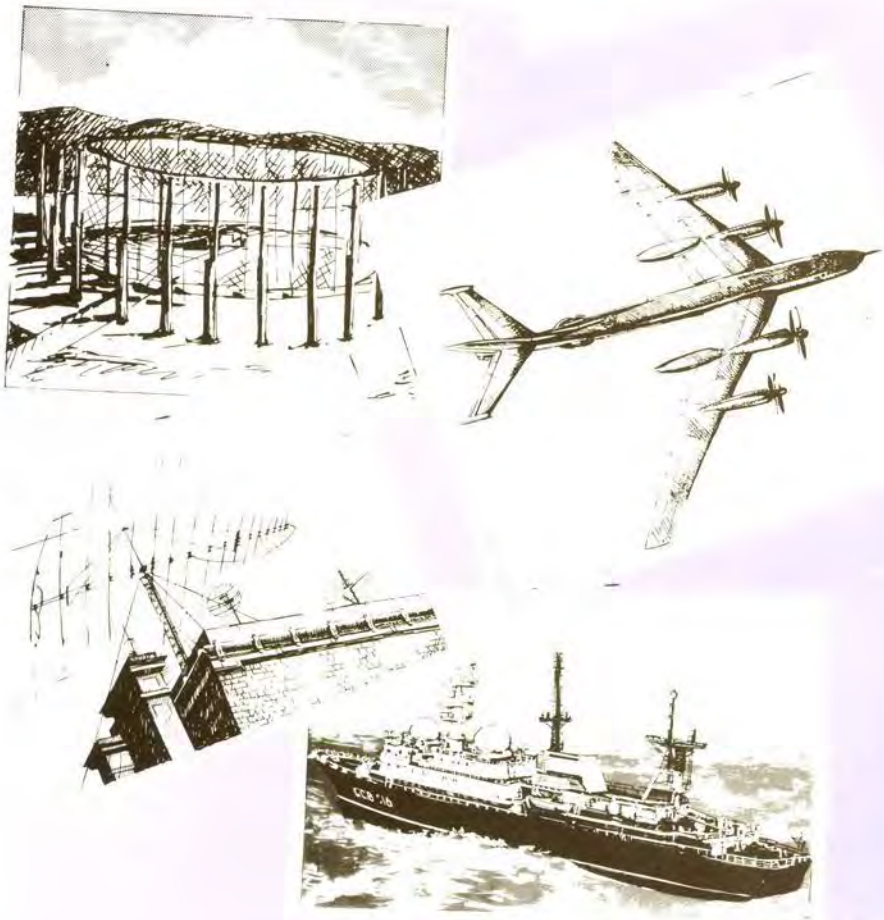
Soviet Signals Intelligence (SIGINT)

Desmond Ball



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SOVIET SIGNALS INTELLIGENCE (SIGINT)

Desmond Ball

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ABSTRACT

The Soviet Union maintains the most extensive and most comprehensive signals establishment (SIGINT) capabilities in the world. This Paper describes the overall scale of the Soviet SIGINT effort; the organisational structure of the Soviet SIGINT activity; the principal platforms, systems and capabilities; and the targets of the Soviet effort. Emphasis is given to recent developments. The Paper concludes that the Soviet SIGINT effort is increasing in terms of both resources and capability, and that there should be greater public awareness of the extent of the Soviet SIGINT threat.

(An earlier version of this Paper was prepared for the US Air Force Intelligence Agency, *Air Force Intelligence Conference on Soviet Affairs: The Soviet Union - Toward the 21st Century: Political-Military Affairs in the Gorbachev Era*, Arlington, Virginia, 19-22 October 1988.)

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ACRONYMS AND ABBREVIATIONS

ABM	Anti-Ballistic Missile
AGI	Auxiliary General Intelligence
ANZUS	Australia, New Zealand, United States
AT&T	American Telephone and Telegraph
AWACS	Airborne Warning and Control System
AV-MF	Aviatsiya Voenno-Morskovo Flota (Naval Air Force)
CDAA	Circularly Disposed Antenna Array
CGF	Central Group of Forces
C3I	Command, Control, Communications and Intelligence
CIA	Central Intelligence Agency
CINCPAC	Commander-in-Chief Pacific
COMINT	Communications Intelligence
COMSEC	Communications Security
CONUS	Continental United States
CSA	Ceskoslovenske Aerolinie (Czechoslovakian Airline)
CTM	Current Traffic Message
DEFCON	Defence Readiness Condition
DF	Direction Finding
DNI	Director of Naval Intelligence
EAM	Emergency Action Message
ECM	Electronic Countermeasure
ELINT	Electronic Intelligence
EORSAT	Elint Ocean Reconnaissance Satellite
ESM	Electronic Support Measure
EW	Electronic Warfare

FA	Frontovaya Aviatsiya (Frontal Aviation)
FBI	Federal Bureau of Investigation
FBM	Fleet Ballistic Missile
FY	Fiscal Year
GAO	General Accounting Office
GMT	Greenwich Mean Time
GRU	Glavnoye Razvedyvatelnoye Upravleniye (Chief Intelligence Directorate)
GSFG	Group of Soviet Forces Germany
GUPV	Glavnoye Upravleniye Pogranichnykh Voysk (Chief Directorate of Border Troops)
HF	High Frequency
HMAS	Her Majesty's Australian Ship
HMS	Her Majesty's Ship
HQ	Headquarters
HR	House of Representatives
ICBM	Intercontinental Ballistic Missile
IEEE	Institute of Electrical and Electronics Engineers, Inc.
IRBM	Intermediate-Range Ballistic Missile
IRTU	International Road Transport Union
KGB	Komitet Gosudarstvennoy Bezopasnosti (State Security Committee)
MD	Military District
MX	Missile, Experimental
NATO	North Atlantic Treaty Organisation
NBC	National Broadcasting Company, Inc.
NCMC	NORAD Cheyenne Mountain Complex
NEACP	National Emergency Airborne Command Post

NGF	Northern Group of Forces
NMCC	National Military Command Center
NMCS	National Military Command System
NORAD	North American Air Defense
NSA	National Security Agency
OKR	Otdel Kontrrazvedki (Counterintelligence Department)
OO	Osobyy Otdel (Special Department)
OSNAZ	Otryad Osobovo Naznacheniya (Special Assignment Detachment)
OTU	Operativno-Tekhnicheskoye Upravleniye (Operational-Technical Directorate)
PDRY	People's Democratic Republic of Yemen
PTT	Public Telephone and Telegraph
RAE	Royal Aircraft Establishment
RAF	Royal Air Force
RN	Royal Navy
RO	Razvedyvatelnyy Otdel (Intelligence Department)
RORSAT	Radar Ocean Reconnaissance Satellite
RU	Razvedyvatelnoye Upravleniye (Intelligence Directorate)
SAC	Strategic Air Command
SALT	Strategic Arms Limitation Talks
SATCOM	Satellite Communication
SCA	Service Cryptological Authority
SGF	Southern Group of Forces
SIGINT	Signals Intelligence

SLBM	Submarine-Launched Ballistic Missile
SMLM	Soviet Military Liaison Mission
SSBN	Fleet Ballistic Missile Submarine (Nuclear-powered)
TAC	Tactical Air Command
TIR	Transport International Routier
TRW	Thomson, Ramo, Woodbridge, Inc.
TS	Technical Service
UHF	Ultra High Frequency
UK	United Kingdom
USAF	United States Air Force
USCINCEUR	United States Commander-in-Chief Europe
USEUCOM	United States European Command
US	United States
USS	United States Ship
USSR	Union of Soviet Socialist Republics
VHF	Very High Frequency
WSMR	White Sands Missile Range

CHAPTER 1

INTRODUCTION

The Soviet Union maintains the most extensive and most comprehensive signals intelligence (SIGINT) capabilities in the world.[1] As Dr Gerald P. Dinneen, then the Assisting Secretary of Defense for Command, Control, Communications and Intelligence (C^3I) testified on 29 March 1977,

> The Soviets today have the capability to intercept and locate the sources of United States communications frequencies. They maintain the largest signal intelligence establishment in the world, ... operating hundreds of intercept, processing and analysis facilities, with heavy exploitation of unsecured voice communications.[2]

---

1 This paper is a product of a major research project by the author concerning Soviet signals intelligence (SIGINT) capabilities and operations. Other papers by the author on this subject include 'Soviet Signals Intelligence', in Bruce L. Gumble (ed.), *The International Countermeasures Handbook*, (EW Communications Inc., Palo Alto, California, 12th Edition, 1987), pp.73-79; 'Soviet Signals Intelligence (SIGINT): The Use of Diplomatic Establishments', in Floyd C. Painter (ed.), *The International Countermeasures Handbook*, (EW Communications, Inc., Palo Alto, California, 13th Edition, November 1987), pp.24-45; 'The Use of the Soviet Embassy in Canberra for Signals Intelligence (SIGINT) Collection', (Working Paper No.134, Strategic and Defence Studies Centre, Australian National University, Canberra, October 1987); 'Soviet Signals Intelligence (SIGINT): Vehicular Systems and Operations', in *Intelligence and National Security*, (forthcoming); and *Soviet Signals Intelligence (SIGINT): Intercepting Satellite Communications*, (Canberra Papers on Strategy and Defence, Strategic and Defence Studies Centre, the Australian National University, Canberra, forthcoming 1989).

2 Testimony of Dr Gerald P. Dinneen, House Appropriations Committee, *Department of Defense Appropriations for 1978*, (US

According to one source, the Soviet SIGINT establishment (i.e. intercept operators, processors, cryptanalysts, etc.) employs about 300,000 personnel[3] - as compared to the US National Security Agency (NSA) and Service Cryptological Authorities (SCAs) which together employ some 60,000-70,000 personnel.[4] However, even this estimate may be somewhat low, with the actual figure more likely being about 350,000 personnel, making the Soviet SIGINT establishment about five times as large as the US SIGINT establishment.

The Soviet Union maintains more than 500 SIGINT ground stations, in both the USSR itself and abroad. SIGINT systems are also maintained in Soviet diplomatic establishments in at least 62 countries. They have also been deployed on an extraordinary range of platforms. These include submarines, surface ships (both 'ships of opportunity' and dedicated SIGINT vessels), aircraft, space satellites, and various trucks and other vehicles.

This paper describes the overall scale of the Soviet SIGINT effort; the organisational structure of the Soviet SIGINT activity; the principal platforms, systems and capabilities; and the targets of the Soviet effort. Emphasis is given to recent developments. The paper concludes that the Soviet SIGINT effort is increasing in terms of both resources and capability, and that there should be greater public awareness of the extent of the Soviet SIGINT threat.

Government Printing Office, Washington, D.C., 1977), Part 3, p.639.

3 Graham Yost, *Spy-Tech*, Harrap Limited, London, 1985), pp.8, 229.

4 James Bamford, *The Puzzle Palace: A Report on America's Most Secret Agency*, (Houghton Mifflin Company, Boston, 1982), p.4.4.

CHAPTER 2

SOVIET SIGINT ORGANISATIONS

There are several different Soviet agencies involved in the collection of SIGINT, the maintenance and operation of SIGINT platforms, and the processing, analysis, and distribution of SIGINT material. These include major Directorates of the two principal Soviet security and intelligence organisations - the KGB, or Committee for State Security (Komitet Gosudarstvennoy Bezopasnosti) and the GRU, or Chief Intelligence Directorate of the Soviet General Staff (Glavnoye Razvedyvatelnoye Upravleniye) - as well as a wide range of military units.

By far the two most important Soviet SIGINT organisations are the 16th Directorate of the KGB and the Sixth (or Radio and Radio-Technical Intelligence) Directorate of the GRU.

The 16th Directorate of the KGB

The 16th Directorate, which was formerly (until about 1972) a department of the KGB's Eighth (or Communications) Chief Directorate, has three primary functions: first, the interception of communications, both foreign and clandestine internal communications; second, deciphering foreign encrypted communications; and, third, the technical penetration of foreign installations (e.g. Western Embassies) in the USSR.

Some officers of the 16th Directorate are assigned abroad to intercept Western encrypted traffic. Others intercept Western traffic from within the Warsaw Pact countries, using intercept sites within Soviet military installations. Soviet merchant ships visiting foreign ports are also used by the Directorate to intercept traffic of interest.

Within the USSR, the 16th Directorate conducts intercept operations against both foreign and Soviet targets, the latter solely for defensive purposes. Clandestine transmitters are located by direction-finding (DF) and their transmissions monitored by SIGINT stations operated by the Directorate. Intercept operations against foreign diplomatic establishments in the USSR are usually conducted jointly

with the Second Chief Directorate and the Operational-Technical Directorate (OTU).

The headquarters of the 16th Directorate is located in the main KGB Headquarters building at 2 Dzerzhinskiy Square in Moscow. The Directorate has its own computer complex in Moscow, and a research laboratory is located in Kuntsevo, on the outskirts of Moscow, near the headquarters of the First or Foreign Intelligence Chief Directorate. A number of other facilities are located throughout the USSR.

The 16th Directorate currently has about 2,000 staff personnel, not counting the military personnel who perform much of its intercept work. It has grown rapidly in size and prestige during the 1980s.

Other KGB SIGINT Activities

In addition to the 16th Directorate, there are several other KGB organisations concerned with some aspect of SIGINT operations. These include:

(i) The Eighth Chief Directorate, which is responsible for communications security (COMSEC). It develops cypher and cryptographic systems for the KGB and the Ministry of Foreign Affairs, transmits communications to KGB posts abroad, and maintains the security of government communications within the Soviet Union.

(ii) The Operational-Technical Directorate (OTU) of the First or Foreign Intelligence Directorate. OTU personnel are stationed in the so-called Zenith rooms in the KGB's major legal residencies in the West to serve as resident audio counter-measures technicians and to monitor the radio transmissions of the host country police and security surveillance agencies.

(iii) The Chief Directorate of Border Troops (GUPV), some intelligence detachments of which maintain radio monitoring stations to collect information along the Soviet borders.

