MODERN WARFARE

SOVIET COLD WAR WEAPONRY

AIRCRAFT, WARSHIPS, MISSILES AND ARTILLERY

ANTHONY TUCKER-JONES

This is a late production D-30M, identifiable by the new double baffle muzzle brake, a new central baseplate (which is square rather than round) and a towing lunette assembly on the barrel.

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Aircraft, Warships and Missiles

Anthony Tucker-Jones

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Preface:
Modern Warfare Series

Pen & Sword's Modern Warfare Series is designed to provide a visual account of the defining conflicts of the late twentieth and early twenty-first centuries. These include Operations Desert Storm, Iraqi Freedom and Enduring Freedom. A key characteristic of all three, fought by coalitions, is what has been dubbed 'shock and awe', whereby superior technology, air supremacy and overwhelming firepower ensured complete freedom of manoeuvre on the ground in the face of a numerically stronger enemy. The focus of this series is to explain how military and political goals were achieved so swiftly and decisively.

Another aspect of modern warfare is that it is conducted in the full glare of the international media. This is a trend that started during the Vietnam War and to this day every aspect of a conflict is visually recorded and scrutinised. Such visual reporting often shapes public perceptions of conflict to a far greater extent than politicians or indeed generals.

All the photographs in this book, unless otherwise credited, were issued by the US Department of Defense at the time of the conflict. The author and the publishers are grateful for the work of the various forces combat photographers.

Introduction: The Cold War

At its height the Cold War saw the armies of NATO and the Warsaw Pact standing toe-to-toe in an armed stand-off that at the time seemed to indicate but one outcome – a third world war. The confrontation was characterised by a terrible fear that any escalation in hostilities would inevitably lead to a devastating nuclear war. To get to this stage it would have first witnessed terrible conventional fighting not only in central Europe but also on the high seas.

The main fault line for the Cold War was the border between communist East and capitalist West Germany. On one side lay the combined might of the Eastern bloc (comprising the Soviet Union and its Warsaw Pact allies) and on the other the Western bloc (comprising the United States and the other NATO allies). Thanks to the Second World War and their growing nuclear arsenals, both the US and the Soviet Union were elevated to superpower status. Their military might became unparalleled.

After the Second World War the authorities in Moscow were determined to learn from their hard-won experiences. In particular, the Red Army and the Red Air Force had lost almost all of their equipment in the latter half of 1941 at the hands of the Nazi invasion. Moscow was determined to ensure that its strategic reserves could cope with all contingencies, and that Eastern Europe would act as a security buffer for the Russian heartland.

As a result of this mindset, and the growing tensions that led to the Cold War, there was no peace dividend for the Soviet Union's weapons factories. All sorts of equipment was churned out in vast quantities and either issued to the Soviet armed forces or placed in strategic reserve. Most notably, the Soviet Union sought to defend its strategic influence by developing its submarine and surface fleet.

Likewise, Moscow's commitment to jet and space technology and its development of long-range weaponry, particularly its nuclear intercontinental ballistic missiles, gave it an initial lead in the arms race with the West. The latter concentrated its efforts on aircraft carriers, bombers, submarines and strategic weapons. By the 1980s the Soviet Union had gained the nuclear upper hand both on land and at sea.

In Europe attention was focused on the massed ground forces of the Soviet Union and other Warsaw Pact members stationed beyond the Iron Curtain in Eastern Europe. These forces were supported by an array of fighter aircraft and bombers, while on the flanks lurked the menace of Soviet warships and submarines. Western planners knew that if the Cold War turned hot, Moscow would move its air and maritime fleets to cut off Western Europe from outside help. Not only would NATO's armies have found themselves under attack, but so would have vessels in the English Channel, North and Irish Seas and the Atlantic Ocean. In particular, the Battle for the Atlantic would be key in settling the fate of

Europe.

Soviet aviation design bureaus were very good at developing easy-to-produce and robust fighter and interceptor aircraft for air defence and ground attack roles. Key features of Soviet Cold War aircraft were their simplicity, toughness, excellent thrust-to-weight ratio, good dog-fighting capabilities and devastating firepower. During the 1970s expansion of Soviet tactical air strength kept NATO ever-vigilant for new aircraft developments.

By the 1970s Soviet submarine technology had gained a lead over many Western designs, making Moscow's submarine fleet a very real threat to NATO shipping. In Soviet strategic maritime thinking the submarine reigned supreme. In light of the country's vast coastline, the submarine was considered much better than surface vessels for operating in Arctic waters or in the confines of the Baltic and Black Seas. In addition, if Soviet submarines were to strike out into the North Sea and the Atlantic to attack NATO convoys, they would be much harder to detect and attack. Whatever shortcomings the Soviet submarines had they more than made up for with their speed, operating depths and double hull designs. The Soviet Navy deployed an array of guided missile submarines, such as the Oscar class ballistic missile and attack submarines. The mighty Typhoon class was the largest in the world.

On the ground, the other leg of Moscow's nuclear triad comprised static (and therefore vulnerable) silo-based intercontinental ballistic missiles plus mobile missiles mounted on great lumbering wheeled vehicles. The latter were able to lurk in Russia's vast forests to avoid detection and could launch at a moment's notice. These missiles, together with Moscow's nuclear missile submarines, provided the Soviet Union's greatest deterrence and provided a first strike capability.

Soviet strategic thinking dictated that its aircraft, warships and missiles would first help to cut off NATO forces in Europe and then destroy them. There is little reason to believe that they could not have been successful in this mission had a third world war broken out.

Chapter One

Fagot to Forger Fighters

In the air Soviet fighters and bombers presented NATO with a massive threat. At its height in 1980 Soviet aviation, consisting primarily of the air force (VVS) and air defence force (PVO), could easily muster 10,000 aircraft, making it the largest force in the world. A third air force was made up of the AV-MF or Soviet naval aviation. The VVS comprised long-range aviation with responsibility for the bombers, frontal aviation which provided close air support, interdiction and battlefield air defence, and military transport aviation which controlled air lift capabilities. The PVO was tasked with shooting down America's strategic bomber force and its reconnaissance aircraft. Eventually all fighter aircraft were transferred to the responsibility of the VVS, with the PVO retaining control only of the anti-aircraft missile systems. Prior to the collapse of the Soviet Union, Moscow's VVS still had 3,530 fighters, 2,135 attack aircraft, more than 1,000 reconnaissance aircraft, 620 transport aircraft and more than 400 bombers. Even at the time of the Soviet Union's dissolution the PVO could still muster more than 2,400 interceptors.

As the Cold War began to gather pace, the Soviet Union swiftly sought to develop a turbojet fighter. It was not long before jets produced by Mikoyan-Gurevich (MiG) and Sukhoi (Su) were embroiled in the Cold War as it turned hot on the periphery in Korea and Vietnam. Initial attempts in the shape of MiG-9 and La-15 fighters using underpowered engines based on captured Germans designs proved wholly unsatisfactory. Although the MiG-9 (known as Fargo by NATO) entered service, it was quickly replaced by the MiG-15. Moscow was subsequently greatly assisted by Britain's remarkable decision to supply examples of the Rolls-Royce Nene, its latest and most powerful turbojet. This was used in the MiG-15 fighter and the Il-28 tactical bomber.

MiG-15 Fagot

Moscow, drawing on its experience with the highly flawed MiG-9, first flew the vastly improved MiG-15 in late 1948 and it was accepted into service the following year. It was designated Fagot by NATO, maintaining the 'F' prefixed codenames which had started with the Fargo. This aircraft heralded a remarkably successful trend among subsequent Soviet MiG fighters and Sukhoi ground attack aircraft. It was armed with both 23mm and 37mm cannon in order to counter America's B-29 Superfortress strategic bomber. Moscow was able to conduct valuable air-to-air combat trials using the Tu-4 Bull, a cloned copy of the B-29. The MiG-15 was quickly sold to eager customers, with China receiving the improved MiG-15bis in 1950. These cut their teeth in the first jet-versus-jet dogfights during the Korean War. The MiG-15's capabilities came as an unpleasant wake-up call for the West and highlighted the threat posed by Soviet fighter technology. Western Intelligence was equally alarmed when it was confirmed that Soviet-piloted MiG-15s were indeed shooting down B-29s over Korea.

The Soviet Union’s first effective subsonic jet fighter, the MiG-15 first flew in 1948 and saw combat during the Korean War. The United States Air Force laid hands on an example in 1953 when a North Korean pilot defected to the South with his aircraft landing at Kimpo Air Base near Seoul.

MiG-17 Fresco

The Mikoyan-Gurevich MiG-17 Fresco was a development of the MiG-15. A single-seater fighter, the Fresco was first flown in prototype during the early 1950s and entered service as a day interceptor three years later. Initially it used the same Klimov VK-1 engine as the MiG-15 but this was soon replaced by the VK-1F, which offered greater thrust. Likewise, it initially featured the same armament as the MiG-15 (a single Nudelmann 37mm cannon and a pair of Nudelmann-Richter 23mm cannon), but this was subsequently revised to just three 23mm cannon; it was also able to carry up to four AA-1 Alkali air-to-air missiles. Like its predecessor, the MiG-17 Fresco was widely exported and was also manufactured abroad by Czechoslovakia as the S-104, by Poland as the LIM-5 and LIM-5P, and by China as the Shenyang J-5. Although it was obsolete by the time of the Vietnam War, the North Vietnamese air force used it with some success against the US and South Vietnamese air forces.

The underside of an Egyptian MiG-17F. This subsonic aircraft entered service just as the Korean War came to a close.

Egypt acquired two squadrons of MiG-15bis and MiG-17 from Czechoslovakia (with Moscow's approval) just in time to take part in the Suez Crisis in 1956.

MiG-19 Farmer

Whereas the MiG-17 was a single-engined fighter, the twin-engined MiG-19 was developed as a multi-role day fighter, attack and reconnaissance aircraft. Numbers were built as the MiG-19S for the Warsaw Pact air forces as a day fighter/attack aircraft and as the MiG-19P all-weather interceptor with radar. Normal armament comprised three 30mm cannon plus four underwing pylons that could take two fuel tanks and two 250kg bombs. The MiG-19PM variant had no guns, relying simply on four AA-1 radar-guided air-to-air missiles. By the late 1950s, when European production was winding down, China was given a licence and produced the MiG-19 as the indigenous J-6.

The supersonic MiG-19, showing its four AA-1 Alkali air-to-air missiles. This fighter came into service in 1955. Serving with the East German air force, it was used to intercept Western reconnaissance aircraft. This fighter saw action during the Vietnam War and the Arab–israeli Wars.

MiG-21 Fishbed

The MiG-21 Fishbed was the first successful Soviet aircraft combining fighter and interceptor characteristics in a single aircraft. Along with the later MiG-29 Fulcrum, it remains one of the most iconic fighter aircraft of the entire Cold War. It epitomised Soviet air power during the early years of the Cold War, just as the MiG-29 epitomised it in the closing years. The Fishbed holds some remarkable records, which place it head and shoulders above its MiG and Su cousins. It is the most mass-produced supersonic jet aircraft in aviation history and the most-produced combat aircraft since the Korean War. The MiG-21 also had the longest production run of any combat aircraft.

A lightweight fighter, it achieved Mach 2 with a relatively low-powered afterburning turbojet, and was comparable to the American Lockheed F-104 Starfighter and the Northrop F-5 Freedom Fighter and the French Dassault Mirage III. The basic layout was used for numerous other Soviet designs; delta-winged aircraft included the fast E-150 prototype from the MiG bureau and the Su-9 interceptor, while the successful mass-produced Su-7 front fighter and MiG's I-75 experimental interceptor combined a similar fuselage shape with swept-back wings.

The MiG-21 first went into service in the late 1950s armed with two cannon and two small missiles. Initial models had a limited fuel capacity, allowing restricted combat time as the centre of gravity in the aircraft shifted rearwards as the fuel tanks emptied. Over the next quarter century it became the most prolific fighter in the world with around 15,000 produced in 15 major and more than 100 minor variants. The MiG-21 bis, known to NATO as the Fishbed-N, was armed with a 23mm GSh–23 twin barrel gun with 200 rounds, while the four wing pylons could carry two 250kg bombs and other stores or four

AA-2-2 Advanced Atoll air-to-air missiles. This aircraft was capable of 2285km/h or Mach 2.15, with a range of 1,100km. Once again it proved a major export success and saw combat in numerous regional conflicts.

Combining fighter and interceptor characteristics into one aircraft, the MiG-21 proved highly successful, with around 15,000 being built between 1959 and 1985. Like its predecessors, it was combat tested during the Vietnam War.

This preserved MiG-21F is in North Vietnamese air force colours.

MiG-21s supplied to the Indian Air Force played a limited role in the Indo–Pakistani War of 1965. The positive feedback from IAF pilots encouraged India to order more and invest in building MiG-21 infrastructure and pilot training programmes. A total of 194 MiG-21F-13s were built under licence in Czechoslovakia, and Hindustan Aeronautics Ltd of India built 657 MiG-21FL, MiG-21M and MiG-21bis (of which 225 were bis).

MiG-23/27 Flogger

The swing-wing MiG-23 was developed as a multi-role all-weather fighter, but it also had a secondary attack or reconnaissance role. Essentially the intention was to produce a tactical fighter with an enhanced range and payload. The fuselage-mounted landing gear made it suitable for rough field operations. It also featured a large forward-looking radar, fully variable ramp-type side inlets and dogtooth-fitted highlight wings. As a fighter it was found wanting and fell far short of its key rival, the American F-4 Phantom.

The first attack variant was the MiG-23M, which featured a redesigned front fuselage. This variant had no air-to-air radar but instead a pointed downward-sloping ducknose with ground attack sensors. The MiG-23BN was an interim design and eventually resulted in the MiG-27. The first version of the MiG-27 Flogger D entered front-line service in 1974 and production of the three main versions continued for a decade.

The MiG-27BM Flogger-F was a combination fighter-bomber that had many of the features of the MiG-23. The definitive attack version was the MiG-27M Flogger-J, which was first identified in 1981. The Flogger's weapons load could include the AS-7 Kerry radio command guided missile and AS-14 Kedge electro-optical guided bombs, as well as FAB-500 bombs, BETAB retard bombs and AA-8 Aphid air-to-air missiles.

The MiG-23M was a swing-wing fighter aircraft that went into production in 1970. More than 5,000 were produced.

A Soviet air force MiG-23MLD Flogger-K.

MiG-25 Foxbat

The MiG-25 was initially designed to intercept the American B-70 Valkyrie Mach 3 bomber that never went into service. As a result, it was built for incredible speed and could manage almost Mach 3 or 3000km/h. The unswept wing was thin with sharp edges and had a fixed leading edge and plain flaps and ailerons. Unfortunately its speed meant sacrificing manoeuvrability. Like the MiG-23, it was armed with four air-to-air missiles. The Foxbat first went operational in 1970 and prompted improvements to the US F-15 Eagle because Western Intelligence initially thought the Foxbat was a combat aircraft rather than an interceptor.

The MiG-25 Foxbat was incredibly fast and could manage almost Mach 3, though there was some risk of engine damage at top speed. In 1976 a Soviet pilot defected to Japan in his MiG-25P; the aircraft was eventually returned, but not before it had undergone an intensive Intelligence assessment. The Iraqis operated this aircraft during the Iran–Iraq War.

Soviet air force MiG-25 interceptors being prepared for cold weather operations.

About 1,200 Foxbats had been built by the time production came to an end in 1984. Because of its speed, the MiG-25 was used for reconnaissance missions by the Egyptian air force (often with Soviet pilots) during the 1970s, and the Iraqis operated the MiG-25 in a combat role with some success during the Iran–Iraq War. An improved Super Foxbat design known as the MiG-31 Foxhound was introduced in 1981; it had two crew, including a dedicated weapons officer. It was the only aircraft capable of intercepting America’s SR-71 Blackbird strategic reconnaissance aircraft.

Along with the MiG-21, the MiG-29 Fulcrum became one of the most iconic Soviet fighter aircraft of the Cold War. This aircraft belongs to the Polish Air Force.

MiG-29 Fulcrum

The MiG-29 Fulcrum-A entered service in 1983 as an air superiority fighter and multirole fighter but it was not seen publicly for another three years. Initially its task was to counter the American F-15 Eagle and F-16 Fighting Falcon. The Fulcrum was produced in a large number of variants but the main ones were the multi-role MiG-29M Fulcrum-E and the navalised MiG-29K Fulcrum-D. Although it was designed to carry air-to-air missiles and unguided bombs, it could also dogfight with a 30mm cannon in the port wing root. The MiG-29 was widely exported, notably to East Germany, India, Iraq, Poland and Yugoslavia. Iraqi MiG-29s saw combat during the later stages of the Iran–Iraq war.

Su-7 Fitter

This robust swept-wing close support attack aircraft was developed by the Sukhoi design bureau and went into production in 1958. It suffered very high fuel consumption when in afterburner mode, which gave a thrust endurance of less than eight minutes. To counter this, the aircraft often carried spare fuel tanks on twin body pylons, with the result that the aircraft had to rely on its 30mm cannon. By the early 1960s the main variant was the Su-7BKL, which featured steel skids by the main wheels, as well as a low-pressure nose tyre and rocket-assisted take-off so that maximum weight missions could be conducted from rough runways. The improved Su-7BM and Su-7BMK were fitted with four wing pylons, which enabled the aircraft to carry two tanks plus a full offensive load. This aircraft was capable of 1700km/h or Mach 1.6, with a combat radius of 386km. About 3,000 Su-7 Fitters were built and served with nineteen different countries, seeing extensive combat.

The MiG-29 was operated by most of the Warsaw Pact members, including Czechoslovakia. It was deployed operationally with the Iraqi Air Force.

Su-15 Flagon

Along with the S-1 swept-wing design which led to the Su-7, Sukhoi also came up with the T-3 delta, which led to the Su-9 interceptor armed with the primitive AA-1 Alkali air-to-air missiles. Improvements to this resulted in the Su-11, which itself was redesigned with twin engines and a larger nose radar to produce the Su-15 all-weather interceptor, codenamed Flagon by NATO. This aircraft was first seen in 1967 and was deployed with the Soviet air defence force. Later versions resulted in the Flagon-D, Flagon-E and Flagon-F, which had less sweep on their outer wings and an extended span. This aircraft was capable of 2660km/h or Mach 2.5, with a combat radius of 725km. Its very fast take-off and landing speed meant it had to operate from long paved runways, hence its use for air defence. Its normal armament comprised two AA-3 Anab missiles. By the mid-1980s some 700 were in service, but many of the units converted to the MiG-23MF.

The Su-15 Flagon was a twin-engined supersonic interceptor that replaced the Su-9 and Su-11. This aircraft was a key element of the Soviet air defence force during the Cold War. In 1983 an SU-15 shot down a Korean Air Lines 747 after it strayed into Soviet air space.

The Soviet Su-17M or Fitter-C was the first major production model. The Su-17/20/22 Fitter range of ground attack aircraft enjoyed a long career and was widely exported to both Warsaw Pact and Middle East air forces.

Su-17/20/22 Fitter

A key feature of this aircraft was its variable geometry swing-wings. In 1967 the West dismissed the Su-22I (Su-7IG) as just plain showing off, whereas in reality the Su-17M production model had been given the green light. It entered service in the early 1970s as a close support attack aircraft capable of carrying twice the external load of the earlier Su-7, over a third further and from runways half as long. This model was dubbed the Fitter-C by

NATO and a simplified version known as the Su-20 or Su-22 was widely exported. By the mid-1970s a number of improved versions had appeared, from the Fitter-E to the Fitter-J. This aircraft was capable of Mach 2, with a range of 630km. Weapons included two 30mm cannon in the wing roots and eight external pylons capable of taking the AS-7 Kerry air-to-surface missiles.

An Su-22 serving with the Polish air force. Around 3,000 Su-17 and variants were built between 1969 and 1980.

Su-24 Fencer

The Su-24 was developed as a long-range all-weather attack aircraft and was similar to the American F-111, though far more capable. For strike missions it could carry twenty-five different types of external stores and weapons (including AS-7 Kerry, AS-9, AS-10 and AS-11 missiles). Issued to Soviet frontal aviation in 1973, it was capable of reaching Scotland with a bombload range of 1,400km at 2124km/h.

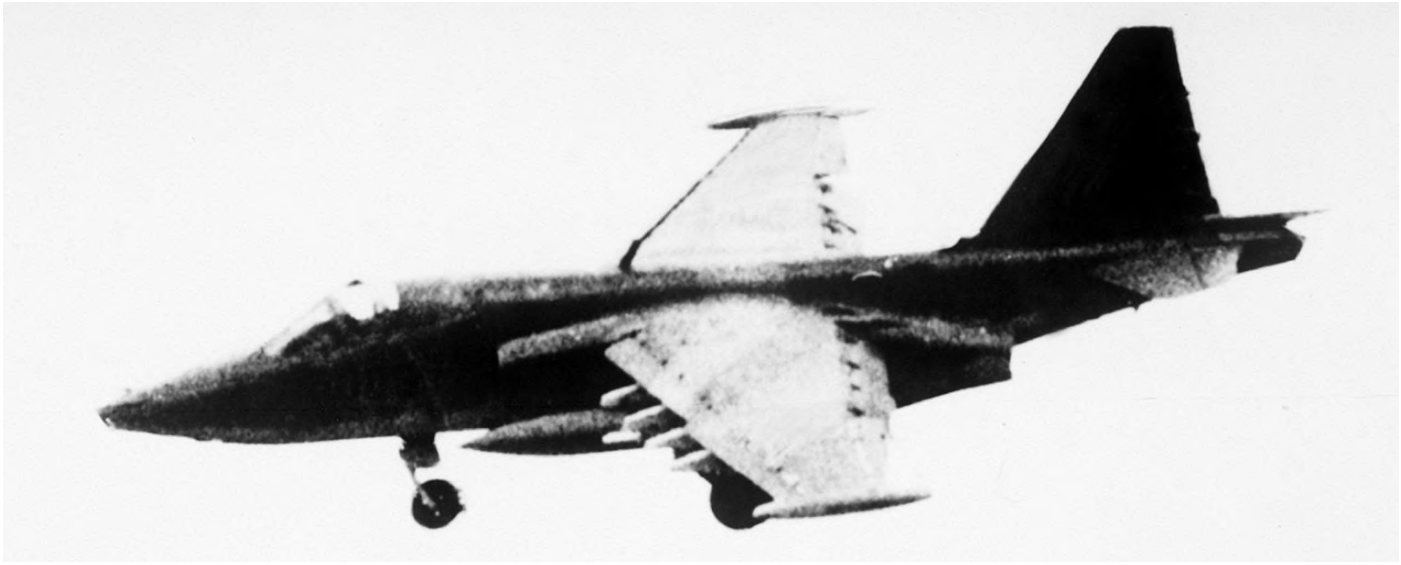
The Su-24 all-weather attack aircraft saw combat in Afghanistan.

