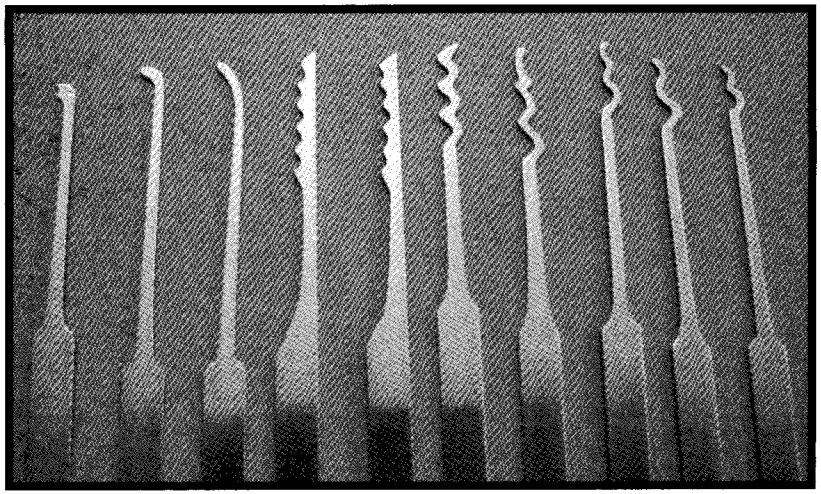
- Certain keyways are cut at an angle. A spy will make sure he picks to compensate and follow the angle.
- Well-made locks are extremely hard to pick; they are very tight and require a little more tension.
- A "springy" pin is not aligned.
- If the lock is open but the door is not there will probably be internal dead bolts. The spy will probably then use hydraulic spreaders in the door jam, but this is likely to leave large, telltale marks.
- Most locks can be opened, but not all of them are easy. Some people have a natural ability for lock picking, while others struggle.

A LOCK-PICKING SET



▲ Lock-picking sets must be made from the correct type of metal.

Pick-locks are made from several strips of high-tensile metal and a spy would probably source the material from a model store. Alternatively, a set of heavy-duty feeler gauges that are used by the motor industry could be used. A spy will scan or photocopy a template and print out a copy onto paper. Next, he will carefully cut out the shapes. He will place each individual template onto a separate strip of metal or on one of the leaves of the feeler gauge. For the spy, it is now a matter of grinding down the metal until the desired shape has been achieved. This would be done by placing the metal in a vice and grinding it with a coarse grinder to get a rough outline, before using a fine grinder to finish off. Finally, the spy will remove the paper template to reveal his pick.

The spy will place the tension bar in a vice and heat it with a blowtorch. Once the metal is hot, he will use a pair of pliers to twist the top 15 mm of the bar to a 90-degree turn. He will then bend this over at 90 degrees to form an upright section. To start with he will only need to make three basic tools.

EMERGENCY PICKS

Any type of thin metal can be used by a spy for makeshift picks and tension bars in an emergency. The best two items to use are heavy-duty paper clips or safety pins. These can easily be straightened or bent in order to make all the tools the spy may need to open a lock. However, they are limited to such items as lockers, drawers and filing cabinets, as heavy-duty locks will require a more substantial set of tools to pick.

There are several new types of lock picks available. One is called the fibre pick. This looks and acts very much like a toothbrush, but is used to brush the lock pins instead of teeth. Fibre picks come in a variety of different fibre sizes and strengths, and it is just a matter of selecting the right fibre pick for the purpose. The spy will try several different-sized fibre picks until he finds the one that operates the lock. He will then record the fibre pick number. After a little practice, the operator soon gets to know which fibre pick is right for a certain type of lock. The fibre pick is an excellent tool to use for a clandestine entry, as, unlike hard metal picks, it does not harm the pins and leaves no scratches.

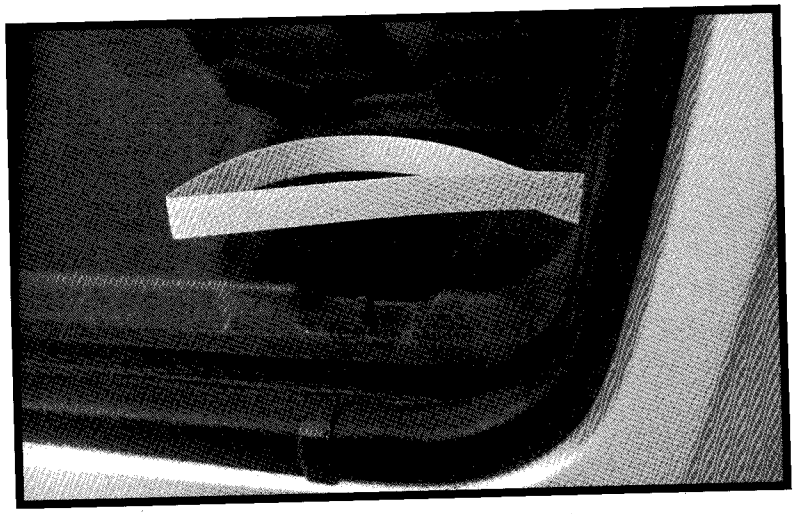
OPENING A VEHICLE DOOR

While there are many ingenious devices available to the agent for opening vehicle doors, this can be achieved by improvisation. One simple way a spy will use to open a vehicle door is to use a strip of plastic banding tape. The spy will take about half a metre in length, and fold this in half, creasing the folded end.

He will use a flat piece of metal to prise the vehicle door open at the top corner (the corner of the door that is furthest away from the wing mirror). This should provide him with enough space to slip in the creased end of the plastic tape. He will push it about 10–12 centimetres, and,

using a sawing action, pull the tape down until it is resting close to the internal door release catch. Once in position, he will push one end of the tape inwards while holding the other end firm; this causes the tape to form a bow near the crease. He will work the tape back and forth until the bow is over the release catch. He then pulls the two ends of the tape tight and lifts at the same time. This should unlock the door.

Note: although this is a method used by spies it should not be used by civilians. It is a criminal offence for civilians to break into other people's cars.



▲ All that is necessary to open most car doors is a small strip of plastic tape.

DEMOLITIONS AND EXPLOSIVES

Most agents will have a basic understanding of demolition techniques. However, this type of work is normally left to experts, such as the British SAS or the American DELTA force personnel. While demolitions often form part of the MoE strategy, they can also be used in assassination and sabotage missions. In their base form, most explosives are safe to handle, easy to use, lightweight and have considerable destructive power. From the terrorist's point of view, explosives offer an easy means of causing devastation and, as such, are widely used, mainly in the form of car bombs.

DEMOLITIONS TRAINING

Few people would argue with the fact that the British SAS demolitions wing offers a remarkable course, covering all facets of demolitions and explosives. The practical work progresses slowly from the basic rules of handling explosives to the making of home-made explosives and advanced sabotage. The latter covers in-depth details on destroying places such as oil refineries, railway stations and telephone exchanges. The aim of the SAS demolition course is to teach the pupil how to use the minimum amount of explosive to cause the maximum amount of damage. This requires the use of complex formulas for cutting steel and for the placement of the explosive. The range of explosives now available to the saboteur has increased immensely; technology has led to the development of advanced explosives together with a wide selection of wireless detonating devices.

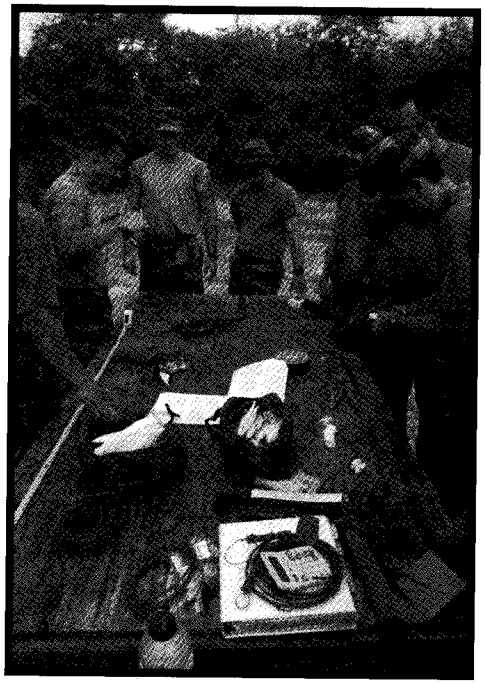
Modern high explosives are fairly safe to handle; they can be dropped, jumped on and even set on fire, although burning a very large amount is likely to produce enough heat to cause detonation (although we strongly recommend against testing this theory.) Handling modern plastic explosive is a little like playing with plasticine and it too can be moulded into different shapes.