FIGURE 1
SOVIET SIGINT FACILITIES, MOSCOW AREA

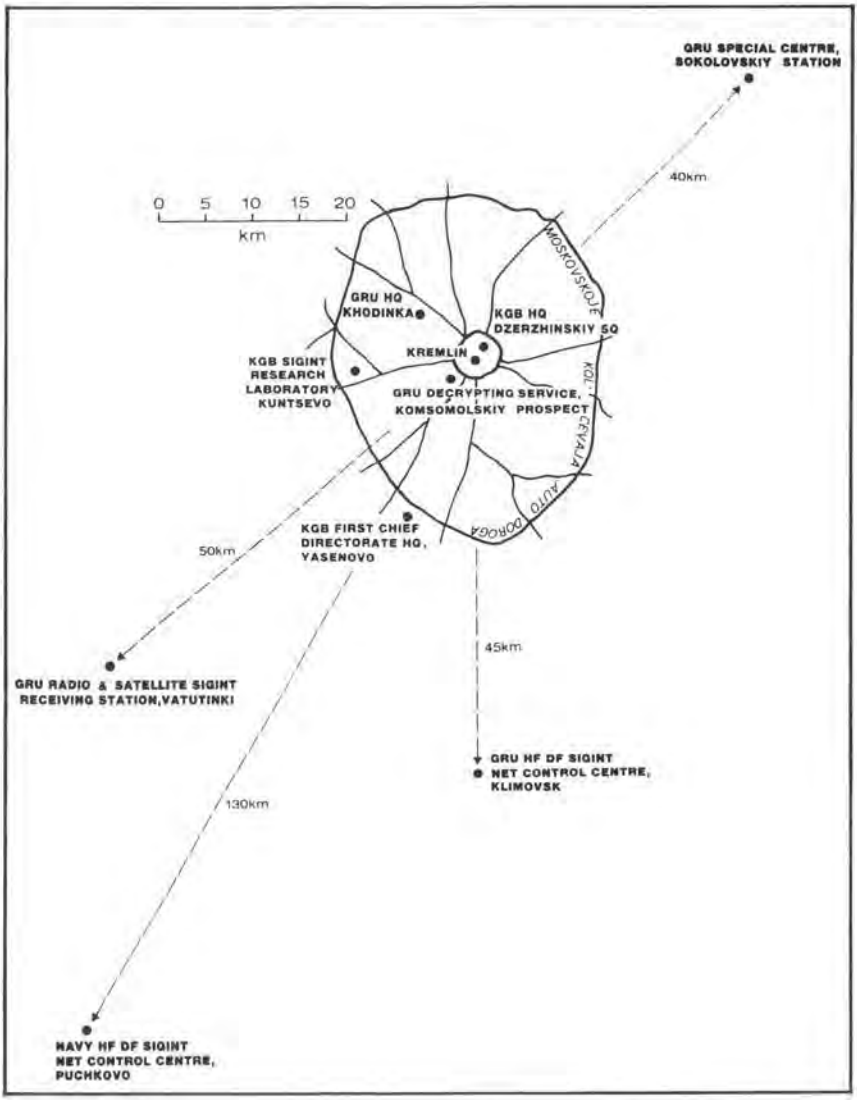
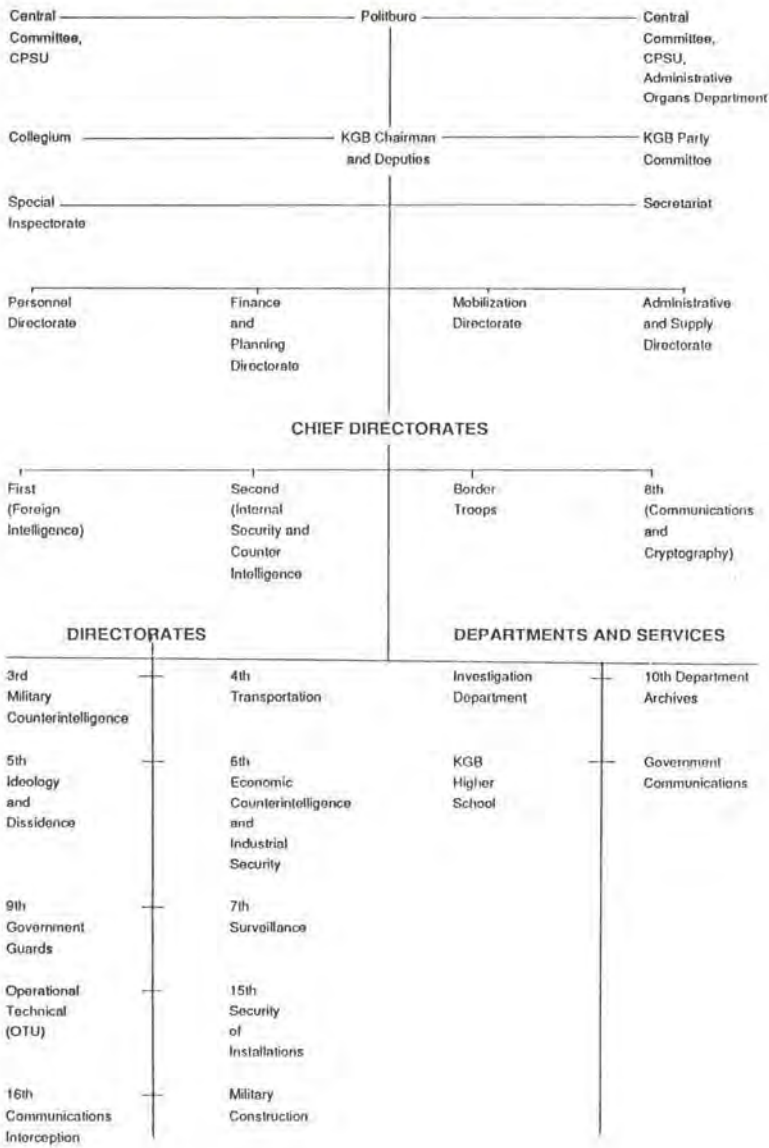


FIGURE 2
KGB HEADQUARTERS, 2 DZERZHINSKIY SQUARE, MOSCOW

FIGURE 3
ORGANISATION OF THE KGB



(iv) Department 16 of the First or Foreign Intelligence Chief Directorate, which conducts SIGINT operations against Western communications personnel and code clerks.

(v) The Special Departments (Osobyy Otdel) of the Third (Military Counterintelligence) Directorate, which is responsible for security in the Soviet Armed Forces. Third Directorate Osobyy Otdel (OO) activities include 'radio direction-finding, radio and telephone interception and recording of conversations'.[1]

The Sixth Directorate of the GRU

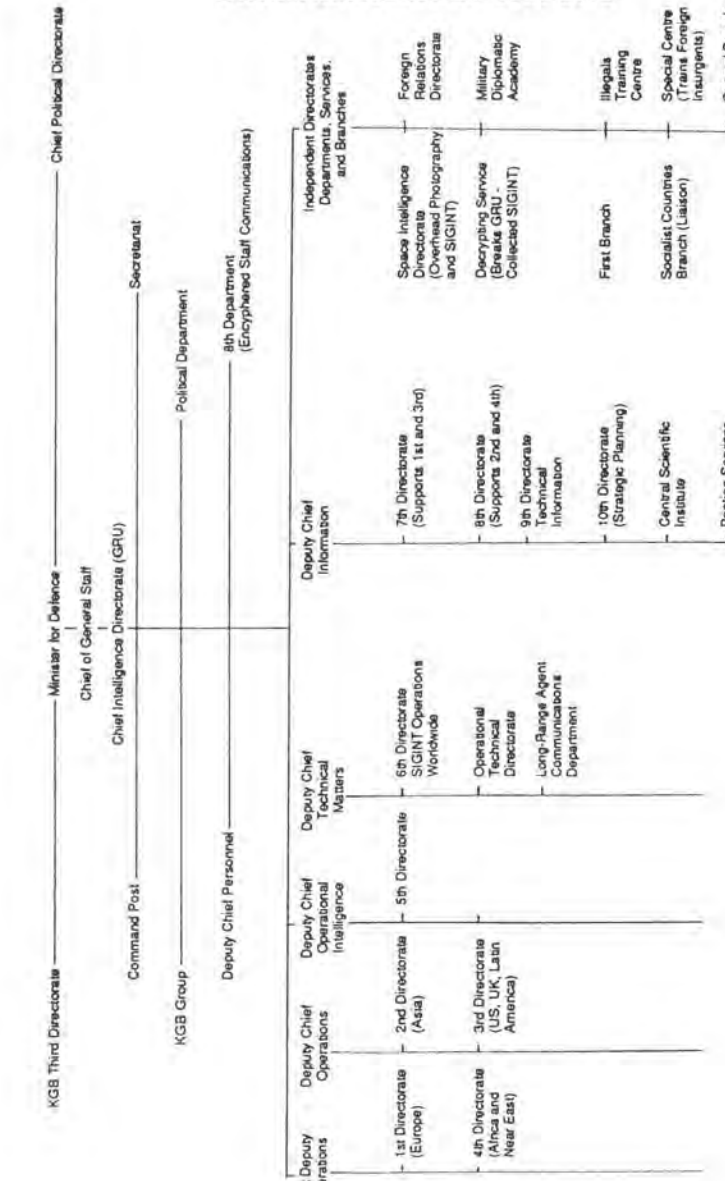
Although the GRU is in many ways a subordinate organisation to the KGB, it is much more extensively involved in SIGINT operations. Organisationally, the GRU is headed by a full General in the Army, who is also the second officer on the Soviet General Staff. It has five major Directorates, each headed by a three-star general, and several other subordinate and supporting divisions. (See Figure 4.) There are two Operations Directorates, an Operational Intelligence Directorate, a Directorate for Technical Matters, and an Information Directorate.

The Sixth (or Radio and Radio-Technical Intelligence Directorate of the Directorate for Technical Matters is responsible for GRU communications intelligence (COMINT) and electronic intelligence (ELINT) collection operations. The primary intercept targets of the Sixth Directorate are the strategic air and ground forces of the United States, the Western European countries, and the People's Republic of China. It intercepts both encrypted and clear-text messages. It collects SIGINT from three main sources: the central GRU COMINT station at Klimovsk, about 32 km south of Moscow; other stations in the Soviet Military Districts and Groups of Soviet Forces in the Warsaw Pact countries; and SIGINT units maintained abroad.

---

1 Vyacheslav P. Artemiev, 'OKR: State Security in the Soviet Armed Forces', *Military Review*, September 1963, p.30.

FIGURE 4
ORGANISATION OF THE GRU



The Sixth Directorate is divided into four Branches. (See Figure 5.) The First (Radio Intelligence or COMINT) Branch coordinates and acts as the headquarters staff for the COMINT activities of the radio and radio-technical regiments (OSNAZ) in the Military Districts and the Groups of Soviet Forces in East Germany, Poland, Czechoslovakia and Hungary. It also controls the GRU's own COMINT network of DF and intercept stations, which consists of the control station at Klimovsk and 11 other stations in various other parts of the USSR. This network employs about 300 GRU staff personnel and some 1,500 non-GRU military and civilian personnel. The most important target is the US Strategic Air Command (SAC), with secondary attention devoted to the UK Royal Air Force, and NATO/Western European tactical nuclear and missile units. The Klimovsk station also maintains a 24-hour watch service and reports directly to the Sixth Directorate's Watch Office It also conducts extensive interception and analysis of major foreign news services such as Associated Press and Reuters.

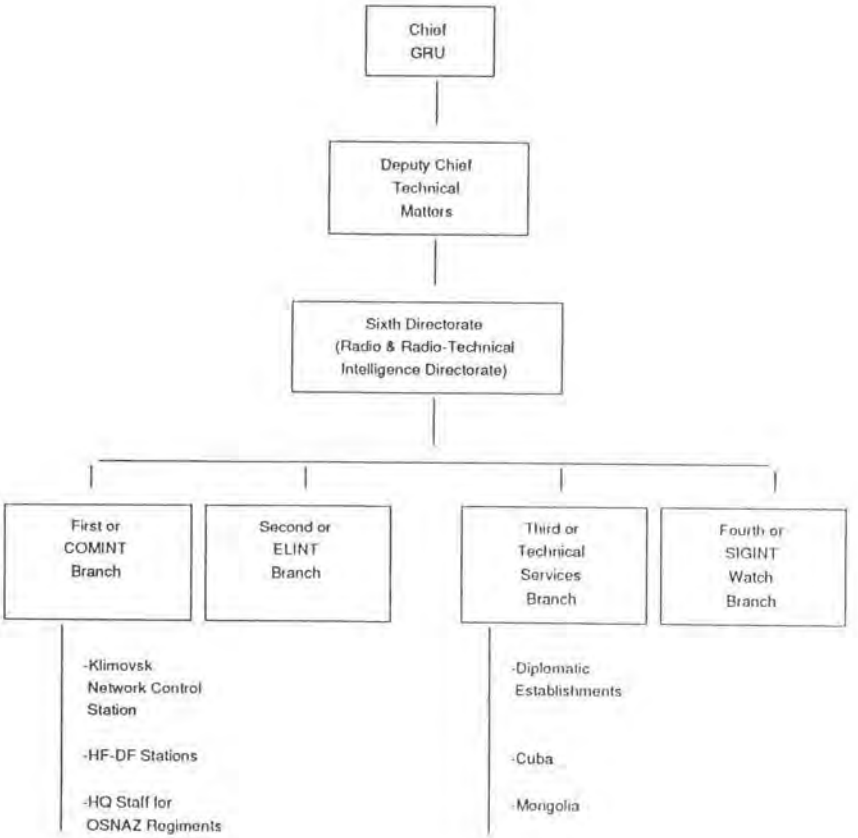
The Second (Radio-Technical Intelligence or ELINT) Branch performs a comparable mission to the COMINT Branch, using many of the same facilities and concentrating on the same targets, but with respect to non-communications SIGINT. It also supports the ELINT activities of the OSNAZ radio-technical or ELINT units in the Soviet Military Districts and the Groups of Soviet Forces in Eastern Europe.

The Third or Technical Services Branch maintains and supports the GRU's intercept sites in Soviet embassies, consulates and trade missions in more than 50 countries throughout the world, as well as major intercept activities in Cuba and the Mongolian People's Republic.

According to Viktor Suvorov (pseudonym), who served in the GRU from 1971 until he defected from Vienna in 1977:

> [Technical Service (TS) officers] are concerned with electronic intelligence from the premises of official Soviet premises, embassies, consulates, and so on. Basic targets are the telecommunications apparatus of the government, diplomatic wireless communications, and military channels of communi-cation. By moni-oring radio transmissions, secret and cipher, technical service groups not only obtain interesting information

FIGURE 5
GRU SIGINT ORGANISATION



> but also cover the system of governmental communications, subordination of the different components of the state and the military structure.
>
> The military ranks of technical service officers are major and lieutenant-colonel.[2]

The Technical Service Groups monitor and record clear-text traffic, voice transmissions, and encrypted traffic. In those countries where microwave and tropospheric scatter links are in common use, a large number of unsecure voice telephone conversations provide a particularly lucrative source of intelligence. TS officers monitor these systems, identifying the interesting and important channels, and then record all conversations carried on them. In those instances where the intercept officers are unable to understand or decipher a particular message locally, the appropriate tapes are sent to the Sixth Directorate in Moscow for processing.

The Fourth or Watch Branch maintains the Sixth Directorate's 24-hour SIGINT watch, in close contact with the GRU Command Post. The primary mission of the Branch is to follow the global military situation through SIGINT, with particular reference to any significant changes in the US military posture. Each officer in the Branch manages a specialised substantive area, such as the Strategic Air Command, the Tactical Air Command (TAC), etc. Based on the analysis and reporting of the Watch Branch, the Sixth Directorate operations duty officer compiles a daily SIGINT summary which is then combined with other intelligence to form the GRU Daily Intelligence Summary.