The Su-24M tactical bomber variant that appeared in the late 1970s included advanced avionics with an upgraded attack and navigation system. This became the primary tactical strike aircraft of the Soviet Air Force. There were at least eight versions of the Fencer but the Su-24MK was considered the definitive export variant. In the early 1980s, at the height of the Cold War, two regiments of Su-24 were stationed in East Germany ready to strike NATO supply depots in the UK.

Su-25 Frogfoot

By the early 1980s the single-seater close support Su-25 Frogfoot was supporting Soviet forces in Afghanistan, where it proved to be a difficult target for Afghan antiaircraft guns. Series production of the army's Su-25 started at the Tbilisi aircraft plant in 1976, with test flights being conducted up to 1980. Smaller than the American Fairchild A-10 Thunderbolt, the Su-25 had lower thrust and was assessed to carry less ordnance than its American counterpart.

Nonetheless, this aircraft was armed with a 30mm multi-barrel cannon beneath the centre fuselage and had ten hardpoints for ordnance. Flexible 23mm cannon could also be carried in SPPU-22 pods under the wings. There were five stations for suspending weapons under each wing. Eight of the stations are interchangeable pylon carriers, which provide for the attachment of various bomb and rocket armament. R-60 air-to-air missiles are mounted on two additional external points under each wing. Maximum speed was believed to be about 880km/h, with a range of 550km.



The single-seater Su-25 close support aircraft also saw action in Afghanistan.

Su-27 Flanker

Lessons gleaned from the third generation of tactical fighters such as the Su-15, Su-17, MiG-23, F-5E, F-4, F-111 and Mirage F.1 resulted in designers coming to the conclusion that the next generation fighter should be dedicated to a single role. In 1969 work began on a project that would result in the Su-27 fighter-interceptor, which looks very much like the US F-15 and F-18. Work also commenced in the early 1970s on a possible carrier-based variant. However, series production of the Flanker did not begin until the second half of the 1980s. Likewise, the first ship-based Su-27K was not finished until 1987. The

first detailed photos of a Flanker armed with missiles were taken over the Barents Sea in the autumn of 1987, when one intercepted a Norwegian maritime surveillance aircraft. Follow-on variants included the Su-32 and Su-35, but these were not developed until the later 1980s.

Known by its NATO reporting name as the Flanker, the Su-27 was accepted into service in the mid-1980s.

Tu-128

This large supersonic twinjet was first observed in 1961. The initial design was the Tu-28/Tu-102 long-range surveillance fighter, which led to the Tu-28P/Tu-128 interceptor. The latter, called the Fiddler by NATO, had a long fuselage in order to cope with the huge fuel capacity needed to cover the vast areas of the Soviet Union. Serving with the air defence force, the Tu-128 was guided by ground-based radars and air defence systems towards enemy aircraft found in Soviet air space. Once the intruder was located, the large ‘Big Nose’ I/J-band radar took over until a radar or IR-homing missile such as the AA-3 Ash could destroy the target. This aircraft was capable of 1,900km/h, with a 1,250km range.

Yak-38 Forger

The Yak-38 was the Soviet navy’s only VTOL strike aircraft. It employed the propulsion system of the earlier Yak-36 experimental VTOL jet first displayed in 1967. This consisted of two lift jets in tandem in the fuselage aft of the cockpit between the main inlet ducts and an engine amidships discharging through left and right vectored nozzles aft of the wing. The Forger was designed to support the Soviet fleet operating off the Kiev class carriers.

A Soviet Yak-38 Forger on the deck of a Soviet carrier. This was the Soviet navy's only VTOL aircraft.

A Yak-38 coming in to land. Fewer than 150 of these aircraft were built.

The Yak-38 Forger-A first flew in early 1971 and became operational with Soviet naval aviation in the summer of 1976. Just 143 were built, and over the next few years these aircraft flew from *Kiev* and *Minsk*. The latter joined the Pacific fleet in July 1979. The Yak-38 also underwent combat trials in Afghanistan but its limited payload and the climatic conditions resulted in disappointing results. Shortly after the third Kiev class carrier entered service an upgraded Yak-38M appeared, but only fifty were produced.

An Iraqi Il-28 bomber abandoned at Al Taqaddum air base in Iraq. The twin-engined Ilyushin Il-28, known as the Beagle by NATO, was a tactical bomber that became operational in 1950. More than 6,300 examples of this aircraft were built, and China also produced a licensed copy known as the Harbin H-5.

Chapter Two

Beagle to Blackjack Bombers

By the height of the Cold War in the late 1980s the Soviet medium bomber force numbered 510 aircraft, all nuclear capable, comprising 240 T-16 Badgers, 130 Tu-22 Blinders and 140 Tu-22M Backfires. This was duplicated by the Soviet naval air arm, which had 395 aircraft of the same types available for strikes on land targets. The newest was the Backfire, which was capable of reaching America.

Around 140 examples of the Tu-20 Bear, which entered service in 1956, provided the bulk of the heavy bomber fleet and were supported by twenty surviving M-4 bombers that had been converted to a refuelling role. The Bear force was expanded to include the new Bear H, which was capable of carrying up to twelve AS 15 cruise missiles. This threat was highlighted by Bear activity off the US and Canadian borders as they exercised flying to their cruise missile release points. The principal operational deployment of bombers in a tactical role occurred during the 1980s in support of Soviet ground troops fighting in Afghanistan. This, though, was on nothing like the scale of American bomber missions over Vietnam, Cambodia and Laos during the Vietnam War.

Although the Soviet Union made its nuclear strategic rocket forces a priority from the late 1950s onwards, its heavy bomber force remained an important part of Moscow's land, air and sea nuclear triad. Within a year and a half of the end of the Second World War Moscow had developed the strategic capability to bomb mainland America. During the 1950s the Soviets built almost a thousand Tupolev Tu-4 – a design that was a direct copy of the American B-29 Superfortress. The Tu-4 was followed by a whole series of medium and heavy bombers culminating in the Blackjack strategic bomber. With the introduction of the latter and cruise missiles, the Soviet long-range air force enjoyed a renaissance.

Il-28 Beagle Tactical Bomber

The Ilyushin Il-28 was produced as a tactical bomber, reconnaissance aircraft and trainer and first went into service with the Soviet air force in 1950. This aircraft could carry bombs, mines, torpedoes and nuclear weapons. Variants also included the Il-28R reconnaissance aircraft, the Il-28T torpedo bomber for the naval air force and the Il-28U pilot trainer. Initially NATO gave the Il-28 the reporting name Butcher, but later changed this to Beagle.

Around 3,000 Beagles were built, with another 200 produced in Czechoslovakia as the B-228. The Chinese also produced it as the H-5 between 1966 and 1982. Of the Soviet production, half were exported to fifteen countries, including the Warsaw Pact members. As a result, the Beagle saw combat in Nigeria and Biafra, Egypt, Vietnam, North Korea, Iraq, Yemen, Syria and Afghanistan. On the whole it was used at low altitude as it was not very accurate as a precision bomber.

M-4 Bison Strategic Bomber

The enormous four-jet Myasishchyev M-4 Bison was first delivered in 1956 as a strategic bomber, and in its day it represented a significant aerodynamic and structural achievement. Due to its massive AM-3 turbojets, this bomber was comparable to the early variants of the eight-engined B-52. The introduction of the Bison led to an increased rate of production for the B-52 and the KC-135 refuelling tanker. The Bison-A had a range of almost 11,000km and the bomb bay could take up to four thermonuclear bombs or 15,000kg of conventional bombs.

The Myasishchyev M-4 four-engined strategic bomber was known to the Soviets as the Hammer but NATO designated it the Bison. This aircraft is being shadowed by a US F-14 Tomcat.

This M-4 was photographed in 1968. This bomber went into service in 1956 and was not phased out until the 1980s.

In the late 1950s the Bison-A was equipped with a flight refuelling probe above the glazed nose and upgraded electronic warfare systems. Others became the Bison-B reconnaissance aircraft, which had a duel capability as an air-to-air refuelling tanker, and the Bison-C maritime reconnaissance aircraft. After 1980 the B and C versions were replaced by the Backfire, and by the late 1980s just 43 bombers and 31 refuelling tankers remained.

Tu-4 Bull Strategic Bomber

The Soviet Union's very first strategic bomber was actually 'stolen' from America. In an act of bravado, and thanks to a wartime technicality, Moscow was able to reverse engineer the US B-29 Superfortress. During the Second World War the Soviets' strategic bomber force in the shape of the Pe-8 had proved highly unsuccessful. Although Washington refused to supply Moscow with the B-29 heavy bomber, a number of them fell into Soviet hands after they had to make emergency landings. As Moscow was neutral in the Pacific War it was not obliged to hand them back until it declared war on Japan in 1945.

The first Tu-4 flew in 1947 and entered service two years later. By the time production closed in 1952 around 850 of these aircraft had been built. The fact that they could reach Los Angeles understandably caused alarm in the West, and this led to a number of exercises in which the US and British air forces found themselves up against American B-

29s acting as the intruder force. Through the 1950s the Tu-16 jet bomber and the Tu-95 turboprop bomber replaced the Tu-4. It remained in service in the 1960s but only in a transport and flying test bed capacity. A larger version of the Tu-4 known as the Tu-85 was developed, but the design work was subsumed into the Tu-95 programme.

Tu-14 Bosun Naval Bomber

The Tupolev Tu-14 bomber was codenamed Bosun by NATO. It entered service in the early 1950s as a shore-based naval bomber and torpedo carrier and remained on front-line duty for a decade. Although 500 were ordered, probably due to the Tu-16 Badger programme, only around 150 were actually built. This aircraft was somewhat flawed by the weight of its tail turret, which had a pressurised compartment for the gunner, and the slightly underpowered VK-1 turbojet engines derived from the Rolls-Royce Nene.

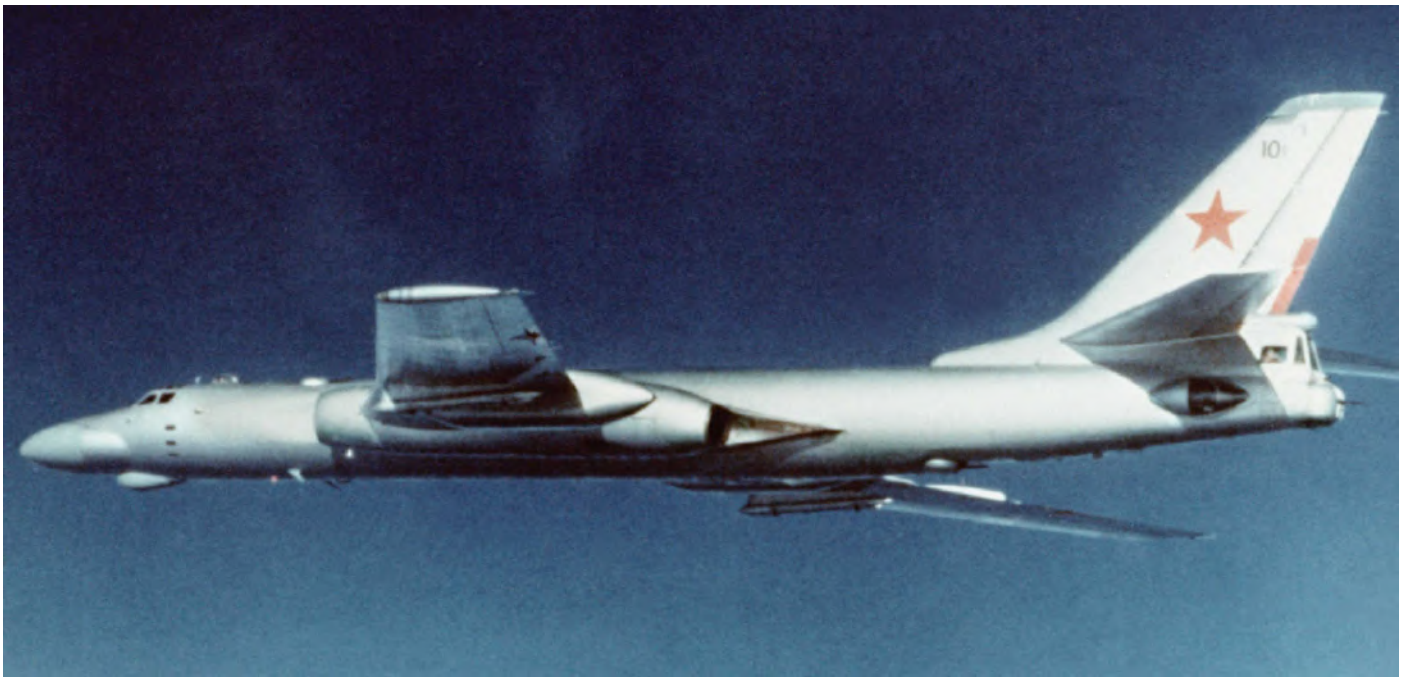
Despite its shortcomings, the Bosun proved reliable and manoeuvrable and was popular with the crews; it only began to be withdrawn from front-line duty in 1961. The standard torpedo bomber was the Tu-14T, which was roughly contemporary with the Il-28. There was also a Tu-14R reconnaissance version but this did not appear in any great numbers.

Tu-16 Badger Strategic Bomber

Production of the Tu-16 strategic bomber commenced in 1954 with about 2,000 built, mainly as free-fall bombers with in-flight refuelling via a looped hose system copied from the British method. This aircraft was the counterpart to the B-47 and Valiant bombers. NATO dubbed the initial model the Badger-A, although about a dozen subsequent models were used in a variety of roles. Two twin-mounted Mikulin AM-3M turbojet engines provided 9,500kg of thrust.

After 1970 most Soviet Tu-16s were deployed in a maritime role and were used for intelligence operations or as stand-off missile carriers. These included the Badger-G carrying the AS-6 Kingfish. The B model carried the turbojet-powered Kennel cruise missile under each wing, but by the late 1980s had been converted to a conventional bomber. The anti-shipping C version carried the large Kipper supersonic cruise missile recessed under the bomb bay and had a giant nose radar. Supporting this was the D model, which served in a maritime electronic reconnaissance role. The Chinese also built their own version known as the H-6.

Production of the Tu-16 strategic bomber started in 1954 and it remained in service with Russia until 1993. This particular example is a Tu-16R Badger-E reconnaissance variant.



The Tu-16K-10-26, or Badger-C, was a naval variant designed to carry anti-shipping missiles.

The rear view of an intercepted Badger reconnaissance aircraft.

Tu-22 Blinder Medium Bomber

First seen in 1961, the Tu-22 was notably bigger and more powerful than previous Soviet supersonic bombers. It was designed as a medium bomber and missile carrier and about 250 were built in four different versions. Called Blinder-A by NATO, the basic free-fall bomber was deployed from 1965, but production focused on the subsequent Blinder-B missile carrier and the Blinder-C reconnaissance and electronic warfare platform. The two Koliesov turbojets sit in tandem on the outside of the upper body of the rear fuselage.

In the mid-1980s around 125 Blinder-A/B were still in operation, with a squadron in Libya and some operated by Iraq. Similarly, the Soviet naval air force operated forty Blinder-C on maritime reconnaissance and electronic warfare duties. The Tu-22 was later redesigned with pivoting swing-wings to improve airfield, range and payload capabilities. This led to the Tu-22M and the Tu-26 Backfire family of bombers.

Tu-22M/26 Backfire Multi-role Bomber

To try to remedy some of the Blinder’s shortcomings, the swing-wing Tu-22M or Backfire-A multi-role bomber and reconnaissance aircraft entered service in the early 1970s. Only a dozen were produced, all believed to be rebuilds of existing Tu-22 aircraft. The Tu-22M could take off and land in less than half the distance of its predecessor, due to greater subsonic cruise efficiency with the wings unswept, could carry greater bombloads and had an increased combat range.

This led to the Tu-26 Backfire-B, which was effectively a new aircraft. It featured a completely revised fuselage, with more powerful engines installed conventionally in the rear of the fuselage, fed by two very large air ducts on the sides of the forward fuselage.

Under the inlet ducts were detachable racks that could carry up to eighteen bombs or other ordnance, a cruise missile could be carried recessed under the central fuselage, or two missiles on pylons under the fixed inboard wings, while the bomb bay could take up to six nuclear weapons. The C version appeared in 1980 and featured wide wedge-type engine inlets similar to those on the MiG-25 Foxbat.

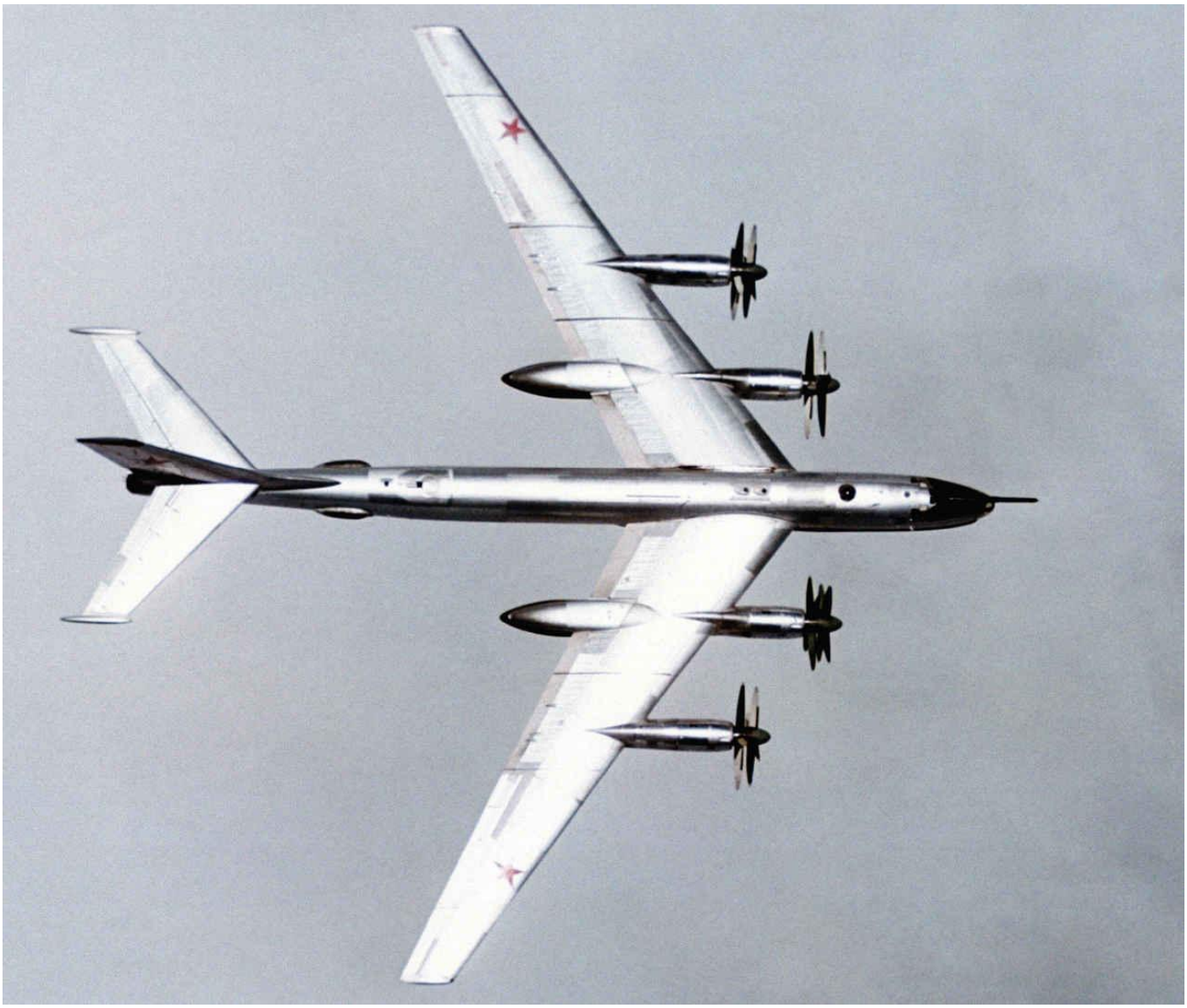
In the early 1980s 220 Backfires were in service with Soviet strategic aviation and naval aviation, and by the late 1980s there were 200 in the west opposing NATO and about 100 in the Soviet Far East. These aircraft had the capability of reaching America, a role that was rendered unnecessary by Moscow's enormous intercontinental ballistic missile force.

The Tu-22 or Backfire was a multi-role bomber and reconnaissance aircraft. These two, belonging to the Libyan navy, were intercepted by a US F-4 Phantom over the Mediterranean in 1977.

The long-lived Tu-95 Bear strategic bomber first appeared in the 1950s.

Tu-95 Bear Strategic Bomber

The Tu-95 appeared in the 1950s and proved to be both very effective and extremely long-lived. The initial free-fall bomber, dubbed the Bear-A by NATO, featured almost the same fuselage as the abandoned Tu-85 (derived from the American B-29) but with a large chin radar and three pairs of 23mm cannon. In 1961 the Bear-B appeared, which was capable of carrying the AS-3 Kangaroo missile or the supersonic AS-4 Kitchen on anti-shipping operations. The Bear-C was developed as an ocean patrol aircraft and, like the B, was fitted with a large ‘duckbill’ nose radar. The D variant was designed as a general purpose missile targeting, maritime reconnaissance and Sigint platform, and examples were regularly found patrolling over the North Sea. The E was a purely reconnaissance aircraft. Another variant that caused NATO some concern was the dedicated anti-submarine warfare Bear-F, which was larger and heavier than any of the other models, and had a longer range.



This shot gives some impression of the Bear’s enormous 50-metre wingspan. It is powered by four Kuznetsov NK-12M turboprops.

This Tu-95RTs Bear-D belonging to Soviet naval aviation was photographed against a clear blue sky in the spring of

1983. This aircraft was designed for maritime reconnaissance and missile targeting as well as electronic intelligence gathering.

This Tu-95 was intercepted by a US Navy F-4 Phantom whilst conducting a maritime patrol.

A Tu-142MR in flight. Known as the Bear F/J, this maritime reconnaissance and anti-submarine warfare aircraft was based on the Tu-95 that entered service in 1972.

What initially baffled Western Intelligence was why a turboprop bomber would need swept-back wings. But the installation of four turbo-props in this giant swept-wing aircraft offered impressive capabilities which in some cases surpassed the American B-52. The Tu-95's combat range of over 14,000km meant it could reach anywhere, especially once it started deploying to Angola, Cuba, Somalia and Vietnam. One of the most important variants that appeared in the mid-1980s was the Bear-H, which functioned as a dedicated cruise missile carrier and regularly probed America's defences off the coast of Alaska.

Tu-160 Blackjack Heavy Strategic Bomber

The Blackjack was the very last of the strategic bombers designed by the Soviets and entered service in the late 1980s, just before the Soviet Union collapsed. It was similar to the American B-1B, but considerably larger. In fact, the Tu-160 is the world's largest variable sweep, largest supersonic and largest combat aircraft. Notably, it was also the very first post-Second World War bomber to be unarmed, as it had no defensive weapons. The prototype was first seen in 1981 and the aircraft went into production three years later.