To activate high explosive, a detonator is required; this device comes in two types – electrical and non-electrical. A detonator is a small aluminium tube about 250 mm long and half-filled with a substance known as PETN. The non-electrical detonator is open and ready to receive a length of safety fuse, while the electrical detonator has two wires protruding from it. When a detonator is pushed into plastic explosive and the fuse is lit (or the wires are connected to a battery), the

detonator is activated. The speed of a detonator is around 6,000 metres per second; this jump-starts the explosive, which, in the case of PE-4, explodes at around 7,300 metres per second – creating enough energy to cut steel. High explosive only becomes dangerous when both a detonator and an initiation device are added.

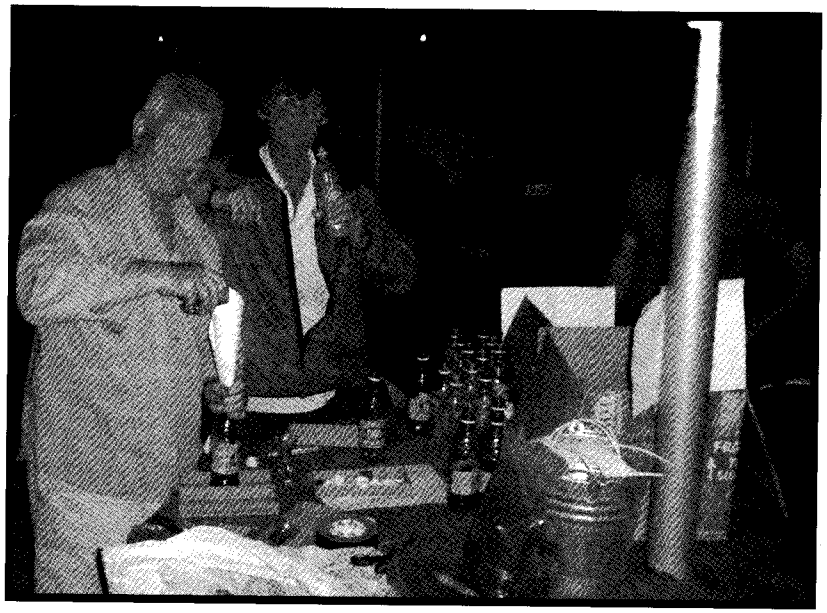
MILITARY EXPLOSIVES

The Americans use an explosive compound known as C-4 that is a common variety of military explosive. In its original state it looks very much like uncooked bread dough. As with many plastic compounds, the basic ingredient is cyclonite (cyclotrimethylene trinitramine), which makes up around 90 per cent of the C-4. It also contains a polyisobutylene binder (5.5 per cent) and the plasticizer, the amount and type of which varies with manufacturer.



◂ American military personnel learning the intricate skill of modern explosives. These agents can be seen preparing improvised bombs for use by African rebels.

As with many other modern explosives, C-4 was developed during the Second World War when the original RDX was mixed with mineral oil and lecithin. C-4 is the latest in a line of C (Composition) explosives, all of which were developed after the war.



▲ With the right equipment, bomb construction can be safe and simple for agents.

Variations of C-4 are used widely around the world. The French news agency, AFP, reported that the explosive used in the Bali bombing was of a type manufactured in Israel. As most modern explosives contain a tracer compound, any residue from an exploded bomb in which commercial explosive has been used will enable you to trace the manufacturer.

SEMTEX

Semtex is a Czech-manufactured, RDX-based, plastic explosive. It contains a higher percentage of RDX than the British PE-4 plastic explosive. It comprises 88 per cent RDX and 12 per cent binder/plasticizer. This means that it has a detonating velocity higher than that of the PE-4's 8,500 mps. In the past Semtex was odourless, which made it difficult to detect using the normal type of explosive detection systems. In recent years, however, the manufacturers have introduced a trace element, making it easier to detect and enabling it to be traced forensically.

The explosive first entered the terrorist chain during the 1970s when Semtex H was used at a training school for terrorists in the Crimea by both the Czech intelligence service and the KGB. Elements of the IRA also encountered it during that period in the Lebanon's Beka'a Valley. Thereafter, the Provisional IRA obtained considerable quantities of Semtex H from Libya.

However, successful operations by Irish security forces, who discovered some one-and-a-half tons, subsequently reduced the terrorists' stocks. Since then, the IRA have primarily used Semtex H in the manufacture of munitions – such as mines, mortar bombs and rocket-propelled grenades – while using home-made explosives – such as ANFO (Ammonium Nitrate Fuel Oil) and Re-crystallized Ammonium Nitrate (RAN) – for bombs.

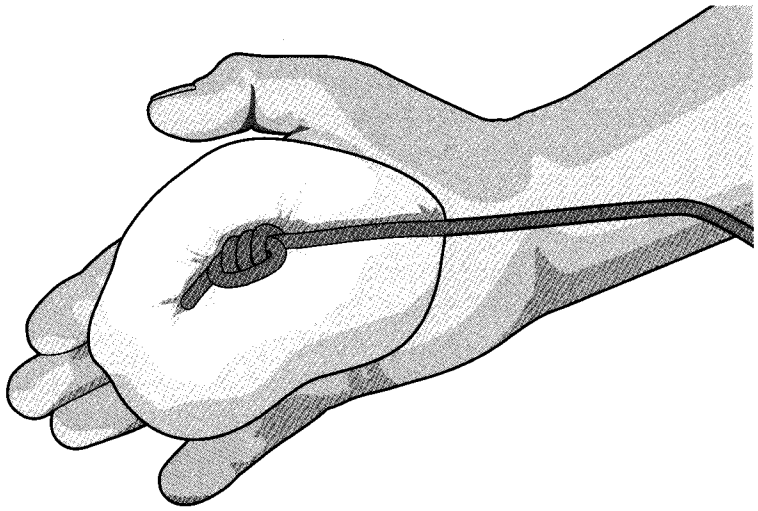
NEW EXPLOSIVE

A new family of explosives has been developed. The Americans for example, have produced Astrolite A-1-5 that is the world's most powerful non-nuclear explosive. It is extremely safe to handle and offers a versatility not available from conventional hydrocarbon explosives. Astrolite was discovered during research into rocket propellant during the 1960s, when ammonium nitrate was mixed with anhydrous hydrazine. This produces Astrolite G, but, when a fine aluminium powder is added, it forms Astrolite A-1-5. It is reported that this liquid high explosive can be safely sprayed from aircraft, and, upon contact, soaks into topsoil to a depth of a few centimetres. With a life of only four days, it is reputedly undetectable, except by chemical agent sensors, and can subsequently be detonated remotely by personnel who are equipped with the necessary initiation device.

It is also believed that the Chinese have developed a new form of high explosive. Two British radical Muslims carried out a suicide bomb attack on a club in Tel Aviv, resulting in the deaths of three people and leaving 50 others injured. One of the suicide bombers managed to escape, but not before he left behind an amount of explosive. Upon investigation, the Israeli analysts concluded that the explosive came from a leading Chinese explosives manufacturer. The explosive was constructed of a new compound, which was both odourless and lightweight. It is believed that this new explosive is also able to pass through airport X-ray machines without being detected.

GENERAL SAFETY RULES

In general, modern explosives are very safe to handle, but certain safeguards should always be in place. For example, charges should be moulded around knotted detonating cord (three knots equal a detonator) as this provides a much better safety margin. It also allows the agent to make up and place a number of charges, and to connect them to a ring-main without the use of a detonator. The detonator is only applied at the last moment when the initiation set is attached.



▲ One safety measure is to use knotted detonation cord instead of a detonator.

Explosives

- No smoking when using explosives.
- Training stores should not be mixed with live explosives.
- Live detonators should not be in close proximity to explosives.
- Explosive should not be tamped with metal instruments.
- The minimum amount of personnel on-site when connecting detonators to explosives.

Detonating Cord Safety Rules

- Sharp curves should be avoided when constructing long runs.
- Detonating cords should only cross at junctions.
- Long suspended sections should be avoided.
- A 15 cm tail should always be left.
- The minimum distance between each charge and the main line should be 50 cm.
- The angle of charge should be at least 90 degrees to the main line.
- Waterproof tail ends should be used if the charges are in place for any length of time.