The headquarters of the Sixth Directorate is located in the main GRU headquarters complex off Khoroshevskoye Shosse near the Moscow Central Airport (Khodinka). The Directorate also maintains a 'Special Laboratory' in the headquarters which serves as a personnel processing mechanism through which additional officers may be assigned to the Directorate.

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2 Viktor Suvorov, *Soviet Military Intelligence*, (Macmillan Publishing Company, New York, 1984), p.89.

Other GRU SIGINT Activities

In addition to the Sixth Directorate, there are several other GRU units and facilities concerned with SIGINT activities. These include:

(i) The GRU Command Post, which is the operational watch office for the Chief of the GRU, and which provides a 24-hour coverage of worldwide developments and deployments of hostile military forces. A key responsibility of the Command Post is the identification of early warning indications of air enemy attack. The Command Post receives intelligence reports from various GRU services, including SIGINT reports from the Sixth Directorate.

(ii) The Fifth or Operational Intelligence Directorate, formerly called the Transborder or Tactical Intelligence Directorate. This Directorate provides training, guidance and personnel to the Intelligence Directorates (RUs) or Second Directorates of the 16 Soviet Military Districts and four Groups of Soviet Forces abroad and collects appropriate intelligence reports from them. The RUs maintain large SIGINT stations, generally colocated with the headquarters of the Military Districts and Groups of Soviet Forces. In addition, the Fifth Directorate has direct responsibility for the operation of a large number of SIGINT stations located along the border with the People's Republic of China.

(iii) The Space Intelligence Directorate, which is responsible for the processing and interpreting of SIGINT collected by means of space satellites.

(iv) The Information Directorate, which provides evaluations of the Sixth Directorate's SIGINT reports.

(v) GRU Radio Monitoring Stations in Soviet diplomatic establishments abroad. These stations, which are functionally equivalent to the KGB Operational-

Technical Directorate (OTU) Zenith Rooms, have been described by Viktor Suvorov as follows:

> In contradistinction to TS [Technical Service] officers, these are concerned with monitoring the radio networks of the police and security services. The technical services and the radio monitoring station are two different groups, independent of each other, both controlled by the [GRU] resident. The difference between them is that the technical services work in the interests of the [GRU] Centre [in Moscow], trying to obtain state secrets, but the monitoring station works only in the interests of the [local] residency trying to determine where in the city police activity is at its highest at a given moment and thus where [local espionage] operations may be mounted and where they should not be mounted.[3]

These Stations are generally manned by two or three officers, who are responsible to the First Deputy to the GRU Resident.[4]

(vi) The Decrypting Service, which deciphers enciphered foreign codes intercepted by the GRU in the USSR or abroad. It is directly subordinate to the Chief of the GRU and is located on Komsomolskiy Prospekt in Moscow. (The Service focuses primarily on tactical military communications links, leaving the higher level foreign cryptographic systems to the KGB's 16th Directorate.)

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3 *Ibid.*

4 Viktor Suvorov, *Aquarium: The Career and Defection of a Soviet Military Spy*, (Hamish Hamilton, London, 1985), p.132.

(vii) The GRU Special Centre for the processing of COMINT by computer, which was established in 1971 and which is located near Sokolovskiy railroad station, about 25 miles from the centre of Moscow.

(viii) The GRU's main radio receiving centre at Vatutinki, some 35 miles southwest of Moscow, which receives intercepted signals transmitted from GRU SIGINT stations located elsewhere in the Soviet Union and abroad.

(ix) The GRU-controlled Central Scientific Research Institute in Moscow, which designs SIGINT equipment and analyses US and other foreign literature pertinent to SIGINT collection.

(x) The Operational-Technical Directorate of the Directorate for Technical Matters, which became independent of the Sixth Directorate in 1968, and which is responsible for the research, development and procurement of GRU SIGINT hardware.

SIGINT Activities of the Soviet Ground Forces

The great bulk of the Soviet SIGINT effort, at least in terms of the numbers of personnel involved and the volume of the signals intercepted, is organic to the various echelons of command within the Soviet military - although it is coordinated and supported by the GRU.

The headquarters of each of the 16 Military Districts and the four Groups of Soviet Forces located in East Germany, Poland, Hungary and Czechoslovakia have attached to them an Intelligence Directorate (RU) or Second Directorate which collects and disseminates operational intelligence. The organisational structure of the RU is shown in Figure 6.[5]

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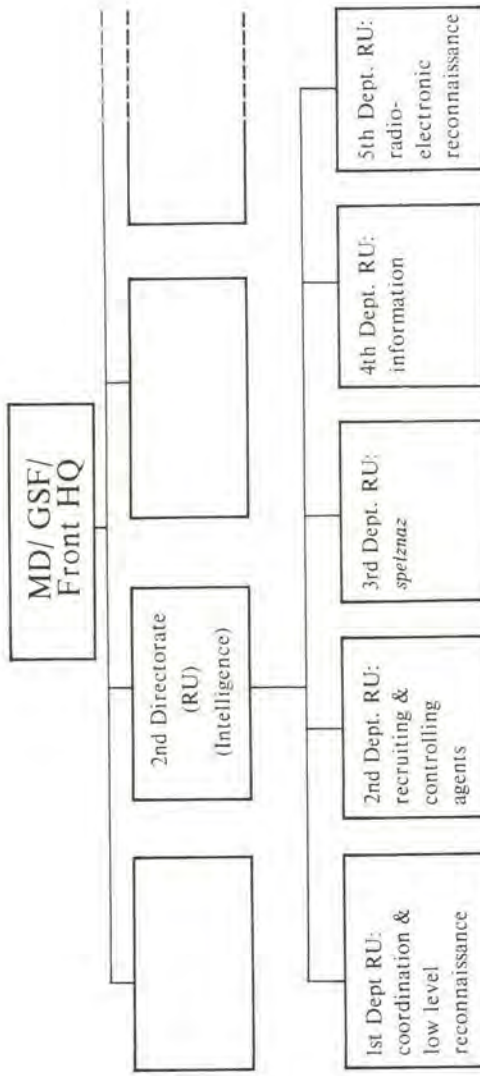
5 Viktor Suvorov, *Spetsnaz: The Inside Story of the Soviet Special Forces*, (W.W. Norton & Company, New York and London, 1987), p.194.

FIGURE 6
ORGANISATION OF SECOND DIRECTORATE OF SOVIET MILITARY DISTRICT AND FRONT HEADQUARTERS



Source: Viktor Suvorov, *Spetsnaz: The Inside Story of the Soviet Special Forces*, (W.W. Norton & Company, New York and London, 1987), p.194.

The headquarters of each RU typically has a large SIGINT station colocated with it, as well as numerous field stations maintained by the OSNAZ Radio Regiments. The Fifth Department in the RU headquarters is responsible for analysis of the SIGINT collected at these stations. The headquarters of the 16 Military District are listed in Table 1.

TABLE 1
SOVIET MILITARY DISTRICTS AND HEADQUARTERS

	Military District	Headquarters
1	Moscow	Moscow
2	Leningrad	Leningrad
3	Kiev	Kiev
4	Ural	Sverdlovsk
5	Transcaucasus	Tbilisi
6	Belorussia	Minsk
7	Far East	Khabarovsk
9	Turkestan	Tashkent
10	Carpathian	Lvov
11	Central Asia	Alma Ata
12	North Caucasus	Rostov-on-Don
13	Odessa	Odessa
14	Siberia	Novosibirsk
15	Transbaykal	Chita
16	Volga	Kuybyshev

Thus, the SIGINT station at Lvov is operated by an OSNAZ Radio Regiment for the Fifth Department of the Intelligence Directorate (RU) or Second Directorate of the Carpathian Military District, under the direction of both the Fifth or Operational Intelligence Directorate and Sixth or Radio and Radio-Technical Intelligence Directorate. The Lvov station is primarily concerned with monitoring military communications and other signals emanating from West Germany. Something of the operations of the Lvov station has been described by Viktor Suvorov, who served in the RU in Lvov in 1970:

The information we provided for the war planners ... was actually obtained from what are known as activity charts. This way of obtaining information amounted to careful monitoring of the enemy's radio and radar stations. Every radio station and every radar installation was carefully documented: its type, its function, where it was situated, to whom it belonged and on what frequencies it operated. A great many messages were deciphered by our Fifth department. But there were some radio stations whose messages took years to decipher. Those were the very ones which were our principal concern, because they were the most important ones. But whether we could understand what they were saying or not, an activity chart was kept for such stations and every time they went on the air they were recorded. Every station had its own character, its own handwriting. Some stations worked in the daytime, others at night, still others had days off, while others did not. If every transmission was recorded and studied it soon became possible even to forecast what it was going to do.

In addition, the activity of the radio stations was compared with the activity of the enemy's forces. We obtained priceless information from the men who drove Soviet trucks abroad, from the stewards on Soviet trains, from Aeroflot crews, from our sportsmen, and of course from our network of agents. This sort of information was very scrappy and disconnected.... Our computer compared these scraps with what was going on in the ether. Any apparent regularity was noted and special cases and exceptions to the rule studied. And as a result of many years spent analysing such things it became perfectly possible to say: 'If RB-7665-I went on the air it means that in four days' time there will take place a mass take-off at Ramstein.' It is an inviolable law. And if a station which we call C-1000 springs suddenly into action even a child would realise that the battle

readiness of the American troops in Europe was raised to a higher level.[6]

The RU-operated SIGINT complex at Chita, near the Mongolian border, is also particularly noteworthy. Chita is the headquarters of the Transbaykal Military District and now also a theatre headquarters combining control of the Soviet Pacific Fleet with the land and tactical air forces of both the Transbaykal and Far East Military Districts. This SIGINT complex is reportedly capable of monitoring communications traffic 'throughout Northeast Asia'.[7]

There are large SIGINT stations maintained by the RUs of the headquarters of the four Groups of Soviet Forces in East Germany (GSFG), Poland, Hungary and Czechoslovakia, the locations of which are given in Table 2:

TABLE 2
GROUPS OF SOVIET FORCES AND HEADQUARTERS

	Group of Soviet Forces	Headquarters
1	Group of Soviet Forces Germany (GSFG)	Zossen-Wuensdorf, East Germany
2	Northern Group Forces (NGF)	Legnica, Poland
3	Central Group of Forces (CGF)	Milovice, Czechoslovakia
4	Southern Group of Forces (SGF)	Budapest, Hungary

The headquarters of the Soviet Forces in East Germany (GSFG) RU is located in Zossen-Wuensdorf, south of Berlin. In addition to the SIGINT station maintained at this headquarters, the GSFG RU maintains numerous other subordinate SIGINT stations throughout East Germany.

The Group of Soviet Forces in Germany (GSFG) consists of five Armies and an Air Force, which also comprise a wartime Front. This Front has an Intelligence (or Second) Directorate, the Fifth Department

6 Suvarov, *Aquarium*, p.71.

7 Colonel William V. Kennedy, *Intelligence Warfare: Penetrating the Secret World of Today's Advanced Technology Conflict*, (Crescent Books, New York, 1983), pp.48-49.

of which directs two OSNAZ Radio Regiments - a Radio Intercept Regiment primarily for 'radio intelligence' (COMINT) and a Radio and Radar Intercept Regiment primarily for 'radio-technical intelligence' (ELINT) operations.

Each of the five Armies in the GSFG also has an Intelligence or Second Department, each of which in turn has an OSNAZ Radio Regiment consisting of two battalions - a Radio Intercept Battalion for COMINT and a Radio and Radar Intercept Battalion for COMINT and ELINT operations. The SIGINT systems maintained by these 10 battalions 'are working operationally in peacetime' to provide a continuous monitoring of communications traffic and other electronic emissions in West Germany.[8]

In addition to the 10 SIGINT battalions maintained by the five Soviet Armies, there are 19 Soviet divisions stationed in East Germany, each of which has a Reconnaissance Battalion, each of which in turn has a 'radio and radar reconnaissance' or SIGINT company, the function of which 'is to detect and locate enemy radio transmitters, to intercept and decipher their transmissions, and to locate, identify and study the enemy's radar stations.[9]

According to Suvorov, the 19 SIGINT companies in East Germany are all located forward at or near the inter-German border, and all function as operational SIGINT collection stations in peacetime:

> In the Group of Soviet Forces in Germany [GSFG]... there are 19 tank and motor-rifle divisions. These contain 19 reconnaissance battalions, each of which has one signals intelligence company. All these companies have been moved, in peacetime, up to the border with West Germany and are working at full stretch, twenty-four hours a day, collecting and analysing any radio signal which is transmitted in their operational area.[10]

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8 Viktor Suvorov, *Inside the Soviet Army*, (Hamish Hamilton, London, 1982), p.96.

9 *Ibid.*, p.95.

10 *Ibid.*

SIGINT Activities of the Soviet Naval Forces

The Soviet naval intelligence forces are also major collectors of SIGINT, for strategic or national purposes as well as for operational or tactical purposes. Naval intelligence operations are coordinated by the Naval Intelligence Directorate (RU) of the Main Naval Staff, located at naval headquarters on Koslovsk Boulevard in Moscow.

The Naval Intelligence Directorate (RU) has direct responsibility for certain SIGINT collection operations. For example, it maintains the central COMINT DF station at Puchkovo near Moscow; its Department for Satellite Intelligence operates the ELINT Ocean Reconnaissance Satellites (EORSATs) and Radar Ocean Reconnaissance Satellites (RORSATs); and it tasks the SIGINT activities of the Soviet merchant and fishing fleets.

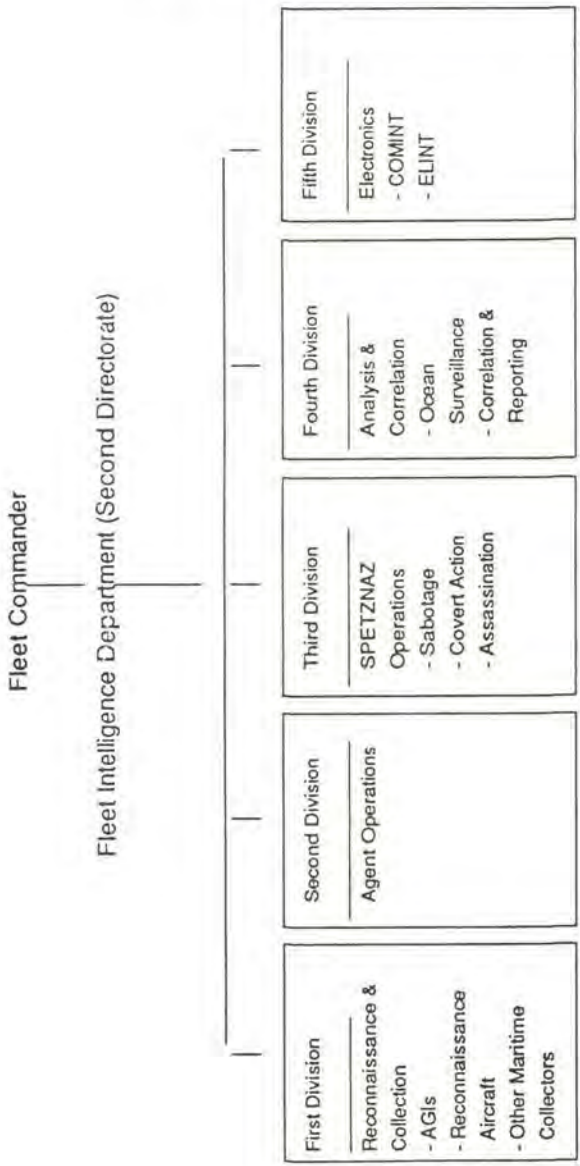
Most naval SIGINT collection, however, is the responsibility of the four Fleet Intelligence Departments (ROs), which are located with the headquarters command of each fleet, as shown in Table 3. The organisation of each RO is shown in Figure 7.