A close-up of the Tu-142M, known to NATO as the Bear F.

A TU-142M on patrol in 1986. These aircraft were considered a threat to shipping and submarines.

Whereas the Backfire was largely concerned with dominating the seas, the Blackjack was designed to strike at enemy heartlands with a range of over 12,000km. It was also designed with stealth in mind to allow it to penetrate defended air space at the lowest altitude. Its two bomb bays could carry 20,000kg of free-fall bombs or a rotary launcher for nuclear missiles.

In total, just nineteen Tu-160 were deployed with the 184th Guards Heavy Bomber Regiment at Pryluky in Ukraine, where they replaced existing Tu-16 and Tu-22M bombers. After Ukrainian independence, the Blackjacks became the subject of much heated and dragged-out negotiations, which resulted in just eight of the aircraft being returned to Russia by 2001.

The Moskva class represented the Soviet navy’s first operational carriers. However, they were not true aircraft carriers as their air wing consisted of anti-submarine helicopters and not fixed-wing aircraft.

Chapter Three

Grisha to Udaloy Class Warships

While the Soviet air force would have played a direct role in supporting Warsaw Pact ground forces, the Soviet navy had an equally important, if more peripheral, role. The Soviet navy was divided into four main fleets: the Baltic, Black Sea, Northern and Pacific. Both the Baltic and especially the Northern fleets would have had a major role in the event of the Cold War ever turning hot, as a key task would have been to prevent reinforcements and supplies shipping across the Atlantic from North America to help NATO forces.

To achieve this, the Soviets maintained their submarine building capabilities after the Second World War and sought to equip their surface fleets with both surface-to-surface and air defence missiles. This resulted not only in fast missile patrol boats but also in well-armed guided missile cruisers, such as the Kirov and Slava classes.

In contrast, a carrier fleet was not considered a priority, as it was not vital for disrupting enemy sea lines of communications, was hugely expensive to build and ultimately vulnerable. Nonetheless, in order to counter Western submarines the Soviets developed anti-submarine helicopter carriers, resulting in the Moskva and Kiev classes. These carried not only anti-submarine warfare helicopters but also aircraft. It was not until the 1980s that the fleet acquired its first true carrier, *Kuznetsov*, but this was designed for fleet defence and not for strike missions.

The carrier force remained the Soviet navy's main weakness, as it never caught up with the carriers of the US Navy. In any case the Soviet planners did not need carriers to attack NATO shipping. Instead they deployed large numbers of strategic bombers in a maritime role, such as the Tupolev Tu-16 Badger and Tu-22M Backfire, armed with deadly high-speed anti-shipping missiles.

The Soviets built very large numbers of cruisers, destroyers and frigates either for surface warfare or for the anti-submarine role, although increasingly these vessels were multi-tasked, particularly once they had firmly shifted from being gun to missile platforms. By the late 1980s the Soviet navy numbered almost half a million men with 268 surface vessels (including 4 carriers, 37 cruisers, 52 destroyers and 171 frigates), plus patrol and coastal combatants numbering another 400 vessels (including 64 corvettes). Soviet naval aviation could deploy 739 combat aircraft and 300 combat helicopters.

Grisha Class Frigate

The Grisha I class commenced production in late 1968 as anti-submarine vessels, but they were also produced for coastal protection. Key weaponry for the former role was the twelve-barrelled RBU 6000 rocket launcher. The Grisha I also featured a twin 57mm gun, while the Grisha II had two twin 57mm guns and the Grisha V had a single 76mm gun. Surface-to-air defence was provided by the SA-N-4 missile in twin launchers mounted on

the fo'c'sle in all variants but the Grisha II. This was replaced by a second twin 57mm in the latter, which were operated by the KGB Border Guard. The Grisha V was very similar to the Grisha II, but with the after twin 57mm mounting replaced by a single 'Tarantul'-type 76mm gun. By the late 1980s the Soviet navy had about fifty Grisha class frigates, with another dozen serving with the KGB.

Kanin Class Destroyer

These destroyers were based on the Krupny class built at Leningrad, Nikolayev and in the Pacific between 1957 and 1962. The first five Kanin destroyers were converted from Krupny vessels at Leningrad during the late 1960s and early 1970s; another three followed, with the work being done in the Pacific. The Krupny's surface-to-surface missile capability was replaced by surface-to-air missiles. The main armament consisted of 57mm and 30mm guns, as well as the anti-submarine RBU 6000. These vessels had a displacement of 4,750 tons with a full load, and carried a crew of 350 men. The four water tube boilers gave these destroyers a respectable 35 knots.

Kara Class Guided Missile Cruiser

The Soviet navy received a total of seven 9,700-ton Kara class missile cruisers during the 1970s. Aside from the Moskva class, this was the first large cruiser class to join the fleet since the Sverdlov class that was specially intended for anti-submarine warfare. Its key weapons were SS-N-14 missiles fired from two quad launchers abreast of the bridge and the two forward-mounted twelve-barrelled RBU 6000 and two aft six-barrelled RBU 1000 anti-submarine rocket launchers.

Kashin Class Guided Missile Destroyer

This 4,500-ton destroyer was notable for being the first warship in the world to rely entirely on gas-turbine propulsion. The Soviet navy designated it a large anti-submarine ship. In total, twenty were built at Leningrad and Nikolayev and were delivered between 1963 and 1972. It was thought that they were designed to provide anti-aircraft cover for the Kynda class destroyers as they were built at the same time. Tragedy struck the *Otvazhny*, which sank on 30 August 1974 following an explosion and fire. Most of the ship's company perished in the accident. During the 1970s half a dozen Kashins were refitted to take surface-to-surface missiles in the shape of the SS-N-2C.

Kiev Class Aircraft Carrier

The Soviet navy's first carriers were *Moskva* and *Leningrad*, built in Nikolayev in the late 1960s, but these were helicopter carriers with a largely anti-submarine warfare role. The first real aircraft carrier did not appear until the mid-1970s, with the commissioning of the 37,000-ton Kiev class carriers, which acted as a platform for the Yak-38 naval aircraft. *Kiev* was followed by *Minsk*, *Novorossiysk* and *Baku*, with the latter commissioned in the mid-1980s. Initially the Soviets classed these vessels as antisubmarine cruisers, but later revised this description to tactical aircraft-carrying cruisers. The crew comprised 1,200 personnel, plus the air group. The Kiev class carriers could manage 32 knots, but at 18 knots had a range of 13,500 miles.

The Kiev class vessels carried an air wing consisting of Forger Yak 38 VTOL aircraft and Hormone helicopters. While the Forger had air-to-air and ground attack capabilities, the Hormone was a submarine hunter. Weaponry fitted to these vessels included SS-N-12 surface-to-surface missiles, while air defences included both the SA-N-3 and SA-N-4. While the Hormone A helicopter had an anti-submarine role, the Hormone B was used to direct the SS-N-12 to its target. The long range of the missile – almost 300 nautical miles – meant that it required external targeting via satellite or helicopter.

Only two Moskva class vessels were built; this is the second, *Leningrad*.

The Moskva class was followed by the more formidable Kiev class. These were true carriers, deploying Yak-38 aircraft as well as helicopters.

The Helix helicopter was used for anti-submarine warfare.

The Soviet Union built just four Kiev class aircraft carriers as Moscow did not consider such vessels a priority.

Kildin Class Destroyer

The four Kildin class 3,500-ton destroyers (starting with *Bedovy*, then *Neuderzhimy*, *Neulovimy* and *Prozorlivy*) were all completed between 1957 and 1959 and were intended for anti-submarine warfare. They were derived from the Kotlin destroyer design, with the SS-N-1 replacing the after 130mm gun turret and with two quad 57mm gun mountings replacing the forward 130mm turret. All except for *Neuderzhimy* were modified during the 1970s with two superimposed twin 76mm turrets replacing the SS-N-1 on the quarterdeck, as well as the installation of four SS-N-2C launchers abreast the after funnel.

Kirov Class Battle Cruiser

The Kirov class battle (or missile) cruisers were not commissioned until the summer of 1980, although *Kirov* had been laid down in Leningrad in 1973 and launched three years later. These vessels were powered by two nuclear reactors and oil-fired superheat boilers for steam turbines, providing some 150,000 ship horsepower and a maximum speed of 33 knots. The ship’s complement consisted of 900 crew.

Kirov carried twenty SS-N-19 surface-to-surface missiles with no reloads, which were launched vertically from deck silos forward of the bridge. Air defences included twelve SA-N-6 launchers with a total of ninety-six missiles and two SA-N-4 launchers with forty missiles. Notably, the introduction of the SA-N-6 with a ceiling of 10,000 feet, a range of up to 40 miles, a 200lb warhead and a speed of Mach 6 ensured these vessels had a formidable anti-aircraft defence system. The SS-N-14 missile provided an anti-submarine capability, along with the forward-mounted twelve-barrelled RBU 6000 and the aft-mounted six-barrelled RBU 1000 antisubmarine rocket launchers.

The first of the four Kirov class battle cruisers was commissioned in 1980.

The second example of this class, *Frunze*, had a modified superstructure and was armed with a twin 130mm gun, similar to that on the Sovremeny class destroyers, rather than the 100mm gun fitted to *Kirov*. It was also equipped with sixteen SA-NX-9 launchers with a total of 128 surface-to-air missiles. The third ship, *Kalinin* was commissioned in 1988, but the fourth, *Yuri Andropov*, was not ready until after the dissolution of the Soviet Union.

Kotlin Class Destroyer

The Kotlin class destroyers, along with the Kidlin class, were some of the first to equip the Soviet navy in the opening years of the Cold War. About fifteen Kotlin destroyers were built in the mid-1950s and modified in the early 1960s. Another eight were subsequently produced as guided missile destroyers; these were equipped with a surface-to-air missile launcher in place of the main 130mm aft turret, while the forward turret was maintained.

Kresta Class Guided Missile Cruiser

The 7,600-ton Kresta I surface warfare missile cruiser was the first Soviet cruiser able to operate without targeting assistance from shore-based aircraft. Built at the Zhadanov yard in Leningrad, the first of the class, *Admiral Zozulya*, was commissioned in 1967 and had a helicopter landing deck and aft hanger; the latter was a first on a Soviet ship. This meant the vessel had an onboard targeting helicopter that could assist the 1,120 nautical mile range surface-to-surface SS-N-3B missile.

The follow-on Kresta II type was assigned an anti-submarine warfare role rather than

surface warfare. This meant replacing the SS-N-3 with the SS-N-14 missile. In addition, the replacement of the SA-N-1 surface-to-air missile with the SA-N-3 greatly improved the Kresta II's air defence capabilities. Around ten Kresta IIs were built during the 1970s, with *Kronshtadt* the first of the class.

Krivak Class Frigate

This versatile multi-role frigate appeared in 1970 and combined anti-submarine and anti-aircraft capabilities. At 3,900 tons fully loaded, including a crew of eighty, its four gas turbines ensured the swift acceleration necessary for submarine hunting. The principal anti-submarine weaponry was the SS-N-14 missile, which was also deployed on the Kara, Kiev, Grisha and Nanuchka classes; its two mountings were located forward of the bridge and abaft the funnel.

The Krivak frigates were constructed in three variants, notably the Krivak III, which was built for the KGB Border Guard and featured a helicopter flight deck and hangar in place of the SS-N-14. The Kivak I vessels were also armed with two twin 76mm gun turrets, and both the Krivak I and II had 100mm guns. In the late 1970s the Soviets reclassified this class of frigate from large anti-submarine ship to escort ship. By the mid-1980s the Soviet fleet had more than thirty Krivak frigates available, a number of which deployed from the Black Sea to the Pacific.

Kynda Class Guided Missile Cruiser

Laid down in Leningrad in the late 1950s and commissioned in the early 1960s, *Grozny* was the first of the Kyndas and the first of the missile cruisers to be built. Three others, *Admiral Fokin*, *Admiral Golovko* and *Varyag* followed in the first half of the 1960s. These served as successors to the Sverdlov cruisers, which had come into service during the previous decade. The only drawback with the Kyndas was that they carried no helicopter, which meant that the SS-N-3 missiles had to be assisted to target by an outside source.

A Krivak II frigate. This anti-submarine and anti-aircraft type first appeared in the 1970s and was produced in three variants.

A Krivak III built for the KGB Border Guard photographed on patrol in the late 1980s. It featured a helicopter deck and hangar on the stern.

The culmination of the Soviet carrier programme was the heavy cruisers of the Kuznetsov class. The naval version of the Su-27 is just visible on the flight deck.

Kuznetsov Class Carrier

The Soviets began working on a 67,500-ton aircraft carrier in January 1983. The Kuznetsov class was a logical progression from the Kiev class, and would have formed the

heart of a carrier task force capable of operating far from its home base. *Admiral Kuznetsov* was launched in December 1985, but delays meant the carrier was not commissioned before the dissolution of the Soviet Union and the end of the Cold War.

The first of the Kuznetsov class was launched in 1985 but it was not commissioned until late 1990, just as the Soviet Union was collapsing.

The second Kuznetsov, *Varyag*, was launched in the late 1980s but was never commissioned. It was eventually sold to China.

Mirka Class Frigate

A small 1,000-ton design, the Mirka class frigates were built at Kaliningrad between 1964 and 1967 as a variant of the Petya class. Initially designated as anti-submarine ships, they were subsequently reassigned to an escort role. The Mark II differed from the Mark I in that the after RBU rocket launchers were removed and an additional quintuple 16-inch torpedo mounting was fitted between the bridge and the mast.

Moskva Class Helicopter Cruiser

In 1967 and 1968 the Soviet navy commissioned into service the 17,500-ton *Moskva* and *Leningrad* helicopter cruisers. Built at Nikolayev, these vessels showed just how seriously the Soviets regarded the need to counter American nuclear submarines. At the height of the Cold War both sides were playing cat and mouse with each other's nuclear submarines, as it was imperative to prevent a first strike. Each carried fourteen Hormone anti-submarine warfare helicopters, and each was armed with an SUW-N-1 missile launcher and the twelve-barrelled RBU 6000, both of which were intended to kill submarines.

The Moskva design was completed while the November class submarines were under construction, and the heavy anti-submarine armament plus helicopters and variable depth sonar indicates that tracking and destroying nuclear submarines was the primary task of both *Moskva* and her sister ship *Leningrad*. It is not clear why only two were built, though the hull did not perform well in rough weather, and the appearance of Soviet VTOL prototype aircraft in the late 1960s suggests that the Soviet navy coveted a much greater reach than could be offered by helicopter carriers. Certainly trials were conducted with VTOL aircraft on *Moskva* in 1973, when a landing pad was installed on the after end of the flight deck, but this was subsequently removed and no further modifications were attempted.

Nanuchka Class Missile Corvette

Although intended for patrolling coastal waters rather than engaging in blue water missions, these 660-ton corvettes were deployed in the Mediterranean, the North Sea and the Pacific. Construction started in 1969. They were armed with six SS-N-9 missiles in two large triple launchers on either side of the bridge, and a twin 57mm turret at the rear. The Nanuchka III type, first seen in 1978, had a 76mm gun in place of the twin 57mm turret, and an added Gatling as in the Grisha III. This type of corvette was supplied to Algeria, India and Libya.

Nanuchka missile corvettes armed with six SS-N-9 missiles were deployed to the Mediterranean, the North Sea and the Pacific.

The Soviet-built Osa fast attack missile boats saw the most combat during the Cold War. This example is an Osa II.

Osa Class Fast Attack Craft

Of all the Soviet naval craft, the Osa class fast attack missile vessels saw the most combat during the Cold War and were transferred to well over a dozen countries. The Osa I and II classes were built from the first and second half of the 1960s respectively, with up to 300 produced. They were armed with four SS-N-2 surface-to-surface missiles, which proved quite deadly to larger warships. While these boats were never to fire in anger while in service with the Soviet navy, they saw combat during the Six Day War, the Yom Kippur War and in the 1971 Indo–Pakistan War.

Petya Class Frigate

This class of escort frigate was constructed just before the Mirka class at Kaliningrad. Weaponry systems included 76mm guns, RBUs and torpedoes. Notably this type of vessel was widely exported, with ten going to India, two to Syria and two to Vietnam during the 1970s. Around forty were in service in the 1980s.

Skory Class Destroyer

These post-Second World War destroyers were built at Leningrad, Nikolayev and Severodvinsk between 1949 and 1954. The two twin 130mm and single twin 85mm gun turrets clearly dated the design. Initially the Soviets had planned to build eighty-five but numbers were slowly whittled away. In the late 1950s some were modified with alterations for anti-aircraft and anti-submarine weapons. By the late 1980s the Soviet navy had just a dozen Skory class vessels, with half of them held in reserve.

Slava Class Guided Missile Cruiser

Just three Slava class 12,500-ton cruisers were built, and these went to sea during the first half of the 1980s. A smaller version of the dual-purpose Kirovs, they were intended to serve as a conventionally powered back-up for that class. These vessels were armed with a formidable array of sixteen SS-N-12 missiles, with eight launchers forward on either side of the bridge. The bow was also armed with a twin 130mm gun.

Sovremenny Class Destroyer

In 1980 the first of the class, *Sovremenny*, sailed from the Zhadanov yard in Leningrad into the Baltic for trials. She transferred to the Black Sea Fleet in early 1982 after her weapons fit and then was deployed with the Northern Fleet in the summer of 1982. In total, almost ten of these destroyers were ordered. The fourth, *Osmotritelny*, was despatched to the Pacific Fleet in the mid-1980s.

Starboard view of a Sovremenny class destroyer photographed in 1986 while monitoring a NATO naval exercise. The first of the class had joined the Northern Fleet four years earlier.

Another Sovremenny class destroyer photographed in 1993. The twin quad missile launchers in front of the bridge housed the SS-N-22 missiles.

Osmotritelny, the fourth Sovremenny destroyer, joined the Pacific Fleet in the mid-1980s. The fore and aft turrets housed 130mm guns.

A typical NATO maritime intelligence photograph taken in 1987 giving an overhead view of the layout of the weapons systems on the Sovremenny class destroyers.

Another close-up of a Sovremenny destroyer's weapon systems taken in 1988. This is *Otlichnny*.

These vessels were designed for surface warfare, being complemented by the Udaloy class anti-submarine destroyers. The Sovremenny class was fitted with four large-calibre 130mm guns mounted in twin turrets fore and aft. The turrets were of a new design and were fully automatic and water-cooled. Missiles included eight launchers mounted in quads on either side of the bridge for the new SS-N-22 system (an improved supersonic SS-N-9 with a range of 70 nautical miles), as well as two launchers for the new SA-N-7 surface-to-air system.

Sverdlov Class Cruiser

This 17,200-ton class was built at the very start of the Cold War in the 1950s and in many ways resembled the cruisers of the Second World War. Weaponry relied on heavy guns with missiles fitted purely for air defence purposes. The Sverdlovs had a somewhat troubled construction: from a fleet of twenty-four vessels, just twenty keels were laid at the Leningrad, Nikolayev and Severodvinsk shipyards. Seventeen hulls were launched from 1951 but only fourteen had been completed by 1956. These cruisers bristled with guns and were armed with up to twelve 152mm guns in four triple turrets, twelve 100mm guns in six twin turrets and no fewer than thirty-two 37mm guns in twin mountings throughout the vessel. A number of these cruisers were refitted during the 1970s and in the mid-1980s twelve still remained in service with the Soviet navy.

Tarantul Class Missile Corvette

Like the Nanuchkas, these corvettes were really designed for coastal water warfare. The first Tarantul appeared in the late 1970s at Leningrad and was followed by the Tarantul II design during the 1980s; they were armed with four SS-N-2C missiles fired from twin launchers.

Udaloy Class Destroyer

This class was designed to replace the Kresta II and to complement the Sovremenny class destroyers. They were built throughout the 1980s and the first vessel was commissioned into service in November 1980. For the anti-submarine role the weapons fit included eight SS-N-14 missiles in quad launchers, as well as two RBU 6000 and two Helix helicopters stored in two hangars. Slightly alarmingly for the ship's officers, the launchers for the SA-N-8 air defence missiles were fitted to the ship's structure with 6ft cover plates, comprising four on the fo'c'sle, two between the torpedo tubes and two at the forward end of the after deckhouse between the RBUs.

A Soviet Udaloy class destroyer under way. These vessels were intended to replace the Krestas and support the Sovremenny destroyers. The two hangars hold ASW helicopters.

Admiral Vinogradov, another Udaloy destroyer, was commissioned in 1988.

An Su-27K Flanker on the deck of *Admiral Kuznetsov*. This carrier-based single-seater variant with folding wings and arrestor gear was developed in the late 1980s but did not become operational until after the Cold War ended.

Chapter Four

Akula to Zulu Class Submarines

Some of the Soviet Union's most-feared weapons were its strategic missile submarines. These ballistic missile submarines (known as SSBNs: submarine, ballistic, nuclear) were capable of striking at the very heartland of America. During the Cold War Soviet submarines had two primary roles: the first to cut off Western Europe from reinforcements crossing the Atlantic and the second to deliver nuclear missiles. It was America's decision in the late 1950s to convert the USS *Scorpion* into the world's first SSBN, renamed *George Washington*, that in part sparked the Soviet Union's own considerable SSBN programme. Up to the early 1970s America had a considerable advantage in the quality of its submarine-launched ballistic missiles, but then the Soviets introduced the SS-N-8, which outranged not only Poseidon but also Trident.

Early Soviet submarine-launched ballistic missiles were derived from the German V-2 developed during the Second World War. This led to the Zulu, Golf and Hotel class SSBNs armed with SS-N-4 or SS-N-5 nuclear missiles carrying a megaton warhead. Their lack of inertial navigation meant that they were not very accurate. In addition, these SSBNs carried their launch tubes in the fin; they were not hull-mounted until the advent of the Yankee boats. The much longer-range SS-N-6 was installed in the Yankee class, while the Delta class SSBNs were armed with the SS-N-8; these missiles had ranges of 1,600 and 4,200 nautical miles respectively. The Delta V, which became operational in 1986, carried the SS-NX-23, which had a reach of 4,500 nautical miles.

In addition, Moscow developed submarines capable of carrying cruise missiles; these were known as nuclear-powered guided missile submarines or SSGNs (submarine, guided missile, nuclear). This led in the early 1960s to the Echo and Juliet classes armed with the SS-N-3C for use against shore targets, but these had to surface to fire. By the late 1960s they had been replaced by the Charlie class, with an underwater launch capability. This was followed by the Oscar class, armed with the SS-N-19. The eventual appearance of the SS-NX-21 sea-launched land attack missile, with a range of up to 1,600 nautical miles, and the tube-launch capability of the Victor III greatly changed the balance of power in cruise missile submarines. Fleet submarines were also developed to hunt enemy submarines and shipping; these were known as nuclear-powered attack submarines or SSNs. There were also nonnuclear patrol submarines known as SSKs.

