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The Soviet M-Class Submarine: A Preliminary Assessment

An Intelligence Assessment

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An Intelligence Assessment

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The Soviet M-Class Submarine: A Preliminary Assessment

Key Judgments

Information available as of 1 March 1984 was used in this report.

In the summer of 1983 the Soviets launched their largest nuclear-powered attack submarine, which NATO has designated the M-class. We expect it to be operational by the end of 1984.

The size of the M-class, coupled with the impending operational status of a new Soviet long-range, land-attack cruise missile—the SS-NX-21—suggests that this submarine may be the first unit of a new type of Soviet multipurpose SSN especially designed to carry large numbers of these new weapons. In wartime, we believe the M-class's primary role probably will be to attack fixed land targets in Eurasia and possibly the United States with the 2,800-kilometer-range SS-NX-21 cruise missile. The apparent absence, however, of some features which have been noted on other new Soviet SSN classes raises the alternative, but less likely, possibility that the M-class may serve as a research platform for developmental testing of submarine-related technology. If this is the case, we would expect only one M-class unit to be built.

[redacted] we think the M-class also has a titanium hull and liquid-metal-cooled reactor. If so, it, like the A-class, may have performance capabilities superior to those of US submarines—speeds of 35 to 40 knots and diving depths of 600 to 1,000 meters. While it is probably quieter than most other Soviet nuclear submarines [redacted]

[redacted] about four M-class submarines could be built by 1990

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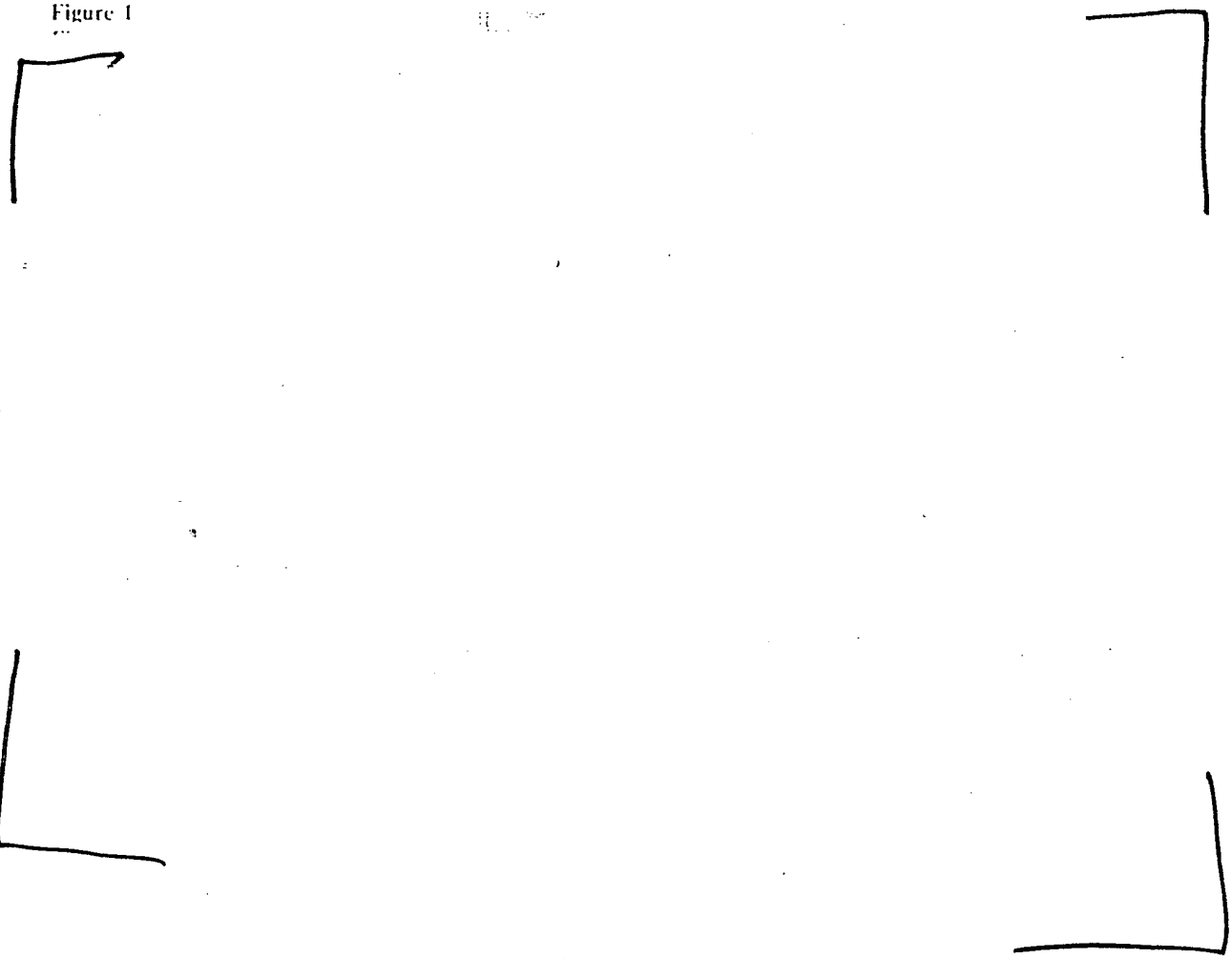
Figure 1