TABLE 3
SOVIET FLEETS AND HEADQUARTERS

	Fleet	Fleet Headquarters
1	Baltic	Kaliningrad
2	Northern	Murmansk-Severomorsk
3	Black Sea	Sevastopol
4	Pacific	Vladivostok

Each RO has SIGINT detachments that monitor radio transmissions of foreign navies and use DF equipment to maintain an accurate plot of ship movements, as well as undertaking more general COMINT collection. For example, the RO at the headquarters of the Pacific Fleet operates a major SIGINT station in Vladivostok. This station also provides extensive coverage of signals throughout north-east Asia, but it has a particular role with respect to monitoring communications stations in Japan - including the communications traffic produced by the major US SIGINT stations at Kamiseya, Misawa, and Wakkanai.

FIGURE 7
FLEET INTELLIGENCE DEPARTMENT (RO)



The RO station at Kaliningrad (formerly Konigsberg) provides coverage of West German and Scandinavian communications traffic. For example, according to Suvorov,

> the 5th department [Division] of the Intelligence directorate of the Baltic Fleet ... recorded a complete replacement of the coding system in governmental and military communications channels in Denmark.[11]

In addition to the land-based COMINT and DF stations, the ROs operate specially qualified intelligence collection vessels (AGIs) and also use other Navy assets for SIGINT collection - including fleet air assets, surface combatants, submarines, other auxiliaries, the coastal defence forces, etc.

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11 Suvorov, *Aquarium*, p.53.

CHAPTER 3

SOVIET SIGINT GROUND STATIONS AND SYSTEMS

The Soviet Union maintains several hundred SIGINT ground stations, in both the USSR itself and abroad. Although it is impossible to ascertain the precise number of these stations, it is probably more than 500 - including more than 300 stations in the USSR, more than 150 stations in the non-Soviet Warsaw Pact countries, and some 50 stations in other countries.

The largest and most sophisticated Soviet SIGINT ground-based system is the Krug circularly-disposed Wullenweber array, which is used for High Frequency (HF) interception and direction-finding (DF) out to ranges of about 10,000 km. The original Krug arrays, which were installed in the late 1940s and in the 1950s, were essentially copies of the Wullenweber Circularly-disposed Antenna Arrays (CDAAs) developed in Germany during the Second World War. The system was designed to cover the frequency band from 6 to 20 MHz.

The capabilities of the Krug system have been progressively enhanced over the past three decades. Many of the installations have been given a second set of monopole arrays, placed concentrically within the outer ring, in order to extend the frequency coverage through the upper end of the HF band and into the VHF band. The performance characteristics of these systems are broadly comparable to those of the US Navy/GTE Sylvania AN/FRD-10 system. The DF accuracy of the Krug system is typically better than one-half of a degree. Some 30 Krug systems are currently operational within the Soviet Union.

The second most capable Soviet HF DF system is the Fix 24, which consists of a circular array of 24 vertical monopoles, placed at 15° intervals in a ring of about 150 metres in diameter, but which does not use a reflecting screen. In some cases, a second array of another 24 monopoles is placed in a ring of about 50 metres in diameter within the outer ring, in order to provide coverage of the whole HF band. The performance characteristics of the Fix 24 are broadly comparable to the Plessey PRS 1120 Pusher HF DF system. Fix 24 systems are

FIGURE 8
KRUG HF DF SIGINT SYSTEM

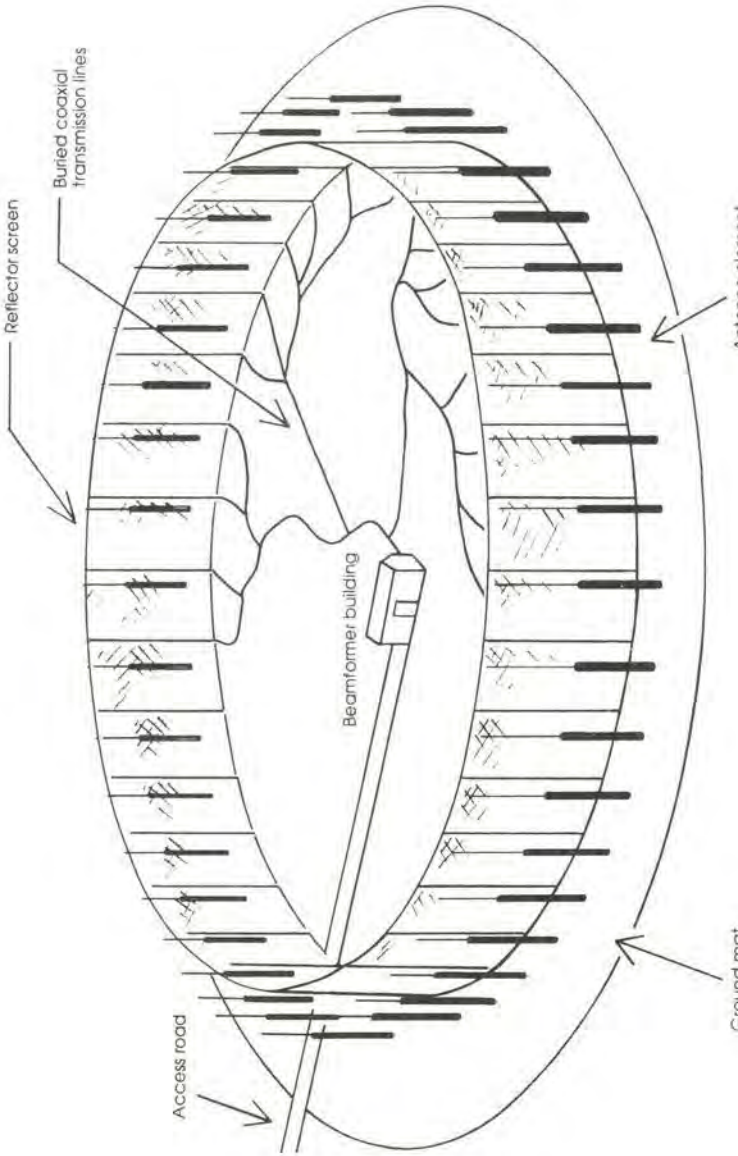
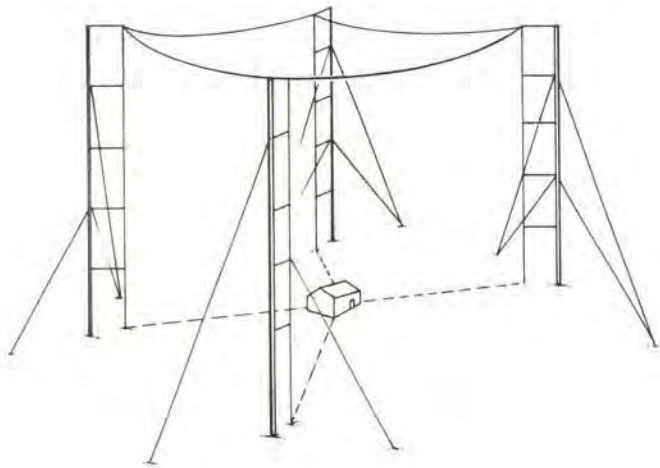


FIGURE 9
MOON HF DF SIGINT SYSTEM



deployed both in the Soviet Union and abroad. (There are two Fix 24s at Cam Ranh Bay in Vietnam.)

Other Soviet fixed SIGINT systems include the Moon HF DF four-element array; the Fix 4 A, Fix 4 B and Fix 4 C HF DF four-element Adcock arrays; the Fix 4 D four-element VHF array; the Thick Eight A system, which consists of eight broadband vertically polarized HF dipoles; and various types of loop systems, such as the Square Four array of crossed loops and the Spaced Loop DF systems. In addition, many Soviet SIGINT stations maintain the Fix 6 and Fix 8 HF DF arrays, which consist of six and eight vertically polarized HF dipoles respectively, and which are designed to be transportable; and the Ring Two and Loop Three HF DF loop arrays, which are also mobile.

There are several particularly noteworthy aspects of the Soviet ground-based SIGINT deployments. First, the ground-based SIGINT sites constitute the largest single collection element in the Soviet SIGINT establishment. Second, the number of Soviet ground-based SIGINT stations is nearly double that maintained by the United States and the United Kingdom together. Third, the capabilities of the more recent Soviet SIGINT collection systems (i.e. the improved Krugs and the Fix-24s) are now nearly as good as those of the comparable US and British systems.

Fourth, the Soviet ground-based SIGINT network is now effectively world-wide. The first deployments outside the Soviet Union itself were in Eastern Europe and Mongolia. Then, in the mid-1960s, SIGINT facilities were established at Lourdes in Cuba. These facilities were greatly expanded in the mid-1970s, and a satellite communications intercept capability was installed in 1974. In March 1983, President Reagan stated that

> This Soviet intelligence collection facility less than 100 miles from our coast is the largest of its kind in the world. The acres and acres of antennae fields and intelligence monitors are targeted on key U.S. military installations and sensitive activities. The installation, in Lourdes, Cuba, is manned by 1,500 Soviet technicians, and the satellite ground station allows instant communications with Moscow. This 28-square

FIGURE 10
SOVIET SIGINT STATION, LOURDES, CUBA

Source: US Department of Defense.

> mile facility has grown by more than 60 percent in size and capability during the past decade.[1]

The Lourdes complex has continued to expand since 1983. According to a report released jointly by the Department of State and the Department of Defense in March 1985, there were then 'about 2,100 [Soviet] technicians at the Lourdes electronic intelligence facility'[2] - a growth of 40 per cent since March 1983.

The State Department/Defense Department report of March 1985 provides the most comprehensive official public description of the Lourdes SIGINT complex:

> Cuba's strategic location makes it an ideal site for an intelligence facility directed against the United States. The Soviet Union established such a site at Lourdes near Havana in the mid-1960s. Lourdes today is the most sophisticated Soviet [SIGINT] collection facility outside the Soviet Union itself. From this key listening post, the Soviets monitor U.S. commercial satellites, U.S. military and merchant shipping communications, and NASA space program activities at Cape Canaveral. Lourdes also enables the Soviets to eavesdrop on telephone conversations in the United States.[3]

In the late 1970s, extensive Soviet SIGINT complexes were also established in South Yemen and Vietnam. The SIGINT facilities in South Yemen are the second largest outside the USSR. Particular sites are located in the Khormaskar district near the airport in Al Adan (formerly Aden), and along the central mountain range of Socotra Island.

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1 *Text of President Reagan's Address on National Security,* Washington, D.C., 23 March 1983, p.4.

2 Department of State and Department of Defense, *The Soviet-Cuban Connection in Central America and the Caribbean,* (US Government Publishing Office, Washington, D.C., March 1985), p.3.

3 *Ibid.*, pp.3-4.