By the late 1980s the Soviet navy's strategic forces had sixty-three nuclear-powered ballistic missile submarines (SSBNs), the most numerous of which were the Delta class, plus half a dozen conventionally powered ballistic missile submarines (SSBs). These were capable of carrying almost a thousand nuclear missiles. They also had 280 tactical submarines, comprising nuclear-powered guided missile submarines (SSGNs) and nuclear-powered attack submarines (SSNs), plus their conventionally powered counterparts. The most numerous SSGNs were the Charlie and Echo classes, while the

principal SSNs were the November and Victor classes.

Akula Class SSN

The first Akula was launched in mid-1984 as a follow-on from the Victor III. The most distinguishable feature on the Akula class was the long, low sail, which was unlike anything on the West's SSNs. The large teardrop fairing atop the vertical rudder was first seen in the Victor II and was designed as a protective housing for a towed sonar array. The Akula class also had greatly reduced noise levels that made them harder to find than the Victors.

The distinctive bulbous housing for the towed sonar array at the rear of this submarine identifies it as an Akula class.

The Akula's torpedo tubes could fire SS-N-15 nuclear-tipped anti-submarine missiles as well as SS-NX-21 cruise missiles and SS-N-16 torpedo-carrying antisubmarine missiles. By the early 1990s six had been built and were based with the Northern and Pacific Fleets, where they served with the similar Sierra class. With the exception of the November class, all fleet submarines were coated with Cluster Guard anechoic tiles.

Alfa Class SSN

The first Alfa was completed at Sudomekh in Leningrad in 1970. However, this was believed to have been a prototype and was scrapped four years later. Six more Alfas were built by 1983; all were slightly different, so may have served as test-beds for future boats such as the Mike class. Notable features were the Alfa's two liquid-cooled nuclear reactors and titanium hull, which gave a speed of 42 knots when dived and a diving depth of 700 metres.

Charlie Class SSGN

The Charlie design represented an attempt to rectify the shortcomings of the Soviets' first cruise missile submarines (SSGNs). Although noisier than their Western counterparts, they were an improvement on the Echos. A total of eleven 4,800-ton Charlie I cruise missile submarines were built at Gorki between 1967 and 1972. They were similar to the Victors, but the almost vertical drop of the forward end of the fin, the lower after casing, the different free flood hole in the casing and the bulge at the bow clearly differentiate the two classes. Although posted on worldwide operations, they also appeared in the Mediterranean, which was understandably a cause for concern for the US 6th Fleet.

As well as eight 21-inch torpedo tubes, the Charlie class submarines had eight SS-N-7 missile tubes; these missiles could be launched while dived and were capable of reaching targets within 35 nautical miles. The initial design was enlarged to create the Charlie II, half a dozen of which were produced at Gorki between 1973 and 1980. These had a slightly increased displacement at 5,500 tons, and carried the SS-N-9, which had twice the range. All the SSGNs (with the exception of some Echo II and all the Juliet and Whiskey classes) were coated with Cluster Guard anechoic tiles.

Delta Class SSBN

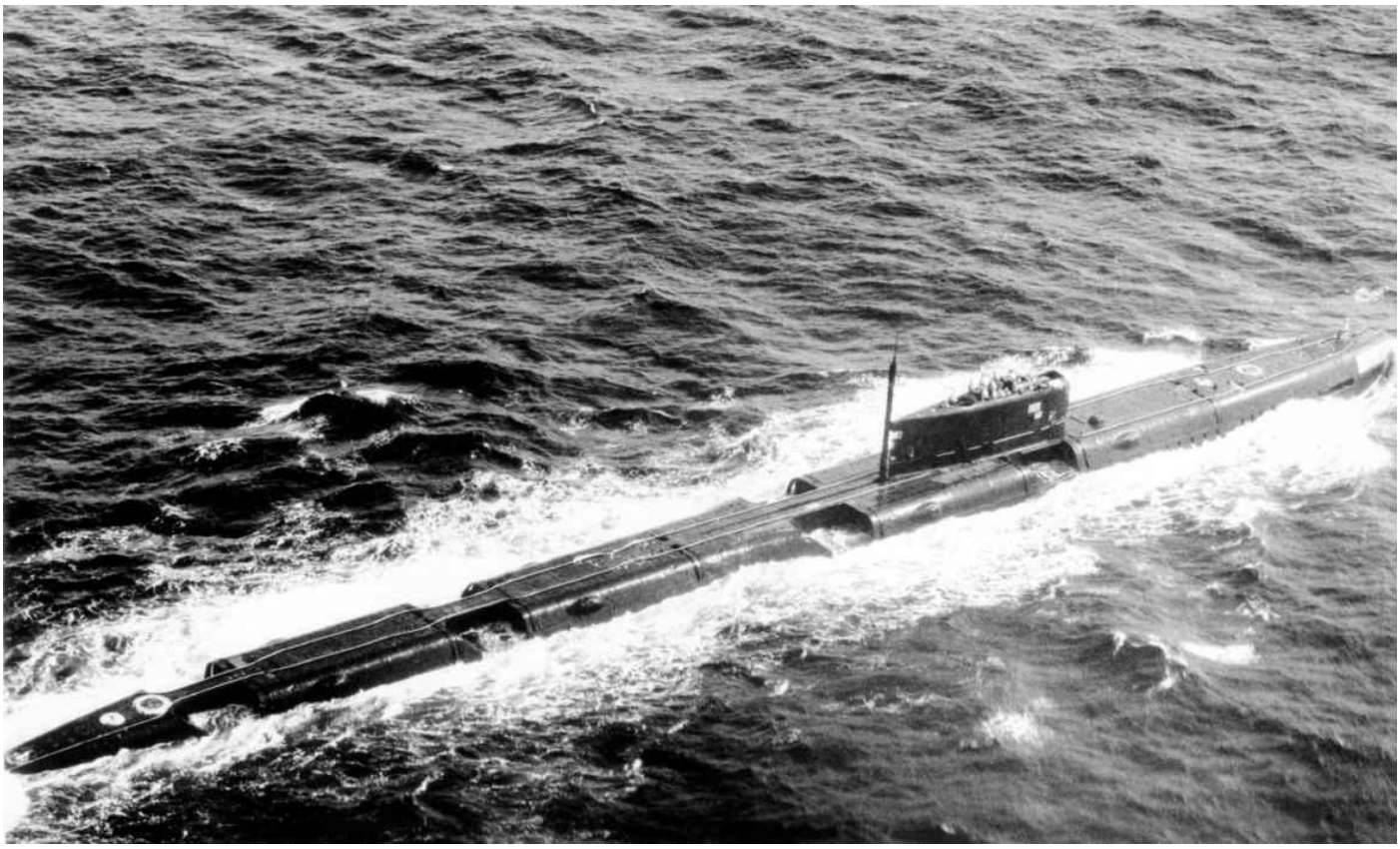
The first 11,000-ton Delta I, an improvement on the Yankee class SSBN, was completed at Severodvinsk in 1972 and by 1977 a total of eighteen had been built. The length of the SS-N-8 missile resulted in a distinctive raised deck behind the bridge, because they could not be installed below the keel. During the same period four 13,000-ton Delta II SSBNs were also built; a larger version of the earlier model, these had a straight run on the after part of the missile housing, which enabled them to carry sixteen rather than twelve missiles. Follow-on boats comprised the Delta III and IV, which had a slightly higher missile casing in order to accommodate SS-N-18 missiles, which had a range of up to 4,300 nautical miles. These submarines posed a major threat to America, as they could hit targets in the US from launch sites in the western Pacific and Murmansk regions, well out of range of existing countermeasures.

A Delta IV nuclear-powered ballistic missile submarine under way on the surface. The Delta class first appeared in the 1970s and posed a serious threat to the US mainland.

Echo Class SSGN

The first submarines equipped with SS-N-3 cruise missiles that could be launched at a distance from America's carrier fleets were the Whisky class conversions. These, though, were crude affairs and the first true cruise missile submarines were the five nuclear-powered boats of the Echo I class built between 1958 and 1962. These were similar to the November (nuclear torpedo armed) and Hotel (nuclear ballistic missile) boats.

The Echo I carried six SS-N-3 turbojet-powered surface-to-surface missiles in individual elevating tubes in the casing, with two ahead and four abaft the fin. The missiles could carry a nuclear or high explosive warhead, but required mid-course guidance. Naturally this rendered the missile, and the ship or aircraft guiding it, vulnerable to countermeasures. Between 1973 and 1974 all the Echo I boats had their launch tubes removed, leaving them armed solely with torpedoes.



The Echo class – the first real cruise missile submarines – entered service in 1960. The Echo II carried eight SS-N-3 missiles.

The Echo I design was superseded by the Echo II, which had a slightly lengthened hull incorporating another pair of SS-N-3 launchers abaft the fin. These boats appeared during the 1960s and initially carried the SS-N-3A cruise missile, followed by the SS-N-12. In total twenty-nine boats were built. The Echo II class was split evenly between the Northern and Pacific Fleets. They were also deployed to the Mediterranean and the Indian Ocean. However, the Echo boats proved to be even noisier than the November class due to the sizeable holes in the casing around each missile launcher. Another disadvantage was that they had to surface to launch their missiles.

Foxtrot Class SSK

The Foxtrot boats were intended as a follow-on to the Zulu class, but only 62 of an anticipated programme of 160 were completed as the change to nuclear boats took effect. These diesel-electric submarines were built at Sudomekh between 1959 and 1983 and formed the bulk of the Soviet submarine force in the Mediterranean in the 1960s and 1970s. These boats were also exported to Cuba, India and Libya.

A Foxtrot attack submarine belonging to the Cuban navy. These boats were intended to replace the earlier Zulu class derived from the German U-boat.

A Golf II submarine armed with three launch tubes for the SS-N-5.

Golf Class SSB

Twenty-three Golf class boats were built at Komsomolsk and Severodvinsk in the period 1958–62. During the 1960s thirteen of them were converted into Golf II boats to carry the SS-N-5 system. With a range of 750 nautical miles, this replaced the earlier and shorter-

ranged SS-N-4. A limited number of Golf III and V boats were also produced, armed with SS-N-8 and SS-N-20 missiles respectively. Six Golf II boats were deployed to the Baltic in 1976, becoming the first SSBs to enter the area. Most of the others were sent to the Pacific.

Hotel Class SSBN

The 6,500-ton Hotel boats were built at Severodvinsk between 1958 and 1962. They were initially armed with the SS-N-4, but a number were upgraded during the 1960s to take the SS-N-5, resulting in the Hotel II. Likewise, a single boat was converted to conduct test firings of the SS-N-8 and was dubbed the Hotel III. As newer submarines replaced the Hotel class boats, a number were converted to the SSN role.

Juliet Class SSG

Sixteen of these conventional (diesel-electric-powered) submarines were completed at Gorky between 1961 and 1968. As an SSG, it was armed with four SS-N-3A launchers, one pair either side of the low fin. In the early 1980s four Juliets were transferred from the Northern Fleet to the Baltic Fleet, but they also saw service in the Indian Ocean and the Mediterranean.

Kilo Class SSK

The diesel-electric-powered Kilo made its debut in the late 1970s and by the time the Soviet Union was dissolved seventeen had been built. Notably, the Kilo featured an improved hull compared to those of the Foxtrot and Tango classes. At 3,200 tons dived, it required a crew of about fifty and was armed with six 21-inch torpedo tubes that could deliver eighteen Type 53 torpedoes. All the Kilo boats were coated with Cluster Guard anechoic tiles and could lay mines via their torpedo tubes. The Kilos were crude compared to Western designs, but their simplicity made them a popular export design. Orders from client states including Poland, Romania, India and Algeria led to an increase in production, with twelve Kilo boats being exported.

The Kilo class attack submarine made its debut in the late 1970s. It was intended for an anti-shipping and anti-submarine role in shallow waters.

The diesel-electric Kilo submarine. This simple design was exported to a number of navies.

A Chinese Kilo being delivered in 1995, just after the Cold War ended.

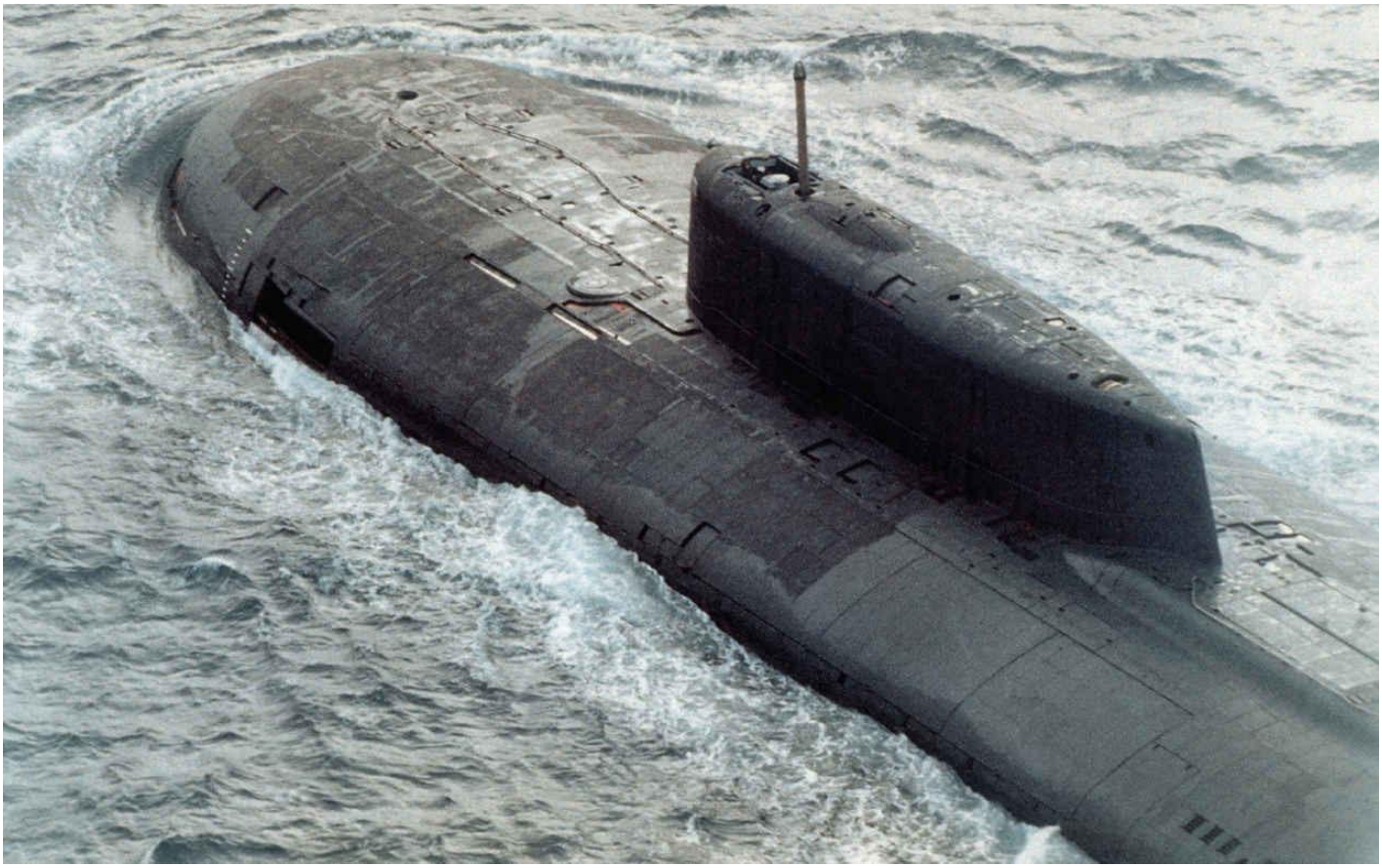
November Class SSN

The very first Soviet nuclear-powered attack boats, the November class submarines entered service between 1958 and 1963. They were powered by two nuclear reactors and two steam turbines, producing a speed of some 30 knots when dived. By the late 1980s

twelve were still in service but the number of free flood holes in the casing meant that it was a noisy submarine and therefore easily detected. One sank off the south-west of the UK in April 1970 and another was scrapped in the late 1970s.

Oscar Class SSGN

The Oscar class was the largest in a line of cruise missile submarines that go back to the nuclear-powered Echo and diesel-electric Juliet classes of the 1960s. Their role was to attack US battle fleets. The first of the Oscars were launched in 1980 and were built at the same time as the massive Typhoon. They had an extremely large beam because the missile tubes were carried in the casing. With a dived displacement of 14,000 tons, the Oscars had a crew of 130, and its twin reactors gave it a top speed of around 30 knots. The Oscars carried twenty-four SS-N-19 supersonic missiles with a range of 295 miles. It also carried torpedoes for its anti-shipping role. Its speed and formidable armament inevitably meant that it acted as point vessel for any Soviet naval task group. As of 1991, two Oscar I and seven Oscar II boats were still in service.



The imposing bulk of an Oscar class nuclear-powered attack submarine, photographed in 1986.

The 14,000-ton Oscar could launch twenty-four SS-N-19 cruise missiles and was built at the same time as the Typhoon.

Romeo Class SSK

This class was an upgrade of the Whiskey class, with an improved conning tower. It was intended to be the Soviet fleet's most numerical class of post-war diesel submarines, with a planned order of some 560 vessels, but the introduction of nuclear power put paid to that and in the event just twenty were built at Gorki between 1958 and 1961. Transfers were made to Algeria, Bulgaria, China, Egypt and Syria up to the 1980s. China and North Korea also copied the design. By the mid-1980s the Soviets had just six still in service.

Tango Class SSK

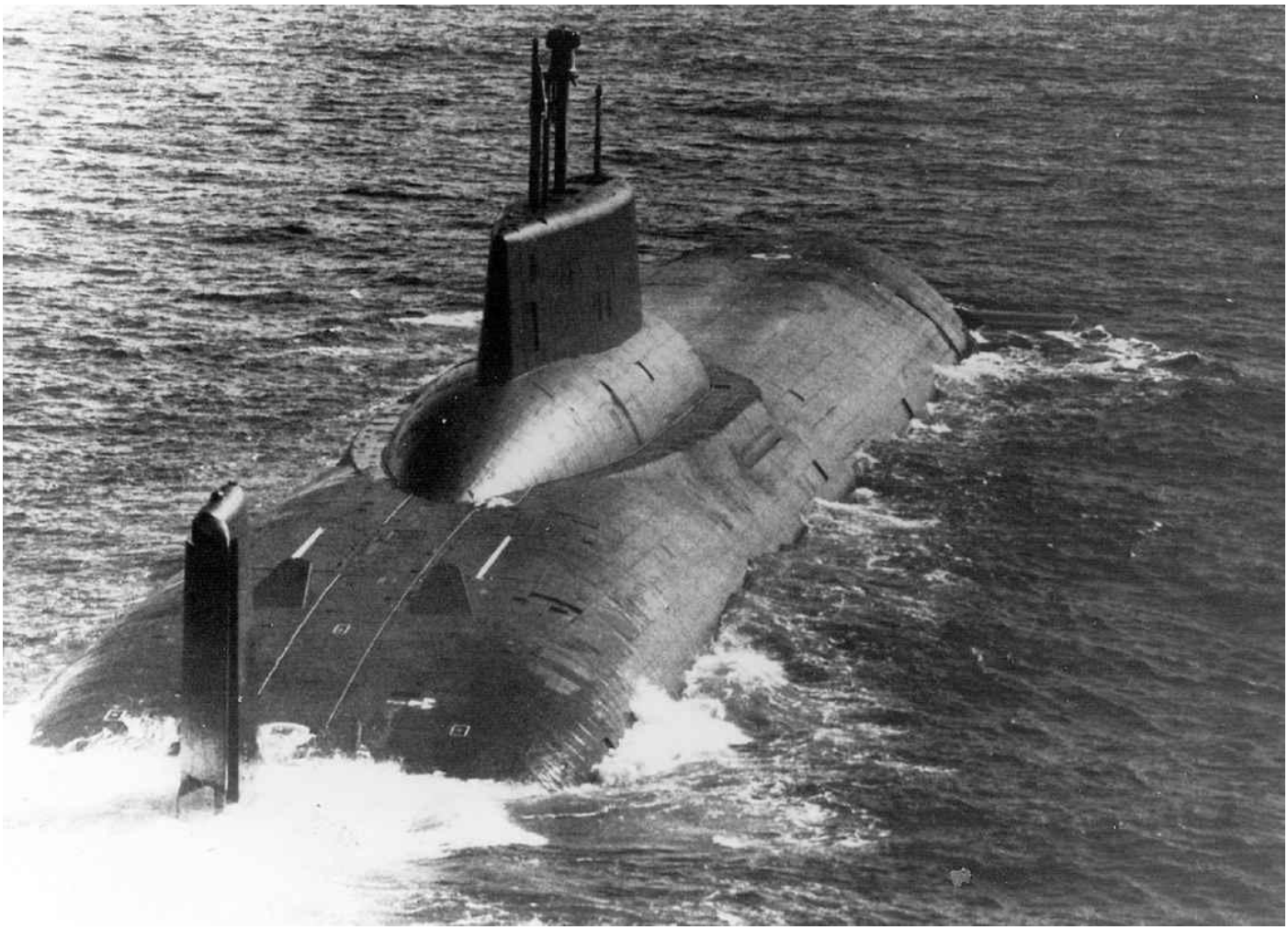
This diesel-electric patrol submarine was first seen publicly in 1973 and showed the Soviets' continuing commitment to non-nuclear-powered boats. It was designed for long-range operations and was deployed to the Mediterranean, though it was only ever stationed with the Northern and Black Sea Fleets. By the mid-1980s just under twenty such boats were in service.

Typhoon Class SSBN

This 25,000-ton monster was the largest class of submarine ever built, and was nearly half as large again as America's Ohio class. It was the pinnacle of Soviet submarine design and a potent symbol of their naval power. The very first was launched in September 1980 at Severodvinsk, entering service three years later, and it was followed by another three. The design differed from previous Soviet SSBNs, with twenty missile tubes fitted forward of the large fin placed aft of centre. In addition, the rounded hull and squat fin meant the Typhoons could force their way through ice up to 3 metres thick, so the ice caps posed no barrier.

Propelled by a pair of water-pressurised reactors, twin steam turbines and twin screws,

the Typhoon was capable of striking its key targets from anywhere in the world. With a crew of 150 men, the Typhoon was assessed to have a speed in excess of 30 knots. The vessel was armed with twenty SS-N-20 solid-fuel missiles with a range of 4,800 nautical miles, each with seven multiple independently targeted re-entry vehicle (MIRV) warheads. The Typhoon could fire two missiles in fifteen seconds, while other SSBNs could only launch one at a time. This may explain why the launch tubes were concentrated forward of the fin, as a joint launch could create severe trim problems.



The even bigger 25,000-ton Typhoon was the largest class of submarine ever built.

The first Typhoon was commissioned in 1981. Of a planned eight boats, six were completed.

