

Secure Patents;
Information for the insecure...

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Topics covered

- What are 'secret' S22 patents?
- What does the IPO do with S22 patents?
- Living and working with S22 patents
- Administrative and legal considerations
- Identifying relevant technologies
- Other Defence technology-related issues

S22 of Patents Act 1977

- Commonly called 'secure' or 'secret' patents
- Rare – only around 100 applications per year in the UK
- Most Patent Agents/Attorneys will work their entire career without needing to deal with S22
- Awareness still needed, however...

Why do we have secure patents?

- Patent applications are normally published as a routine part of the processing
- Some disclosures could be 'damaging' if technical details of them were made public
- IPO has obligation under the Act to give 'directions' prohibiting disclosure of a patent application (S22 directions or 'prohibition')

Reasons for prohibition

- The patent would be prejudicial to national security – s22(1)



- The patent would be prejudicial to the safety of the public – s22(2). This is rarely, if ever, used and I will not discuss this further



What is ‘prejudicial’ to national security?

- The nature of national security means that there are no precise definitions
- It depends on what ‘threatens’ the body politic of the United Kingdom at any given moment
- The nature of world events means that what is considered prejudicial can change over time
- Some technologies, however, will always be problematic

- Some threats are temporary, and may reflect current geopolitical trends and events;



- Others, such as nuclear weapon technologies, are permanent;



What are S22 directions?

- S22(1) & (2) directions are a blanket ban on the disclosure of an application’s content and prohibit; the publication of the *information* in the patent application the *communication* of that information to any person in any way
- Please note that there is no right to, or mechanism allowing, an appeal about a decision to give S22 directions – s97(1)(c)
 - MOD review (discussed later) functions as a surrogate to an appeal process

Identifying S22 applications

- Every application filed at the IPO - GB, EPC and PCT - is checked by security section Examiners
- All types of filing are checked – paper and electronic
- 4 patent examiners work on a rota system
- Over 30 000 applications per year
- We may miss some – this is where your vigilance and help is necessary!

The ‘Stop List’

- The Security Section is provided with a guide to technologies that are considered of *potential* interest by the Ministry of Defence (MOD)
- The full list is classified - and therefore not available to the public or other IPO staff - but a simplified (and unclassified) version is on our website for your reference
- <http://www.ipo.gov.uk/ip-security/list.pdf>
- As a guide, it is defence-related technology - not merely technology ‘suitable for’ military use that **may** be subject to S22 directions (or provisions).

Secret filings

- Some applicants (normally defence contractors) deal with technology they know will fall within S22
- They will file directly with Security Section, Room GR70, Concept House, Cardiff Road, Newport, NP10 8QQ
- Marked FAO Huw Jones
- Can now also file online at screening@ipo.gov.uk

Processing S22 applications

- Once subject to S22 directions a patent application is separated out from the normal workstream at the IPO
- The agent/applicant is notified within 6 weeks of filing
- S22 applications are held and processed within Security Section
- The application is searched and examined as normal but will *not* be published or granted while the s22 directions are in force – s22(3)(a)

MOD Review

- Once identified, an application may be forwarded to MOD for review of the IPO's decision if they request it S22 – S22(5)
- But only 18 months from priority date – S22(6)(b)
- This rarely (never!) happens
- Applicant can, however, ask for early review before 18 months using Form DP2
- MOD may remove the directions –application 'released' and normal processing resumes
- MOD may confirm S22 directions
- Protective marking (more later!) may rise or fall

Protective marking scheme

- Since 2014 the following protective markings have been applied as appropriate;
- Official
 - Official Sensitive
 - Secret
 - Top secret
- Other caveats (e.g. "UK Eyes Only") may apply
- Documents classified under the old scheme (Protect, Restricted, Confidential, Secret, Top Secret etc.) retain their markings under the old scheme unless or until their protective marking comes up for review.

- Old scheme v's current scheme for reference



Working with secret patents

- Anyone working on or handling an application that is protectively marked must;
- be cleared to the appropriate level and
- store the application in an appropriate manner



Security Clearance

- To handle protectively marked material, you **must** hold the correct security clearance from *United Kingdom Security Vetting*; <https://www.gov.uk/government/organisations/united-kingdom-security-vetting>
- There are 3 levels – basic check, Security Check (SC) and Developed Vetting (DV)
- Staff in IPO Security Section hold *at least* SC clearance



But I'm not cleared!