FIGURE 11
SOVIET SIGINT SITES IN AFGHANISTAN

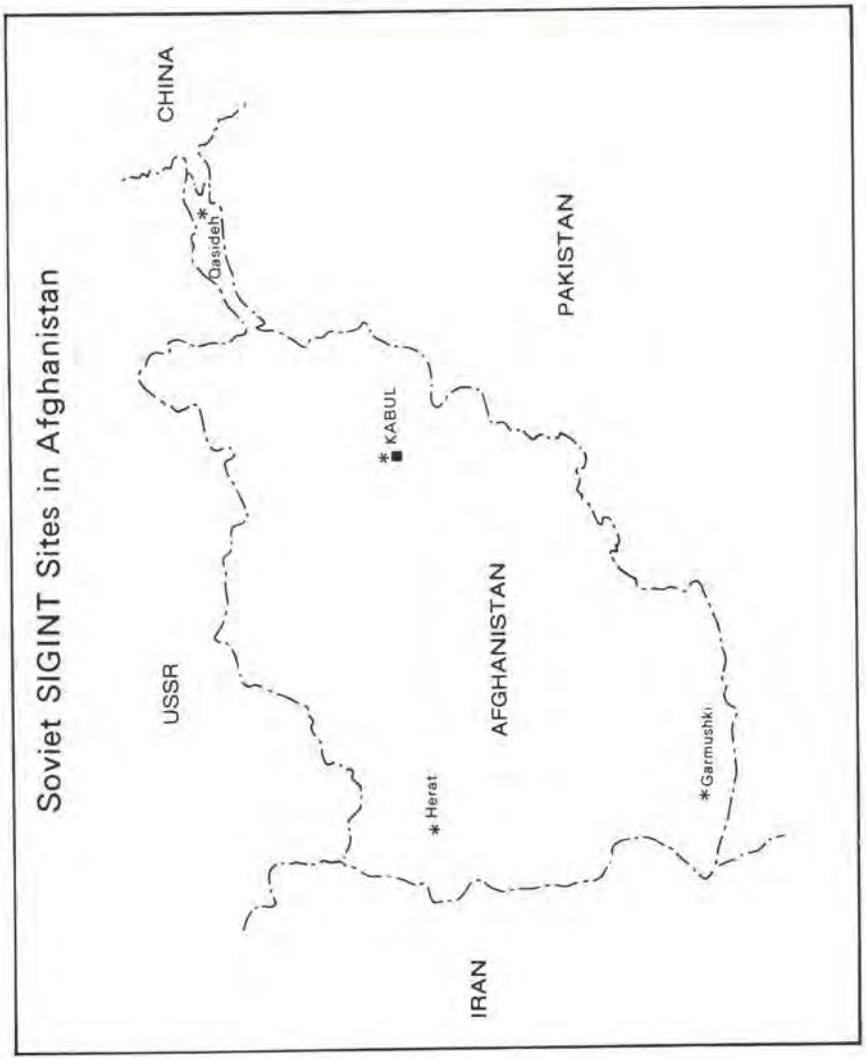


FIGURE 12
SOVIET SIGINT SITES IN NICARAGUA

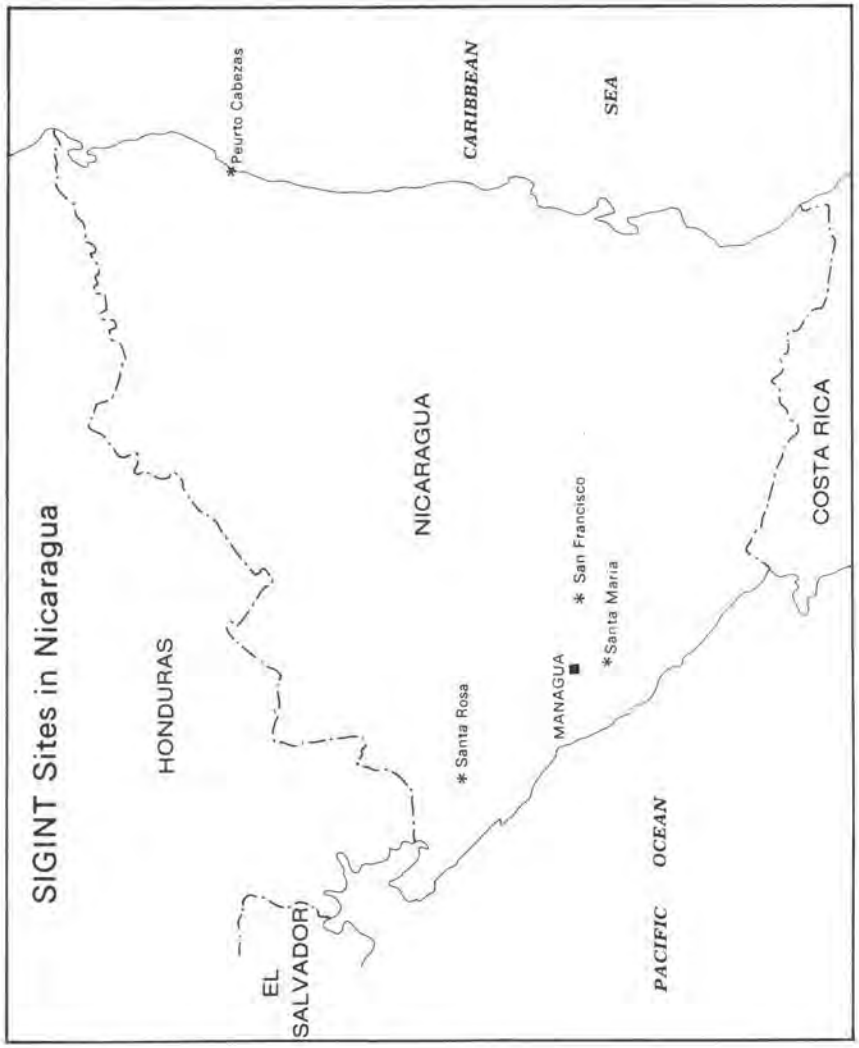
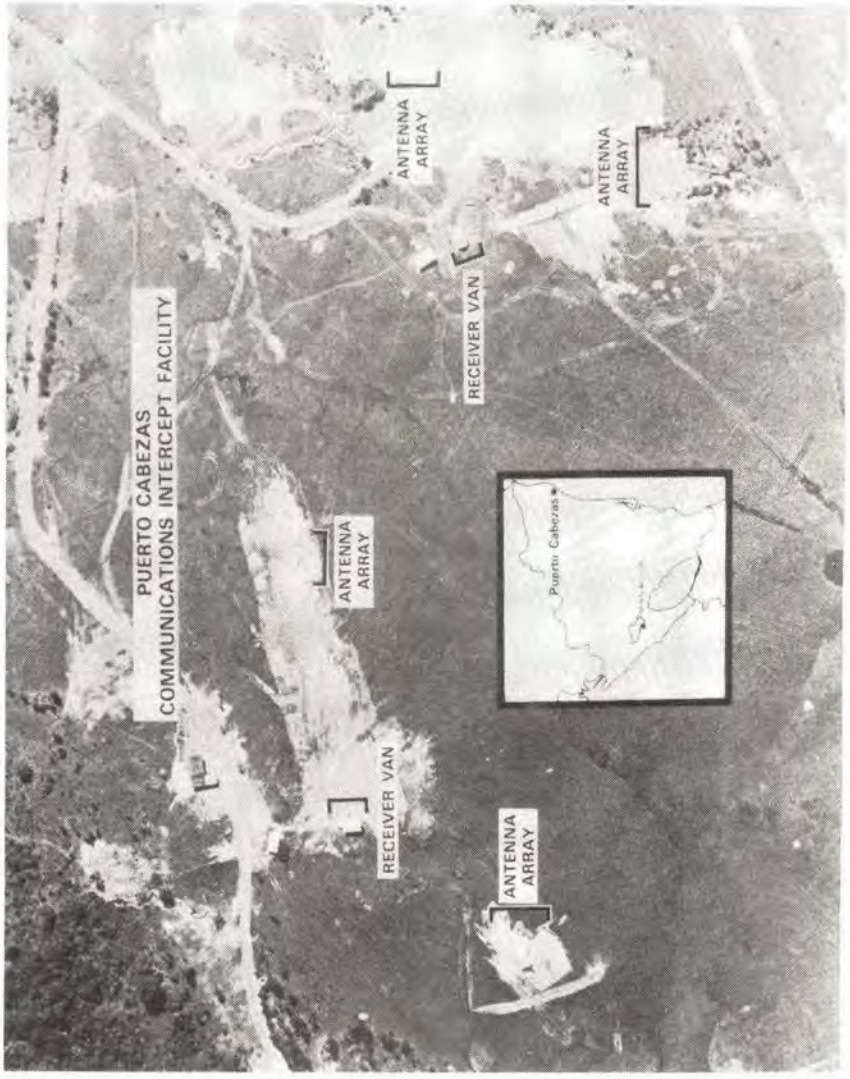


FIGURE 13
SOVIET SIGINT STATION, SANTA MARIA, NICARAGUA

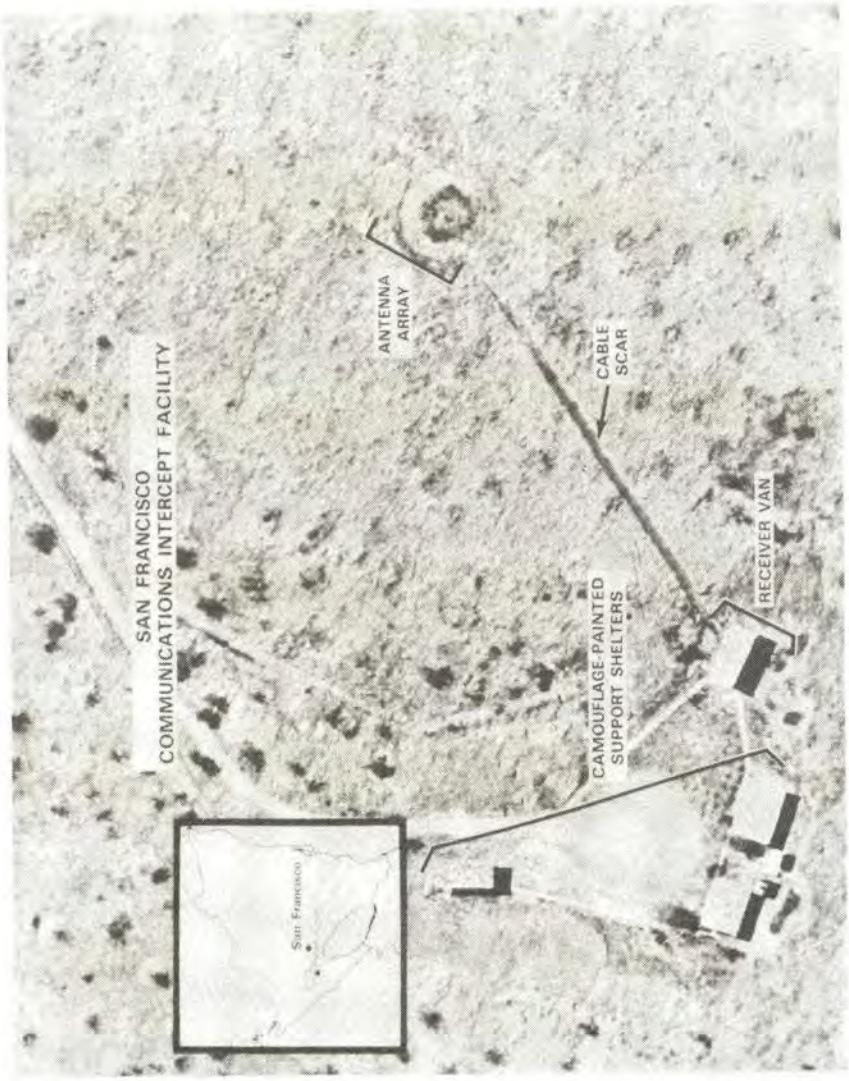
Source: US Department of Defense.

FIGURE 14
SOVIET SIGINT STATION,
PUERTO CABEZAS, NICARAGUA



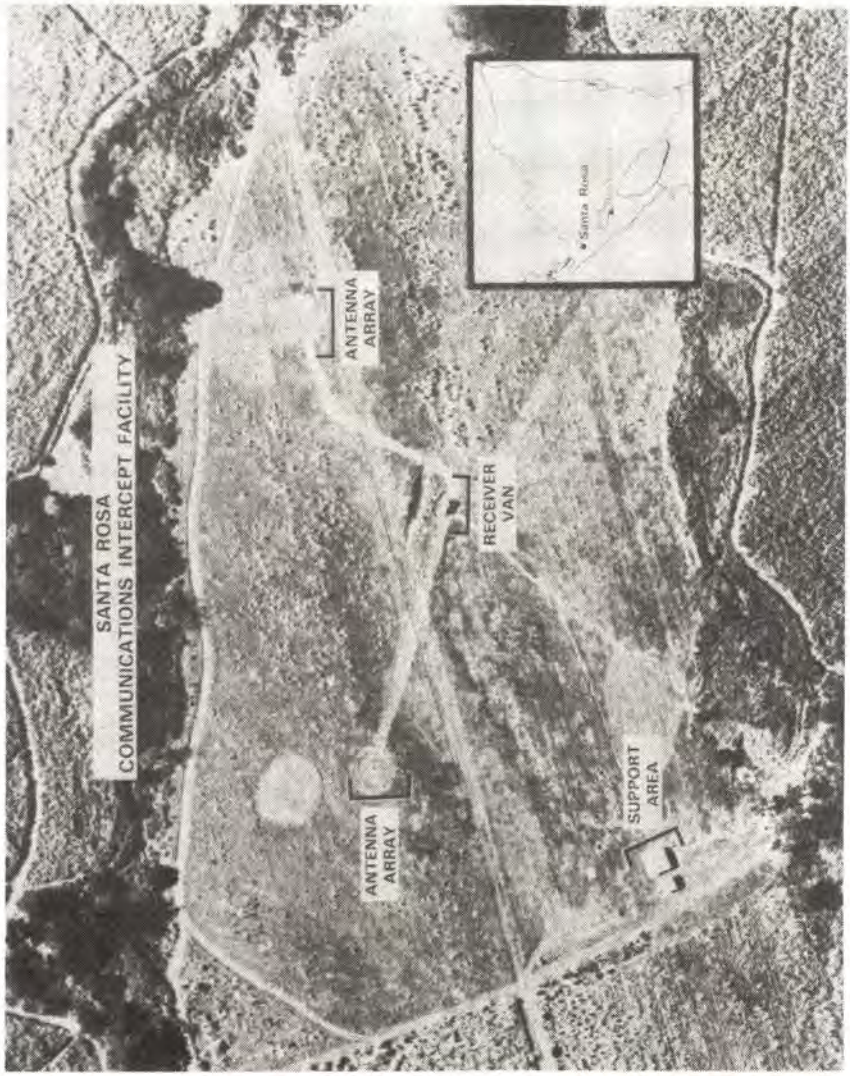
Source: US Department of Defense.

FIGURE 15
SOVIET SIGINT STATION, SAN FRANCISCO, NICARAGUA



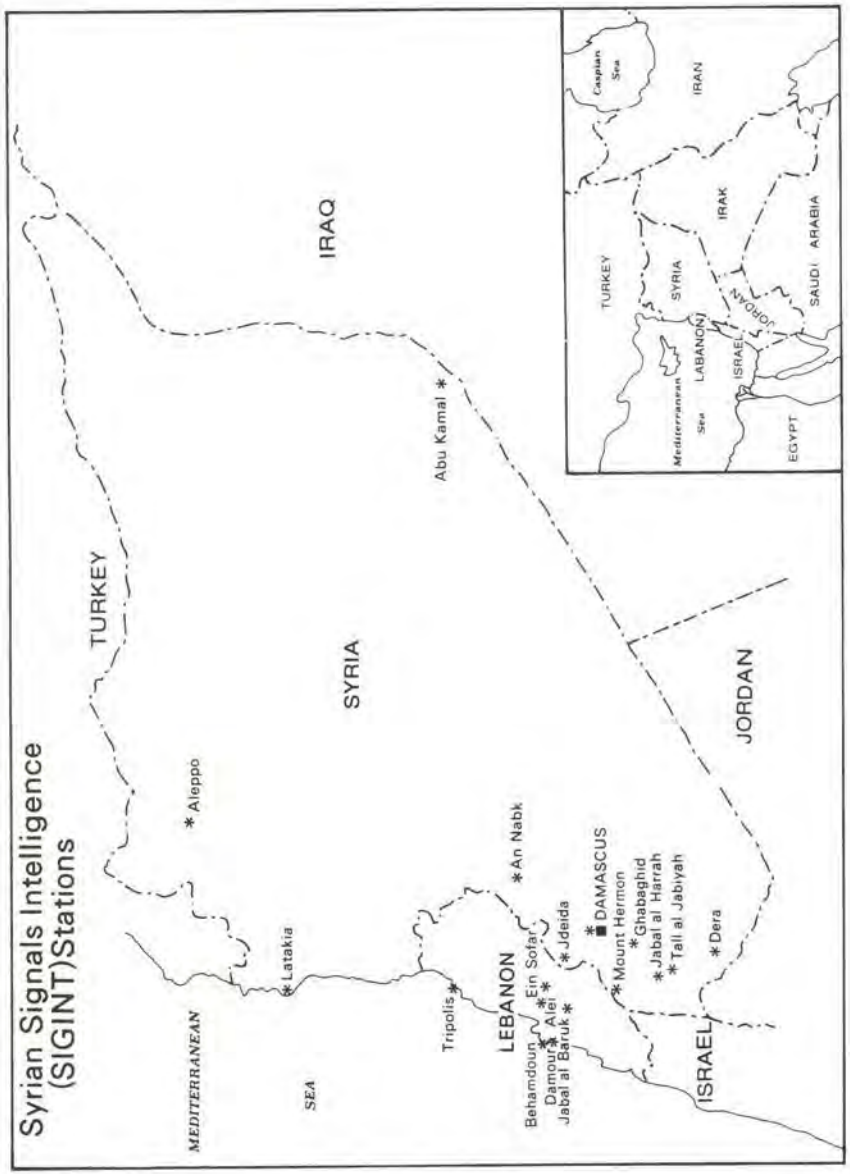
Source: US Department of Defense.

