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SPG-55(V) - Archived 2/97

Outlook

- The system is in service and ongoing logistics support is being provided
- The U.S. Navy has 82 systems, and Italy six
- A spare parts and repair market will continue for the duration of ships using it
- No further production is planned

Orientation

Description. Naval Fire Control/Guidance Radar for Standard (SM-1 & SM-2) and Terrier missile systems.

Sponsor

US Navy
Naval Sea Systems Command (NAVSEA)
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Contractors

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Status. In service, ongoing logistics support.

Total Produced. An estimated 95 units have been produced.

Application. Various guided missile cruisers and destroyers in the US and Italian Navies.

Price Range. The estimated cost per unit is US\$3.2 to US\$4.3 million.

Technical Data

Dimensions	Metric	US
Antenna weight:	5,888 kg	12,970 pounds
Antenna dimensions:	445 x 554 cm	175 x 218 inches
Antenna dish diameter:	244 cm	96 inches
Characteristics		
Frequency:	Acquisition/Tracker	500 - 1,000 MHz (C-Band)
	CW Illuminator	8 - 12 GHz (I-Band)

Power:	Tracker	1 MW
	CW Illuminator	5 kW
PRF (C-Band acq/track):	203 - 225 pps	
Pulse Width (C-Band):	1.5 and 26 μ sec	
Beam width:	1.6° (C-Band)	
	0.8° (I-Band)	
Range:	100,000 yd (1 m ² target)	
Polarization:	Vertical	
	Track-on-Jam capable	

Design Features. The SPG-55 fire control radar was designed for use with the Terrier and the Standard SM-1 and SM-2 ER (Extended Range) missile systems. It is a major subassembly of the Mk 76 missile fire control system, with two sets comprising the typical system.

The SPG-55 was a successor to the SPQ-5, a derivative of the SPG-49. The C-Band pulse transmitter and receiver portions of the system are used for monopulse target tracking. The I-Band portion of the radar provides CW illumination missile homing.

The SPG-55 includes a four-horn Cassegrain main antenna with a capture antenna and a Cluster horn antenna over the main Doppler antenna. The system tracks targets either via pulse, continuous wave Doppler or low-elevation track.

Ongoing modifications have added upgrades and enhancements, including improved counter-countermeasures. In the event of a transmitter failure, the two antennas power-share the remaining unit to ensure continued missile operation. A radar silence mode was added by radiating into a dummy load, improving reliability and making it possible to perform maintenance checks without radiating emissions.

Operational Characteristics. The radar performs several functions. It will automatically acquire and track designated primary and secondary targets, providing position and velocity data to the missile fire control system computer. It transmits guidance information for beam-riding missiles while in flight. The system transmits a continuous wave illuminator beam for the beam-riding missile's homing sensor. The SPG-55 can acquire and track the missile's beacon signal and generate command (arm, detonate and destruct) signals to the missile.

The system can acquire and track on jamming sources. It will detect, acquire, and track anti-ship missiles and function as a secondary area surveillance radar, if needed. The system also has surface-target and shore-bombardment modes of operation.

There is a casualty mode capability which makes it possible for a single radar to perform the functions of target detector, radar launch control and missile assignment, and engagement monitoring. In this mode, the radar uses a pulse transmitter and receiver for target tracking, CW transmitter and receiver for Doppler target tracking and target illumination, and a G-band capture and guidance transmitter and beacon receiver for Terrier beam-riding missiles.

Variants/Upgrades

SPG-55A. No longer in service. Part of the Mk 76 Mod 1 Fire Control System.

SPG-55B. Part of the Mk 76 Mod 2 Fire Control System. Some still operational on the DDG-37 Coontz class guided missile destroyer (two per ship).

SPG-55C. The current operational system on the CGN-25 *Bainbridge* (four per ship) and CG-16 *Leahy* class

(four per ship) guided missile cruisers and with the Italian Navy on the C-550 *Vittorio Veneto* and C-553 *Andrea Doria* class cruisers (two per ship).

SPG-55D. The New Threat Upgrade version (Mk 76 Mod 10) for the CGN-9 Long Beach (four per ship) and CG-26 Belknap class (two per ship) guided missile cruisers.

Program Review

Background. The SPG-55 was first deployed in 1961 onboard the cruiser *Long Beach* (CGN-9) and DDG-37 Coontz class destroyers. The system served as the fire control radar for the Terrier surface-to-air fleet air-defense missile system.

In 1978, the US Navy became concerned that many of its guided missile cruisers would be incapable of coping with the advanced aerial threats anticipated during the 1990s. The US Navy began developing a New Threat Upgrade (NTU) program to upgrade the capabilities of the Terrier-

equipped guided missile cruisers. The missile systems were upgraded to the Standard SM-1 ER and eventually the Standard SM-2 ER capability. The air search and missile fire control radars were to be upgraded to cope with future threats as well.

The Navy installed a prototype NTU system onboard the destroyer *Mahan* (DDG-42) in 1983. This system included the Terrier Ordalt Program (TOP), designed to improve the SPG-55's acquisition and tracking capabilities.

The Mk 76 Fire Control System was upgraded to the Mk 76 Mod 10, with a solid-state digital control system. These new systems allowed the ship to launch missiles in a Remote Track Launch-on-Search (RTLOS) mode. This mode allows the NTU-equipped ship to launch a missile from track data generated by a ship carrying the AEGIS system, and allows a Mk 76 ship to launch its missiles without activating its fire control radars.

Funding

No recent DoD contracts over US\$5 million recorded.

Analysis. The SPG-55 is one of the older fire control radars in US naval service. It has been modified many times, with the latest (and probably last) modification being designated Mod 10. The US Navy is enhancing and upgrading the protection it provides its surface combatants. Many of the efforts will be in enhancing IR/EO countermeasures and EW-based protection against sea-skimming missiles rather than the anti-air protection provided by the SPG-55.

Although NTU upgrades continued through FY93, ships carrying the SPG-55 are being retired. It is not likely that the Navy will undertake further comprehensive modification or upgrade programs involving the SPG-55 because of the age of the ships equipped with the system and the availability of more modern equipment for installation on other ships.

The US Navy has withdrawn most steam turbine ships carrying the SPG-55 from service. This will significantly prune the support requirement for the SPG-55.

Recent Contracts

No recent DoD contracts over US\$5 million recorded.

Timetable

early	1950s	Initial development
	1961	Initial deployment
	1964	ECM upgrade
	1978	NTU program begins
Jun	1986	First NTU-equipped ship commissioned
	FY93	Final Mk 76, Mod 10 ORDALT completed

Worldwide Distribution

Italy. Italy bought six sets in three groups of two.

United States. Eighty-two systems are installed on a variety of guided missile destroyers and cruisers.

Forecast Rationale

The Navy upgraded all ships slated for the New Threat Upgrade by 1993. Twenty-one ships equipped with the SPG-55 went through the NTU. The SPG-55 will steadily

leave service through the 1990s. Reductions in the defense budget and a down-sizing of the combat fleet may slow some of these decommissioning plans as newer hulls

do not materialize. Some ships may find their way into international service. This will make a small ongoing support requirement necessary.

A spare parts and repair market will continue as long as ships carrying the system are in service. A limited program of minor capability, reliability, and maintainability modifications may continue as well.

Ten-Year Outlook

No further production is planned.