- If you are not cleared for S22 work, check with your employer's Security Controller to see who is cleared at your practice - *immediately*
- If no one at your practice has clearance to work on S22 material you must contact the IPO so that the application can be transferred to another practice - *immediately*



Working with us on S22

- All correspondence relating to S22 applications must be sent to us direct by post/courier or fax
- Double enveloped; do not draw attention by writing "TOP SECRET" on the outer envelope...
- Security Section
Room GK70
Concept House
Cardiff Road
Newport
NP10 8QQ
- fax: 01633 814415 (for communication purposes only NOT for new applications)
- Regular online e-filing services must not be used
- Ever
- You can, however apply by email (understanding the security risks thereof) at screening@ipo.gov.uk.

How long do directions last?

- S22 directions last indefinitely – oldest are 80 years plus!
- The MOD reconsiders all S22 applications 'periodically'
- At any time the directions can be lifted and the case is 'released'
- If released with time remaining on the 20 year term, grant can occur – provided all usual requirements have been met
- If there is no time left on the 20 year patent term, the application will still be published for prior art effect once released if it meets the usual requirements
- Some technologies (e.g. Uranium enrichment) are such that applications will never be released from S22 restrictions

Withdrawal and S22

- An application subject to S22 directions can be withdrawn by the applicant *at any time*.
- Withdrawal before release prevents publication
- Allows agent and applicant copies and papers to be destroyed
- **Official IPO guidance:** Please withdraw and destroy any and all S22 applications with no patent term remaining or that the applicant has no desire to proceed with
- 1949 Patents Act applications can be withdrawn *even if the sealing fee was paid*.

Breaching S22

- The most important slide?
- Breach of S22 is a **criminal offence**
- Punishable by up to 2 years imprisonment
- Or a fine
- Or both...



Variation orders

- s22 directions prohibit communication of the information in an application to third parties
- Sometimes communication is essential – the applicant may wish to engage in commercial negotiations etc.
- Variation orders allow this to happen (under agreed terms)



Other patent-related issues

- Please be aware of special measures regarding the following:
- Landmines
- Cluster munitions
- Chemical weapons



Landmines Act

- The Landmines Act 1998 made anti-personnel and 'booby-trap' mines illegal in the UK
- Any act to "transfer" landmine technology (e.g. writing a patent specification) is a criminal offense
- The IPO will not process any application relating to an anti-personnel mine - they are immoral S1(3)



Cluster Munitions Act

- The Cluster Munitions (Prohibitions) Act 2010 makes cluster weapons illegal in the UK
- As with landmines, transfer of knowledge is a criminal offense and the IPO will not process any application relating to cluster-munition technology.



Chemical and biological weapons

- The Chemical Weapons Act 1996 and the Biological Weapons Act 1974 made certain aspects of such weapons illegal in the UK
- Contact Security Section for more information if needed.



How can you help?

- If you think a case may be subject to S22 please contact us before filing for advice on best practice
- Remember - it is specific defence-related technology, not technology suitable for military use that attracts S22 provisions – but we're always happy to chat!
- Don't hang on to S22 case files if there is no commercial need – you are Patent Attorneys, not the National Archive!

Summary

- We've had a brief introduction to S22 patents, what they are and how they work
- We've looked at how you as patent professionals work with them - including your legal obligations
- We've briefly looked at what is 'military technology'
- We've had a look at other defence-technology patent issues

Questions?

Please feel free to talk to me afterwards or contact me at work

- mike.leaning@ipo.gov.uk
- Direct line 01633 813795



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TECHNOLOGY WHICH MAY BE SUBJECT TO SECTION 22 OF
THE PATENTS ACT 2004

The following is a list of technical areas which is that currently notified to the Comptroller by the Secretary of State for Defence as being information the publication of which might be prejudicial to national security. This list is for internal use, only by the UK Patent Office.

Directions under section 22 may be issued in respect of any technology falling under any of the categories listed, but information which falls into any of the categories listed will not automatically attract such directions. The Secretary of State reserves the right to add to the categories.

For the purposes of section 23, permission to file abroad is necessary for applications containing information which relates to military technology regardless of whether such technology falls within any of the categories listed.