FIGURE 16
SOVIET SIGINT STATION, SANTA ROSA, NICARAGUA



Source: US Department of Defense.

FIGURE 17
SYRIAN SIGINT STATIONS



The SIGINT complex at Cam Ranh Bay in Vietnam has been described by the Commander-in-Chief Pacific (CINCPAC) as 'the [third] largest in the world outside the Soviet Union'.[4] Its facilities include a satellite communications intercept system, two Fix 24 HF-DF CDAAs, and a Park Drive communications satellite terminal which provides a direct communications link between the Cam Ranh Bay SIGINT complex and the Soviet Navy's Pacific Fleet Headquarters at Vladivostok 'as well as with the General Staff in Moscow'.[5]

Other Soviet SIGINT sites outside the USSR are located in Afghanistan and Nicaragua, and cooperative arrangements exist with respect to SIGINT stations in Syria, Lebanon, Libya and North Korea.

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4 House Armed Services Committee, *Hearings on Military Posture and H.R. 5968*, (US Government Printing Office, Washington, D.C., 1982), Part 1, p.1038.

5 Leif Rosenberger, 'The Soviet-Vietnamese Alliance and Kampuchea', *Survey*, (Vol.27, No.118/119), Autumn-Winter 1983, p.212.

CHAPTER 4

THE USE OF SOVIET DIPLOMATIC AND TRADE ESTABLISHMENTS FOR SIGINT PURPOSES

The Soviet Union has installed SIGINT systems in more than half of the countries in which it maintains diplomatic establishments (i.e. embassies, consulates and/or official residences). Diplomatic missions are currently maintained in about 115 countries, and SIGINT operations are presently conducted in some 62 of these countries. SIGINT systems are installed in embassies, consulates (where these are separate from embassies), trade and other commercial missions, the offices of military attaches, the official residences of diplomatic personnel, and official recreational facilities for these personnel.

Table 4 lists the 62 countries in which the Soviet Union is known to use diplomatic establishments for SIGINT purposes. In many of these countries (such as the US, the UK, Japan, Canada, West Germany, France, Belgium, the Netherlands, Sweden, Finland, Switzerland, Italy, Turkey and Pakistan) more than one such establishment is used. The total number of Soviet diplomatic establishments known to maintain extensive SIGINT collection activities is about 100. (In addition, other buildings occupied by Soviet diplomatic personnel, such as apartments and commercial offices, are used for more limited SIGINT activities as circumstances permit.) Given that the average number of personnel engaged in SIGINT activities in these establishments is 8-12, it can reasonably be estimated that some 1,000 Soviet personnel are currently collecting SIGINT from diplomatically immune facilities.

Following the October 1973 war in the Middle East, the Headquarters of the US European Command (USEUCOM) conducted an assessment of 'the known communications collection capabilities of the SOVIET UNION and WARSAW PACT nations' in Europe, the Near East and the US, and concluded that Soviet diplomatic establishments in 22 countries could have been used to monitor US and NATO communications relating to military and diplomatic activity concerning the war:

> The KGB and GRU are known to conduct SIGINT collection from a variety of diplomatically immune buildings around the world.
>
> (1) In EUROPE, known sites are located in the following cities: VIENNA, AUSTRIA; COPENHAGEN, DENMARK; POTSDAM, EAST GERMANY; HELSINKI, FINLAND; PARIS, FRANCE; ROME, ITALY; THE HAGUE, NETHERLANDS; OSLO, NORWAY; STOCKHOLM, SWEDEN; LONDON, ENGLAND; FRANKFURT, COLOGNE and BONN, WEST GERMANY; and BRUSSELS, BELGIUM.
>
> (2) In the NEAR EAST, SIGINT collection is accomplished from: CAIRO, EGYPT; ATHENS, GREECE; TEHRAN, IRAN; BAGHDAD, IRAQ; BEIRUT, LEBANON; KARACHI, PAKISTAN; DAMASCUS, SYRIA; ADEN, YEMEN; and ANKARA and ISTANBUL, TURKEY.
>
> (3) WASHINGTON, D.C. and NEW YORK CITY are prime collection locations with CONUS [Continental United States].[1]

As the HQ USEUCOM report noted, both the KGB and the GRU use diplomatic establishments for SIGINT collection. The principal Soviet SIGINT agencies concerned are the GRU's Third Branch of the Sixth Directorate and the KGB's 16th Directorate. In addition, the KGB's Operational-Technical Directorate (OTU) of the First Chief Directorate and the GRU's Radio Monitoring Stations maintain SIGINT operations specifically directed against the radio transmissions of the host country police and security surveillance agencies.

The selection of which Soviet diplomatic establishments should be used for SIGINT operations, and the relative responsibilities assigned to KGB and GRU personnel, depends on a variety of factors.

---

1 Headquarters United States Euroepan Command, *COMSEC Assessment During October 1973 Mid-East Conflict*, (HQ USEUCOM, Vaihingen, Germany, ECJ-A-73-0045-S, December 1973, pp.A2-A3.

TABLE 4
SOVIET SIGINT POSTS
LOCATED IN DIPLOMATIC AND
TRADE ESTABLISHMENTS

	Country	Site
1	Afghanistan	Kabul
2	Angola	Luanda
3	Argentina	Buenos Aires
4	Australia	Canberra
5	Austria	Vienna
6	Bangladesh	Dacca
7	Belgium	Brussels (3)
8	Burma	Rangoon
9	Canada	Ottawa
		Montreal
10	China	Beijing
11	Costa Rica	San Jose
12	Cuba	Havana
13	Cyprus	Nicosia
14	Denmark	Copenhagen
15	East Germany	East Berlin
		Potsdam
16	Egypt	Cairo
17	Ethiopia	Addis Ababa
18	Finland	Helsinki
		Maarianhamina
		Turku
19	France	Paris
		Marseilles
20	Greece	Athens
21	Iceland	Reykjhavik
22	India	New Delhi
		Calcutta
23	Indonesia	Jakarta
24	Iran	Teheran
25	Iraq	Baghdad
26	Ireland	Dublin

	Country	Site
27	Italy	Rome
		Milan
28	Japan	Tokyo
		Osaka
		Sapporo
29	Kenya	Nairobi
30	Kuwait	Kuwait
31	Laos	Viangchan
32	Lebanon	Beirut
33	Libya	Tripoli
34	Madagascar	Antananarivo
35	Malaysia	Kuala Lumpur
36	Mexico	Mexico City
37	Mongolia	Ulaan Baatar
38	Mozambique	Maputo
39	Nepal	Katmandu
40	Netherlands	The Hague
		Amsterdam
		Hilversum
		Rotterdam
41	New Zealand	Wellington
42	Nicaragua	Managua
43	North Korea	Pyongyang
44	Norway	Oslo
		Svalbard
45	Pakistan	Islamabad
		Karachi
46	Peru	Lima
47	Philippines	Manila
48	Portugal	Lisbon
49	Seychelles	Victoria
50	Singapore	Singapore
51	South Yemen	Aden
52	Spain	Madrid

	Country	Site
53	Sri Lanka	Colombo
54	Sweden	Stockholm
		Gothenburg
55	Switzerland	Berne
		Geneva
		Zurich
56	Syria	Damascus
57	Thailand	Bangkok
58	Turkey	Ankara
		Istanbul
59	United Kingdom	London (3)
		Flimwell
60	USA	Washington DC (3)
		New York (4)
		Pioneer Point, Md.
		San Francisco
		Chicago
61	Vietnam	Hanoi
62	West Germany	Bonn
		Baden Baden
		Bunde
		Cologne
		Frankfurt
		Hamburg
		West Berlin

The most important of these is the location of the particular establishment in relation to communications and other signals of interest to the respective agencies. The size of the establishment, both physically and in terms of the number of available personnel, as well as the nature of the establishment, is also important. For example, the KGB generally has responsibility for operations conducted from consulates, while the GRU conducts operations from the offices of military attaches (where these are separate from the embassy building). In a relatively large mission of, say, 300 personnel, about 20

people are involved in various sorts of SIGINT activity. In relatively small missions, SIGINT activity is generally conducted only if there are signals of special interest and no other collection system is available within the region.

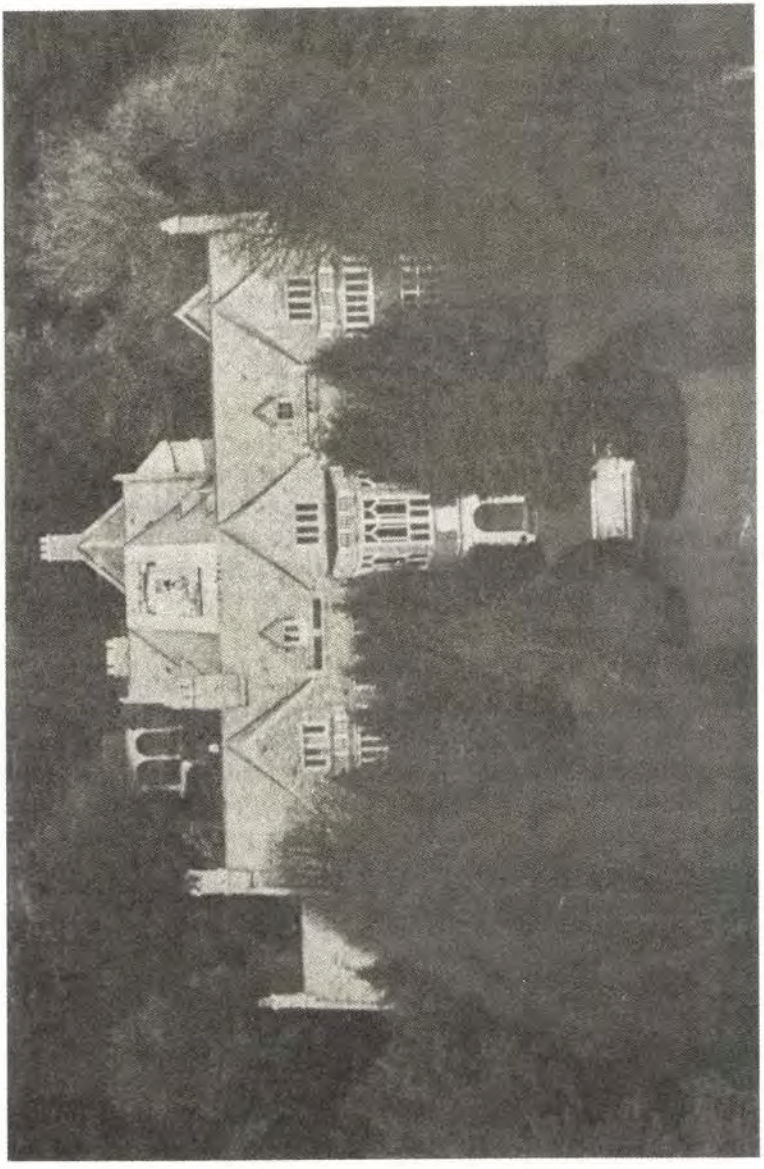
It is obvious that some mechanism must exist for the coordination of the various KGB and GRU SIGINT activities, particularly in the smaller establishments where the physical and personnel resources simply would not allow separate operations. It is also likely that in areas where there are several diplomatic establishments engaged in SIGINT activities, there is some division of labour with respect to the monitoring of particular signals, with some establishments focussing on high frequency (HF) transmissions, some on terrestrial microwave and tropospheric scatter circuits, some on satellite communication (SATCOM) signals, and others on local police and security service communications activity.

In general, very little SIGINT processing is undertaken abroad. The Soviet SIGINT complex at Lourdes in Cuba has processing and analytical capability, and some of the SIGINT collected at Soviet diplomatic establishments in the Washington and New York areas is transmitted to Lourdes for some processing and analysis. In virtually all other cases, SIGINT collected at Soviet diplomatic establishments, and which is of no immediate local utility, is sent to the relevant KGB and GRU facilities in Moscow.

There are several noteworthy aspects of these Soviet SIGINT activities involving diplomatic establishments. To begin with, there is the global scale of the activities. Stations are now maintained in some 62 countries in all continents. Although Western SIGINT agencies also use diplomatic missions for SIGINT collection, the Soviet effort is perhaps 2-3 times more extensive. (And, of course, the Western operations against the Soviet Union are limited essentially to Moscow and Leningrad, while the Soviets maintain operations in all major Western capitals.)

Second, the Soviet activity has grown markedly over the past decade or so. The number of countries in which the Soviets use diplomatic establishments for SIGINT purposes has increased by about one per year since the mid-1970s. There has also been an expansion of SIGINT capabilities in those establishments that have long maintained

FIGURE 18
SOVIET RECREATIONAL FACILITY AT KILLENWORTH, GLEN COVE, NEW YORK



SIGINT operations. In the case of the Soviet recreational facility at Killenworth in Glen Cove, Long Island, for example, the SIGINT capabilities have expanded quite dramatically over the past three decades. According to Arkady Shevchenko, who defected in April 1978,

> When I first came to the United States in 1958, there were three or four KGB communications technicians and their gear sharing the former servants' quarters in the attic [of the Killenworth mansion]. By 1973, the specialists in intercepting radio signals numbered at least a dozen, and they had taken over the whole floor. Their equipment occupied so much space, in fact, that one of the two large unused greenhouses had been commandeered to store it. These quarters were off limits to other personnel.[2]

By 1978, the number of SIGINT personnel had increased further. As Shevchenko stated in an interview broadcast in June 1981:

> All the top floors of the building are full of the sophisticated equipment ... to intercept all the conversations, telephone conversations on anything which is going on. At least 15 or 17 technicians were working to do all this job.[3]

Third, it is clear that in many cases the Soviet acquisition of diplomatic sites has been guided by the utility of the particular sites for SIGINT collection. This is clearly evident, for example, in the siting of establishments in the United States, where nine Soviet establishments have been equipped for extensive SIGINT collection. As an analyst at American Telephone and Telegraph (AT&T) has noted with respect to the more recent Soviet diplomatic establishments, 'it is most unlikely that these sites were selected for

---

2 Arkady N. Shevchenko, *Breaking With Moscow*, (Alfred A. Knopf, New York, 1985), p.245. See also William F. Parham, 'KGB Spares No Expense on Eavesdropping in United States', in *Congressional Record - House of Representatives*, 1 October 1982, pp.E4633-E4634.