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The Soviet M-Class Submarine: A Preliminary Assessment

Introduction

[redacted] it is a nuclear-powered attack submarine (SSN). Designated the M-class by NATO, it is one of six new submarine classes—four new designs and two conversions of dismantled Y-I ballistic missile submarines (SSBNs)—launched by the Soviets in the last two years. The purpose of this paper is to discuss the likely role of the M-class in future Soviet submarine operations, assess its technical characteristics, and examine its relationship to new Soviet submarine-related weapons programs.

Probable Missions

We estimate that the primary role of the M-class will be to conduct nuclear strikes against fixed land targets with long-range cruise missiles. The parallel development and coincident transition to operational status of the M-class and the SS-NX-21 sea-launched cruise missile (SLCM) suggest that this missile is intended for use on this submarine [redacted] This would be consistent with the Soviet practice of mating new generations of naval weapons with new platforms. A review of the probable research and development and construction programs of these two new systems indicates that the decision to develop them probably occurred at about the same time—in the early 1970s.

The M-class's large size, coupled with Soviet statements about the US Tomahawk cruise missile, also suggests that this new submarine is intended to carry SLCMs. In a 1980 issue of *Morskoy Sbornik* (the Soviet Navy's professional journal), Captain First Rank Rodionov discussed the US Tomahawk cruise missile in detail. He pointed out that the number of cruise missiles carried by a US SSN could limit its capability to fulfill other missions requiring torpedoes (that is, for each SLCM loaded, at least one torpedo must be removed). A similar problem would be faced by existing classes of Soviet attack submarines, which carry fewer torpedoes than their US counterparts. We

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believe the Soviets may have decided to build a submarine large enough to carry SLCMs without degrading its capability to defend itself and perhaps carry out other vital missions. They also probably considered the fact that a dedicated SLCM platform such as the M-class which could carry perhaps some 20 SLCMs in addition to its other weapons--would reduce the requirement for other Soviet SSNs to carry the SS-NX-21.

Alternative Roles. If the M-class is not designed for primary use as a platform for the SS-NX-21, its large size would enhance its capability to perform other SSN missions. It could incorporate greater firepower, larger and more varied weapons loads, and improved quietness with better speed and operational depth capabilities than smaller SSNs. It could be used to defend Soviet SSBNs, attack Western SSBNs, conduct minelaying missions, or perform long-range peacetime reconnaissance and surveillance.

The M-class could also have a research and development role.

Operational Implications. We have no evidence about the Soviets' plans for operating the M-class, and it may be some time before its role in the Soviet submarine force is fully understood. We do not know, for example, whether it will operate alone or in conjunction with other SLCM platforms. Soviet operational procedures and exercises suggest, however, that, like SSBNs, the M-class will be supported during the various stages of its patrols by attack submarines, surface ships, and naval aircraft.