1. Atomic Energy

- a. Nuclear weapons or nuclear explosives of any kind, including their components such as neutron generators.
- b. Methods of detecting nuclear explosions or atomic energy plant.
- c. Nuclear reactors or other nuclear devices or processes for military purposes, eg for the propulsion of naval vessels or submarines.



- k. Treatment of uranium to increase the proportion of the isotope 235 contained in the uranium, including equipment and software specifically designed or adapted (or, if not so designed or adapted, likely to be of exceptional use) in this connection. (See also Uranium Enrichment Technology (Prohibition on Disclosure) Regulations 2004).

2. Airborne Anti-submarine Warfare (ASW)

- a. Underwater detection of targets, including new frequency bands and modes of operation.
- b. Software associated with special algorithms for detection, classification and location of underwater sonar targets.
- c. Sonobuoy location systems (with special frequency, accuracy or mode of operation).

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3. Military Aircraft and Helicopter Construction and Design (*Excluding* sailplanes, or minor features not connected with armament or performance, and *excluding* civil aircraft of all types)
 - a. Aircraft.
 - b. Helicopters.
 - c. Remotely piloted vehicles.
4. Aircraft Engineering
 - a. Retarding devices on aircraft (*Except* designs of wheel brakes and brake parachutes).
 - b. Air conditioning systems using other than air for heat transfer fluid.
 - c. Measures to reduce vulnerability of aircraft to enemy action.
 - d. Complete flight refuelling systems (*Not* Flight refuelling components such as valves, hoses, nozzles etc.).
 - e. Aircraft escape systems (*Except* parachutes).
 - f. Inert gas purging and explosion suppression of fuel tanks and other spaces liable to contain inflammable vapour.
 - g. Active control systems to prevent flutter and reduce loads on aircraft structures.
 - h. Reduction of helicopter vibration.
 - i. Ice detection and de-icing systems. Methods of icing protection for helicopters.
 - j. Undercarriage design and components for reducing aircraft response to rough ground taxiing loads such as shock absorbers.
 - k. Fire detection and extinguishing systems.
 - l. Erosion resistant radomes.
 - m. Enhancement of radome performance, especially for very wide frequency operation or angle of incidence.
5. Aircraft Launching, Take-off and Landing Devices
 - a. Launching manned or unmanned aircraft including
 - i) Boosting devices and methods of increasing thrust and lift at take-off, other than by increasing engine power;
 - ii) Catapults for launching manned or unmanned aircraft;
 - b. Aids to landing or retarding aircraft on landing including arrester gear.
6. Airfields, Runways, Landing Decks and Tracks
 - a. Take off or Landing surfaces, including
 - i) Flexible surfaces
 - ii) Those with special shock absorbing abilities
 - iii) Surfaces impervious to jet down-thrust gases
 - iv) Surfaces capable of rapid laying
 - v) Surfaces effective on soft ground or water, or
 - vi) Any surface which involve radical changes in existing landing or take-off techniques.
7. Armour and Protective Devices
 - a. Armour, including body armour of metal, plastic fabric or other materials or combination of materials for protection against enemy action or terrorists.
 - b. Protective devices to minimise the effect of enemy action, such as devices for sealing tanks or protection against fire.
 - c. Shelters against nuclear blast and fall-out.
8. Alloys, Ceramic Materials and Coatings
 - a. High temperature alloys.

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- b. Alloys possessing resistance to erosion, creep, fatigue or mechanical shock at elevated temperatures
- [REDACTED]

- d. Alloys with high strength to weight ratios, fatigue to ultimate tensile strength ratios fracture toughness, stress corrosion resistance or Young's Modulus.
- e. Alloys selected for their electrical or magnetic properties, such as to permit weight reduction or other improvements in components.
- f. Hard alloys having a density greater than 13 grams per cc.
- g. Alloys stated to economise in strategic materials (ie those likely to be in short supply in times of emergency), but giving a performance equal to those using larger quantities of such materials.
- h. Any ceramic, alloy or metal ceramic material where reference is made to its use for specific military purposes, including guided missiles and rockets.
- [REDACTED]

- j. De-icing and anti-icing coatings for aircraft and helicopter equipment.

9. Camouflage

- a. Camouflage, decoy and deceptive devices including materials capable of absorbing, reflecting or dissipating electro-magnetic or infra-red radiation.

10. Catalysts

- a. Catalysts for hydrogen peroxide breakdown.