Victor Class SSN

Appearing in the late 1960s, the Victor nuclear-powered attack submarine was intended for an anti-submarine and anti-shipping role. Equipped with six torpedo tubes, it carried a total of eighteen torpedoes. The Victor had a dived displacement of 5,300 tons and a complement of 90 men; the two nuclear reactors were capable of propelling the vessel underwater at 29 knots. By 1974 the Soviets had built sixteen Victor I boats; they were deployed with the Northern Fleet, although some also served in the Pacific. The enlarged Victor II was 9 metres longer to accommodate the tube-launched SS-N-15. This version went into production in 1972 and was completed six years later.

Whiskey Class SSN

Some 240 diesel-electric Whiskey patrol submarines were built between 1951 and 1957 at four different shipyards. As with the Romeo, planned production numbers were reduced (from 340) because of the introduction of nuclear propulsion. Along with its larger contemporary, the Zulu, the Whiskey class showed many similarities with the German U-boat. The Whiskey class appeared in five types: types I and IV had guns forward of the conning tower, the type II had guns at either end, and the types III and V had no guns. They proved to be a highly popular export, with forty transferred to half a dozen countries. Despite their age, Whiskey boats served throughout the Cold War and by 1986 around fifty were still operational, with another sixty-five held in reserve.

Yankee Class SSBN

Drawing on their experiences with the diesel-propelled Golf and nuclear-powered Hotel classes, Soviet submarine designers came up with the 10,000-ton Yankee class. This was the first purpose-designed nuclear ballistic missile submarine to enter service with the Soviet navy, albeit it was a decade behind the Americans. It was also the first Soviet submarine to use hull-mounted submarine-launched ballistic missiles that could be fired while submerged. The first boat was laid down in 1963-64 and handed over three years later. By the mid-1970s a total of nineteen Yankee I boats had been built.

The sixteen missiles were installed in two vertical rows of eight abaft the fin in a similar way to the American Polaris boats. The first twenty Yankees were armed with the SS-N-6 Mod 1 SLBM (designated the Sawfly by NATO). This had a single 1–2 megaton warhead with a range of 1,100 nautical miles. The following thirteen boats were armed with the longer-range SS-N-6 Mod 3, which had three re-entry vehicles. The last of the Yankees were equipped with the newer SS-N-17, with a range of almost 2,500 miles. Like many Soviet submarines, the Yankee was noisy and easy to detect, largely due to the raised casing covering the missiles abaft the fin.

Initially these boats were deployed off America’s eastern seaboard, and their SS-N-6 missiles could reach at least as far as the Mississippi. Once numbers permitted, they were also stationed off the western seaboard, which meant they could reach targets east of the Rockies. A total of thirty-four were built, including one Yankee II, but fourteen were converted to an SSN role. Two former Yankee SSBNs were converted to carry SS-N-21 cruise missiles, which made them SSGNs; these were dubbed Yankee Notch by NATO. The SS-N-21 SLCM was a long-range strategic weapon and the mission of the Yankee Notch was therefore different from that of the Oscar class and other Soviet SSGNs.

Zulu Class SSK

The general similarity between the diesel Zulu class and the German U-boat is perhaps not surprising as this was the first large post-war submarine built by the Soviet Union. It displaced 2,300 tons dived and its three diesel engines gave it a top speed of only 16 knots. During the period 1951–1955 some twenty-six were completed from an original order of forty. The six Zulu V conversions provided the first Soviet ballistic missile submarines armed with the SS-N-4, the first of which was finished in 1955. By the mid-1980s the Zulu IV was obsolescent and the Vs were either scrapped or converted to auxiliary roles such as oceanographic research.

Chapter Five

Scud to Sickle Mobile Ballistic Missiles

As well as submarine-launched nuclear missiles, the Soviets devoted much time and energy to developing mobile land-based nuclear-capable missiles, which provided both tactical and strategic support. Notable missile systems such as Scud, Scaleboard and Scarab gave Soviet commanders the means to strike deep into the enemy's lines of communication and across the battlefield. The initial generation of mobile medium- and intermediate-range ballistic nuclear missiles such as the SS-4 Sandal and SS-5 Skean were transported by cumbersome trailers. (The latter systems gained some infamy after they were involved in the Cuban missile crisis.) These were followed by much more mobile self-propelled missiles mounted on their own transporter-erector-launchers (TELs).

The Soviet Union viewed its strategic rocket forces as the heart of its defensive system and the rocket personnel as the very elite of the Soviet forces. The strategic rocket forces evolved from the Soviet Army's artillery, and the first commander-in-chief was also head of the artillery. They were formed in 1959 and were responsible for all Soviet land-based missiles with ranges over 1,000km. (Missiles with lesser ranges were assigned to the rocket and artillery branches of the ground forces.) Notably, the strategic rocket forces were considered the 'primary service' and their commander-in-chief took precedence over all other military supreme commanders.

SS-1 Scud Medium-Range Ballistic Missile

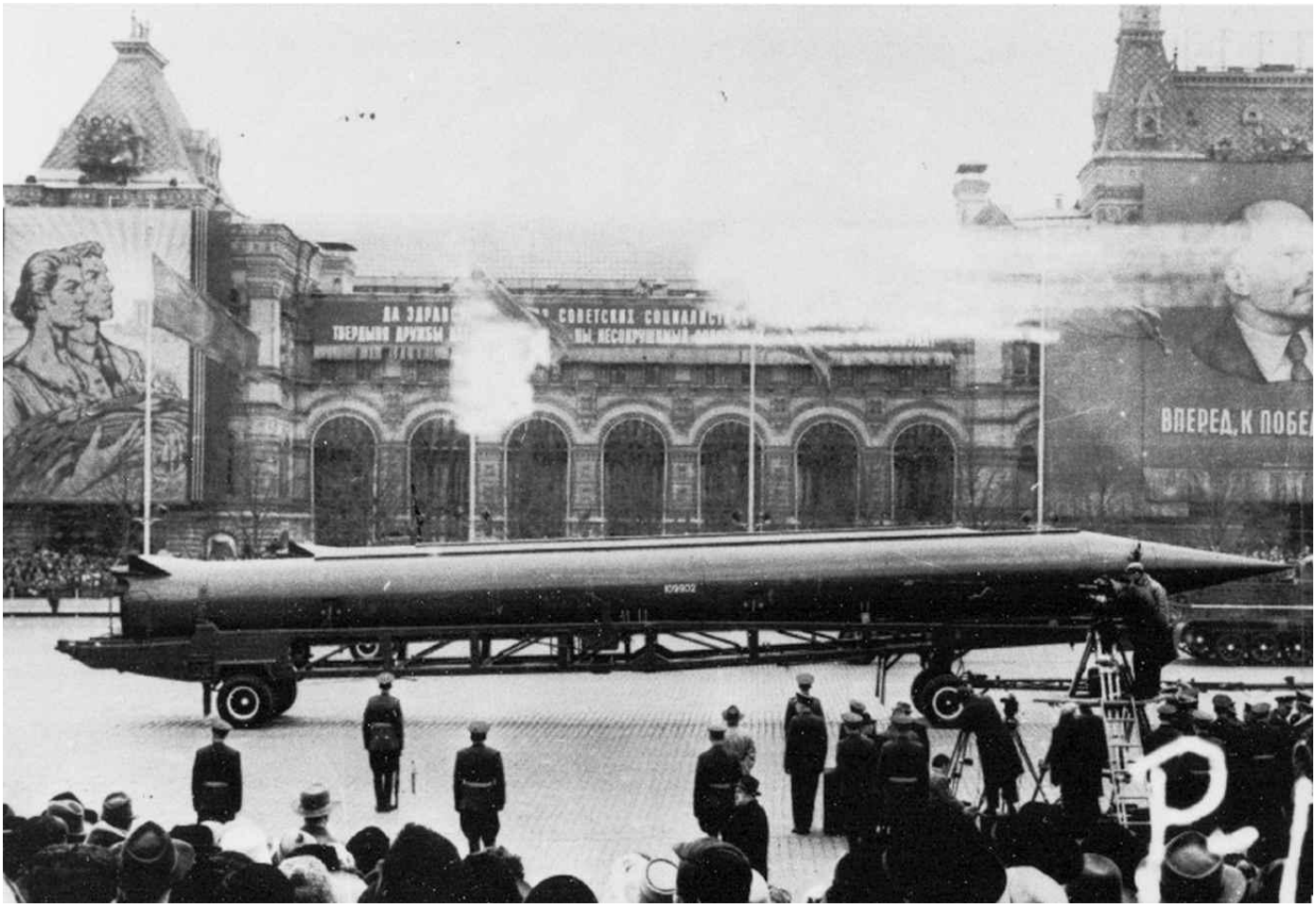
The SS-1C, known to NATO as the Scud B, was a medium-range surface-to-surface missile intended for battlefield strikes to hit troop concentrations, defences, depots and railways up to a distance of 280km. The missile was 11.4m long and could take high explosive, chemical and nuclear warheads. The rocket was a single-stage missile employing a liquid propellant. The Scud A and B were initially deployed on tracked carriers derived from the IS-3 (Joseph Stalin III) heavy tank chassis, but were later transported on the eight-wheeled MAZ-543. This had eight-wheel-drive, with the front four wheels steerable, and weighed 28 tons with the missile. The crew compartment consisted of a heated and air-conditioned cab divided into two by the missile. The original version was first seen in 1957, and the longer B variant five years later. The SS-1C Scud B was widely deployed with all the Warsaw Pact armies, as well as in Egypt, Iraq, Libya and Syria. The Egyptians fired a number at Israeli targets in the Sinai in 1973, but missed. Around a thousand Scud B missiles were fired at Mujahideen targets in Afghanistan during the 1980s. The longer-range Scud C and D missiles were largely superseded by the SS-12 Scaleboard and the short-lived SS-23 Spider.

A Scud missile in launch position. This battlefield ballistic missile was widely exported and has seen combat in numerous wars. The SS-1 Scud medium-range ballistic missile first appeared in the late 1950s.

SS-4 Sandal Theatre Ballistic Missile

The SS-4 Sandal, with a range of 2,000km, was an upgraded version of the earlier SS-3

Shyster. It became operational in the late 1950s and was deployed in some numbers with Soviet field armies. This missile system, though, was not really very mobile as it required twelve vehicles towing special trailers, and the missile itself had to be erected and fuelled before firing. From the late 1970s it was replaced by the fully mobile SS-20 Saber, although this process was not completed until the late 1980s. The longer-range silo-based SS-5 Skean that appeared in the early 1960s was essentially a scaled-up version of the Sandal. It was withdrawn from service from the mid-1970s onwards.



The SS-4 Sandal also became operational in the late 1950s and was shipped to Cuba in 1962.

The SS-12 Scaleboard was an improved Scud that appeared in the late 1960s.

SS-12 Scaleboard Medium-Range Ballistic Missile

The SS-12 Scaleboard, first reported in 1967, was previously known as the SS-1D Scud C, but Scaleboard was a much more powerful missile than the Scud. Its range of 800km made it more of a strategic weapon than one for battlefield support. Scaleboard missiles deployed in East Germany could have reached much of eastern and south-eastern England. The SS-12 was very similar in appearance to the earlier SS-1C and employed the same MAZ-543 chassis as the transporter/launcher, but with a more fully enclosed body behind the cab. The missile was erected for firing in a similar way but was contained in a ribbed casing until ready for launch. The longer-range SS-23 Spider was eliminated in the late 1980s under the Intermediate-Range Nuclear Forces Treaty.

SS-14 Scapegoat Intercontinental Ballistic Missile

The SS-14 Scapegoat and SS-15 Scrooge were monstrous long-range ballistic missiles carried on tracked chassis. Neither was deployed, and subsequently the Soviets opted increasingly for heavy wheeled vehicles. The SS-14 was carried in a cylindrical container mounted over the carrier vehicle. Before launching, the container was raised hydraulically and placed in a vertical position on a launch pad lowered from the rear of the vehicle. The container was then opened and removed, leaving the exposed missile ready for firing. First observed on a mobile launch pad in May 1965, the SS-14 was an intermediate-range (3,500km) missile with a nuclear warhead; it measured about 10.7 metres in length and

was propelled with a solid-fuel rocket. Due to poor mobility and slow missile deployment time, the system did not enter service and the missiles were replaced in 1970.

The massive but unwieldy SS-14 Scapegoat missile preparing to fire.

SS-15 Scrooge Intercontinental Ballistic Missile

The SS-15 Scrooge was an even larger intercontinental ballistic missile, measuring 18.3 metres, likewise carried in a tube on the back of a tracked vehicle. While erected in a similar way to the SS-14, it was fired direct from the tube. Propelled by a solid-fuel rocket, it could reach up to 5,600km. The carrying vehicles for both the SS-14 and the SS-15 were very similar, though their missile erecting systems differed. Interestingly, the running gear was derived from components of the IS-3 heavy tank or its later T-10 derivative.

The ungainly tracked SS-15 Scrooge. Although it looked impressive on parade, like the tracked SS-14 Scapegoat it did not enter service.

The transporter had eight small road wheels (whereas the IS-3 had six and the T-10 seven) sprung on torsion bars. The long upper track was supported on five return rollers on each side, which were unevenly spaced. Power transmission was via rear drive sprockets and the engine was believed to have been a V-2 cylinder diesel similar to that in the T-10, which was capable of producing 700hp. In both systems the crew travelled in a superstructure at the front. Again the SS-15 was deemed simply too ungainly for use in the field.

SS-16 Sinner Intercontinental Ballistic Missile

This was the Soviet Union's very first mobile ICBM, with a range of around 10,000km. The three-stage solid-propellant 18.5 metre-long missile was transported on a massive 12×12 TEL. According to the Soviets, it was never deployed, although Western Intelligence believed it had gone operational in the late 1970s, by which time 200 missiles had been built. Of these, fifty were deployed at the test training site in Plesetsk, but these

ran foul of the SALT II Treaty and by the mid-1980s they had been removed from the training sites. Design work on this missile influenced both the SS-20 and the SS-25.

SS-19 Stiletto Intercontinental Ballistic Missile

The Stiletto, unlike the other nuclear missiles described here, was not mobile, but was a fourth generation silo-launched liquid-propelled ICBM (supplementing the earlier SS-9, SS-11, SS-13, SS-17 and SS–18). Alongside the mobile Soviet strategic rocket forces, the SS-19 was the backbone of the silo-launched missile force. It was initially deployed in the 1970s but was replaced by the upgraded SS-19 Mod 3. This had a storage life of twenty-two years and was armed with six MIRVs. By 2008 Russia still had 126 operational missiles, but the mobile SS-25 remained the most numerous ICBM. Clearly Moscow felt that mobile systems offered a greater deterrence and first strike capability.

SS-20 Saber Intermediate-Range Ballistic Missile

In light of the Warsaw Pact's numerical superiority in ground forces, NATO developed a tactical nuclear weapons option that could form part of a graduated nuclear response. In order to neutralise these forces in Western Europe Moscow developed a new mobile intermediate-range ballistic missile with a nuclear warhead with a range in excess of 5,000km. This was given the NATO reporting name of SS-20 Saber, and entered service in 1976. The system was also intended to supersede the old SS-4 and SS-5 missiles.

A 37 ton, 16.5 metre-long missile based on two solid-fuel fibreglass-clad stages originally designed for the abandoned SS-16 Sinner mobile ICBM programme, the Saber initially had a single warhead but was made MIRV-compatible and transported on a 12×12 MAZ-547A/MAZ-7916 TEL. This mobile system so alarmed NATO that it responded by deploying ground-launched cruise missiles to Western Europe. By the mid-1980s an estimated 350 Sabers had been deployed, with 240 in eastern Russia threatening Europe and the remainder in Siberia targeting China and Japan. In total, 654 SS-20 missiles and 499 TELs were built, but they were withdrawn from service in the late 1980s under the terms of the Intermediate Range Nuclear Forces Treaty and destroyed in 1991.

The US Department of Defense’s impression of the SS-20 Saber in launch position. This missile entered service in 1976 and by the mid-1980s no fewer than 240 were threatening Europe.

SS-21 Scarab Short-Range Ballistic Missile

The smallest member of the Soviet Union’s family of short-range ballistic missiles was the mobile SS-21 Scarab, with a range of 120km (compared to the 50km of the SS-23 and the 900km of the SS-12M). Mounted on a 6×6 TEL, the SS-21 could take fragmentation, nuclear, biological or chemical warheads. Developed in the late 1960s, it was used to replace the shorter-ranged FROG-7 battlefield rocket.

The SS-21 Scarab battlefield ballistic missile replaced the FROG-7 battlefield rocket, and was forward-deployed in East Germany.

The Scarab A entered service with the Soviet Army in 1975 and was forward-deployed into East Germany in the early 1980s. From there, it could have destroyed NATO's early warning radar and surface-to-air missile sites prior to air strikes. The longer-range Scarab B appeared in 1989, with a third version developed after the dissolution of the Soviet Union. By this stage Scarabs had replaced most of the FROG-7 rockets in Eastern Europe and had been supplied to Czechoslovakia, East Germany and Syria.

SS-24 Scalpel Intercontinental Ballistic Missile

Unlike the SS-19, the SS-24 Scalpel was deployed in 1987 as both a railway-based and silo-based missile. The rail-mounted version understandably had limited utility in time of war. In total, fifty-six rail-based systems were produced but they have since been decommissioned.

An artist’s impression of the rail-mounted version of the SS-24 Scalpel. The Soviets built fifty-six such trains.

Another US Department of Defense graphic showing the SS-25 TEL being deployed. Development of this missile started in the late 1970s.

A camouflaged SS-25 Sickle and TEL on parade in Moscow. This missile was first deployed in 1985.

SS-25 Sickle Intercontinental Ballistic Missile

Development of the SS-25 Sickle by the Soviets commenced in the late 1970s as an improved three-stage solid-propellant single-warhead mobile ICBM. The missile was deployed in a TEL canister on a 14×14 chassis. Measuring over 29 metres long and 1.7 metres in diameter, the missile was mounted on the MAZ-7310 or MAZ-7917. The TEL was normally supported by a mobile relay station and command support vehicle. Understandably, because the Sickle was fully mobile, it was vastly more expensive than the silo-based ICBMs. The first regiment equipped with it was activated in 1985; by 1991 the Russians had deployed 288 SS-25 missiles and five years later this figure had risen to 360. They were used to equip three strategic rocket forces missile armies totalling seven divisions.

The SS-25 Combat Support Vehicle formed part of the command and control package.

The troposphere relay station for the SS-25.

Another SS-25 TEL. By 1991 the Soviets had deployed 288 Sickle missiles.

Chapter Six

FROG to Smerch Rocket Launchers

During the late 1950s and early 1960s the Soviets developed a wide range of truck-mounted rocket launchers, which drew on their experiences with the Katyusha systems such as the 132mm BM-13 and 300mm BM-30/31 during the Second World War. These were designed to support both tank and motor rifle divisions by bombarding broad areas of the battlefield with anti-tank/anti-personnel, high explosive-fragmentation incendiary and chemical warheads.

FROG Artillery Rocket

FROG – the NATO acronym for Free Rocket Over Ground – was used to describe a series of Soviet tactical missiles starting with the FROG-1 that entered service in 1957. These were intended to provide battlefield nuclear fire support at divisional level. In the event the FROG-7 saw combat as rocket artillery, deploying high explosive, submunition and chemical warheads.

The single rail Filin (Eagle Owl) designated FROG-1 by NATO was carried on a modified IS-2 heavy tank chassis, while the single rail Mars known as FROG-2 by NATO was carried on a non-amphibious version of the PT-76 light tank chassis. During the 1960s these were replaced by the Luna range of rockets designated FROG-3, FROG-4 and FROG-5, which were again mounted on a version of the PT-76. The only variations in these rockets was in the warhead, while the FROG-6 was a training rocket.

The FROG-3 was first observed in the 1960 Moscow parade and was the first to feature a tandem two-stage propulsion system, with each motor having a central nozzle surrounded by a ring of twelve smaller nozzles.

It was assessed to be capable of delivering both conventional and nuclear warheads to a range of 40km. The FROG-4 featured a slim warhead that was the same diameter as the motor tube. In contrast, the FROG-5 was assessed to be an improved FROG-3.

The FROG-7a appeared in 1965, using an 8×8 BAZ-135 cross-country vehicle as the transporter-erector-launcher. It had a maximum range of up to 70km and a minimum range of 15km. Warheads included nuclear, conventional high explosive, chemical and, in the case of the FROG-7b, cluster munitions. The FROG-7b, featuring a longer rocket, followed in 1968. Despite the appearance of the FROG-7, the earlier tracked variants continued in service well into the 1980s. Soviet divisions had four launchers in two batteries accompanied by four resupply trucks each carrying three missiles. During the late 1970s the SS-21 Scarab replaced the FROG.

The FROG-7 battlefield rocket entered service with the Soviet Army in 1965. The Soviet Army used it in Afghanistan during the 1980s. The Iraqi Army also used it during the Iran–Iraq War to deliver chemical warheads.

This FROG-7 belonged to the East German Army.

During the late 1970s the SS-21 replaced the FROG, seen here on parade in Moscow.

Tracked FROG rockets were supplied not only to the Warsaw Pact armies but also to Algeria, Cuba, Egypt, North Korea and Syria. The wheeled FROG-7 was likewise exported to the Warsaw Pact armies, Algeria, Cuba, Egypt, Iraq, North Korea, Kuwait, Libya, Syria and Yemen. Iraq produced its own variant of the FROG-7, known as the

Laith 90, with a cluster munition warhead and a 90km range. During the Iran–Iraq War the Iraqis deployed their FROG-7 rockets with mustard gas warheads against Iranian troop concentrations with deadly effect. The Soviet Army used FROG-7b rockets operationally in Afghanistan in 1985 as part of a campaign to deny the Mujahideen food supplies.

BM-21 122mm Multiple Rocket Launcher

The BM-21 was by far the best known and most widely deployed Soviet rocket launcher. Known as the Grad or Hail, the BM-21 could be fitted with twelve (Grad V), thirty-six (Grad 1) or standard forty (Grad) round launchers. Its job was to saturate enemy positions and weapons systems with a deluge of rockets.

The BM-21 was the natural successor to the Red Army's wartime Katyusha rocket launchers known as *boyevaya mashina* ('combat vehicle'), utilising the same system of firing a cluster of solid-fuel rockets from a 6×6 truck. However, the BM-21 dispensed with the open rack configuration used on the wartime BM-13 and BM-31 and the post-war BM-24 and BM-25 in favour of closed tubes.

Developed in the 1950s and mounted on the Ural-375 truck, this multiple 122mm rocket launcher first appeared publicly in November 1964. The truck was selected for its cross-country capabilities, and as with most Soviet wheeled vehicles it had a central tyre pressure control system to enhance its performance. For firing purposes the vehicle had to be parked obliquely so that the blast does not damage the unarmoured truck cab.