Nuclear Missions. In wartime, we believe that the M-class's nuclear-armed missiles would most likely be used against targets in Western Europe and China. Those M-class units carrying such missiles would probably be deployed in the Norwegian and Greenland Seas, as well as in the Sea of Japan, where they could receive optimum protection from other Soviet naval forces.

In light of Soviet threats to place the United States in an "analogous position" with respect to US INF deployments, the Soviets may initiate intermittent peacetime M-class patrols off the coasts of the United States. The relatively long time an SS-NX-21 would take to reach most targets, however, indicates it would not be used as a first-strike weapon. For

Figure 2

Figure 3

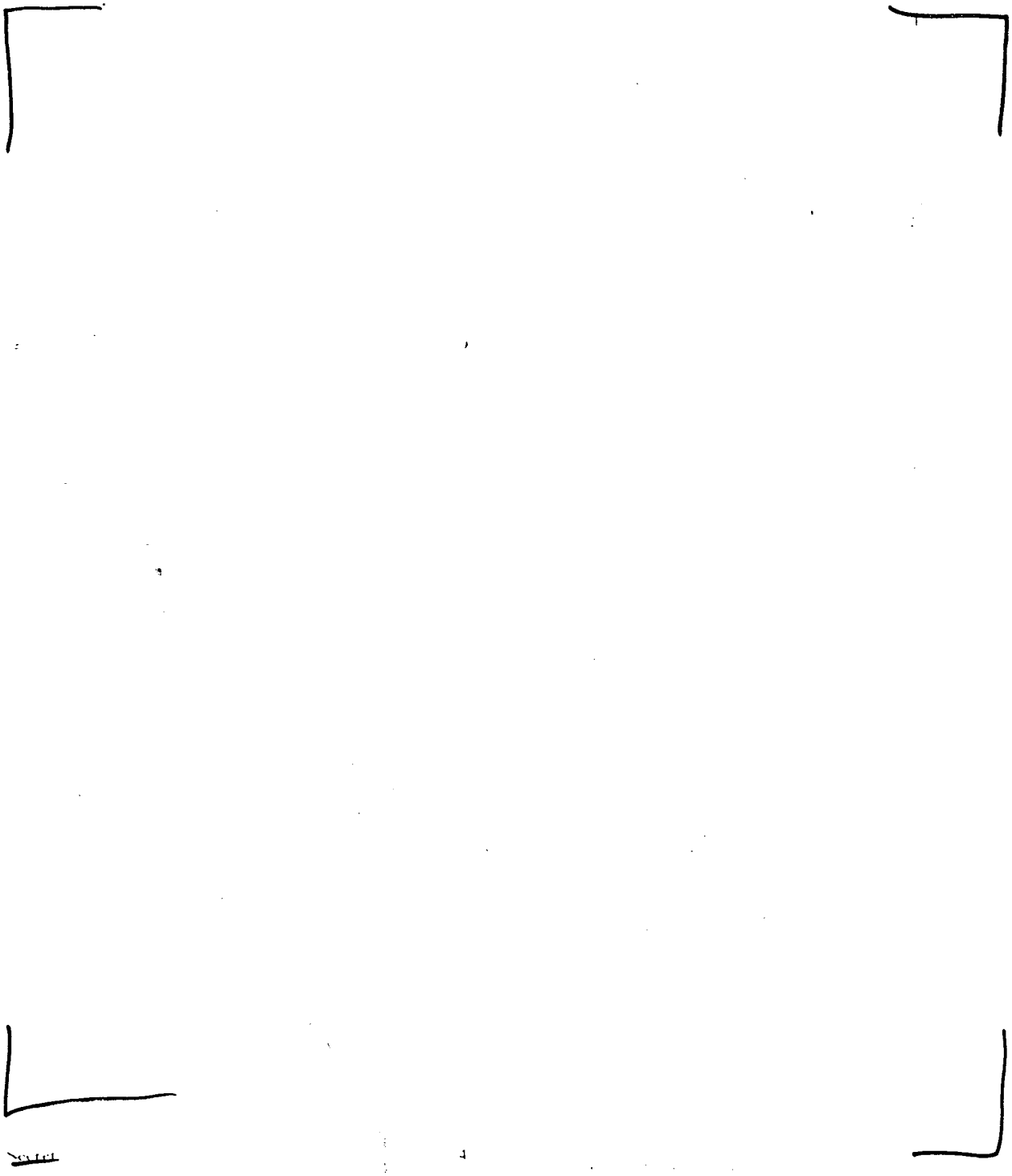

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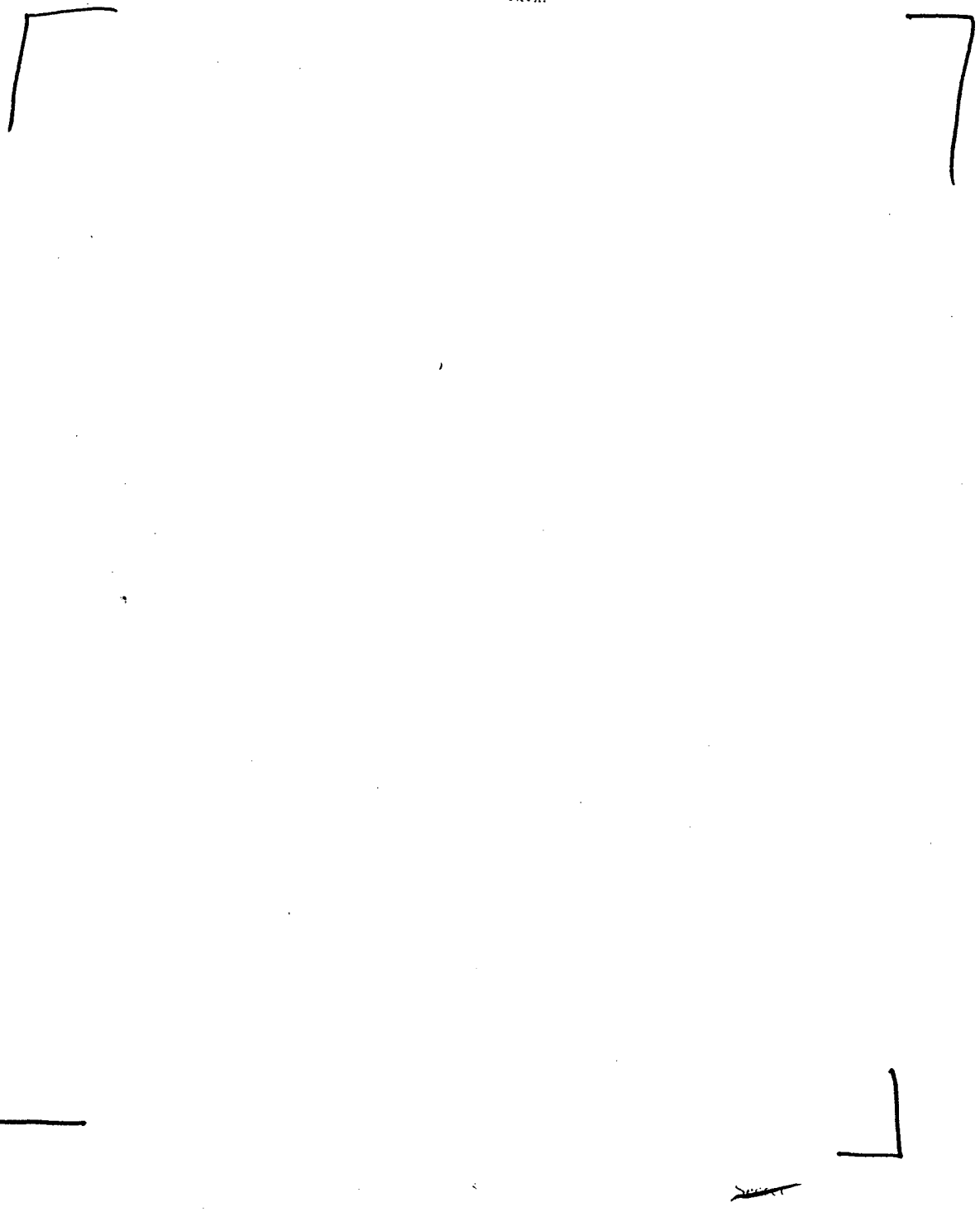
Figure 4