11. Chemical and Biological Warfare

- a. Chemical compounds of high toxicity;
- b. Methods of disseminating chemical agents (including the generation of very fine aerosols):
- c. Methods of production, storage, dissemination and detection of pathogenic micro-organisms, their toxin products.
- d. Methods of production, storage, dissemination and detection of toxins derived from sources not falling under c.
- e. Methods and devices for protecting personnel against chemical and/or biological warfare including antidotes.
- f. Detection and Alarm devices.
- [REDACTED]

12. Clothing

- a. For surmounting obstacles or protection against injury eg anti-mine shoes.
- b. For protecting against Nuclear, Biological and Chemical Warfare (NBC).

13. Controls, Power Operated

- a. Power Operated controls including active control techniques and servo systems.
- b. Highly accurate rate gyroscopes and those with fast reaction times.
- c. Methods of transmitting data with high accuracy and response.
- d. Schemes for achieving high reliability, integrity and survivability in active control

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systems including system architecture for same.

14. Cypher, Code, Encryption and Secrecy Systems and Devices

- a. Cipher, code, encryption, secrecy and privacy systems and devices.
- b. Scrambling systems involving a random element.
- c. Signals (radio or otherwise), claiming to be difficult for an unauthorized person to intercept.
- d. Means of communication claiming to be proof against interception and/or geolocation.
- e. Communication systems using spread spectrum.
- f. Communications systems using low power or low modulation techniques.
- g. Any system for detecting and/or extracting information from systems, devices or methods using techniques set out in a to f or otherwise designed to circumvent secure communications systems.

15. Electrical Apparatus

- a. Heat activated electric cells.
- b. Generating sets for use under arctic conditions.
- c. Batteries having very small size, long shelf life, or high output for short periods.
- d. Electric cells having high output to weight ratios.
- e. Seawater electrolyte cells.
- f. Super-conducting machines for naval propulsion.
- g. Submersible motors.

16. Aerials, Radar, and associated circuits.

- a. Anti-drag aircraft systems for 2MHz upwards (eg structurally part of the aircraft);
 - b. Systems giving very narrow beams;
 - c. Overlapping beams for "split" systems;
 - d. Correction means for the deleterious effects of radome installations.
 - e. Adaptive beam and null-steering arrays for discrimination between wanted and jamming signals.
 - f. Side lobe cancellation techniques for aerials.
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17. Radar

- a. Application of ultra-high frequencies. FM systems, including FM carrier wave systems.
 - b. High power pulse modulation and pulse techniques.
 - c. Display apparatus.
 - d. Ambiguity resolution apparatus.
 - e. Harmonic radars and their application.
 - f. Transmission of early- warning, identification and fire control radar data. Radar camouflage and deception techniques.
 - g. Systems employing time or spatial integration to improve resolution of position measuring devices.
 - h. Doppler systems with high clutter rejection.
 - i. Systems with high resolution of range or angle, and those with very high angular accuracy.
 - j. Low level tracking.
 - k. Multi-function multi-beam radars.
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- m. Systems employing very low wavelengths (eg millimetric radar systems).

18. Electronics

- a. Band-width compression techniques.
- b. Wide band amplifiers whose band-width exceeds 50% of mid-frequency.
- c. DC or magnetic amplifiers.

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- d. Stable generation, modulation or amplification and associated techniques.
- e. Oscillators with stability better than a few parts per million per year.
- f. Circuits for secure means of communication.
- g. Micro-wave power oscillators and amplifiers (*Except* Magnetic amplifiers for power lines), offering:
 - i) High peak power output
 - ii) High average output power
 - iii) High instantaneous band-width
 - iv) High tunability
 - v) Low noise
 - vi) High operating temperature
 - vii) Small size, and/or
 - viii) High ruggedness.
- h. Miniature rugged devices capable of use in shells, bombs or rockets.
- i. Systems and devices for detecting and amplifying small microwave signals and having very low noise, very wide band-widths or very large dynamic range;
- j. Systems or devices having special features to reduce the effect of atomic acoustic or intense electro-magnetic radiation, including protection of micro-wave receivers against very high incident mean power.
- k. Equipment for detection of low-level ELF (extra low frequency) and ULF (ultra low frequency) electro-magnetic fields.