Detonators

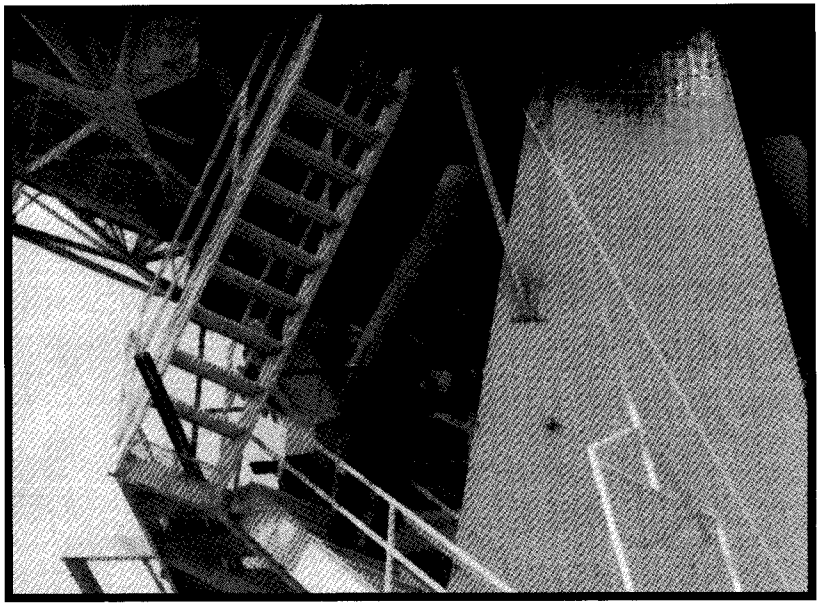
- Detonators should be kept away from the explosive until the initiation is required.
- Detonators should be kept away from heat sources.
- The wires from electrical detonators can be short circuited by twisting them together.
- Initiation set can be prepared prior to marrying it with explosives.
- Knotted detonating cord (three knots) can be used in make-up charges.

Conventional explosive is a solid carbon-based or liquid substance which, when stimulated at the correct speed (through the use of a detonator), converts almost entirely to gases of both intense pressure and temperature.

Explosives are divided into two forms, low and high. Low explosive is ignited by a flame and the resulting explosion is a rapid burn that forms combustion. Low explosives contain their own oxygen, so the burning is extremely quick and produces stable gases of high temperature and high pressure. While low explosive provides gases that have a pushing or lifting effect, they are not normally capable of cutting steel. One example of a low explosive is gunpowder.

High explosive generally has a detonating speed in excess of 8,000 metres per second, making the base substance very stable. This substance must be detonated. Detonation involves the almost-instantaneous decomposition of the compounds that make up the explosive. This process is started by an initial shock and the effect is twofold. A small detonator is fired to produce a shock wave that travels outwards from the point of initiation through the explosive and into the target. This shock wave imparts an energy that is strong enough to cut steel. This is followed by the gases, which achieve intense temperatures and the pressure to provide the push. The power of an explosive is expressed by the rate at which it detonates – it is called detonating velocity.

One important aspect of both high and low explosives is the tamping effect. Tamping simply involves containing the gases and allowing them to build to the point where they must break out. The better the tamping the better the effect. A normal firework, for example, explodes with a loud bang only because of the cardboard housing which forms the tamping. Empty the contents of a firework into a loose heap and the compound will simply burn.



▲ The secret of a good explosives expert is knowing where to place the charges.

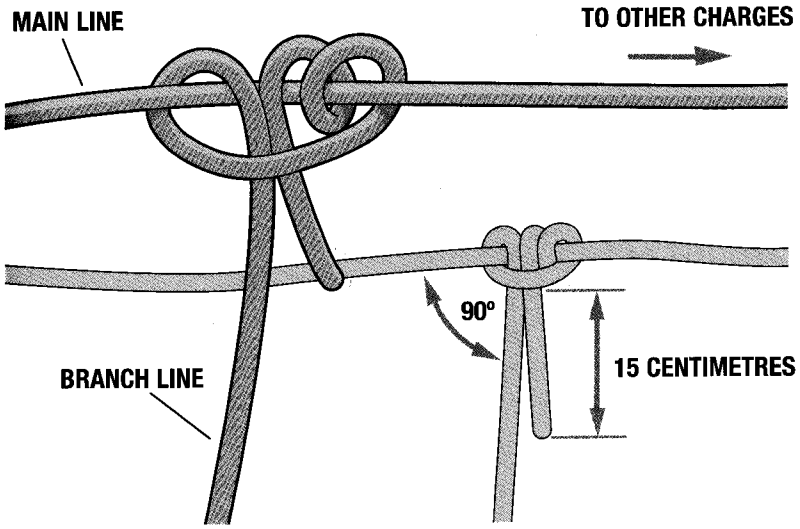
When detonation occurs, the gases will escape via the least line of resistance away from the direction of initiation. Various materials can be used for tamping – water, clay or sandbags are all good examples.

An agent or a Special Forces team may be required to attack any number of different targets – railway lines, oil refineries or, as in recent years, a drugs warehouse. Every target presents different problems, and circumstances will often govern the chosen method of attack. If time is required for a getaway, concealment of the charges is critical, and this may take precedence over the best place in which to position them. For this reason, complicated formulas have been worked out in order to obtain the best results.

Despite the number of different formulas for cutting steel, concrete and wooden targets, the one overriding factor when it comes to all explosives is the formula "P" for plenty. It is a phrase that is widely used during the SAS demolition course. An SAS soldier will have to learn many technical formulae in order to apply the right amount of explosive to a particular type of explosive target. The "P" for plenty factor is used to err on the safe side.

Another basic component used in explosives is the main circuit of a demolitions set-up, which links all the charges. Most targets that require the use of explosive need to be cut in many different locations at the same

time and in order to achieve this, a ring of detonating cord is passed from the initiator around every charge and back again to the initiator. This is called the "ring main". The shock waves then travel both ways; if one end should fail, the other will detonate the charges.



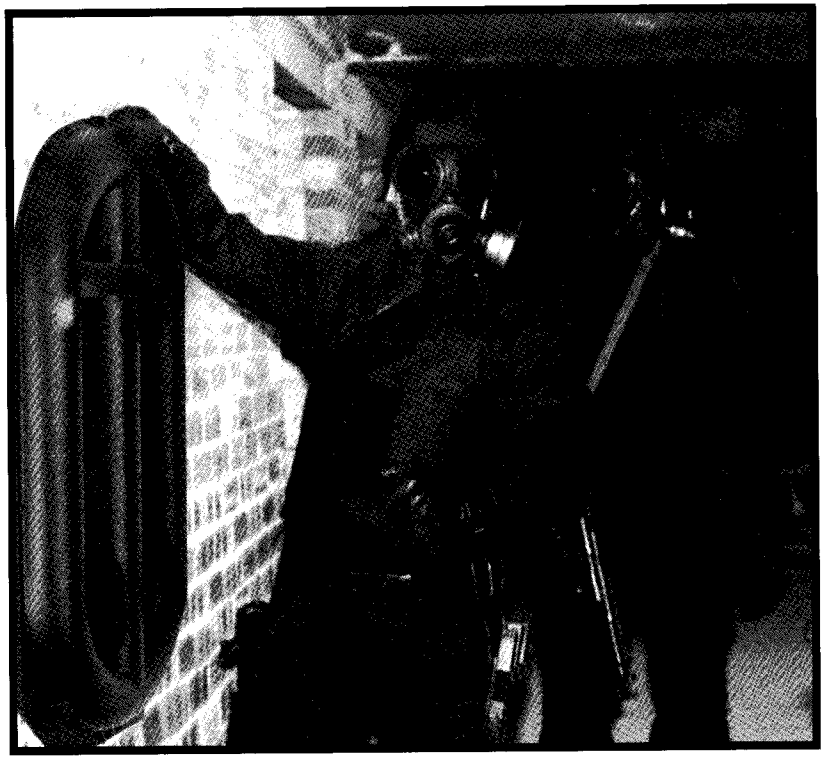
▲ Targets that require several charges can all be connected by a ring main. This allows all the charges to go off at the same time.

Most formula explosives need to be placed in a certain shape and placed flush to the target. With steel beams, it is a simple matter of covering every surface of the "I" beam. When it comes to cutting round metal, the explosive charge may be halved and shaped into a saddle or a diamond, to create a shear effect.

While all precise explosive charges are formed into a shape, the actual "shaped charge" itself normally refers to an inverted cone-shaped explosive charge. The principle behind the charge is based on the inversion of shock waves once the explosive has been initiated; this forms the explosive force into a pinpoint cutting charge which, due to its standoff, can penetrate thick steel. A shaped charge can be found in most anti-tank missiles, but it is also used during demolitions for depth penetration.

FRAME CHARGE/FLEXIBLE CUTTING CHARGE

MoE will often involve cutting through a reinforced door, a window or a wall. To do this, an explosive frame charge is required. Originally developed on a wooden frame to which a metal-cased explosive was attached, the simple aim was to blow a hole through a wall. The size of the frame depended on the area that was to be blown, and the amount of explosive used depended on the thickness of the wall. The early frame charge has since been developed by Royal Ordnance into a cutting explosive known as "Blade". This is a linear-shaped charge made from DEMIEX 200 – an EDX-based plastic explosive that detonates in excess of 7,500 metres per second. Internally, copper produces a shaped charge jet that, on initiation by an L2AI/LIA1 detonator, cuts with fine precision. Blade is fitted with a self-adhesive strip so that it can be attached to the target. The charge is covered by a sheath of close-cell foam. Blade comes in five different weights and thicknesses, each of which can be cut with a knife and tailored to a design of cutting charge. Blade can be incorporated into a conventional explosive ring-main with charges linked together with detonating cord for simultaneous detonation.