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example, an SS-NX-21 launched from deep water (off the 100-fathom line) near the east coast of the United States would take approximately 24 minutes to strike Washington. We do not believe the Soviets would launch a preemptive strike using SLCMs in the hope that these submarines could remain undetected while initiating such an attack. Moreover, in the event of impending hostilities, we expect that M-class units on patrol off the US coasts would be withdrawn to positions closer to the USSR where they could launch followup strikes against targets in Eurasia and be afforded greater protection by other Soviet naval units.

The Soviets also may assign M-class units more than one mission. For instance, they could also be assigned to protect SSBNs. Their increased weapons capacity would allow them to carry sufficient torpedoes to carry out ASW missions as well as a reserve number of long-range cruise missiles for land attack. Those protecting Soviet SSBN patrol areas close to the USSR could also target much of Europe and Asia with their SLCMs.

Conventional Missions. We have no evidence to indicate that the SS-NX-21 is accurate enough to be useful with a conventional warhead. We believe the Soviets have the technology to achieve the required accuracy, but [redacted] that they are not pursuing this objective. If they did, submarines carrying large numbers of conventionally armed SS-NX-21s could be used during the nonnuclear phase of a war to launch SLCM strikes against targets such as airfields, command and control centers, and the US Navy's Sound Surveillance System (SOSUS) facilities, as well as for concentrated attacks upon important naval targets located in Iceland, the United Kingdom, Japan, the Philippines, and Guam.

The U.S. SOSUS system is used to detect submarines in the open ocean. It consists of a number of acoustic arrays, mounted on the ocean bottom, that can monitor broad areas of the Atlantic and Pacific Oceans. It can detect the low-frequency sounds generated by Soviet submarines at hundreds and sometimes thousands of nautical miles.

Table 2
Estimated Characteristics of the M-Class SSN

Hull characteristics	
Hull displacement (*metric tons*)	[redacted]
Length (*meters*)	
Beam (*meters*)	
Draft (*meters*)	[redacted]
Engineering	
Speed (*knots*)	35 to 40 [a]
Propulsion (*kilowatts*)	33,000 to 42,900 SkW [a]
Propeller	One centerline, 4.7 meters in diameter
Rudders	One (with upper and lower sections)

[a] Estimated.

Characteristics and Capabilities

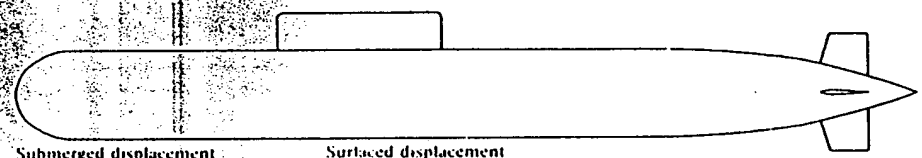
Size and Displacement. The M-class is the largest Soviet SSN, and it is about 2,000 metric tons (mt) larger in surface displacement than either the V-III-class or the US Los Angeles–class SSNs. (For a comparison of these three SSNs, see figure 5.) We believe the M-class was built large probably to accommodate increased weapons loads, improved acoustic quieting, and better sensors.

The physical characteristics of the M-class are those of a nuclear-powered attack submarine (table 2)

[redacted]

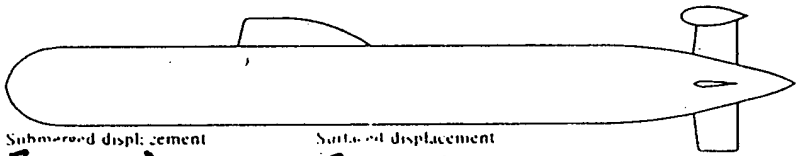
Figure 5
Comparison of the Size of the M, the V-III, and the US Navy's Los Angeles-Class SSN*