19. Communication, Signaling, Navigation, Identification and Direction Finding

- a. Countermeasures including jamming and anti-jamming devices, jamming simulators
- b. Any form of signaling, including spread spectrum, claiming to give a degree of immunity from natural and man-made interference.
- c. Navigation, Tracking and/or and Direction Finding (*Except* Low accuracy navigation systems).
- d. Navigation devices of high accuracy with errors of a few metres, including navigation on land;
- e. Rallying aids for airborne troops on ground;
- f. Beacons including droppable sonobuoys;
- g. Direction finding systems operating above 500MHz;
- h. Apparatus for characterising and locating short-duration transmissions
- i. Applications of ionospheric and tropospheric scatter or absorption band transmission to communications;
- j. Data telemetering systems;
- k. High definition facsimile or television transmission systems, especially when small enough for use in aircraft or weapons;
- l. Systems employing spread-spectrum or frequency hopping (agile) and high speed or burst transmission techniques;
- m. Search, panoramic and recording receivers;
- n. Military identification devices or techniques.

This class includes both electronic and non electronic methods and devices.

20. Opto-electronics, infra- red and other non visible systems

- a. Reliable and secure optical systems for communications
- b. Holographic optical components. (Not Telecommunication components, optical encoders such as for use in machine tool control systems)
- c. Methods and devices to detect and/or intercept optical signals or communications
- d. Communications or surveillance systems using non-visible parts of the spectrum;
- e. Infra-red and other non visible target detectors and vision aids;
- f. Infra-red and other non visible radiation detection cells, photo-electric and otherwise
- g. Pre-detection and post-detection filters, including both optical and digital transformation and filtering techniques capable of enhancing the ability to distinguish a target from background clutter, including design and manufacture.
- h. Means for suppression of infra-red radiation, other than structural or camouflage.

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- i. Infra-red and other non-visible radiation transmitting window material.

21. Engineering Equipment

- a. Assault, defence and demolition devices;
- b. Systems for covert entry;
- c. Lock (physical or electronic) picking devices;
- d. Systems to defeat surveillance systems;
- e. Systems for rapid embarkation and disembarkation of troops;
- f. Illumination for night photography (including illumination or flash systems using non-visible parts of the spectrum);
- g. Bridging;
- h. Amphibious equipment;
- i. Temporary harbours;
- j. Barriers such as tank traps.

22. Engines, Prime Movers and Propulsion

- a. Gas turbines, ram-jet and rocket motors including those using liquid fuels.
- b. Improvements in any of the following:
 - i. Specific fuel consumption.
 - ii. Specific thrust
 - iii. Weight
 - iv. Life
 - v. Reliability
 - vi. Cooling techniques
 - vii. Fabrication techniques applied to engines specified at "a".
- c. Variable intake and exhaust nozzles.
- d. Variable shape transonic and supersonic compressors and compressors containing unique features for supersonic flight.
- e. High heat release and high velocity combustion systems. Combustion and fuel systems for other than liquid hydrocarbon fuels.
- f. Features enabling turbine entry gas temperatures above 1500K or re-heat boost temperatures above 1800K to be sustained in a gas turbine.
- g. Control systems of advanced design eg where the intake and nozzle areas are variable and inter-related to the engine and/or aircraft speed.
- h. Control systems pertaining to jet-lift, jet-flap or flap-blowing.
- i. Fuels and oxidants for missiles.
- j. Methods of containing rocket fuels and oxidants in missiles and of delivering them to the engine.
- k. Devices for assisting combustion ignition in flight.
- l. Infra-red and radar suppression devices.
- m. Ship and boat engine silencing devices.
- n. Devices or techniques for improving the power to weight ratio of naval propulsion machinery of 1 MW and over, including those for thrusters and low-speed drives.
- o. Non-magnetic machinery.
- p. Means for vectoring or reversing thrust in flight.

23. Explosives and Propellants

Propellants, high explosives, detonating initiation and delay compounds, detonators, shaped and stranded charges, fuze compositions, plastic explosives. (*Except* Blasting and mining explosives.)

24. Fighting Vehicles

- a. Tanks, armoured and other fighting vehicles including bridge laying.
- b. Floatation and wading devices.

25. Fire-control for Gunnery and Attack by Missiles

- a. Predictors, directors, fire-control gear, bomb sights, bombing computers and other aiming and sighting devices.
- b. Gun control equipment eg for stabilising guns in vehicles and ships.

