miles.

Mobility: Fully transportable by air, land, or sea, with rapid setup and teardown capabilities.

Reliability: Designed for minimal maintenance and high operational availability, even in harsh environments.

Modernization imperative:

The evolving threat landscape necessitates that the AN/TPS-75 not only maintain its current capabilities in order to ensure Agile Combat Employment, but also adapt to address emerging peer and near-peer adversaries.

Evolution meets innovation

How TSS Solutions matches emerging tech to modern defense needs

The AN/TPS-75 is the primary and only transportable Aerospace Control and Warning (AC&W) Radar used by the United States Air Force. For decades, the "75" has been the cornerstone of tactical air operations, serving both domestic and overseas missions.

While the TPS-75 has a proven track record of excellence in safeguarding our skies, the rapid pace of technological advancement – and the changing dynamics of aerial threats – make modernization essential to ensuring the system's optimal performance in an evolving threat landscape.

TSS Solutions meets these challenges head-on, leveraging our extensive experience working with the TPS-75 and the industry-leading expertise of our engineering team to deliver a system that is more capable, maintainable, and robust than ever.

In 2018, the Project Management Office (PMO) at Hill AFB began exploring obsolescence mitigation for the TPS-75. The PMO was granted an Unfunded Request for \$4.2M in order to complete a DMSMS

mitigation effort comprising several "refreshed" technology insertion subsystems within the 75. The PMO contracted with TSS Solutions to produce and install these subsystems.

Modernizing the TPS-75 ensures:

- Enhanced detection ranges and accuracy.
- Improved resistance to jamming and electronic warfare tactics.
- Seamless integration with contemporary defense systems and networks.
- Extended service life and reduced maintenance burdens.

With the addition of the new Signal Processor, IF Receiver, Frequency Generator, RF Driver, and Array Signal Amplifiers, the TSS Solutions system is fully modernized for today's threat scenarios.

By investing in the TPS-75 Modernization, the USAF ensures that this pivotal radar system remains a robust, adaptive, and sustainable asset, ready to tackle the challenges of today and tomorrow.

TPS-75 MODERNIZATION

REPLACED/UPGRADED

- Display
- Processor
- Transmitter
- Rotary Joint
- Frequency Generator
- RF Driver
- IFF/SIF

ADDITIONS

- UPX-44 secondary radar
- Processor Tracker Server
- Array Signal Amplifier

DISPLAYS

Legacy displays will be replaced with our new touchscreen LCDs to deliver significant usability enhancements, including software that provides superior tactical interfaces for operators. All tracked and untracked videos are output from the video processor as ASTERIX Ethernet signals in CAT-240. The additional capabilities added to the AN/TPS-75 signal and post-processing functions include ADS-B data incorporated and available at the output and on the display. Legacy maintenance display functions can optionally be integrated into and handled by the TSS PPI display. A 3D Tracker is also an available option.



Upgraded PPI Display

PROCESSOR

The new processor provides an IF receiver, signal/data processing, radar control, and self-test/monitoring while retaining all the functionality of the legacy processor. Improved system characteristics include:

Pulse Correlator

Adaptable pulse compression technique ensures optimal S/N while maintaining sufficient range resolution

Dual Beam Processing or Vertical Clutter Canceler (VCC)

Improved clutter mitigation and interference suppression

Median Filter

Interference suppression and improved detection performance

Doppler processing

Improved target detection and false target processing over legacy MTI processing

CFAR/clutter maps

High-resolution clutter maps and CFAR processing for each Doppler filter

Slow Clutter Canceler (SCC)

Enhanced Anomalous Propagation performance

Plot Extractor

Improved positional accuracy (in both range and azimuth) and false target mitigation

TRANSMITTER

The TSS transmitter incorporates the new TSS solid-state RF driver. The solid-state modulator has scalable output modulator power. This allows the modulator to decrease the brute force pulsing that was required in the past, adding the benefits of redundancy and longevity as a result of reduced pulse intensity. The output can be adjusted as a portion of the total in increments, which allows even degraded systems to continue to operate.

Extended Service Life

The new Klystrons can output up to 4 MW but will allow longer service when a lower output is selected

Redundancy

Solid-state modulators allow full power operation with one modulator failure and reduced power operation with two failed modulators

RF DRIVER

The new TSS solid-state RF driver reduces the cost of future repairs and delivers several performance benefits. The increased phase stability of the output pulses allows better MTI performance on the receiver side. The TSS RF driver is part of the TSS transmitter but is also available in a FFF chassis to upgrade OEM RF drivers in the AN/TPS-43, 70, 72, and 75 radars. This design eliminates DMS issues.

ROTARY JOINT

The TSS Solutions rotary joint is a proprietary design utilizing Roll-Ring Technology, upgraded bearings for longer life, and a carbon face seal to control pressure leakage. Benefits of this custom design include:

Enhanced S-Band Component

Supports the TSS transmitter

Connectivity

Support for IFF Mode 5 and Mode S

Enhanced Power Coupler

Provides additional power capacity at the antenna for upgrades

Added Fiber Optic Channel

FREQUENCY GENERATOR

Our new design incorporates 16 individual protected oscillators, which output the full suite of TPS frequencies typically selected by processor settings. This design eliminates the synthesizer and frequency drooping at the upper and lower frequency bands that was inherent in the older technology. The upgraded frequency generator uses solid-state, ultra-reliable components, replacing crystal set/synthesizer modules. Key benefits include:

Reliability

Enhanced MTBF and phase stability; much more stable MTI operation

Streamlined Design

Eliminates DMS issues and re-utilizes the legacy frequency generator chassis as a base

IFF

The TSS Solutions IFF Mode 5 and Mode S upgrade incorporates AN/UPX-44A, which is the first IFF interrogator to achieve the more stringent test requirements of the new "B" level AIMS certification. The first AN/UPX-44A IFF production system has been delivered to JASDF U.S. The AN/UPX-44A is DoD AIMS program office certified. The TSS IFF upgrade requires the capabilities of the TSS rotary joint and makes antenna system modifications to support Mode 5 and Mode S.

ARRAY SIGNAL AMPLIFIER

TSS array signal amplifiers (ASAs) are installed on each of the 48 waveguide sticks; antenna gain is increased while lowering the noise floor. The design works in conjunction with modern high-performance TSS IF receivers, allowing additional processing after detection and throughput to the new TSS video processor. The TSS ASAs also incorporate solid-state receiver protection, which helps compensate for degrading gas tube protectors in the waveguide system and provides a test signal input. This gives the radar extensive control of the video processor tracker, working on a higher signal amplitude above the inherent noise floor.



IF RECEIVERS

The TSS Solutions IF receivers upgrade the legacy receivers, eliminating DMS issues. Enhanced gain and noise floor performance adds stability under temperature variations and is a form-fit-function replacement for the older units.

PROCESSOR TRACKER

Our video tracker software adds multiple video post-processing enhancements to the display system, allowing the operator to deal with clutter areas in the environment of the sited radar.

DATA DELIVERY

All tracked and untracked videos are output from the video processor as ASTERIX Ethernet signals in CAT-240 and CAT-48. Data delivery via Ethernet.



We've Got Your Track™



RADAR
Solutions



DEPOT
Solutions



SATCOM
Solutions

TSS Solutions has been integral to national defense, homeland security, and counter-drug and counter-terrorism initiatives for more than 30 years.

We have established a reputation as a proven and capable business partner, integrating our engineering, manufacturing, service, and operational expertise to benefit the customers we serve.

We are at the cutting edge of Radar and SATCOM modernization technology, sharing and leveraging our expertise with customers across the globe.

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