As it used a smaller calibre fin-stabilised rocket than any other system, the enclosed tube launcher could take forty rounds. Each rocket weighed around 46kg, and they could be fired in salvo, rippled or individually. Understandably, the effect on the target was devastating: with the warhead containing 19kg of high explosive, a battery target could be saturated with almost a ton of HE in around 30 seconds out to a range of 15km.

BM-21 122mm multiple rocket launchers fitted with forty launch tubes came into service in 1987.

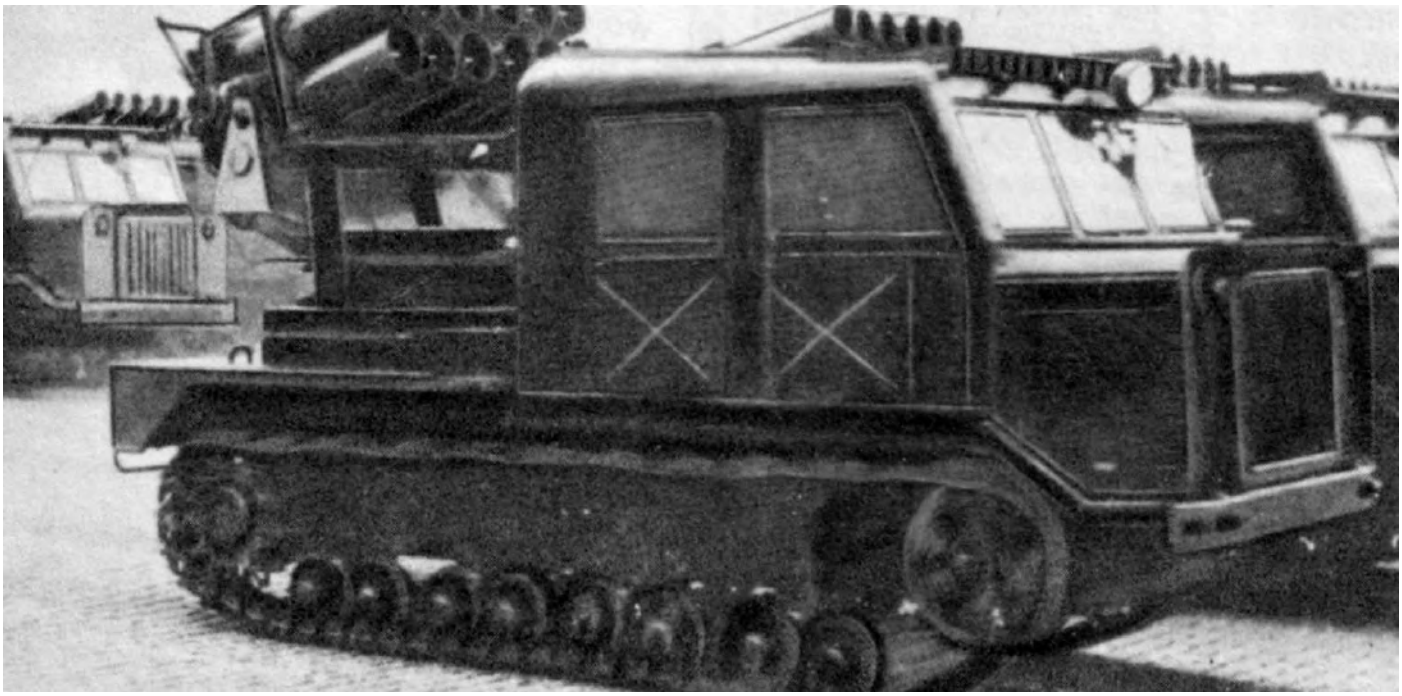
The BM-21's predecessor, the 240mm BM-24, entered service in the early 1950s, drawing on the Red Army's experiences during the Second World War.

The only real drawback with the BM-21 was that it could take up to 15 minutes to reload. The Czechoslovak Army came up with a solution to this by developing a reload rack that could conduct reloading in less than two minutes. It consisted of a BM-21 launcher mounted on a Tatra 813 8×8 truck with the palletised reload behind the cab.

The subsequent Grad 1 and Grad V rockets become operational in the mid-1970s. The BM-21 first saw action in the 1969 Sino–Soviet border war, and subsequently was fired in anger during numerous wars around the world. Well over half a dozen countries have produced their own versions. Soviet motor rifle and tank divisions fielded rocket launcher battalions consisting of three battalions, each with twelve launchers. During the Soviet–Afghan War the Kabul regime employed the ancient 132mm BM-13, while the Soviets fielded the BM-21a forty tube and BM-21b twenty-six tube 122mm and the BM-22 220mm multiple rocket launchers.

BM-24 240mm Multiple Rocket Launcher

The BM-21's predecessor, the 240mm BM-24, entered service in the early 1950s. The large 112kg rocket was spin-stabilised and, although packing a punch, had a shorter range at 11km. The open frame welded steel tube launcher had two rows of six rounds mounted on the ZIL-157 truck, which replaced the Zil-131 in 1966. A twelve-round tube launcher was also installed on the AT-S tracked artillery tractor. The BM-24 was used to support the motorised rifle divisions of the Soviet Army, but was eventually replaced by the BM-21. Most were sold off to the Arab states, while Israel captured enough from Egypt in 1967 to equip a battalion that saw action in the Yom Kippur War and the 1982 Lebanon War.



The BM-24 was mounted on the ZIL-151 6×6 truck chassis and the AT-S tracked artillery tractor.

BM-25 250mm Multiple Rocket Launcher

During the 1960s the 250mm BM-25 was the largest multiple rocket system in service with the Soviet Army. The launcher had six rails and was carried either on a ZIL-157 truck or on the KrAZ-214 chassis. It came into service in the late 1950s and had a greater reach than the other systems, with a range of 30km. The BM-25 rocket launcher battalions were made up of three batteries, each deploying six launchers. Like the earlier BM-24, it was phased out in favour of the BM-21.

BM-22/BM-27 220mm Uragan (BM 9P140) Multiple Rocket System

Known as the M1977 by NATO, the fifteen-round Uragan (‘hurricane’) went into service with the Soviet Army in 1975. Until the introduction of the Smerch, the Uragan was the largest system of its type in service. (The BM-24 240mm and BMD-20 200mm truck-mounted rocket systems had been retired many years before.) In some units it was also used to replace the shorter-range BM-21. The BM-27 first saw action against the Mujahideen in Afghanistan from 1984, but as American-supplied surface-to-air missiles began to curtail Soviet helicopter gunship operations from 1986–87, numbers were greatly enhanced. The Afghans dubbed it the BM-40, as they believed it had a 40km range.

The BM 9P 140 was mounted on a ZIL-135LM 8×8 chassis, which was also used with the FROG-7, greatly enhancing the launcher’s mobility. The launcher pod comprised an upper layer of four tubes, with two lower layers of six tubes each. Two engines were to the rear, while the unarmoured crew compartment was at the front. When firing, two stabilisers were lowered at the rear and steel shutters raised over the windscreen. A full salvo took just 20 seconds to fire. The launcher had to be traversed to the side and horizontal for reloading, which could take up to 30 minutes.

The BM-27 220mm rocket launcher first saw action against rebel guerrillas in Afghanistan in the mid-1980s.

BM-21 122mm Prima (BM 9A 51) Multiple Rocket System

Like the Smerch, the Prima entered operational service in the late 1980s. It consisted of a 122mm launcher based on a 6×6 Ural-4320 truck chassis and was essentially an updated BM-21. The launcher comprised five layers, each of ten tubes, inside a rectangular box frame. It could fire all the standard BM-21 rockets.

BM-30 300mm Smerch (BM 9A 52) Multiple Rocket System

The twelve-round 300mm Smerch (‘tornado’) multiple rocket system entered service in 1987. Its NATO reporting name was the M1983. The elevating launcher was mounted on a modified 8×8 MAZ-543M cross-country truck chassis. The slightly unusual rocket tube arrangement consisted of two separate banks of four, with four further tubes in a single row over the top. For stability before firing, two stabilisers positioned on either side between the rear two road wheels were lowered. The system could conduct either single round or salvo firing. The launcher was supported by a reload vehicle carrying twelve rockets and a crane. It was designed to destroy enemy artillery, missile and mortar batteries, as well as enemy strongpoints. The minimum range of the rocket was 20km, and its maximum range was 70km. Each brigade had four battalions, each with twelve launchers.

The powerful BM-30 Smerch (‘tornado’) fires twelve 300mm rockets from a modified MAZ-543 truck chassis.

BM-30s supplied to the Kuwaiti Army.

The FROG-7 was widely exported and saw combat in numerous regional conflicts during the Cold War.

Chapter Seven

Guideline to Gadfly Mobile Air Defence Missiles

The Soviets appreciated that to dominate the battlefield they needed to command the airspace over their forces. As a result, during the 1960s they developed one of the most comprehensive ranges of air defence systems of any army during the Cold War. By the early 1980s Soviet air defence forces could field about 10,000 surface-to-air missile launchers, many of which were the ageing SA-2 Guideline.

Close air defence was provided by smaller calibre weapons, such as 12.7mm and 14.5mm machine guns, ZU-23 multiple machine guns (*see* Chapter 9) and SA-7 man-portable surface-to-air missiles. Unit protection was provided by SA-9 Gaskin and ZSU-24-4 mobile systems, which included the SA-6 Gainful and SA-8 Gecko for both low and medium air defence. Most of these weapon systems were combat tested in the Middle Eastern and Vietnam wars. These provided valuable testing grounds and the Soviets were swift to learn valuable lessons from these conflicts, which resulted in continual upgrades.

SA-2 Guideline Towed Mobile Surface-to-Air Missile System

The towed SA-2 Guideline missile first went into production in the mid-1950s and it became probably the most widely deployed system of its kind in the world. Subjected to continuous improvement, this 10.7 metre missile included cruciform small fixed nose fins, a second set of larger cruciform cropped delta wings two thirds of the way along and a third smaller set towards the rear. In tandem was a solid boost motor with four very large delta fins, which, like the others, were indexed in line. One opposite pair had trailing edge controls for the initial roll-stabilisation and gathering onto the guidance beam. It had a range of some 50km.

A single missile was transported on a ZIL-157 hauled articulated trailer, from which it was pulled backwards onto a rotatable launcher, which was elevated to about 80 degrees before firing. The standard support radar, known to NATO as the Fan Song, locked onto the target and fed data to the computer van. The latter set up the launcher and, after firing, employed a UHF link to guide the missile once it was on the guidance beam. The SA-2 was deployed by all the Warsaw Pact armies and was also widely exported to such countries as China, Egypt, India, Iraq, North Korea and Vietnam. The SA-2 served with the Soviet Army at both front and army level, with eighteen launchers per air defence regiment.

The SA-2 Guideline towed surface-to-air missile, first deployed in the 1950s, formed the backbone of the Soviet and Warsaw Pact armies' air defences.

Soviet air defence crews move to adjust their SA-2 missiles.

The SA-2 was widely exported and saw combat in Vietnam and the Middle East with mixed results.

SA-3 Goa Wheeled Mobile Surface-to-Air Missile System

This 1960s missile had half the range of the SA-2, so acted as the latter's medium altitude partner. The SA-3 was carried in pairs on inclined launcher ramps mounted on the ZIL-157 truck. This air defence missile had a large tandem boost motor with large rectangular fins that spread through 90 degrees at launch, a solid sustainer, fixed rear wings and ailerons on two opposite surfaces, plus powered nose control fins. It was served by the Flat Face radar, a UHF acquisition system with superimposed parabolic areas with a range

of 250km, along with the Low Blow target tracking and missile guidance radar with a reach of 85km.

The SA-3 Goa wheeled surface-to-air missile system appeared in the 1960s. With only half the range of the SA-2, it acted as the latter’s medium altitude partner.

The imposing SA-4 Ganef missile was carried on a specially developed tracked launcher. Two of the missile's four solid-boost motors are visible between the two sets of stabilisation fins.

SA-4 Ganef Tracked Mobile Surface-to-Air Missile System

This self-propelled anti-aircraft missile system, bearing the NATO codename SA-4 Ganef, appeared publicly in the Moscow Red Square parade in 1964. It was a medium-to long-range air defence weapon that could reach targets up to 75km. It comprised two large missiles on a launcher mounted over the hull of a specially designed tracked carrier. Unlike the normal redesign and conversion of existing armoured vehicles, this vehicle had its engine and transmission at the front, thereby freeing the rear of the hull for the launching equipment. This was also air portable. The launch platform could be rotated through 360 degrees with a maximum elevation of 70 degrees.

The missile itself was about 9 metres long and, after being lifted off by four solid propellant boosters mounted externally, was propelled by an internal kerosene-fuelled ram jet. The Ganef operated with a scanning radar and with what NATO called the Pat Hand target acquisition and fire control radar carried in separate vehicles. The SA-4 was deployed at army level in SAM brigades consisting of three battalions each with nine launchers.

Soviet crews preparing their SA-4 missiles. These were deployed in brigades made up of three battalions each with nine launchers.

SA-6 Gainful Tracked Mobile Surface-to-Air Missile System

The surface-to-air system known as the SA-6 Gainful by NATO was a highly mobile and flexible system that was credited with destroying more than one-third of the Israeli aircraft lost in the 1973 Arab–Israeli War. This was a medium-range anti-aircraft weapon designed to deal with attacking aircraft at ranges of between 5 and 30km. It was supported by the SA-4 Ganef covering greater ranges up to 70km and the SA-7 Grail man-portable or vehicle-mounted launcher and the ZSU-23-34 dealing with short distance and close-up aircraft.

The SA-6 Gainful was first seen in Red Square on 7 November 1967. It consisted of three rockets mounted on a fully rotating turntable carried on a tracked chassis derived from the PT-76 amphibious tank. The SA-6 itself was a single-stage missile some 6.2 metres long launched by a solid-fuel rocket engine and propelled at a cruise speed of Mach 2.5 by a liquid fuel ram jet. The warhead was of the high explosive fragmentation type. The command guidance system was in the centre section and there were receiver antennae and beacons on the tips of the two rear fins.

An SA-6 battery unit comprised five vehicles, three with the triple launchers, a loading vehicle and a Straight Flush radar vehicle. Each Soviet Army deployed five batteries, with three positioned 5km behind the front and the other two covering the 10km gaps further back. Various radars, most notably the Long Track, provided early warning and preliminary target data. In Egyptian service SA-6 units were supported by the van-mounted Flat Face radar, but the key guidance radar was the Straight Flush.

Iraqi SA-6 surface-to-air missiles. This system needed two vehicles: the tracked launcher shown here and a second vehicle mounting the Straight Flush search, acquisition and tracking radar.

The Straight Flush fire control vehicle was used in conjunction with the Gainful and utilised a similar chassis to that of the missile carrier. The target tracking radar and the target acquisition radar were both mounted on a pedestal in the centre of the vehicle, with

the tracking radar on top. When deployed, the Straight Flush would be supplied with target information from long-range radars such as Flat Face and from its acquisition radar after locating a target and identifying it as friend or foe; this data was then passed to the tracking radar to lock the system onto the enemy aircraft so the missile could be launched. The Gainful was supplied by the Soviet Union to other Warsaw Pact armies and to the Middle East, including Egypt and Syria.

SA-7 Grail Man-Portable Surface-to-Air Missile

This very basic man-portable SAM consists of a tube missile container. Using the grip unit, the operator aimed the launch tube at the target over an open sight, placed initial pressure on the trigger, waited until the resulting red light turned green to indicate that the seeker was locked on, and then pressed the trigger again. The missile had a dual thrust solid motor and was steered by canard fins. The boost charge extinguished before the missile cleared the tube, then at a safe distance the sustainer ignited, accelerating the missile to about Mach 1.5. The 2.5kg warhead had a smooth fragmentation casing with both graze and impact fusing. It was lethal only against small aircraft; during the 1973 Yom Kippur Arab–Israeli War, half the Israeli A-4 Skyhawk jets hit by Grails returned safely.

This weapon was originally known as the Strela or Arrow in the West and was very similar to the American Redeye. It certainly had the latter’s shortcomings, which included a very unhelpful ability for the uncooled PbS IR seeker to lock on to any heat source besides the engine of a departing attacker. An improved version put into production in 1972 had an IR screen to filter out decoys, higher speed and improved guidance. The SA-7 was issued to every Soviet infantry section providing a carpet of air defence weapons across the battlefield. It was also widely exported and saw combat in numerous wars.

SA-8 Gecko Wheeled Mobile Surface-to-Air Missile System

This short-range all-weather anti-aircraft system first appeared in public in 1975 and came as something of a surprise. It comprised a quadruple launcher, early warning surveillance and tracking radar and two guidance radars mounted on a turret, transported on a six-wheeled vehicle. The Gecko carrier vehicle, while based on a greatly modified version of the ZIL-167 truck employed in the Soviet Union’s arctic territories, was not known to have been used for any similar purposes, therefore making it unique.

The SA-8 Gecko with its quadruple missile launcher and self-contained on-board search, acquisition and guidance radars.

The missile itself, powered by a solid-fuel rocket, had a range of 19km horizontally or 11km vertically, so could engage targets outside the range of the SA-9 but below the effective range of the SA-6 Gainful. It had small fixed tail fins, small nose canard controls, a radar beacon and external flare. The dual thrust solid motor gave very high acceleration to burn-out speed greater than Mach 2, whereas the typical interception speed was around Mach 1.5.

The SA-8 Gecko system had the advantage of being able to fire a salvo of two missiles at the same target, simultaneously guiding them on different radio frequencies. This made jamming countermeasures and evasive manoeuvring far less effective. Each vehicle carried eight additional missiles, enough for two reloads. Every Soviet motor rifle and tank division included an air defence regiment with five batteries, each equipped with five SA-8 vehicles.

SA-9 Gaskin Wheeled Mobile Surface-to-Air Missile System

The very widely deployed SA-9 surface-to-air missile entered service in the late 1960s, but was first seen publicly in November 1975. The Gaskin consisted of an SA-9 missile mounted on a modified BRDM-2 amphibious scout car chassis with the cross-country belly wheels removed. The scout car’s machine gun turret was replaced by a new one-man turret with an elevating arm on either side of which were two box-type launchers with two missiles each. When travelling, the latter were usually lowered into a horizontal position on the top of the hull deck and protected by raised grilles.

The SA-9 Gaskin was designed as a mobile anti-aircraft system to protect armoured and motorised units from low-flying aircraft. The missile was an infra-red heat-homing

weapon developed from the earlier man-portable SA-7 Grail, but incorporating a larger warhead and a more powerful solid-fuel rocket motor. It had a maximum range of 7,000 metres, with altitude limits of 900–5,000 metres. No reserve missiles were carried on the Gaskin.

SA-9 Gaskins on patrol. The four missile launcher tubes were mounted on a rotating platform and had an effective range of 7km.

It was normally deployed in batteries of four, with one vehicle equipped with the Flat Box A passive radar detection system. In total, there were sixteen of these vehicles in a division, greatly enhancing the already considerable air defences. These batteries operated alongside the ZSU-23-4 four-vehicle platoons. Likewise, the SA-9 system could be linked with the Gun Disk radar as an alternative to the optical sighting system, and such equipment would also be carried in an accompanying vehicle. The Gaskins were backed by the division's air defence regiment armed with the SA-6 or SA-8, which supplied the SA-9s with preliminary target data.

SA-10 Grumble Wheeled Mobile Surface-to-Air Missile System

The SA-10 was introduced in 1979 as a long-range air defence missile that was designed to protect the Soviet Union's infrastructure. As such, it was a strategic rather than a battlefield weapon and by the late 1980s most of these weapon systems were deployed mainly in the Moscow area. The 5P85-1 vehicle was an eight-wheeled semitrailer truck that served as a twin missile TEL. It was supported by the Tin Shield surveillance radar

and a Flap Lid fire control system. Just as the Cold War was coming to an end, a variant with the NATO reporting name SA-12 Gladiator/Giant was introduced as a replacement for the SA-4 Ganef.

The SA-10 Grumble system was designed as a strategic air defence weapon to protect the Soviet Union’s infrastructure.

SA-11 Gadfly Tracked Mobile Surface-to-Air Missile System

Following their experiences with the SA-6, the Soviets sought to improve upon it and this resulted in the SA-11 Gadfly missile, which went into service in the early 1980s. This medium-range, semi-active, radar-guided missile using solid rocket propulsion was designed to offer defence against high-performance aircraft and cruise missiles. The Mach 3 semi-active homing missile had a maximum range of 28km. Notably, it could engage up to six targets simultaneously – a major improvement on the single-target capability of the SA-6.

The Gadfly was based on the GM-569 tracked chassis and comprised four ready-to-fire missiles on a turntable that could traverse through 360 degrees, plus a Fire Dome monopulse guidance and tracking radar. The system was supported by a loader/launcher, Snow Drift surveillance radar and a command and control vehicle; the tracked surveillance radar used the same chassis, as did the loader.

The SA-11 Gadfly first went into service in the early 1980s and was a vast improvement on the singletarget capability of the SA-6.

In-depth Soviet air defences inevitably posed a considerable threat to NATO’s air forces.

Chapter Eight

Field Artillery

Soviet artillery designers led the world in producing simple, effective and reliable guns, with a greater range for a given calibre than any other nation. Such weapons proved ideal for the Soviet Army and its allies, as well as for the armies of the developing world. This was typified by the 130mm M-46 field gun that first appeared in 1954 and was one of the most powerful of its type worldwide. Like the equally successful D-30 122mm howitzer, it ended up equipping the armies of Africa and the Middle East.

76mm M1966 Mountain Gun

This mountain gun had a split trail and split shield. Dubbed the M1966 by NATO, this weapon was probably designed with the mountains of Central Asia in mind; certainly its first reported use by the Soviet Army was in Afghanistan in 1966. It had no muzzle brake and the breech had a horizontal sliding wedge that opened to the right. The direct fire and panoramic sights were positioned on the left of the barrel. Maximum range was about 11,000 metres, with a maximum rate of fire of fifteen rounds per minute. The wheels were mounted on stub axles that were lowered or raised to alter the height of the gun. Transport was either broken down on pack animals or towed by 4×4 trucks such as the GAZ-66. The Soviet and Afghan armies were the only forces to have deployed this weapon.

85mm D-44 Divisional Gun

The D-44 85mm divisional gun was designed during the Second World War as a replacement for the highly successful M1942 76mm gun but it was not issued until after the war. The weapon had a proven pedigree, as it was essentially the same calibre as that used in the T-34/85 tank and the M1939 anti-aircraft gun, but fitted with a double baffle muzzle brake. The gun shield had a distinctive wavy top with a small sliding panel in the front, which moved with the elevation of the barrel. The recoil system was mounted above the cradle and breech ring and behind the shield. It was fitted with the gunner’s OP1-17 and PG1M periscopes; it could also take the APN3-7 infra-red night device. The D-44 was used by the Soviets and the Warsaw Pact armies and was also widely exported. The Chinese manufactured a version known as the Type 56.