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26. Fuzes and Initiating Devices

- a. Devices for initiating the operation of munitions.
- b. Anti-handling and disturbance devices.
- c. Proximity fuzing.

27. Guided Missiles and Unmanned Vehicles

Guided missiles and unmanned vehicles and associated equipment. Guidance systems whether active or passive, over any part of the flight.

28. Infra-red

- a. Infra-red target detectors and vision aids, infra-red radiation detection cells, photo-electric and otherwise. Pre-detection and post-detection filters, including both optical and digital transformation and filtering techniques capable of enhancing the ability to distinguish a target from background clutter, including design and manufacture.
 - b. Means for suppression of infra-red radiation, other than structural or camouflage.
 - c. Infra-red transmitting window material.
-

29. Instruments Computers etc.

- a. Instruments capable of measuring or recording time events of one millisecond or less, muzzle velocity measuring equipment, propellant pressure recorders.
- b. Very high precision time interval devices.
- c. Range finders.
- d. Periscopes and associated equipment including periscope sextants and automatic periscope bearing transmitters.
- e. Astro-navigation, automatic sextants, star following, precision gyroscopes and gyro techniques aimed at wander rates of below 0.1 degrees per hour.
- f. Automatic pilot and stabilising equipment for aircraft and guided missiles, coupling arrangements between autopilots and bombing or navigation or landing approach and terrain following systems.
- g. Landing approach aids.
- h. Indicators capable of measuring true air speed above 550 mph.
- i. Mach-meters where performance of aircraft is specifically mentioned.
- j. Navigational devices of high accuracy, giving position within a few metres.
- k. Air mileage units.
- l. Accelerometers of accuracy better than $10^{-3}g$.
- m. Turn-sensitive devices for radar and gun stabilisation, or for stabilisation of mountings and for auto-pilots and auto-stabilizer
- n. Hardware and software specially designed for:
 - i) Modelling, simulation or evaluation of military weapon systems
 - ii) Development, monitoring, maintenance or updating of software embedded in weapon systems
 - iii) modelling or simulating military operation scenarios
 - iv) Command, Communications, Control and Intelligence (C³I) applications or Command, Communications, Control, Computer and Intelligence (C⁴I) applications
 - v) Determining the effects of conventional, nuclear, chemical or biological warfare weapons.
- o. Computer systems or software specially adapted for military or intelligence purposes. (Not Computers of commercial type)
- p. Airborne digital computing system architectures designed to achieve high integrity and survivability, particularly in relation to critical flight safety functions such as stores management and flight control.
- q. Inertial navigation and flight systems using high accuracy components.
- r.
- s. Gravity gradiometers with an accuracy better than 10EU.

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- t. Head up displays.
30. Internal Security and Counter Insurgency
- a. Weapons, chemicals and devices for the control of crowds.
 - b. Methods and devices for the detection of NBC materials, weapons and explosives.
 - c. Methods and equipment for the disruption or making safe of explosive devices.
 - d. Specialist surveillance devices.
 - e. Devices aimed at intruder detection such as radar, infra-red or seismic detectors.
 - f. Communication equipment claiming to be tap or tamper proof.
 - g. Devices and measures to prevent or/detect the counterfeiting of money (including banknotes) and of other valuable financial instruments.
- [REDACTED]
31. Directed Energy Devices
- a. Laser weapons and components.
 - b. Other directed energy devices and components.
32. Mines and Explosives
- a. Mines and explosive devices including beach and sea mines.
 - b. Laying devices for above.
 - c. Detectors for non-magnetic mines (*Not* Metallic mine detectors).
33. Nuclear Power
- Nuclear propulsion plant for ships and associated equipment.
34. Ordnance, Projecting and Launching of Missiles
- a. Guns and their ammunition (*Except* Sporting guns and sports equipment).
 - b. Missile launchers, release and projecting devices including rocket projectors.
 - c. Unguided missiles including shells, bombs, torpedoes and rockets (*Not* Distress signal and rescue projectors).
 - d. Gear specially designed for handling munitions including equipment on aircraft for suspension and housing.
 - e. Anti-armour munitions and improvements in conventional, sensing, and terminal guided munitions and submunitions.
35. Plastics, Rubbers and Glasses
- a. Plastics and rubbers containing oxygen furnishing groups such as nitrate, nitro, nitroso, chlorate, perchlorate and the like, mainly of interest in propellants and explosives.
 - b. Reinforcing material or compounding ingredient for plastics or rubbers, eg inorganic fibres or stabilisers., which will give a high strength to weight ratio, or which provide chemical and thermal stability at temperatures above 200C.
 - c. Plastics or rubbers having good chemical and thermal stability above 250C and substantial retention of mechanical properties above 200C together with:
 - i. Good dielectric properties above 200°C or useful semi-conductive properties, or
 - ii. Good chemical resistance such as ability to withstand fuming nitric acid, High Test Peroxide (HTP) or other rocket fuels and, in the case of rubber, having good resistance to fuels, lubricants and hydraulic fluids above 200C or below -40C.
 - d. Coatings having outstanding resistance to rain erosion in flight.
 - e. Anti-corrosion coatings and sealing compounds stable at 200C and above.
 - f. Metal-metal or metal-ceramic adhesives having high strength above 200C and with good creep, fatigue, chemical and climatic resistance
36. Radiological Equipment (*Not* Medical X-ray equipment, Linear accelerators, Xeroradiographic equipment.)
- a. Flash X-ray tubes.
 - b. Flash generators
37. Naval Ships, Boats and their Equipment