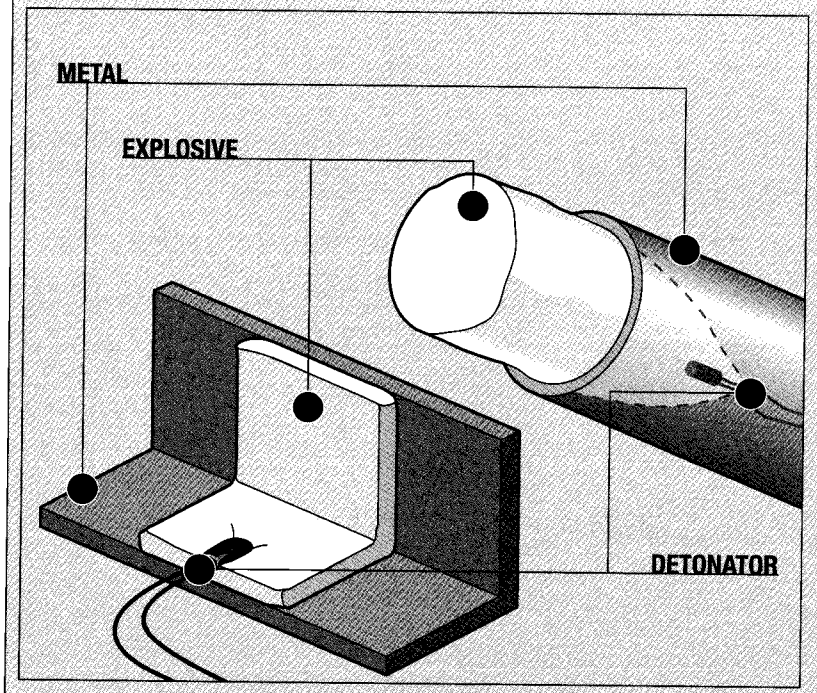


▲ Some targets require specialist explosive such as a frame charge which is designed to blast a hole in a wall.

EXAMPLE

A military operation is planned against an enemy city, the first wave of which will be an air strike in order to eliminate the enemy's radar and communications. It would be advantageous if the city lights were off when the raid took place. To accomplish this, the agent is given the task of demolishing an electric power station. The first thing he has to establish is the type of generation equipment used; in this case, there are three inline gas generators, two of which are operational with one in reserve. The most effective way to destroy all three is to attack them in exactly the same place, in this case the weakest point that is common to each individual generator.

While the destruction of a large facility such as a generating station may seem demanding, it can be achieved by just one agent, although for security purposes several would be better. The answer is to produce three identical saddle or diamond charges depending on the size of the parts the agent needs to destroy.



▲ The saddle charge is formulated and shaped to cut round steel bars. Where flat metal is to be cut the explosive is calculated and placed as shown.

DIAMOND CHARGE

The diamond charge can be placed, for example, on half-exposed round steel targets such as the cast housing for the generator drive shaft. The charge is diamond-shaped, with the long axis equal to the circumference of the target, i.e. the shaft, while the short axis is equal to half the circumference. The thickness of the charge depends on the shaft material – for high carbon steel, for example, it should be 2 cm thick. The best way to make a diamond charge is by using sheet explosive.

Calculation:

The generating shaft is 15 cm in diameter.

Therefore the long axis is 47.6 cm. Rounding up to the next highest figure, the long axis of the charge will be 48 cm. The short axis of the charge will be 25 cm. You will note the "P" for plenty rule is applied by rounding up the figures to a whole number. Initiation will take place from simultaneous points of the short axis.

Providing that the agent manages to attach all three charges and can effect simultaneous detonation, the generators should be put out of action. While the diamond charge may not actually destory them completely, the buckle effect on the running shafts will destroy both the generator and the drive motor and the drive casing on the reserve machine will take at least a week to repair.

$$\frac{22}{7} \times \frac{6}{1} = \frac{132}{7} = 18\frac{6}{7}$$

▲ The complexity of explosives formulas ensures the agent only uses the minimum amount of explosives to achieve maximum effectiveness.

IMPROVISED EXPLOSIVES

Fortunately for an agent, military explosive can be purchased from many countries and its commercial equivalent can be found in any quarry around the world. In most countries, there are laws to control explosives. However, these are enforced more through safety than for any other reason. In addition, high explosive is extremely simple to make, with many DIY stores and supermarkets stocking the basic ingredients.

Even when no explosive is available, combustible material, such as gasoline, is always accessible and one gallon of gasoline has the blast power of seven pounds of high explosive when detonated. The use of fertilizer and diesel oil could make up the bulk of a bomb which, in order to achieve the required detonation speed, could then be initiated by commercial explosive. The secret to making any explosive is having a basic understanding of chemicals and chemistry.

When attached to a friendly guerrilla or revolutionary unit, agents and Special Forces units are sometimes required to carry out demolitions work without the use of military explosives. Training friendly forces in another country often involves teaching them the basics of improvised explosives. A good example of this was when American agents trained Al Quaeda soldiers during the Russian invasion of Afghanistan.

Although it is possible to construct a detonator, as a rule, improvised high explosive mixes require a commercial detonator in order to make them work. To this end, most terrorist organisations use a "booster" for the improvised mix. Without the booster, there is a very good chance that the home-made explosives will not detonate due to the crude method of its construction.

CACHE

When working in a foreign country, it is not always possible for the intelligence agency to provide the agent with the correct equipment. To overcome this problem, spies, agents and covert operators are often guided to an existing cache in order to retrieve supplies such as ammunition, weapons or explosives. Caches were widely used by the OSS and the SOE during the Second World War, thus allowing agents to carry out prolonged operations. Modern caches are housed in purpose-built, watertight containers, which can be hidden for years. They are generally deployed during times of peace or when the opportunity arises. During the first Gulf War, hundreds of caches were planted in Iraq, both by the United States and the British. These secret locations are then carefully recorded. Traditionally, however, cache reports are notoriously poor and even if they are well documented, the cache usually evades the seeker.

Note: explosives are dangerous and should only be used and created by experts. In most instances the use of explosives by members of the public is illegal.

CHAPTER 5

By land, sea and air, the modern espionage agent must be placed among the enemy in order to complete their mission.

INFILTRATION

Missions that involve simple car, plane or train travel to a close-by country are few and far between in the current political climate. More common these days is an infiltration operation by an individual or team of agents. Access to many politically volatile countries via "safe" infiltration means is much more limited than a few years ago. What is the implication? Today's spy is going to have a huge amount of work to perform to even get into a territory, before they may start the search for operatives there. Information and technology are the keys to the door.

Planning any clandestine operation requires expertise, experience and a complete understanding of the operational task. For the agent or the Special Forces unit this is generally expressed as the "mission". Before any mission can start, however, there needs to be planning phase; this will involve acquiring knowledge of the terrain, the prevailing weather conditions, the disposition of enemy troops and, finally, the implementation of infiltration and ex-filtration methods. These will depend very much on the "mission" statement and may involve penetration into enemy territory, by land, sea or air.

Infiltration involves the positioning of personnel and supplies into a denied area, making maximum use of deception while they are there to avoid detection as they enter the operational area. The best way of achieving this is usually by air, although this may not always be possible if the enemy employs radar, or if the target area is over jungle terrain, where there may be nowhere to land or drop parachutists. The alternative is to insert personnel by land or sea, but insertion by this method will invariably mean confronting formidable defences, such as coastal patrols, border patrols or minefields. In instances where an enemy has good border and internal security, the means of entry for an agent is restricted. However, modern stealth techniques are advancing rapidly.

The infiltration of an agent or a Special Forces unit normally requires the use of ships, submarines or aircraft, and the intelligence agencies will often work in conjunction with the appropriate military service when it comes to clandestine operations; the different modes of transport used for these operations are normally manned by members of the Special Forces units who have been trained specifically for such work.

FACTORS INFLUENCING INFILTRATION MEANS

- The type of mission to be undertaken is the first thing that is taken into consideration when it comes to selecting the means of infiltration.
- The enemy dispositions may restrict certain means of infiltration. A heavily defended border would make entry by vehicle impossible, for example.
- Unfavourable weather conditions can seriously affect air or sea operations.
- The topography of the land needs be considered. Land infiltration through mountainous or heavily forested areas will make movement very slow. In addition, high mountains force aircraft to operate at heights where they become susceptible to enemy radar.
- Hydrographical factors, such as tide-data, the depth of offshore water and the location of reefs and sandbars can all influence the selection of water as a means of infiltration.
- The number of personnel being infiltrated may be a limiting factor, as will the distance if part of the way is to be made on foot.
- The equipment required in order to carry out the operation successfully may also determine the infiltration method selected.