3 'The KGB Connections', Canadian Broadcast Corporation, 8 June 1981, transcript, p.9.

any other reason than microwave interception'.[4] According to US intelligence assessments, these establishments rank as listed in Table 5 in terms of the quantity and quality of the SIGINT collected.

The Soviet residential complex in Riverdale in the Bronx, NY, is one of the highest sites in New York City and has access to a significant proportion of the telecommunications network in the northeast of the US.[5] The post at Killenworth, Glen Cove, is ideally located for SIGINT purposes, both because of the excellent microwave propagation characteristics of Long Island Sound, commonly known as 'microwave alley', and because of the proximity of two microwave nodal points in the East Coast telecommunications network and of several important defence and military-industrial establishments in the region.[6] The new Soviet Embassy on Mount Alto in northwest Washington, DC, has a commanding view over most of the District of Columbia itself, and extending into Maryland and northern Virginia. As a senior US intelligence official has stated, 'From an eavesdropping standpoint, that's one of the most magnificent vantage points in Washington'.[7] The Soviet recreational facility at Pioneer Point on the Eastern Shore of Maryland is also extremely well-placed for SIGINT operations. According to a report based on interviews with Arkady Shevchenko and US Navy sources,

> In the mid-1970s, Shevchenko says, the Soviets were ecstatic when they were allowed to purchase a beautiful remote estate with several buildings on Pioneer Point on the Chester River on Maryland's

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4 Information provided by Robert Windrem, 7 February 1986, citing interview with AT&T Long-line technical officer.

5 'The KGB's Spies in America', *Newsweek*, 23 November 1981, p.8. See also Leslie Maitland, 'New York Termed "Hub" of Foreign Spies in U.S.', *New York Times*, 14 November 1981, pp.25-26.

6 William J. Broad, 'Evading the Soviet Ear at Glen Cove', *Science*, (Vol.217, No.4563), 3 September 1982, pp.910-911; and Harold Jackson, 'The Long Island Listening Post', *Guardian*, 6 September 1982.

7 See 'Embassy Row: Hill With Topflight Electronic View', *New York Times*, 28 January 1985, p.A12.

FIGURE 19
SOVIET RESIDENTIAL BUILDING, RIVERDALE, NEW YORK, MARCH 1986

TABLE 5
SIGINT POSTS IN THE US

	Post	*Date Occupied*	*Dimensions of Site*
1	Soviet Residential complex, Scharansky Square, Riverdale, The Bronx, New York	1974	17-storey apartment building, based on a massive 4-storey foundation.
2	New Soviet Embassy complex, 2650 Wisconsin Avenue, N.W., (Mount Alto), Washington, D.C.	1986	12.5 acres. Complex of five buildings totalling approximately 460,000 square feet. 7-storey chancery/administration building. 4-storey residential building, containing approximately 160 permanent apartment units and 20 visitor units. Total resident population of 350-400 people. Residential building is 90-feet high, with the roof 420 feet above sea level.
3	Soviet Embassy, 1125 16th Street, N.W., Washington, D.C.	1933	4-storeys.
4	Soviet Consulate, 2790 Green Street, Pacific Heights, San Francisco, California	1972	7-storeys. 74 rooms.
5	Soviet Mission to the United Nations, 136 East 67 Street, New York	1962	11 storeys. 1,145,000 square feet.
6	Soviet recreation complex, Pioneer Point, Maryland	Mid-1970s	Large estate with 3-storey mansion and some dozen detached dachas and other support buildings.
7	Soviet recreation complex, Killenworth, Dosoris Lane, Glen Cove, Long Island, New York	1946	37-acre estate. 3-floor mansion with 39 rooms.
8	Soviet Recreation complex, 136 Mill River Road, Oyster Bay, Long Island, New York		2-storeys.
9	Office of Soviet Military, Air and Naval Attaches, 2552 Belmont Road, N.W., Washington, D.C.		4-storeys.

FIGURE 20
NEW SOVIET EMBASSY, MOUNT ALTO, WASHINGTON, D.C., SEPTEMBER 1985

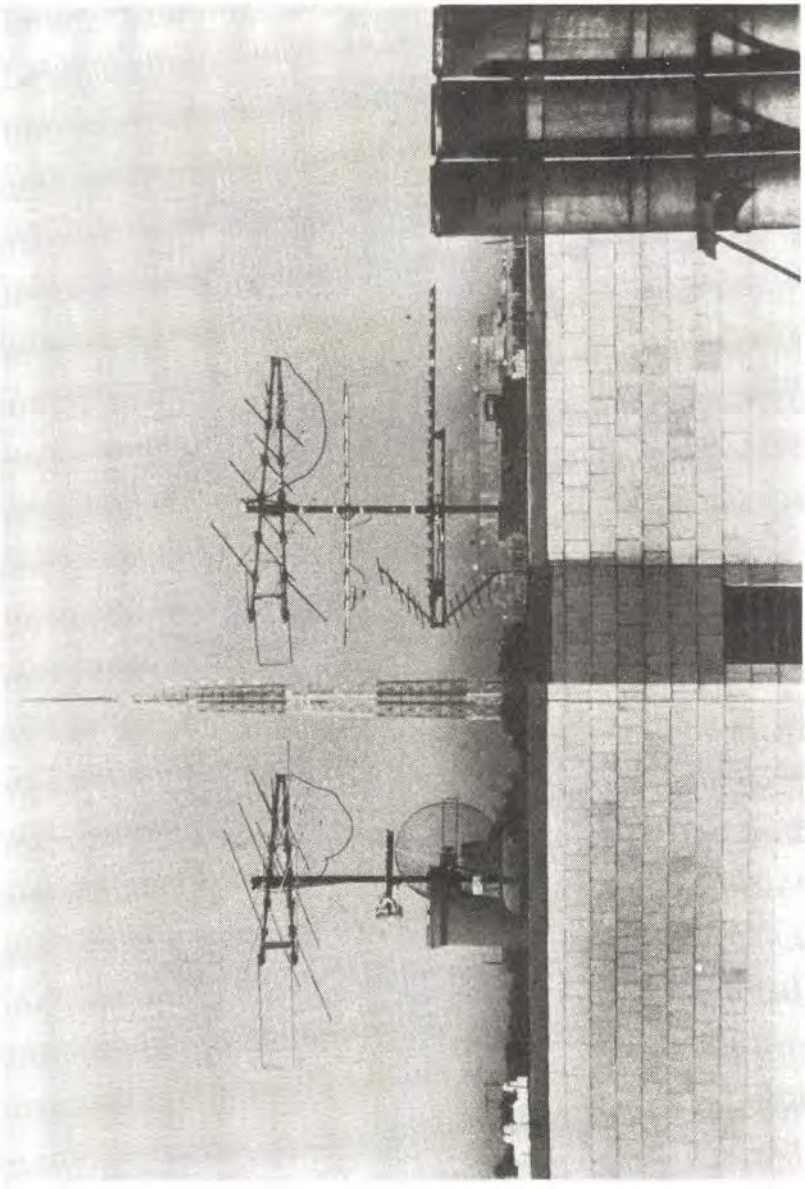

FIGURE 21
SOVIET RECREATIONAL FACILITY, PIONEER POINT, MARYLAND, JULY 1987

> Eastern Shore. 'It was not accidental that they looked where to get that.'
>
> The Eastern Shore property happens to be in the main microwave transmission corridor between Norfolk, Va., hub of the U.S. Atlantic Fleet operations and the Air Force's major base at Langley Field, and Washington.
>
> Several microwave relay links between Washington and Norfolk pass directly over the Soviet antennae.
>
> 'I'm not privy to the details', Shevchenko says, 'but I remember how happy they were when they bought this estate'.
>
> At first the antennas went up slowly.
>
> Later, a Navy source says, more and more antennae grew.[8]

The same pattern is evident from examination of the sites of Soviet diplomatic missions elsewhere in Europe, Asia and Australasia.

Fourth, there has been a significant evolution in the antenna systems installed on Soviet diplomatic buildings. During the 1950s, of course, these were primarily HF systems. Three variants of Birdcage broadband HF dipoles are currently deployed on several dozen Soviet missions known to be engaged in SIGINT activities. VHF and microwave systems were extensively installed through the 1960s and 1970s. More recently, satellite communications (SATCOM) systems have been installed at various establishments - including Tokyo, New Delhi (2), London, Paris, Amsterdam (2), Copenhagen, Gothenburg, Reykjhavik, Ankara and Milan.

Finally, the Soviet use of diplomatic establishments for SIGINT purposes is supplemented by similar operations in other East European missions. In the United States, for example, SIGINT operations are reportedly maintained in an official East German residence in Arlington, Va., the Polish and Czechoslovak Embassies in

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8 William F. Parham, 'KGB Spares No Expense on Eavesdropping in United States', *Norwich Bulletin*, in *Congressional Record - House of Representatives*, 1 October 1982, p.E4634.

FIGURE 22
SOVIET BIRDCAGE 1 HF DIPOLE ANTENNA, LISBON, CAIRO (2), LONDON, MEXICO CITY, GOTHENBURG, KUALA LUMPUR (2), THE HAGUE

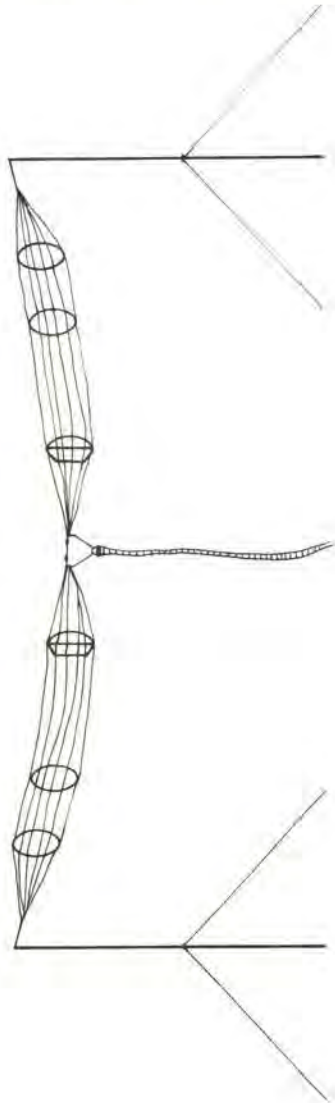


FIGURE 23
SOVIET BIRDCAGE 2 HF DIPOLE ANTENNA, LISBON, CAIRO, MADRID, LONDON, JAKARTA, GENEVA, STOCKHOLM, COPENHAGEN, KUALA LUMPUR, PARIS