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- a. Ship hull forms.
 - b. High speed marine craft.
 - c. Booms and nets for use as a defence against surface and underwater craft.
 - d. Drag reducing designs and devices for use in waterborne and underwater vehicles.

 - e. Means of changing ships acoustic signature.
 - f. Means of reducing ships motions.
 - g. Means of improving ships manoeuvrability.
38. Smoke, Flame and Incendiary Equipment
- a. Smoke screening both visual and infra-red, smoke markers, composition and methods of stabilising. (*Not* Equipment for generating smoke.)
 - b. Flame throwers, incendiary agents and gelled fuels.
39. Supply Dropping
- a. Homing, guidance, control or orientation of parachute loads (freight or personnel containers), decelerating devices using rockets or other means.
 - b. Safety accommodation provision for personnel containers.
 - c. Landing shock absorber systems. Detachment devices for parachute after landing. (*Not* Parachutes)
 - d. Systems governing accuracy of aim from high altitudes.
 - e. Aids for location of stores dropped by parachute.
40. Military Survey and Photographic Equipment(*Except* Stereoscopic mapping equipment.)
- a. Quick survey, (including air survey and photo interpretation) reconnaissance, including systems using radio, radar, television and other equipment transmission techniques.
 - b. Missile recording cameras:
 - i. Multi-lens type
 - ii. Strip type
 - iii. Cine, ultra high speed, or
 - iv. Night and high speed aerial photography.
 - c. Improvements in resolving power of aircraft cameras, including the use of illuminants of greater efficiency.
 - d. Low light and night photography.
41. Target Location
- a. Laser systems for ranging.
 - b. Systems which are intended to assist weapon location and identification on the battlefield.
 - c. Detection of laser sources and laser beams.
42. Training Devices
Training devices for equipment not having civilian applications.
43. Underwater Craft, Weapons and Devices
- a. Submarines and their equipment.
 - b. Underwater vehicles including midget submarines, manned and unmanned submersibles, swimmer delivery vehicles, underwater swimming devices and human torpedoes.
 - c. Underwater propulsion systems.
 - d. Systems for the surveillance, detection and location of underwater vessels, weapons and objects.
 - e. Countermeasures and counter-countermeasures against underwater vessels and weapons including anti-torpedo weapons and devices, anti-mine devices and methods for deploying them, including anechoic coatings, confusion and deception devices.
 - f. Torpedoes and underwater launched missiles including homing systems, power sources motors, engines and propulsors for them, also their launching, guidance and fire control systems. Surface launched missiles for deploying torpedoes.

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- g. Sea mines and their sensors and actuating devices, including equipment for fusing, setting, laying and mooring them.
- h. Mine-sweeping and mine countermeasures equipment including devices for locating mines, rendering them harmless, recovering or destroying them.
- i. underwater explosives, projectiles, depth-charge and thrown weapons including launching and fire control equipment for them.
- j. Limpet mines and like devices for attachment to underwater surfaces.
- k. Shallow water diving equipment.
- l. Underwater communications by acoustic means.