SPECIAL FLIGHTS

▲ The mighty C130, for many years the backbone of western armies.

The British have two Special Forces flights within the RAF, which form a part of 7 and 47 Squadrons respectively. Aircrew within both flights are trained for special operations – namely low-level deep penetration into enemy airspace and the delivery and extraction of Special Forces personnel. The Special Forces Flight of 7 Squadron is based at RAF Odiham in Hampshire. It is currently equipped with the UK-designated HC.2, a variant of the Boeing Vertol Chinook twin-rotor heavy-lift helicopter that can be fitted with four (two forward and two aft) M134 pintle-mounted mini-guns. Within the next two years, however, the flight will be re-equipped with the HC.3. This will be the first special operations-dedicated aircraft to be purchased by the British armed forces. The same aircraft is currently being operated as the MH-47E by the US Army's 160th Aviation Battalion, who are better known as Task Force 160. It features a glass cockpit, terrain-following, forward-looking infra-red (FLIR), built-in fast-roping brackets, and four .50 calibre Gecal mini-guns.

The Special Forces Flight of 47 Squadron is located at RAF Lyneham in Wiltshire. It is equipped with the C-130K variant (designated C.3 in the UK) of the Hercules transport plane, fitted with an in-flight refuelling probe, electronic counter-measure systems and chaff and flare dispensers. Both the latter are designed to provide a measure of defence against enemy air defence systems. The aircraft are currently being equipped with dedicated night-vision goggles (NVG), that are compatible with cockpit lighting. It is reported that four of the C-130J Hercules on order for the RAF will be for dedicated Special Forces use and that they will be upgraded to the same specification as the MC-130E Combat Shadow which is currently utilized by the special operations squadrons of the US Air Force. This aircraft has terrain-following radar and FLIR systems, an integrated avionics package for long-range, low-level covert ops – which enable precision insertion and re-supply of Special Forces – and NVG-compatible cockpit lighting.

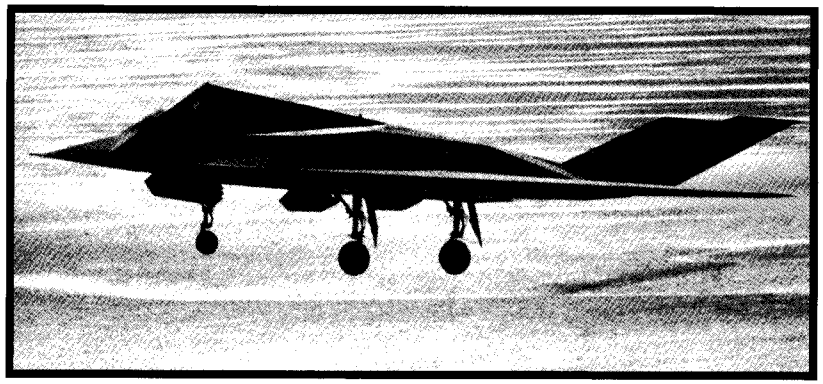
Finally, M Flight of the Fleet Air Arm's 848 Squadron, equipped with the Commando Mk.4 variant of the Westland Sea King helicopter, provides support for the maritime counter-terrorist role.

Over the years the CIA has set up many proprietary companies to provide air support for its agents. During the Vietnam War, they used Air America to support operations throughout the whole of southeast Asia. Most of the pilots were ex-military and they flew a whole range of fixed-wing aircraft and helicopters. Their missions ranged from re-supply to drug running and reconnaissance; much of their work was highly dangerous. Other airlines used by the CIA include SETCO, Evergreen, Hondu Carib and Arow Air.

▲ The 160th Aviation Group supports American agents and Special Forces.

Both Delta and SEAL team 6 are supported by the 160th Aviation Group. While American agents and Special Forces have call on the USAF Special Operations Aviation Command, in reality, most of the clandestine work is carried out by the 160th. Established in 1981, the 160th Aviation Battalion, or Task Force 160, is generally known as the "Night Stalkers", mainly due to their extremely professional night-flying capabilities. In 1990, they were officially designated as the 160th Special Operations Aviation Regiment. It uses a variety of helicopters and fixed-wing aircraft, such as the HH-60G "Pave Hawk", the AH-6G "Little Bird" and the advanced RAH-66 Comanche. There are three battalions, two of which are based in Fort Campbell, Kentucky, and one at Hunter Army Airfield, Georgia. They all specialize in armed attack, insertion, extraction and all three are generally dedicated to the Special Forces.

STEALTH TECHNOLOGY



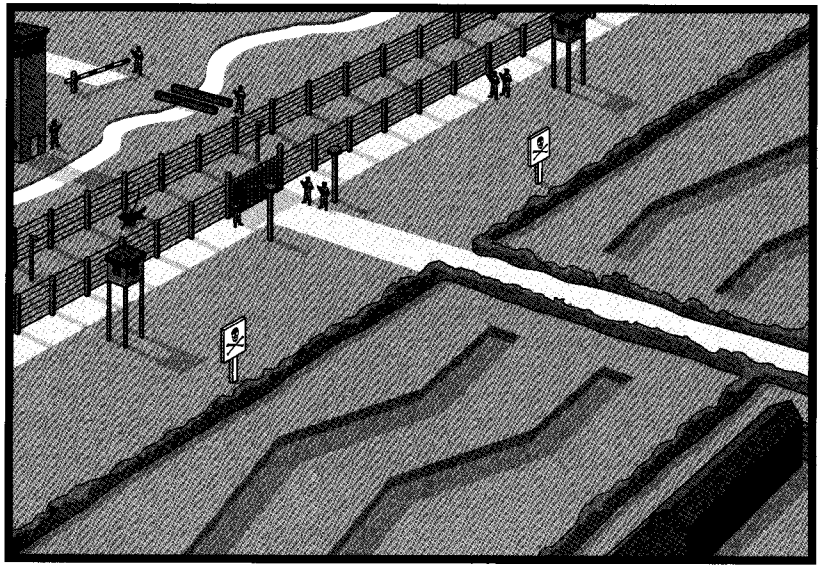
▲ Stealth technology is now a major aspiration of many Western armies.

Stealth is the simple act of trying to hide or evade detection. It is not so much a technology as a concept that incorporates a broad series of technologies and design features. Stealth technology is a prime goal for most military organizations, including the intelligence agencies. Stealth enables you to sneak up on the enemy undetected. Militarily, this catches the enemy unawares, giving you the advantage of surprise while seriously impeding both the enemy's resistance and defences. In the past, this would have been achieved through camouflage and concealment, but modern stealth technologies mean that in many instances the enemy cannot respond at all, because they simply cannot see you.

The demonstrations of stealth aircraft used during the Gulf War of 1991 illustrated their effectiveness. Since that time, however, current aircraft stealth technology has been seriously weakened by the introduction of particle filter methods for detecting stealth-built aircraft. Despite this, stealth aircraft and sea vessels continue to be built, most relying on shape, and the use of non-metallic materials called "composites". Radar-absorbing paint is also used, especially on the edges of metal surfaces, while other technologies also help reduce the signature.

Stealth clothing has been a desirable asset on the battlefield for a long time, especially for Special Forces infiltrating behind enemy lines. This has been achieved to some degree. One British firm in Cardiff discovered that shredded foil, similar to that used for insulation, could be used to blank out any thermal or infrared signature. This provided perfect night-time camouflage for both soldiers and tanks. However, the insulation material caused the body to overheat and the suits had to be fitted with a cooling system. Despite these drawbacks, the race is on to produce a real day-night stealth system that is suitable for both men and machines.

BORDER CROSSING

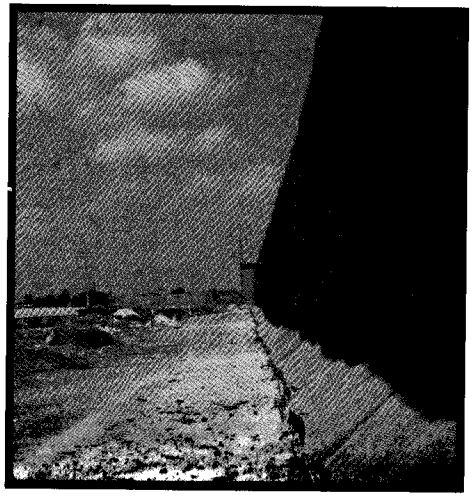


▲ Border crossing can provide many obstacles from mines to dogs and machine gun towers.