M-Class



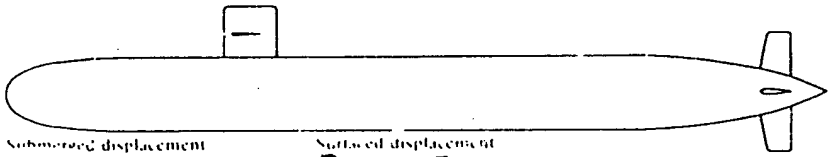
Submerged displacement [redacted] Surfaced displacement [redacted]

V-III-Class



Submerged displacement [redacted] Surfaced displacement [redacted]

Los Angeles-Class



Submerged displacement [redacted] Surfaced displacement [redacted]

[redacted]

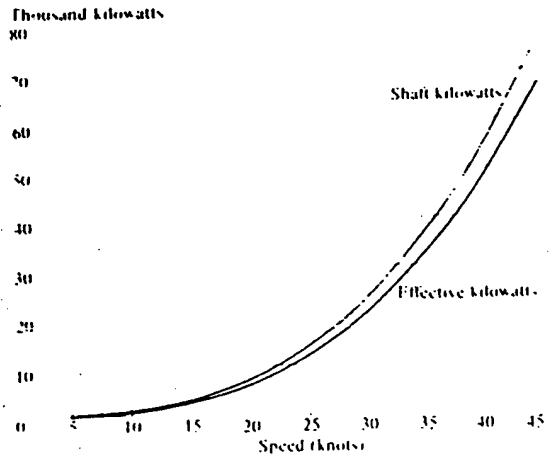
Propulsion. We do not know the type of reactor system in the M-class SSN. Circumstantial evidence, however, suggests that it has a liquid-metal-cooled reactor. First, a self-propelled support ship, previously used only with the A-class SSN, has been servicing the M-class. The A-class SSN has a liquid-metal-cooled reactor. Second,

Figure 6 shows the relationship of shaft kilowatts (SkW) to speed for the M-class. From this, it is possible to estimate the propulsion power needed to propel the M-class at any given speed. The largest Soviet submarine propulsion plant known is the 33,000 SkW on the A-class. With a plant of this size, the M-class could achieve a speed of about 33 knots. The new submarine's size, however, would enable it to incorporate an even larger propulsion plant than the A-class SSN. We know that the Soviets have the capability for testing a 73,500-SkW plant and propeller shaft line, but we have no evidence that they have built such a plant. One of this size, however, would drive the M-class at about 44 knots. The speed of the M-class is probably in the upper 30-knot range, which would equate to a 36,000- to 45,000-SkW propulsion plant. (S)

Pressure Hull Material. We believe the M-class's pressure hull may be made of titanium

A major advantage of using titanium in submarines is its high strength combined with light weight; it is about 60 percent as dense as steel. An M-class submarine with a titanium pressure hull could dive to greater depths than if its pressure hull were made of steel. We believe the diving depth[1] of the M-class may be as deep as that of the A-class SSN, which is estimated to be 600 to 1,000 meters. The use of titanium would save weight in the hull as well as increase diving depth. The Soviets could then use the weight saved to incorporate larger propulsion plants, heavier weapons loads, or improved sound reduction equipment.

Figure 6
Estimated Speed and Power Ratios of the M-Class



Note: data inputs
Area bare hull: 4,091.2 square meters
Area appendixes: 261.2 square meters
Area sail: 218.0 square meters
Propulsion coefficient: 0.80

Weapons. The total weapons capacity of the M-class is estimated to be about 30 to 36 SLCMs and

[1] Diving depth refers to the maximum depth to which a submarine can conduct operations with relative safety.

torpedoes—mostly SLCMs. These weapons would include 53-cm antiship and antisubmarine torpedoes and ASW missiles such as the SS-N-15, as well as SS-NX-21 SLCMs.

Estimated Combat Effectiveness. The M-class's effectiveness in combat will depend upon its quietness, speed, and the capabilities of the SS-NX-21.

its greater volume may permit larger weapons loads and possibly increased habitability during long patrols.

A faster production rate would be possible if the submarine is not built of titanium or if additional construction halls are committed to its production.