The postwar 85mm D-44 divisional gun was intended as a replacement for the M1942 76mm.

100mm T-12 Anti-Tank Gun

Developed as a replacement for the 85mm D-48 and the M-1955 100mm gun, the T-12 went into service in 1960 and was followed by the improved MT-12. Both types were employed by the anti-tank units of the tank and motorised rifle regiments. Although designed for direct fire, both could also be used for indirect fire. The carriage was of the split trail type with a castor wheel mounted on the left rail to facilitate bringing the gun into action.

120mm 2B16 Combination Gun

The 2B16 combined the features of a howitzer and a mortar into one system and was unique as there was nothing comparable in the West. It was developed during the 1970s and accepted into service with the Soviet Army in 1986, being mainly issued to the air assault forces. The weapon was mounted on a split trail carriage, with each trail fitted with a castor wheel to allowing the weapon to be brought into action quickly. When under tow, the trails were closed together and locked, and the upper part of the weapon was traversed through 180 degrees and locked over the closed trails. It was normally towed by a GAZ-66 4×4 light truck, which also carried the five-man crew and ammunition.

122mm M1938 Howitzer

Until the introduction of the D-30, the M1938 – a veteran of the Second World War – was the standard divisional howitzer of the Warsaw Pact armies, with two battalions equipped with a total of thirty-six guns per motorised rifle division and three battalions with fifty-four guns per tank division. The shield was folded with the top half sloping to the rear and in the centre was a section that slid upwards to allow barrel elevation. The carriage comprised a riveted box section split trail identical to that employed on the M1943 152mm howitzer. The M1938 was already obsolete before the Second World War due to its short range and poor mobility. Nonetheless, it was sold to armies around the world, with China producing a version known as the Type 54.

122mm D-30 Howitzer

The D-30 was the basic field gun of the Soviet Army and was deployed throughout the Warsaw Pact. Unusual features of this gun was that it was towed by the barrel and the

recoil system was mounted over the barrel rather than below it. It first entered service in the early 1960s as a replacement for the M1938 howitzer. The main improvements included increased range and the ability to traverse rapidly though 350 degrees. It was towed by a lunette lug under or just behind the muzzle brake, with its trails folded under the barrel.

The D-30 122mm entered service in the early 1960s as the basic field gun of the Soviet Army and was deployed throughout the Warsaw Pact.

This is a late production D-30M, identifiable by the new double baffle muzzle brake, a new central baseplate (which is square rather than round) and a towing lunette assembly on the barrel.

A D-30 122mm howitzer serving with the Afghan Army.

The D-30’s longer barrel provided greater range than the M-30, while an unusual three-leg stabilising system allowed for the rapid traverse of the gun through 360 degrees.

On reaching the battery position, the crew had to unlock the barrel travelling lock, which then folded back onto the central trail. The firing jack under the carriage was then lowered, lifting the wheels clear of the ground. Then the two outer trails were spread at 120 degrees and the firing jack raised until all three trail ends were on the ground, where they were staked into position. Like the M1938, the D-30 was widely exported.

122mm D-74 Field Gun

The D-74 gun was seen for the first time in public at the 1955 May Day parade in Moscow. It used the same carriage as the 152mm D-20 howitzer, although the D-20 had a thicker barrel and larger muzzle brake.

Both the D-74 and the M-46 130mm field gun were designed to replace the M1931/37. Although the M-46 was chosen in preference to the D-74 as it fired a heavier shell, the latter was built in some numbers and exported, most notably to Cuba, Egypt, North Korea and Vietnam.

A Chinese Type 59-1 130mm field gun (a recalibrated Soviet D-74 122mm gun), with an Iraqi S-60 57mm anti-aircraft gun. Both were captured during Operation Desert Storm in 1991.

M-46 130mm guns belonging to the Bosnian Serb Army.

130mm M-46 Field Gun

Technically speaking, the M-46 was the only towed ‘gun’ used in Soviet field artillery units, as all the others were howitzers. It was originally a naval gun, but was remounted for field use because of its exceptional range of over 27,000 metres. In the mid-1970s a

modified version featuring a longer barrel, recuperator and cradle went into service.

Like all other Soviet indirect fire weapons, the M-46 could also fire an anti-tank round capable of penetrating 230mm of armour at 1,000 metres. This 130mm field gun was normally deployed at front level with two battalions each with eighteen guns. Because of its range its main role was counter-battery fire, but by the end of the Cold War it had been replaced in most front-line units. The Egyptian, Iranian, Iraqi and Syrian armies were all supplied with the M-46.

152mm D-20 Gun Howitzer

The standard heavy artillery of the Soviet Army was the D-20, which replaced the M1937 (ML-20) 152mm weapon, which had served the Red Army during the Second World War. The D-20, like the D-74, first appeared in the mid-1950s. Its massive barrel had a large double baffle muzzle brake and a semi-automatic sliding wedge breech, giving a rate of fire of up to four rounds a minute despite having to use separate loading variable charge case ammunition. The D-20 employed the same recoil system and carriage as the D-74, but had a much shorter and fatter stepped barrel. Initially these weapons were deployed in regiments of eighteen at army level, though they may also have been deployed at front level. By the 1970s they were increasingly replaced by a generation of self-propelled guns.

The standard heavy artillery weapon of the Soviet Army was the 152mm D-20 howitzer.

This D-20 belonged to the Iranian Army and was employed during the Iran–Iraq War.

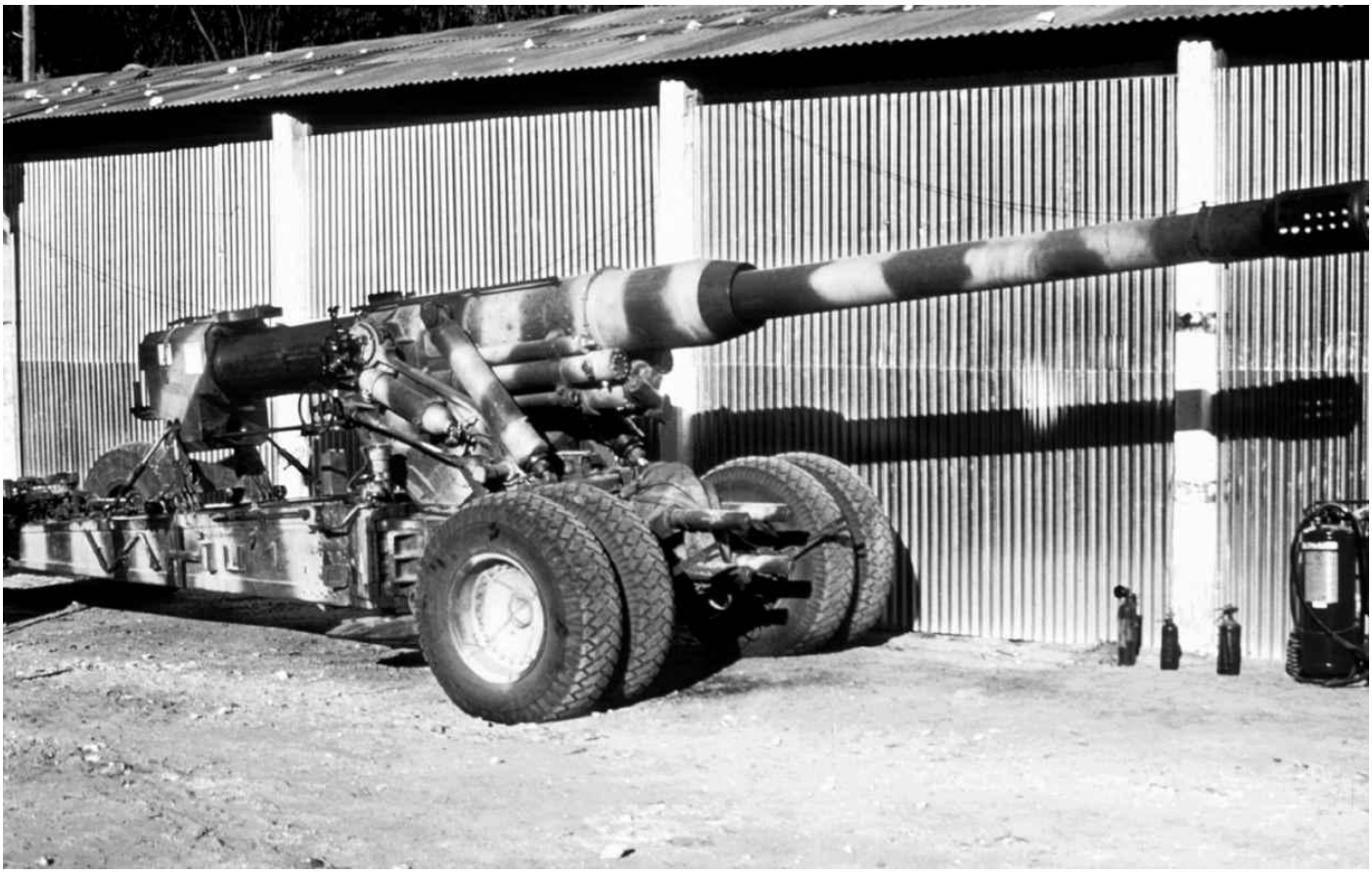
152mm Gun 2A36 M1976

During the 1970s the Soviets developed a new towed 152mm gun. It was first seen by NATO Intelligence sources in 1976, and so was dubbed the M1976. However, it did not enter service until 1981, when it replaced the M-46 130mm field gun. It was another four years before the M1976 was seen in a Moscow May Day parade, towed by a 6×6 KrAZ-260 truck. Its Soviet industrial number was 2A36 but it was called the Giatsint (‘hyacinth’) by the Soviet Army and was the same as that used in the 2S5 tracked self-propelled artillery system. The M1986 was deployed in batteries of six or eight guns, with three batteries per battalion. Production ceased during the 1980s.

The massive 152mm M1976 replaced the M-46.

180mm S-23 Field Gun

By the 1980s the largest piece of ordnance in the Soviet inventory was the massive 180mm S-23 field gun. Developed from a naval weapon, this was observed in public for the first time at the 1955 Moscow May Day parade. Due to its size, Western Intelligence initially assessed that it was 203mm calibre and gave it the reporting name of M1955. It was not until the Israeli Army captured some in 1973 that it was realised that the gun was 180mm. Its range was 30,400 metres, though this could be boosted to 43,800 metres with the use of a rocket-assisted shell. This field gun fired an 88kg fragmentation high explosive shell or an 84kg rocket-assisted fragmentation high explosive (FRAG-HE) projectile, but it could also fire a nuclear round, a 97kg blockbuster and a chemical shell. Notably, unlike almost every other Soviet artillery weapon, it did not have an anti-tank capability. This was probably due to its very slow rate of fire, which averaged one round per minute.



By the 1980s the S-23 180mm field gun was the largest piece of ordnance in the Soviet inventory.

During transport, the barrel, which has a large pepperpot muzzle brake, was withdrawn and linked to the trails to reduce the overall length of the gun. The carriage was of the split trail variety with box section trails and two large dual rubber tyres at the front and two slightly smaller ones on a limber at the back for towing. The prime mover for the S-23 was the AT-T heavy tracked artillery tractor.

This gun was made redundant when the Soviet Army’s divisional artillery regiments re-equipped with the M-1973 155mm and M-1974 122mm self-propelled guns. Under the Conventional Forces Treaty of 1990, Moscow declared that it had no S-23 field guns west of the Urals and that none of these weapons remained in front-line service. Nonetheless, it remained operational with the Egyptian, Indian, Iraqi and Syrian armies.

Chapter Nine

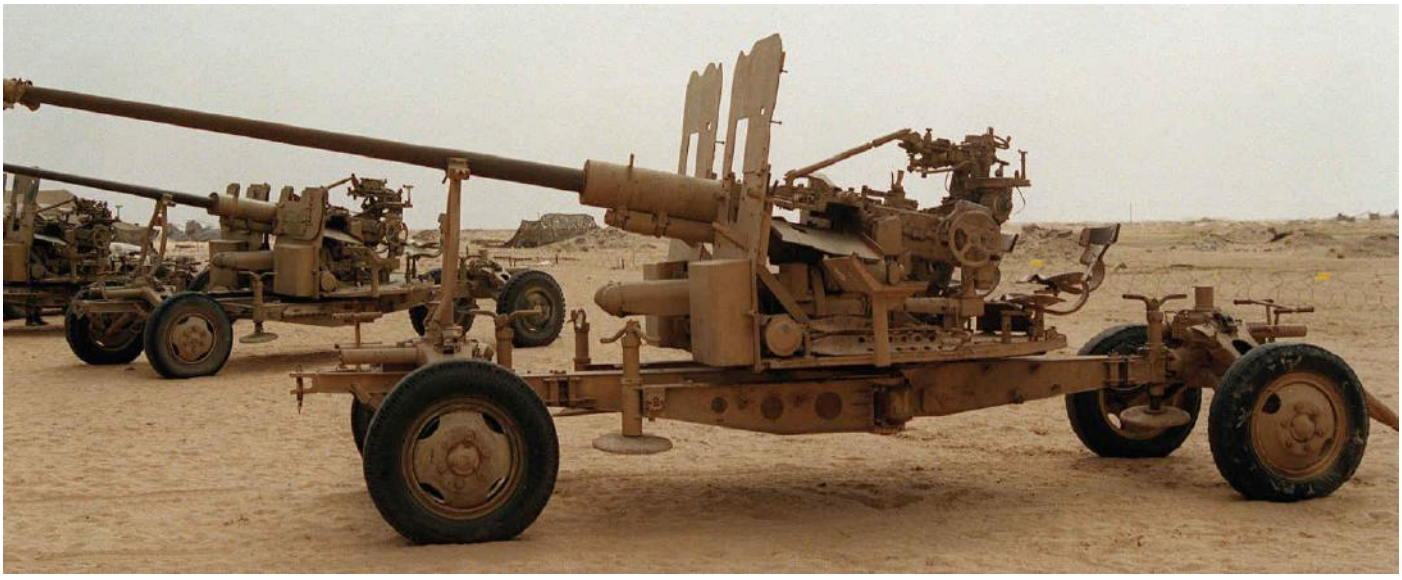
Anti-Aircraft Artillery

After the Second World War the Soviet Army persisted in fielding large numbers of towed anti-aircraft guns in support of their motor rifle and tank divisions. These weapons were gradually phased out by the ZSU-57-2 and the ZSU-23-4 self-propelled guns and the SA-6 and SA-8 Gainful, SA-8 Gecko and SA-9 Gaskin mobile surface-to-air missile systems.

S-60 Towed Anti-Aircraft Gun

The 57mm S-60 was the most widely employed towed anti-aircraft gun in service with the Warsaw Pact armies. There were single, twin and self-propelled versions. The single towed version, which was mounted on a four-wheeled trailer and was capable of a 360 degree traverse, ended up equipping around thirty countries worldwide.

This 4-ton gun could be radar-controlled and, like most Soviet guns, had a dual anti-aircraft and anti-tank capability. It had a 4,000 metre vertical range and a 12,000 metre horizontal range, with an effective rate of fire of seventy rounds per minute. The S-60 was issued on a generous basis, with twenty-four per tank and motor rifle divisions and eighteen with the air assault divisions. However, as technology progressed so the S-60 was phased out in favour of self-propelled guns and missiles.



The S-60 57mm was the most widely employed towed anti-aircraft gun by the Warsaw Pact armies. These examples were captured from the Iraqi Army.

ZPU-1 Anti-Aircraft Gun

The ZPU-1 was part of a family of towed anti-aircraft weapon mounts utilising the 14.5mm KPV heavy machine gun. The single-barrelled ZPU-1 and the ZPU-2 twin-and ZPU-4 quadruple-barrelled versions were all accepted into service in the late 1940s. The ZPU-1 was carried on a two-wheeled carriage, while the ZPU-4 had a four-wheeled

carriage. Each barrel had a maximum firing rate of 600 rounds per minute, though the effective rate was only about 150. Engaging ground targets, the 14.5mm had a range of 8,000 metres, but maximum altitude was only 5,000 metres and it was only really effective at 1,400 metres.

Although the Soviet Army soon replaced the ZPU series with the more powerful ZU-23, the ZPUs saw extensive combat with the North Korean and Chinese armies during the Korean War and with the North Vietnamese Army and the Viet Cong during the Vietnam War. In Afghanistan the Mujahideen used the 14.5mm gun (nicknamed the ‘Zigroiat’) and the DShKM 12.7mm ‘Dashika’ machine guns against Soviet aircraft and ground targets. When firing armour-piercing ammunition, it was capable of penetrating the 7mm titanium belly armour of the Hind Mi-24 helicopter gunship.

The ZPU-1 anti-aircraft weapon formed part of a family of infantry support weapons utilising the 14.5mm heavy machine gun.

The ZPU-2 variant with twin 14.5mm machine guns. The mobility of these weapons made them very popular with guerrilla armies.

The quad ZPU-4. As an anti-aircraft weapon, it was effective up to 1,400 metres and could engage ground targets out to 800m.

The larger calibre ZU-23-2 twin 23mm anti-aircraft gun. Like all such weapons, it was popular in the ground support role.

Although a towed weapon, the ZU-23-2 was regularly mounted in or on vehicles. This one is in the back of an Afghan Army truck.

ZU-23 Towed Twin Anti-Aircraft Gun

The twin 23mm ZU-23 was a fully automatic weapon capable of 200 rounds per barrel per minute. The ammunition was fed from two box-type magazines located outboard of the trunnions, each holding fifty rounds in a belt. The maximum antiaircraft ceiling was some 5,000 metres, but it was only effective at about half this distance.

As a purely visually sighted weapon, with no radar control, it could only really be used in fine weather. Like the S-60, it could also be used in an anti-armour role. While a single-barrelled towed version existed, its better-known incarnation was the four-barrelled water-cooled variant used on the ZSU-23-4 self-propelled gun. The ZU-23 was widely deployed for low-level unit air defence, with a battery of six issued to every tank and motor rifle regiment.

ZSU-57-2 Twin Tracked Anti-Aircraft Self-Propelled Gun

While the Soviet Union was swift to convert from anti-aircraft guns to mobile missile launchers to counter medium- and high-altitude aircraft, it still retained multiple quick-firing cannon, often radar-controlled, to defend its armoured formations from fast and low fighter-bombers.

The ZSU-57-2 was one of the first generation Cold War self-propelled antiaircraft guns and was first seen publicly in the late 1950s. It comprised twin S-60 guns mounted in an open-top turret on a shortened T-54 tank chassis. While the vehicle commander and the four gun crew operated from the turret, the driver was seated on the left-hand side at the front of the hull. The engine was the standard T-54 tank engine and the running gear was very similar but with one fewer road wheel on either side. While the road speed was comparable to the T-54, the reduced weight of 28 tons gave better overall performance.

The tracked ZSU-57-2 was one of the first Cold War self-propelled anti-aircraft guns, appearing in the late 1950s. Essentially it utilised a T-54 tank chassis minus one set of road wheels on either side.

A Croatian ZSU-57-2 that saw action during the Croatian War of Independence.

This modified Bosnian Serb ZSU-57-2 was photographed in 1996. This system saw extensive combat during the Vietnam, Arab–Israeli and Iran–Iraq Wars.

The guns had a range of 4,000 metres, with an elevation of up to 85 degrees. Although principally an anti-aircraft weapon, the ZSU-57-2 was also deployed in a devastating ground support role and was very effective against lightly armoured vehicles and troops caught in the open. The system was deployed in the Soviet Army purely as a line-of-sight weapon and little attempt was made to upgrade it with a tracking and fire control radar.

Even so, by the late 1970s the ZSU-57-2 was still in service with well over a dozen countries.

ZSU-23-4 Quad Tracked Anti-Aircraft Self-Propelled Gun

The follow-on ZSU-23-4 was a vastly more versatile weapon that could operate in a wide range of climatic and visual conditions as it was equipped with a radar for both target acquisition and fire control. This made it one of the most potent low-level anti-aircraft systems in the world. The crew of four comprised a commander, driver, radar operator and gunner; the large turret provided plenty of room, but the armour was very thin.

The ZSU-23-4 proved to be a highly effective low-level air defence weapon, but was equally devastating against ground targets due to its enormous rate of fire.

The running gear on the ZSU-23-4 drew on the PT-76 amphibious light tank.

This self-propelled gun was first seen in the mid-1950s and was named Shilka. It was combat-tested during the Yom Kippur War in 1973, where it proved itself one of the most effective low-level air defence systems used against the Israeli air force. The radar could detect targets out to 20km and the system could be fired while the vehicle was moving. One drawback with the radar was that it suffered from ‘clutter’ or background interference when engaging targets below 60 metres. The quadruple-mounted 23mm cannon offer a rate of fire of 1,000 rounds a minute for each gun, though the normal rate of fire was much lower at about 200 rounds a minute, fired in 50-round bursts per barrel. As the gun calibre is smaller, the effective range against low-flying aircraft is around 2,500 metres.

Overall, the ZSU-23-4’s layout was similar to that of the ZSU-57-2, although it was not mounted on a T-54 chassis. The lower chassis and running gear were largely identical to the PT-76 amphibious tank, with the same engine and transmission. Vehicle performance was similar, but the ZSU-23-4 was not amphibious. It was used to replace the ZSU-57-2 in the Soviet Army and in the front-line units of the other Warsaw Pact armies. Four ZSU-23 equipped every Soviet tank and motor rifle regiment, with a total of sixteen per division.

12.7mm DShK-38 Heavy Machine Gun

The Model 1938 large calibre machine gun, mounted on a two-wheeled chassis, was designed as an infantry support weapon but its most widespread use after the Second World War was as an anti-aircraft weapon on armoured fighting vehicles. In 1946 the DShKM modernised version was introduced. Since then it was manufactured by China, Pakistan and Romania, and became one of the most widely employed heavy machine guns in the world.

Notably, it was used on Soviet tanks from the T-54 to the T-72. This was thanks to its

2,000 metre range and firing rate of 575 rounds per minute. Initially, the vehicle commander had to expose himself at the turret hatch to deploy the weapon, but this was later remedied by a remote control fire station. Soviet troops dubbed it Dushka (‘sweetie’). In the 1980s a number were smuggled from Libya into Northern Ireland, where the Irish Republican Army used them to try to shoot down British Army helicopters.

The DShK heavy machine gun was used for air defence on Soviet tanks and armoured fighting vehicles.

Chapter Ten

Soviet Kit in Combat

Despite the fact that the Cold War never turned hot in Europe or North America, nearly all of the equipment described in this book, except for the ICBMs, saw very extensive combat throughout the world. From the Middle East to South-East Asia, Soviet designed and built aircraft, warships and missiles made their presence felt in a series of long-running and very bloody regional conflicts. Over the contested skies of Korea MiG fighters flew combat missions during the early 1950s. Likewise, two decades later Soviet-supplied jet fighters and surface-to-air missiles played a prominent role in the Vietnam War. In Afghanistan the Soviet Army and air force put much of the late Cold War hardware through its paces during the 1980s fighting the Mujahideen.