Because of the line-of-sight principle, both sea and air defences are highly successful when it comes to detecting approaching ships and aircraft. Insertion by either of these methods will require a final covert method in order to cross the border into enemy-held territory. An alternative is to cross the border by foot or by vehicle. Depending on the country, this avenue may also prove difficult, though.

One of the most formidable borders in the world is the one that divides North Korea from the South. This consists of a whole range of defences that include high walls, tripwires, minefields, barbed wire, ditches and armed patrols. It is not an easy place to cross. In 1978, information filtered through to the South Korean intelligence agency that the North were busy digging a tunnel under the border in preparation for an invasion. The North Koreans built the tunnel by digging and dynamite-blasting for more than 1,500 metres, slipping beneath the Military Demarcation Line in the process. The tunnel reaches some 437 metres into South Korea, at an average depth of 73 metres. Once its presence was discovered, the North stopped digging and the tunnel was sealed off with concrete. Although this was the only tunnel discovered, it is thought that several others existed.

Elsewhere in the world, the Israelis are currently building a massive wall in order to stop the Palestinian suicide bombers from entering their territory. The first 110 km of it is already finished and the total 350-km fence will be completed by the end of the year. The wall is extremely high and will be backed up by a combination of fences, walls, ditches, patrol roads and electronic surveillance devices.



While basic in concept the new Israeli wall, designed to keep out Palestinian suicide bombers, is proving very effective.

Most modern borders are guarded by high-tech defences such as seismic sensors that silently detect movement. Other systems involve a series of poles between which several layers of invisible beams are emitted. Breaking these beams sends off a silent warning. These devices work well in principle, but they do have a number of limiting factors. Few of them can differentiate between animals and people and they can also be vulnerable to attack.

OVERCOMING SENSORS

Any sensing system, whether it is an electric fence or a seismic device, can be overcome by creating an error of reasoning. The easiest way to approach this is to have a long piece of rope with a large metal object tied to the end. This is thrown at the electric fence or onto the area where known seismic probes are buried. The result will be an investigation by the border patrol. Some borders are monitored by camera, so make sure that you operate from a concealed position. Once the patrol has come and gone, repeat the process. If this is done during a storm, or during a period of high wind activity, the border guards will eventually turn off that sector or ignore the alarms, putting it down to faulty equipment.

LAND

Land is the least desirable means of infiltration and is usually limited to short movements by individuals or small detachments. However, it is the best alternative if an infiltration team is confronted with difficult terrain and poor weather conditions, as land infiltration has its greatest chance of success when the enemy's border defences are inadequate, or if the combat zone is fluid. Insertion by land is carried out either on foot or by using a vehicle. While the final entry point may require the agent to move on foot, the distance from the start point to the actual operational areas will normally require the use of a vehicle. The most widely used modes of four-wheel transport are the Light Strike Vehicle (LSV) and the basic military jeep, such as a HMMWV (High-Mobility Multipurpose Wheeled Vehicle) or a Land Rover.

ADVANTAGES OF LAND

- It is simple and requires minimal support.
- You have flexibility if you are compromised by the enemy.
- You have the ability to change routes as operational needs dictate.
- You can remain comparatively covert if you travel at night.

DISADVANTAGES OF LAND

- It is slow compared to infiltration by air.
- You are subjected to long-term exposure to the enemy.
- There is a limit to the amount of supplies and equipment that can be carried.

Light Strike Vehicles

▲ The light strike vehicle (LSV) looks the part but its performance leaves much to be desired

LSVs were used by both the American and British Special Forces during the Gulf War, although neither of the two British variants were considered to be as reliable as the Land Rover 110. The Longline LSV has a VW 1.91 flat-four, water-cooled petrol engine, while the Wessex Saker has a Perkins Prima 801 1.993, four-cylinder, water-cooled, turbocharged diesel. Although there are four-man LSVs, most are designed to carry two or three soldiers, with stowage for the crew's kit in panniers and racks along the sides of the vehicle. Despite their "beach buggy" appearance, the vehicles are not cheap and additional items – such as Kevlar armour and ignition retardant fuel tanks – come as extra. After initial trials during their warm-up training in the Gulf, the SAS decided to drop the LSVs from the mobile fighting columns.

HMMWV (Humvee)

▲ America's new multi-purpose all-terrain vehicle, the "Humvee", has already seen action.

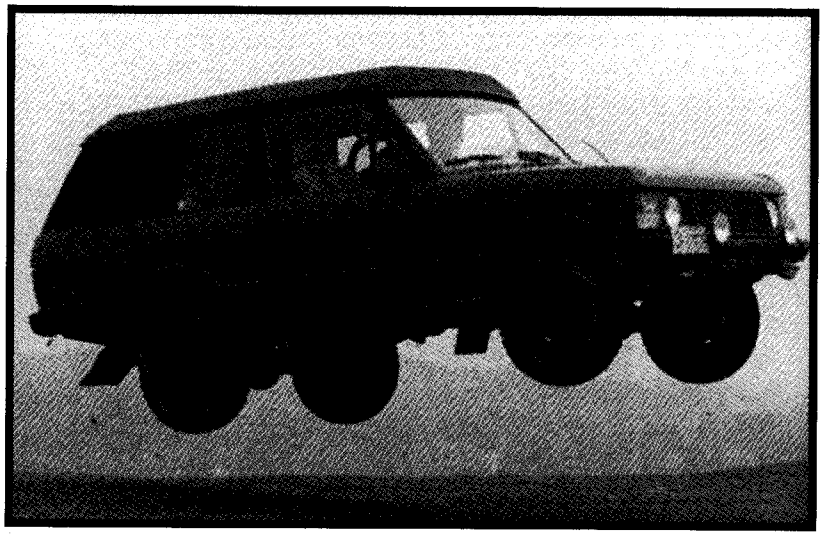
The Humvee – real designation Highly Mobile Multi-purpose Wheeled Vehicle – is a high-mobility, multi-purpose military vehicle produced by AM General Motors. The introduction of the Humvee in 1985 provided a single-platform, multi-mission truck that has become the mainstay of the US military. It is the basis for over 65 types of combat vehicle, from delivering ammunition to supporting special operations units and is acclaimed as the world's most versatile, dependable and mobile tactical wheeled vehicle. AM General has produced more than 175,000 Humvee's for the US and more than 50 for other friendly international forces.

Land Rover

▲ A Land Rover being used by the British SAS. This picture was taken deep inside Iraq weeks before the allies attacked. They roamed at will, looking for the elusive Scud missiles, or any other opportune target.

For many years, the British SAS used a specially painted Land Rover known as the "Pink Panther". In the Gulf War, the SAS used the existing Land Rover 110, modified with extra stowage and weapons mounts, including smoke-dischargers mounted on both the front and rear bumpers. These vehicles were sturdy enough to withstand several months of hard operations behind enemy lines. Land Rover now produces a Special Operations Vehicle based on the 110 used by the SAS, retaining many of their special features and modifications. The result is a long-wheelbase, all-terrain weapons platform that is capable of supporting a wide variety of weapons, such as the Milan Mark 19 grenade launcher, and .50 heavy machine gun.

Range Rover



▲ An early Range Rover being driven by a British Brixmis team operating in the former East Germany. These intelligence teams did much to keep tabs on the Russians during the Cold War.

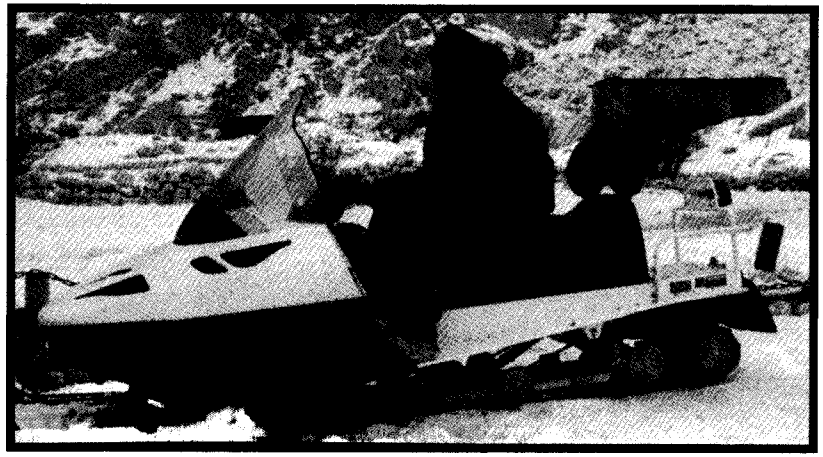
Range Rovers were first used by the SAS following the formation of the anti-terrorist team in November 1972. The government sanctioned the purchase of six Range Rovers and a team of SAS soldiers were sent to the factory to collect them directly from the assembly line. The characteristics of the Range Rover, which at the time was only one year old, were ideally suited to the role – the drop-down tailgate allowed for easy loading and the vehicle itself could be used in an Immediate Action (IA). Twenty-five years later, the Range Rover is still used by the SAS, having been adapted as a main assault delivery vehicle. Platforms and ladders attached to the Range Rovers can carry the assault personnel directly to the required height of an aircraft door or building window.

The Range Rover was also used by Brixmis. This organization started at the end of the Second World War, when Germany was divided into two major zones, the East and the West. Brixmis stood for the British

Commanders'-in-Chief Mission to the Soviet Forces in Germany. The organization was set up on 16 September 1946 under the Robertson-Malinin Agreement between the Chiefs of Staff of the British and Soviet forces in occupied Germany. The idea was to have a mutual exchange of liaison missions that would monitor the troop activities in both German zones, i.e. the Russian mission would monitor military activity in West Germany, while the Brixmis mission would monitor similar activities in East Germany. Brixmis provided most of the intelligence on Soviet and Warsaw Pact military equipment, including some outstanding photography. The Brixmis agreement remained in force until the eve of Germany's reunification on 2 October 1990.

The function of Brixmis was to shadow all troop movements, especially those of the Russians inside East Germany. In order to do this, specially adapted vehicles were used. These had four-wheel drive with strengthened suspension, plus half a tonne of armoured plating under their belly. Fuel-tank capacity was increased and the internal windows were blacked out so that the occupants could take photographs without being observed. The Range Rover was selected by Brixmis in the 1970s as it provided a good observation platform through the sunroof. This was particularly good for the RAF section, who could observe Soviet airfield activity some distance away.

Daimler Benz GS-182 Snowmobile



▲ Snowmobile used to cross the Arctic tundra. This vehicle is ideal for infiltration under such conditions.

Clandestine operations often take place in Arctic conditions where the only means of transport is skis or a snowmobile. The GS-128 has become the industry standard for many Special Forces units operating in Arctic climates. This high-speed military snowmobile is capable of negotiating the roughest terrain at speeds of over 100 kmh. The GS-182 uses a CH002 burning system that can be switched to a high-output electric motor for quiet running. The snowmobile normally carries two people – one man steering, the other armed.

SEA

Infiltration by water includes the use of surface and subsurface craft. Up to the point where the personnel disembark from the parent craft it is a secure and economical means and, if the operator's target area is close to the coast, then it is an infiltration method that should be considered. Many countries have a long and open coastline that is difficult to defend against small clandestine teams. While radar and sonar may pick up large surface and subsurface shipping, smaller vessels can slip by undetected. Small rubber craft can carry both a four-man unit and their equipment right up to the beach; they can be launched from submarines, boats and helicopters and can be powered either by engine or paddle. Their one disadvantage is lack of speed if the infiltration unit is discovered on the beach.

▲ The first hostile area for many infiltration teams is the shoreline. This must be secured before a clandestine landing is performed.

Divers offer a better alternative, as they are hidden up to the point where they emerge from the water. If discovered, they can simply return to the protection of the water. However, divers require specialist training. Their main advantage is their ability to attack coastal targets, such as shipping harbours. As is the case with small rubber craft, they can be delivered by submarine, ship, helicopter or by parachute.

Surface swimmers can also be delivered in the same way, and, for the most part, will remain undetected. They require no specialist training and are hidden until they reach the coastline. One method tried by the British Special Forces was to use surfboards to assist their approach. These were delivered by submarine some four miles off the coast of Norway. The swimmers simply lay on the boards, with their packs secured between their legs at the rear. They achieved good speeds and did not suffer from tired limbs, as would have been the case if they had swum.

ADVANTAGES OF SEA

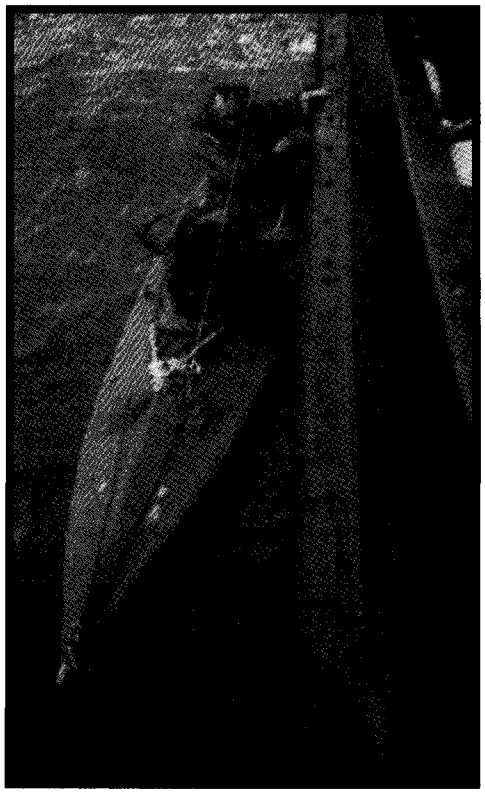
- Operations can be long range.
- The weather has little or no effect up to point of disembarkation.
- Evacuation is possible with a "no-go" operation.
- Operational briefings can continue en route.
- Large quantities of supplies can be delivered.

DISADVANTAGES OF WATER

- The visibility of the mother craft.
- Vulnerability to enemy shore defences during landing.

Canoe

During the Second World War, the canoe became one of the mainstays of infiltrating agents and Special Forces during covert operations. The "Klepper" two-man collapsible canoe is still used by both the SAS and the SBS, although its use has declined somewhat. This German-designed canoe, which proved to be much lighter than the previously used Cockle II, came into service in the 1950s and remained until the mid-1980s. Despite its primitive design, the frame is made from hardwood Mountain Ash and Finnish Birch, the deck is covered with self-drying cotton woven with hemp and the hull material has a core of polyester cord surrounded by rubber. It is ideal for clandestine insertions onto hostile coastlines. It can also be carried ashore and camouflaged by its crew. The canoe's skin is loose fitting until "airsponsons" that run under each gunwale are inflated. It measures 5.2 metres long, 89 cm wide and 61 cm deep and will pack into a bag 69 cm x 58 cm x 20 cm.



◀ Extensively used during the Second World War, the canoe has fallen from grace mainly due to its slow speed and poor load carrying

Assault Boats

There are several small boats available for clandestine operations. Many countries use a mixture of medium inflatable boats (MIBs), rigid inflatable boats (RIBs) and fast interceptor craft (FICs). Of these, the most remarkable is the Halmatic Very Slim Vessel (VSV). In addition to normal boats, Special Forces also operate a range of small landing craft air-cushion vessels (LCAC). Both the Americans and the British use a similar 12-metre-long hovercraft capable of speeds up to 30 knots across water and land. They can carry up to 16 fully equipped personnel or two tonnes of stores.

▲ Assault boats can be used for river or open sea operation. Their construction, once flimsy, has been greatly increased. This picture shows an armoured rubber assault boat.

The Rigid Raider assault craft, which replaced the older inflatable Gemini, is much speedier when it comes to disembarking the men on board. Fitted with four lifting points, the craft can be transported by helicopter and is powered by one or two 140 HP Johnson outboard motors with a top speed of 37 knots. It is capable of carrying nine fully equipped men with a coxswain. The Rigid Raider claims to be virtually unsinkable. Both British SBS and SAS have recently taken delivery of 16 new RTK Rigid Raiders that have been specially adapted for them and are constructed from Kevlar that gives them a hull weight of less than 300 kg. This means that a four-man patrol can carry the craft, even when it is fitted with twin 40 hp motors.

The Americans use the Rigid Raiding craft (RRC) that is some eight metres long and capable of carrying a section of eight marines with full kit. The new Mk 3 RRC has a 240 BHP inboard diesel engine giving it a speed of more than 30 knots when fully laden to a range of 120 nautical miles.

One of the most impressive high-speed delivery platforms is the Halmatic VSV. This vessel is wave piercing and offers high speeds in rough weather conditions. It has a very low radar signature and no heat spots, making it hard to detect. Additionally, its linear acceleration causes no discernible hump speed. It has the ability to carry high payloads with very little loss of speed over a considerable range. It is air-portable by both fixed-wing and helicopter. The Halmatic VSV comes in two sizes, at 16- or 22-metre lengths. The latter is capable of carrying up to 26 passengers, including equipment. Due to its stealth capabilities, the Halmatic is widely used for seaborne covert insertion by many countries.

▲ High speed, wave piercing boats such as the British Halmatic or this American TK used extensively to insert agents.