Moscow was never slow supplying its Warsaw Pact allies and other Soviet client states with weaponry, technicians and pilots. When Soviet aircraft and air defence systems were supplied, it inevitably resulted in the presence of a Soviet military training team, allegedly there in a non-combat ‘advisory’ role. In the case of the developing world, such equipment played a part in the post-colonial struggles when many countries sought independence. The civil wars that followed as the victors fell out with one another were fuelled by a steady flow of Soviet arms; such was the case with Angola, Ethiopia, Mozambique and Yemen.

The Arab–Israeli Wars and the Iran–Iraq War proved ideal testing grounds for Soviet jets, anti-aircraft systems and ballistic missiles. Ultimately, though, the Soviet-supplied jet fighters and bombers of the Arab air forces proved no decisive threat to Israel. The one war that stands out is Yom Kippur in 1973, when the Egyptians and Syrians launched a surprise attack on Israel. When the Egyptian Army stormed across the Suez Canal and through the lightly defended Bar Lev line, it was covered by an initially impenetrable Soviet-designed air defence screen. For a while Soviet missiles brought Israeli jets crashing to the ground.

Soviet ground crew preparing their aircraft for a mission in Afghanistan. Pilots also covertly gained combat experience during numerous regional conflicts, such as the Korean and Vietnam Wars.

Soviet pilots being briefed before a training mission. When Moscow supplied client states with jets, training teams inevitably followed.

Just two years after the Cold War commenced, the MiG-15 appeared over Korea in late 1950, with initially some fifty aircraft flown by Chinese and Soviet pilots in support of the North Korean Army. The first all-jet battle occurred on 8 November 1950 when an American pilot shot down the first MiG-15. Despite the MiGs' presence, much to Moscow's dismay the American F-86 Sabre gained almost complete command of Korea's skies.

A MiG-17 being shot down by an American F-105D in 1967 during the Vietnam War. Although obsolete by this stage, the North Vietnamese Air Force used the MiG with some success.

The 1956 Suez crisis was sparked when Egypt announced a massive arms deal with Czechoslovakia that included 150 MiG-15 fighters and its intention to nationalise the Suez

Canal. The ill-advised Anglo-French operation to seize the canal resulted in only minor air losses, with a total of ten aircraft lost (two British and eight French). The Egyptian–Israeli air war was also fairly limited. The Egyptians lost nine aircraft, including four MiGs and four British-made Vampires.

Alongside the MiGs, SA-2 and SA-3 surface-to-air missiles went head-to-head with the United States Air Force over Vietnam with mixed results. North Vietnamese MiG-17 and later MiG-19 and MiG-21 aircraft opposed American bombing raids beyond the demilitarised zone. Some of the USAF's very first air-to-air combat losses occurred in 1965 when a force of F-105 Thunderchiefs and F-100 Super Sabres were attacked by four MiG-17s, which scored two kills. Later that same year two F-4 Phantoms intercepted four MiG-17s, claiming two with radar-guided missiles. Later still, four piston-engined A-1 Skyraiders took on two MiG-17s and shot one down with 20mm cannon fire.

By mid-1966 North Vietnam deployed about sixty-five MiG-17 and MiG-21 fighters, but by early 1972 this force had expanded to 200, half of which were MiG-21s. During the period 1965–67 four MiGs were shot down for every American fighter lost; in total, USAF claimed 137 MiG kills. Nevertheless, by 1972, once the North Vietnamese Army was equipped with shoulder-launched SA-7 and radar-controlled anti-aircraft artillery, all but the most modern aircraft became obsolescent.

North Vietnam built several hundred SA-2 sites but they proved ineffective, as fifty missiles were fired for every aircraft brought down. The North fired 1,242 surface-to-air missiles in December 1972, exhausting their air defences. USAF's previous experience with the SA-2 and SA-3 meant it was able to develop electronic countermeasures that could jam the missiles' radar-guidance frequencies.

During the Six Day War in 1967 it took the Israelis just 25 minutes to destroy the Jordanian Air Force, damage the Iraqi Air Force and inflict such losses on the Syrian Air Force that it took no further part in the fighting. At the end of the first day 300 Egyptian planes had been destroyed; for the whole of the conflict Israel claimed 452 Arab aircraft for the loss of just 46. It proved a nasty wake-up call for Moscow, which was swift to blame the capabilities of the Arabs' early warning systems.

In Africa, the Nigerian civil war fought from 1967 to 1970 was a one-sided affair in terms of the air war, thanks to Soviet-supplied MiGs. The Nigerian government deployed six MiG-15, ten MiG-17 and twelve Czech Aero L-29 aircraft, easily defeating the Biafran separatists' three B-26 light bombers, single B-25 Mitchell bomber and six French Airliners in 1967. Egyptian pilots gained valuable combat experience with the MiGs.

A Soviet warship launching its missiles during an exercise. Such flexing of naval muscle was commonplace by both sides during the Cold War.

During the early 1970s the Egyptians and Syrians, with Soviet assistance, built up dense networks of anti-aircraft missiles (including the then new SA-6), even more densely than those used by North Vietnam. The Israeli Air Force learned the hard way in the 1973 Yom Kippur War. In eighteen days of fighting it lost more than 25 per cent of its combat

aircraft, mainly to radar-guided anti-aircraft artillery rather than missiles.

The Israelis greatly benefited from America's experiences in the Vietnam War. The SA-2 and SA-3 missiles used by the Arabs were relatively immobile and most of their frequency codes had been broken. But the Arabs also deployed the SA-6 in combat for the first time, and it was this that posed the greatest threat to the Israeli Air Force. It was fully mobile and its frequencies unknown, and the Israelis were reduced to dropping Second World War-style 'Chaff' to blind the Arab radars.

Arab missiles accounted for 114 Israeli planes (only fifteen were lost in air-to-air combat). In stark contrast, losses in the Egyptian and Syrian Air Forces were comparable to those suffered in the Six Day War, with 442 aircraft lost in dogfights, ground fire and bombing raids. Its high losses brought into question Israel's capability to operate against dense air defences, although a succession of Israeli Air Force commanders subsequently stated they could not only cope but could also destroy them. This was proven to be the case in 1982 in the Lebanon.

The fortunes of the Angolan civil war were swayed by the use of Soviet surface-to-air missiles. In 1980 the UNITA opposition forces shot down two government transport aircraft using SA-7 missiles. The following year they accounted for another government transport plane, and these losses continued to escalate. Using a combination of SA-7 missiles and anti-aircraft guns, in 1983 UNITA claimed five MiG-21 aircraft and four helicopters, much to the government's annoyance.

By 1984 the Angolan government's growing air power saw the deployment of the MiG-23 and Mi-24; these helped to change the course of the war, although government losses continued. America's response to the presence of these aircraft was to supply UNITA with Stinger SAMs. This effectively nullified the Angolan government's air power. Using this weapon, UNITA shot down two MiGs in 1987, and was also able to prevent the Angolan government from intercepting South African Air Force fighter-bombers supporting UNITA. In contrast, during the Mozambican civil war in 1986 government forces were able to conduct close air support with MiG-17, MiG-19 and MiG-21 aircraft largely with impunity as the Renamo rebels lacked any credible air defence.

Soviet helicopter carriers were designed to conduct anti-submarine warfare using the Helix helicopter.

The Nanuchka missile corvettes first appeared in the 1970s and were exported to Algeria, India and Libya. This one was photographed serving with the Soviet Pacific Fleet in 1988.

During the Chadian civil war in 1983–87 the Libyan Air Force suffered one of its greatest disasters. Supporting the Chadian opposition, Libya had been conducting an air war using MiG-23 fighters and Tu-22 bombers. In 1987 the Libyans lost twenty fighters and a helicopter gunship in one swoop when Chadian government troops overran their airbase at Ouadi Doum. The Chadian government also captured newly delivered SA-6 SAM systems.

Meanwhile in the Middle East the MiG continued to fare poorly. In June 1982 some 200 jets fought one of the biggest aerial battles in history high above the Bekaa Valley in eastern Lebanon. The Israeli Air Force destroyed a considerable Syrian Soviet-supplied air defence system and inflicted a defeat of the first magnitude on the outclassed Syrian Air Force. No operation in the history of air warfare stands comparison, except for that of the 1967 Israeli attack on the Arab air forces. Then, however, the enemy was caught largely on the ground.

The outclassed Syrian Air Force lost ninety-one aircraft, including MiG-23s/25s and six helicopters in three days of aerial engagements. Syrian losses would have been even greater had Israeli pilots been allowed to pursue their opponents over Syrian airspace. According to USAF figures, about forty Syrian fighters were downed by F-15s, forty-four by F-16s and one by an F-4. Not a single Israeli warplane was shot down in air-to-air combat; in total, they lost only three jets, all of which were brought down by ground fire.

An Osa I missile boat. These saw action during the Six Day War, the Yom Kippur War, and the Indo–Pakistani War of 1971. The Israelis sank a Syrian Osa during the Battle of Latakia and three Egyptian Osas in the Battle of Baltim, while the Indian Navy, by contrast, had some success against the Pakistani Navy. Osas were also employed in the Iran–Iraq War.

An Il-28U trainer of the Egyptian Air Force photographed in 1981.

Export customers for the Tu-16 bomber included Egypt, Indonesia and Iraq. These Egyptian Air Force Badgers were photographed in 1980; this type remained in service until 2000.

After the Soviet–Iraqi Treaty of Friendship and Co-operation was signed in 1972 Moscow provided the backbone of the Iraqi Air Force (as it did with Libya and Syria), including MiG-21, MiG-23, Su-7, Su-20, Tu-22 and Il-28 aircraft. Iraq's need for such weaponry was fuelled by a renewal of the Kurdish insurgency in the mid-1970s. Things really cranked up in January 1983 with the signing of a deal that included hundreds of MiG-23s and MiG-25s.

During the mid-1960s the Soviet Union first supplied Iraq with SA-2 Guideline missiles, which were deployed to launch sites around the Iraqi capital. Soviet deliveries picked up quite considerably during the early and mid-1980s with the delivery of SA-6 Gainful, SA-8 Gecko and SA-9 Gaskin systems. The Soviets had replaced their own SA-9s with the SA-13 Gopher, so had plenty to spare. The Soviet Union also provided Iraq with its tried and tested ZSU-57-2 and ZSU-23-4 self-propelled anti-aircraft guns, as did a number of Soviet client states.

During the Iran–Iraq War both sides had sizeable air forces and a full range of air defence systems, supplied by the West and the Soviet Union. The Soviet-supplied MiG-23 and Su-22 aircraft with their Soviet-trained pilots conducted most of Iraq's chemical warfare attacks. In 1984 Moscow started delivery of its then new Tu-22 Blinder bombers to Iraq. The Iraqis also reportedly received Soviet AS-4 Kitchen and AS-5 Kelt air-to-surface missiles to go with these aircraft.

A Polish MiG-29. This aircraft entered service in the early 1980s, seeing action with the Iraqi and Syrian Air Forces during the Cold War.

Poland purchased twelve MiG-29 fighters just before the collapse of the Soviet Union. Further aircraft were later obtained from the Czech Republic and Germany.

The war, however, was not characterised by air-to-air combat. In February 1982 three Iranian F-5E Tigers attacking Kirkuk were fired at by SA-9 and SA-6 missiles, as well as anti-aircraft artillery; only one aircraft was shot down, though an Iraqi F-1 accounted for another. Iraqi pilot Abdel Ali flying a MiG-23 was shot down at 13,000ft over Basra by an Iranian Hawk missile on 28 January 1987. He claimed Iran had greatly improved its air

defences since its 1986 offensive against the Fao Peninsula. The Iranians by the end of the month claimed to have downed another thirty-one Iraqi planes. Nonetheless, unlike in 1973 where the Egyptian and Syrian air defences seemed to prove that the SAM was king of the air, both Iran and Iraq's systems were nowhere near as effective.

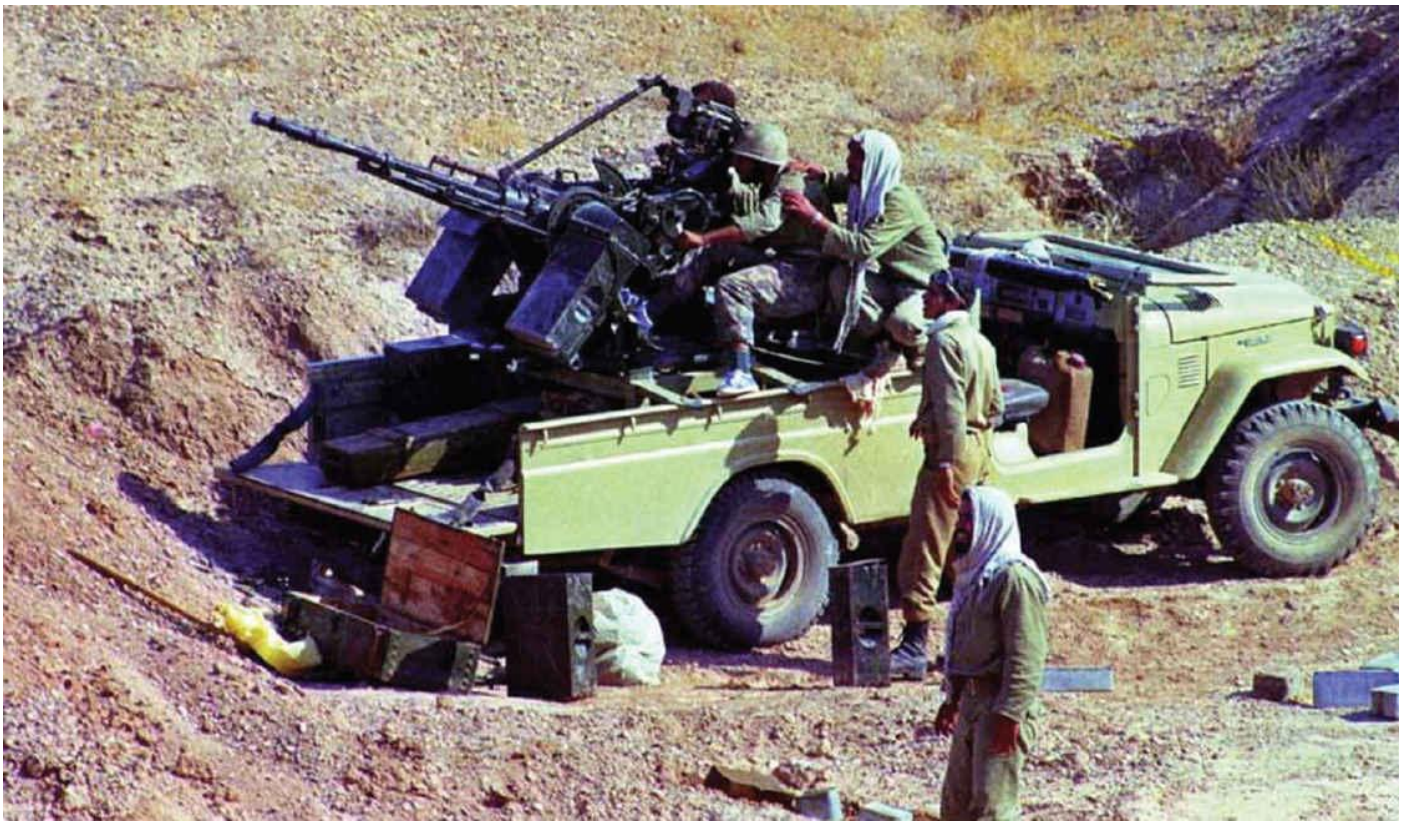
While the MiG-23 was highly thought of by Iraqi pilots, the Su-20 ground attack fighter was deemed a real '*clunker*', despite being able to carry twice the external load of the Su-7 over a 30 per cent greater range. Likewise, China's MiG-21 copies were not easy to operate or maintain, and were poor performers. Iraq's MiG-25s ended up relegated to bomber escort duties.

While the role of Soviet surface combatants was limited during the many regional conflicts of the Cold War years, Soviet missile patrol boats were considered revolutionary when they appeared in the early 1950s. Torpedo boats were becoming increasingly vulnerable as the North Vietnamese Navy (NVN) discovered in the early 1960s. Interestingly, while Moscow chose not to arm the NVN with missile boats, it looked upon the Arab states more favourably. The SSN-2 Styx ship-to-ship missile proved itself deadly and cost-effective in 1967 when Egypt's Soviet-supplied Osa or Komar missile patrol craft struck the Israeli destroyer *Eilat* with three missiles; a fourth fell amongst the survivors after the vessel sank. Indian Osas also proved effective during the Indo–Pakistan War in 1971.

The threat presented by these small vessels was such that countermeasures had to be developed and by the 1973 Yom Kippur War electronic countermeasures showed that the Styx could be countered in flight. Israel, with just seven boats armed with the shorter-range but highly sophisticated Gabriel missile, took on the combined Egyptian and Syrian fleets of twenty-eight Styx-armed boats, destroying almost 40 per cent in the process.

The Scud missile was employed extensively during the Iran–Iraq War.

An Iranian soldier with the DShKM heavy machine gun during the Iran–Iraq War.



More Iranian troops during the Iran–Iraq War with a ZPU-2 mounted in a Toyota pick-up truck.

In the late 1950s and early 1960s Moscow provided Iraq with twelve P-6 torpedo boats, six smaller patrol boats and three submarine chasers. Initial Iraqi naval imports were followed by four Osa-I and three Osa-II missile patrol craft, each armed with four SSN-2 launchers. This development was of concern to both the Kuwaitis and the Iranians as the 20km range of the Styx, although primarily an antishipping weapon, meant it could also

be used to attack coastal targets. During the period 1975–76 Iraq received five additional Osa-IIs and the Iraqis were so enamoured with Styx that they began to develop their own indigenous versions.

When the Iran–Iraq War broke out in 1980, the Iraqi Navy could pit just five ex-Soviet large patrol craft (three SO-1 and two Poluchat), twelve Osa craft (four Osa-I and eight Osa-II) and twelve P-6 fast attack craft armed with torpedoes against the Iranian Navy. The latter, built up by the Shah, was equipped with three destroyers, four frigates, four corvettes, nine FAC(M)s and fourteen hovercraft. Not surprisingly, the Iraqi Navy spent most of the war holed up in its bases.

Soviet battlefield ballistic missiles and rockets were fired in anger in Afghanistan, and were also used extensively during the Iran-Iraq War. Iraq resorted to the sustained use of ballistic missiles. The Iraqi missile blitz, launched on 1 March 1988, was designed to beat Tehran into submission. Baghdad fired seventeen missiles at the Iranian capital on that day, and nine days later launched another forty-eight modified Scud Bs; the Iranians retaliated by launching twenty-six missiles at Baghdad and four other cities. By 12 April 1988 Iraq had fired a total of 152 missiles at Tehran and other Iranian cities, with Iran having fired sixty-seven back. During eight years of war Iraq fired a total of 428 missiles at Iranian targets, and Iran launched 445 in response. This brutal devastation of civilian targets increased Iranian war weariness and contributed to Iran’s acceptance of UN Resolution 598.

By the outbreak of the Gulf War in 1991, just as the Soviet Union was imploding, the Iraqi Air Force was allegedly the sixth largest in the world. In reality, though, only half of its MiG-29 and MiG-21 aircraft were operable. In the face of Operation Desert Storm the Iraqi Air Force was shot out of the sky or destroyed on the ground. Iraq’s Soviet-supplied air defence system was quickly neutralised and the radar sites flattened. At the very point when the Soviet Union was disintegrating, this was hardly a good endorsement of its Cold War hardware. Nonetheless, in the preceding decades that hardware had helped to sustain numerous regional wars and brought misery to millions.

Epilogue

Tracking the Bombers, Submarines and Missiles

The Cold War most famously nearly reached boiling point during the 1962 Cuban missile crisis. Following the failed Bay of Pigs invasion of Cuba the year before and the deployment of American ballistic missiles to Italy and Turkey, the Soviet Union decided to base road-mobile medium- and intermediate-range ballistic missiles on the island. This resulted in a highly tense nuclear stand-off between Moscow and Washington. America was also alarmed by the presence of MiG-21 fighters, Il-28 bombers and SA-2 surface-to-air missiles in Cuba. Both sides went on red alert and the world braced itself for the worst. Eventually, after much brinkmanship, both sides agreed to withdraw their offending ballistic missiles.

At the time the outside world did not realise that a Soviet submarine also almost sparked a nuclear war. As part of their build-up in Cuba, the Soviets intended to forward-base seven ballistic missile submarines to the island. As a prelude to this, they deployed four Foxtrot Class submarines to the Caribbean, but in a dramatic act of bravado the US Navy forced three of them to the surface by conducting depth-charge exercises in their vicinity.

In particular, a dozen US destroyers and a carrier detected Foxtrot B-59. The crew, not realising the US Navy was using practice depth-charges, believed they were under attack and almost retaliated with a nuclear torpedo bearing a 10-kiloton warhead. The decision not to do so narrowly avoided nuclear war breaking out between the Eastern and Western Blocs. Only Foxtrot B-4 managed to escape contact and headed home without being forced to surface. It was a salutary lesson for the Soviet Navy’s submarine fleet. None of the ballistic missile submarines was ever sent to Cuba.

Had the Cold War turned hot in Europe, the Norwegian Sea would have become the front line. Soviet submarines operating from the Kola Peninsula would have sought to enter the North Atlantic via the gap between Greenland and Iceland or the gap between the UK and Iceland. This placed Iceland, as a NATO ally, directly in the firing line, especially as it was host to the US Iceland Defense Force based at Keflavik.

Likewise, Greenland hosted the US Thule air base as part of NATO’s Cold War unified defence strategy. The presence of US nuclear-armed B-52 bombers on Greenland, plus the secret and subsequently highly controversial Project Iceworm (whereby US nuclear missiles were to be hidden under the ice sheet at Camp Century), made Greenland a target for Soviet nuclear missile submarines.

To prevent Soviet submarines from preying on convoys en route to Europe from America, a sound surveillance system (SOSUS) was located near the Greenland, Iceland

and UK (GIUK) gap. It was also deployed in the Pacific. The system detected its first Soviet diesel submarine in 1962 and was so sensitive that it could even detect Soviet Bear Tu-95 bombers passing overhead.

Six years later Soviet Charlie and Victor class submarines were located for the first time. In the 1970s SOSUS began to track the Soviet Delta class. Data from the system also enabled the Americans to recover in the mid-1970s a Golf class ballistic submarine that had sunk north of Hawaii in 1968. Soviet submarines were also closely tracked by American submarines and this often led to collisions. On the surface warships and in the air surveillance aircraft monitored every Soviet naval movement. NATO’s integrated air defence system, which included the Icelandic air defence system, was also established to protect against Soviet long-range bombers. This deadly game of cat-and-mouse continued right up until the end of the Cold War.

Suggested Further Reading

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