Marine Assault Access System (Moby)

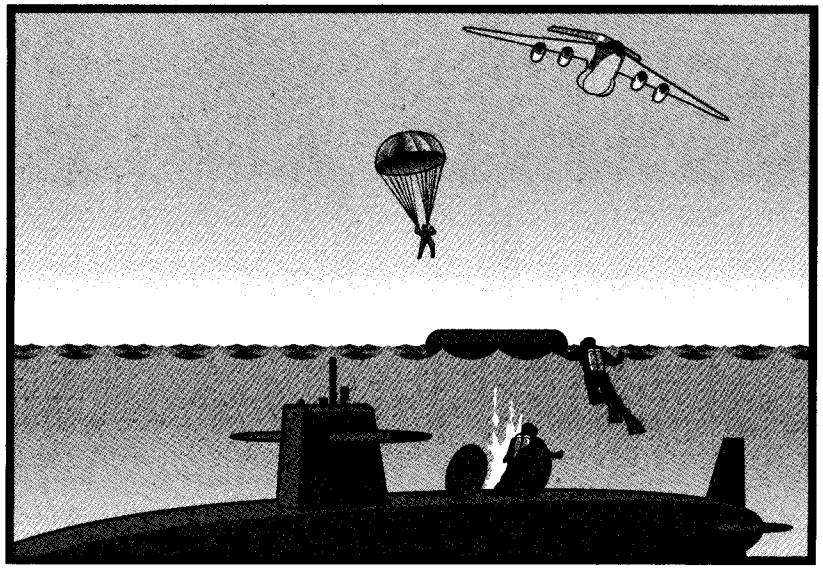
▲ The MOBY system helps agents gain access from the sea surface.

The marine assault access system has been designed to provide access from the water to elevated marine structures and vessels. The system, which raises a flexible ladder and grapple, is particularly suitable in operations where silence and stealth are of paramount importance. The device is compact, extremely portable and has proven operational advantages that are unsurpassed by any other existing equipment. One

diver can deploy the device to the target with ease, and its compact design allows mobilization within seconds, together with easy manoeuvrability during operation. The system is used by both the SAS and the SBS when quick access is required and when the use of traditional ladders or grappling hooks is not feasible.

Divers

Divers are used to perform many roles, such as sabotage on shipping, covert entry to offshore facilities and underwater searches prior to VIP visits, to name but a few. Normal SCUBA equipment is unsuitable for military operations, as bubbles indicate the diver's position. Modern systems include the electronically controlled Divex closed-circuit, mixed-gas, rebreather stealth system. This compact unit is both easy to operate and maintain, giving the diver up to four hours of submersion, depending on the underwater activity. The Divex system is ideal for covert operations as it leaves no traceable bubbles, either below or above the surface.



▲ **Divers can be inserted by air, or delivered to the area by submarine or boat. This flexibility makes them extremely useful as they remain unseen until they reach the shoreline.**

Divers can carry a wide variety of equipment, as can be seen by a new underwater digital camera which was designed for the Navy SEALs. This digital camera can be used up to a depth of 50 metres and can take either IR or normal spectrum pictures. The camera, which can be switched between single frame and video mode, connects to a specially modified diving mask that allows HUD-style viewing. The camera also has a standard 10x telephoto option, a wide-angle option and can be fitted with a fibre-optic flexi-lens. The memory can store up to 30 minutes of video or 500 still images, thus making it an invaluable asset for reconnaissance purposes. Other diver systems include the deployment of underwater GPS navigation and communications.

UNDERWATER COMMUNICATIONS

It is difficult for divers to communicate underwater without the use of an umbilical line. However, a new system has emerged that makes such a task easier. The diver speaks into a mask, or a mouthpiece-mounted microphone (various microphone-earphone configurations are possible to fit a range of masks, breathing systems and even re-breathers). The voice signal is converted into an ultrasonic-equivalent signal within the diver unit, amplified and is then applied to the transducer. The transducer resonates to produce a sound signal of optimum wavelength that can be carried long distances through water.

Transducers of a similar wavelength (approximately 31 KHz) mounted on the other diver units or lowered into the water on a cable from the surface supervisor, receive and transmit such signals. The received signals then undergo the reverse process to yield the original speech signal in the diver's earphone or in the supervisor's headset and speaker.

Through-water communications are still in their infancy and are affected by many factors. Some of the energy is absorbed and converted to heat (attenuation) and some of the energy is scattered by fish, seaweed and bubbles (diffraction). In addition, the surface and the seabed will affect the sound intensity by reflecting the sound back into the water, causing interference. Temperature variations in the water may refract the signal. The sound intensity of through-water communications will, therefore, be affected by both the speed of sound in water – 1,480 metres per second – and variations in water temperature.

Special Forces divers also practise parachuting into water for both clandestine entry and counter-terrorist operations. A water jump differs from a land-based parachute drop in as much as the parachutist must disconnect from the parachute prior to hitting the water. This allows him to swim free of the parachute should it cover him on landing. Agents can also

be inserted by parachuting into the water before swimming to the operational area.

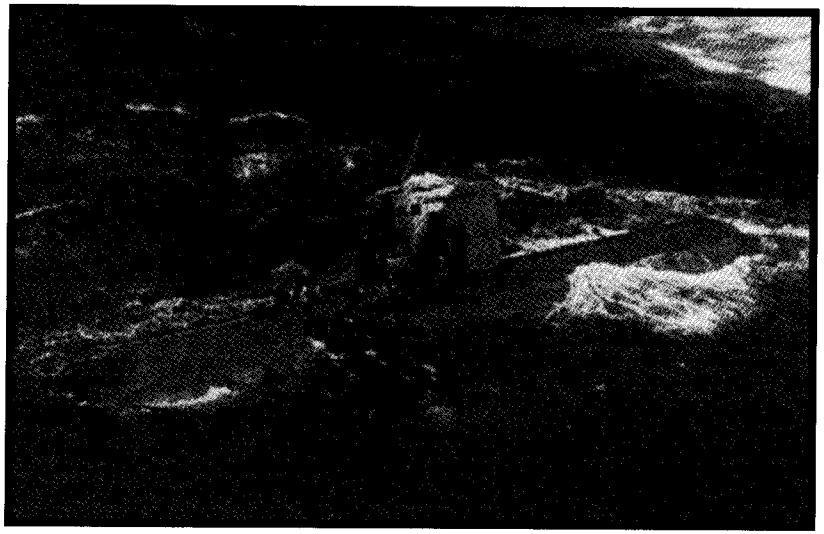
Convertible High Speed Surface/Submarine Vessel

▲ Submersibles offer a perfect way of getting a team close to a ship or oil rig installation undetected. It has the ability to travel on or below the water surface.

This is a fast offshore boat that has deflatable-re-inflatable hull tubes and waterproofed, pressurized operating systems. While on the surface, it serves as an offshore rigid hull that can be converted into mini-submarine mode in less than 20 seconds, even while underway. The boat is powered by outboard motors on the surface and by electric propulsion when it is underwater. It is capable of carrying up to six combat divers plus their equipment and standard fuel bags. The surface range of the vessel is 100 nautical miles at a speed of over 30 knots; underwater, it has a range of ten kilometres and a speed of around two to three knots. It can dive to a depth of 100 metres. The underwater performance can be greatly improved by substituting standard lead acid batteries with silver zinc units. The boats can be deployed from a road trailer towed by a large car, a submarine, a patrol craft or by helicopter, all of which will greatly extend the combat diver's range and operational capabilities.

These sub-skimmer craft are uniquely versatile, making them indispensable for reconnaissance, surveillance, agent handling in hostile territorial waters and waterborne clandestine missions of many kinds where divers are involved. It offers an ideal method of approach for such scenarios as oil rig and ship-at-sea assault operations, delivering divers covertly to the target.

Submarines



▲ As can be seen here, submarines have been used for many clandestine infiltration operations.

Small submarines are used by many countries, mostly for the purpose of gathering information and for carrying out clandestine operations. North Korea developed a small submarine with the express purpose of inserting groups of Special Forces into South Korea. On one occasion the South Korean Navy captured a North Korean 70-ton Yugo-class submarine that had become entangled in fishing nets off the port of Sokcho. The same region saw another incident when, in September 1996, another North Korean mini-submarine ran aground in Kangnung. A firefight ensued and most of the 24 crew and Special Forces were killed or drowned.

The Americans developed the Mark-XII ASDV, an advanced swimmer-delivery submersible that carries combat swimmers and their cargo inside a fully flooded compartment. The vessels are launched from larger host submarines. The Mark-XII is fitted with a range of advanced sensors, including sonar, IR, UV and thermal imaging. Navigation is provided by the MUGR, a miniature, underwater GPS Receiver. The Mark-XII is used by all Navy SEAL teams, the British SBS and the French GIGN. The Russians use the Sirena-UM manned torpedo, as well as small submarines. In October 1981, the Swedish Royal Navy detected Soviet submarine activity near their navy base at Karlskrona. Similar activities resulted in depth charges being dropped, in order to force the vessels to the surface. Investigations by