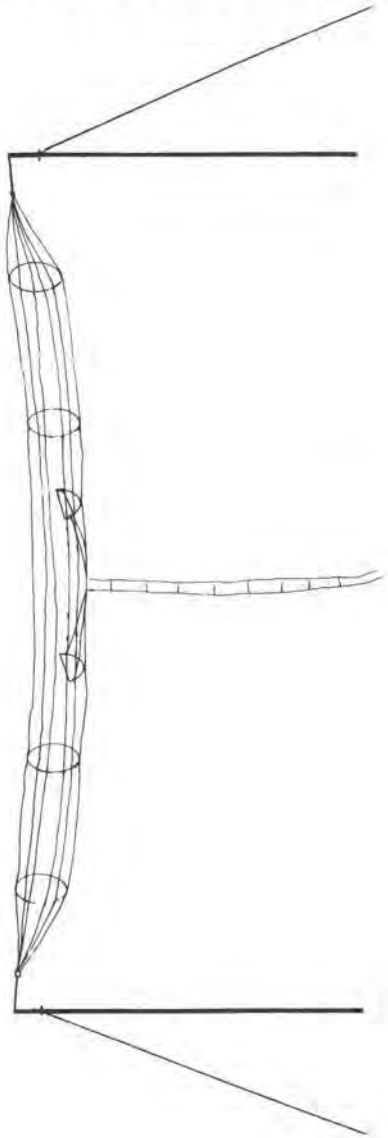


FIGURE 24
SOVIET BIRDCAGE 1 HF ANTENNA, LISBON, SEPTEMBER 1987

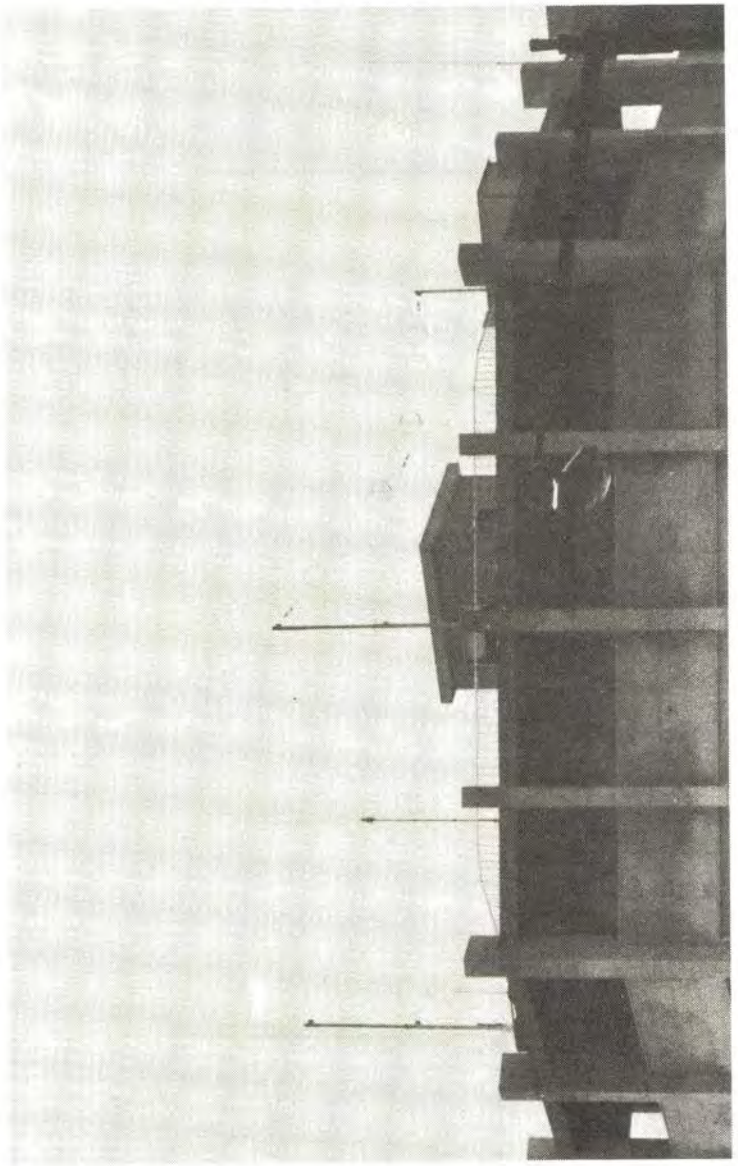


FIGURE 25
SOVIET BIRDCAGE 1 HF ANTENNA, THE HAGUE, SEPTEMBER 1988

FIGURE 26
SOVIET BIRDCAGE 2 HF ANTENNA, STOCKHOLM, JUNE 1988

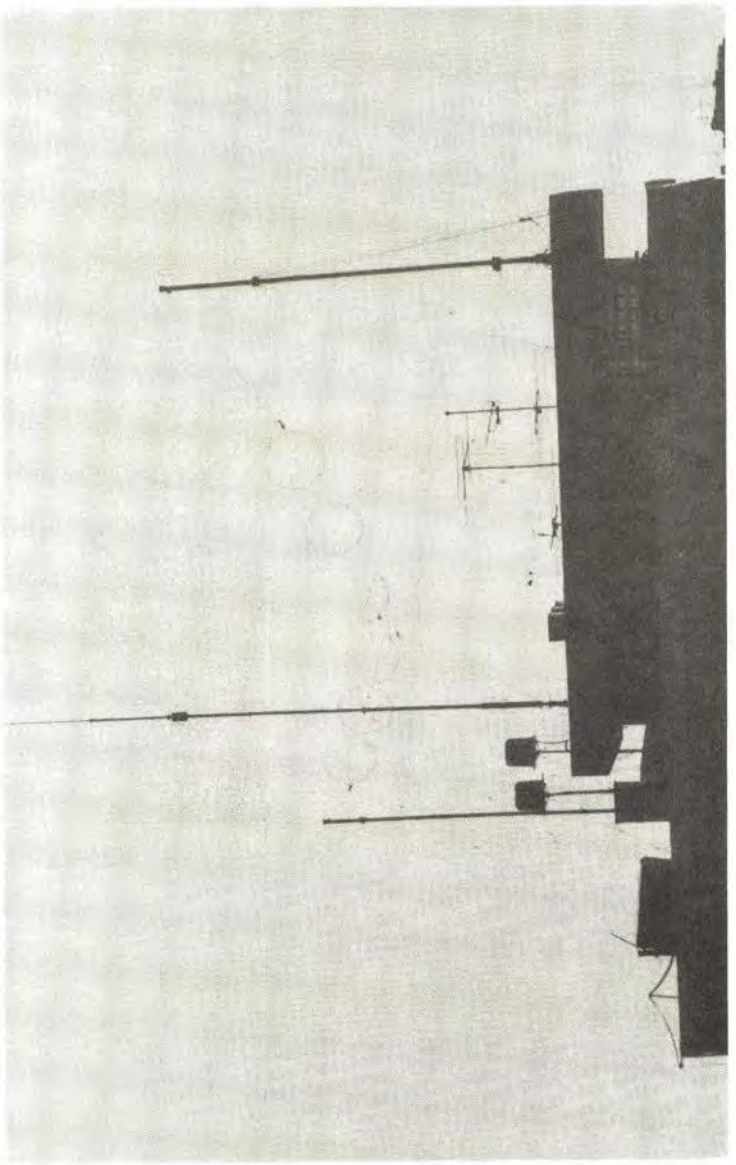


FIGURE 27
SOVIET BIRDCAGE 2 HF ANTENNA, MADRID, SEPTEMBER 1987

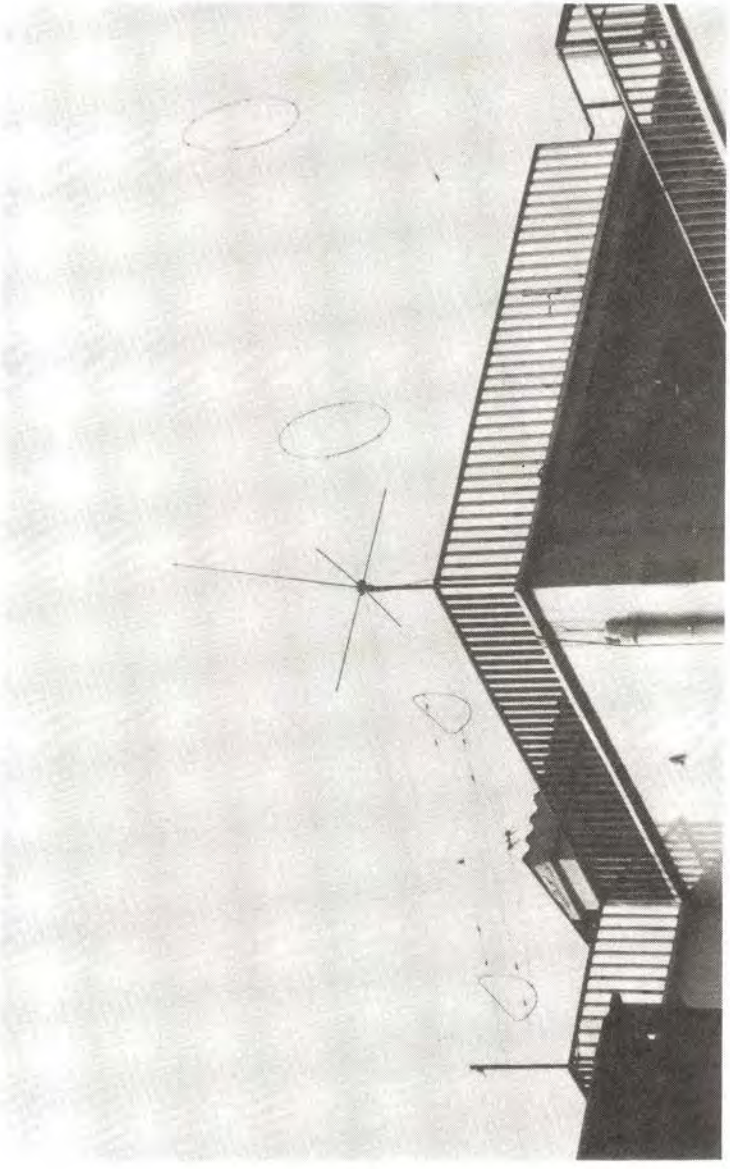


FIGURE 28
SOVIET BIRDCAGE 2 HF ANTENNA, COPENHAGEN, JUNE 1988

FIGURE 29
SOVIET BIRDCAGE 2 ANTENNA, CAIRO

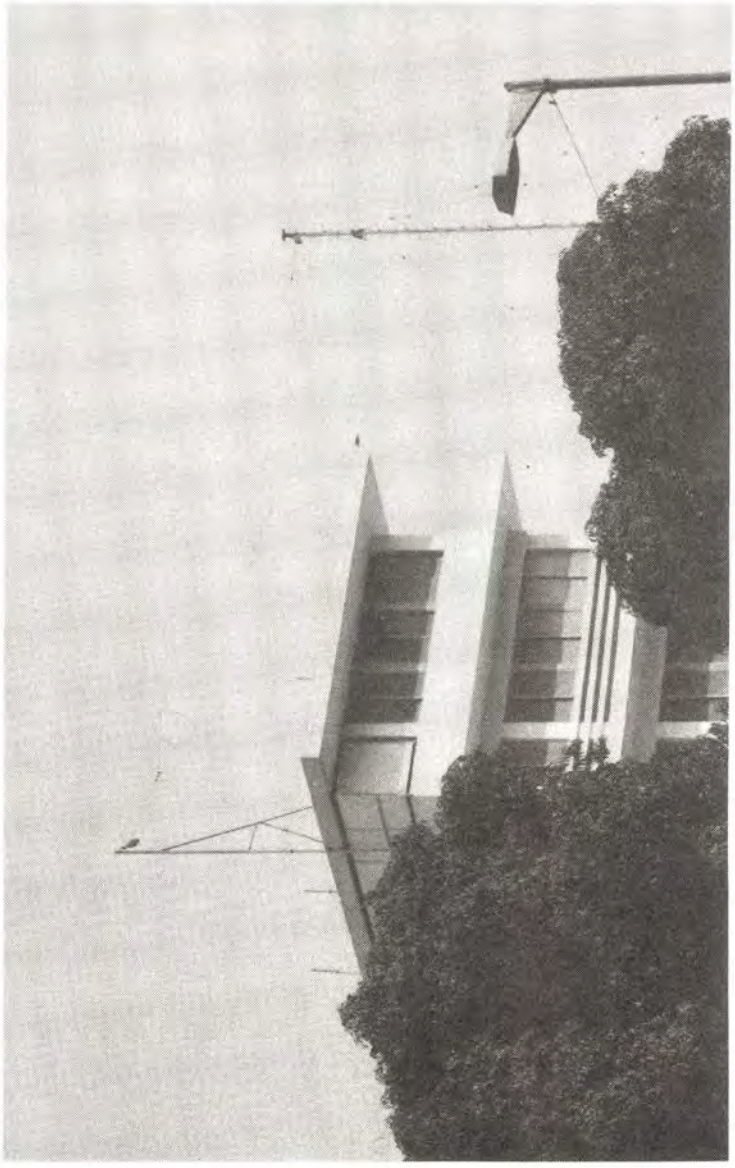


FIGURE 30
SOVIET BIRDCAGE 1 HF ANTENNAS, CAIRO

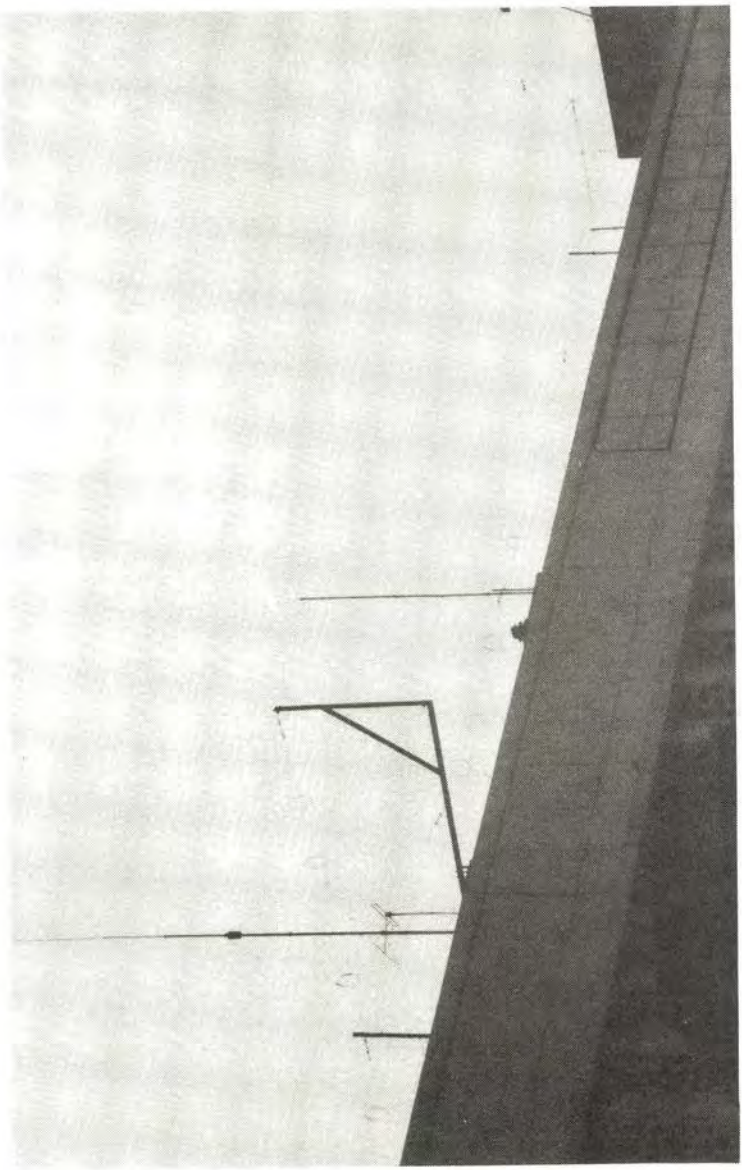


FIGURE 31
SOVIET BIRDCAGE 1 AND 2 HF ANTENNAS, LONDON, SEPTEMBER 1988

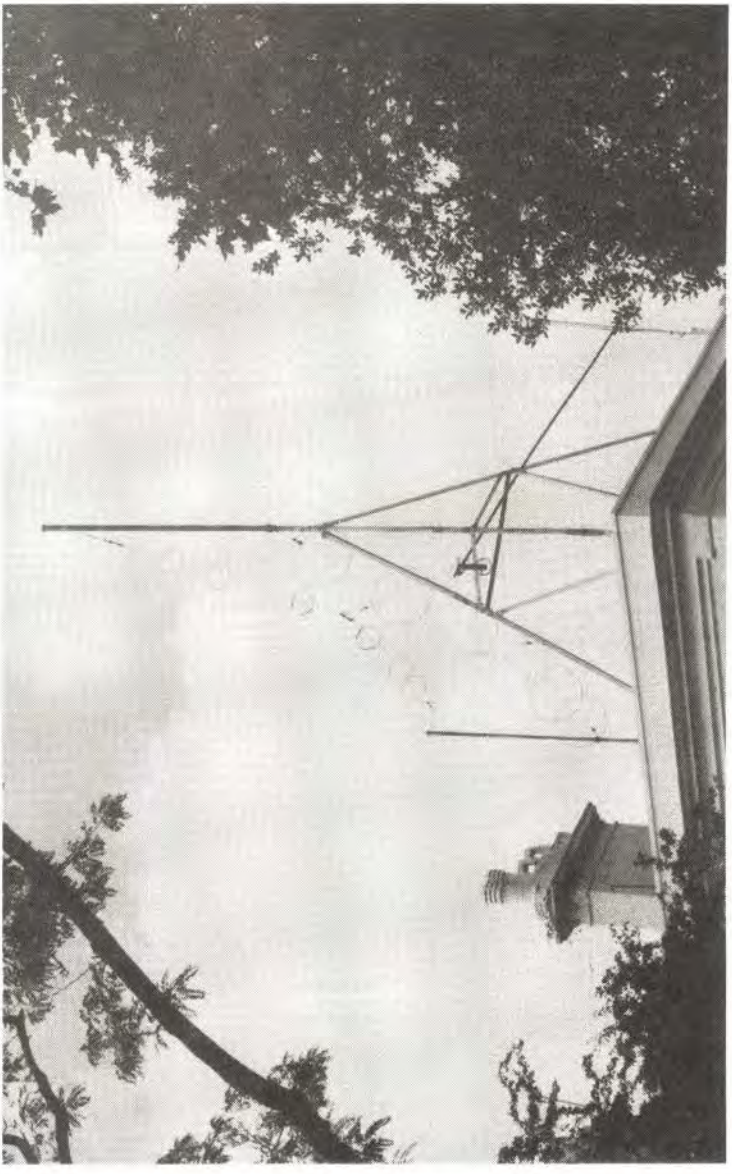


FIGURE 32
BIRDCAGE 3 HF DIPOLE ANTENNA, SOVIET CONSULATE, SAN FRANCISCO, CALIFORNIA, MAY 1985

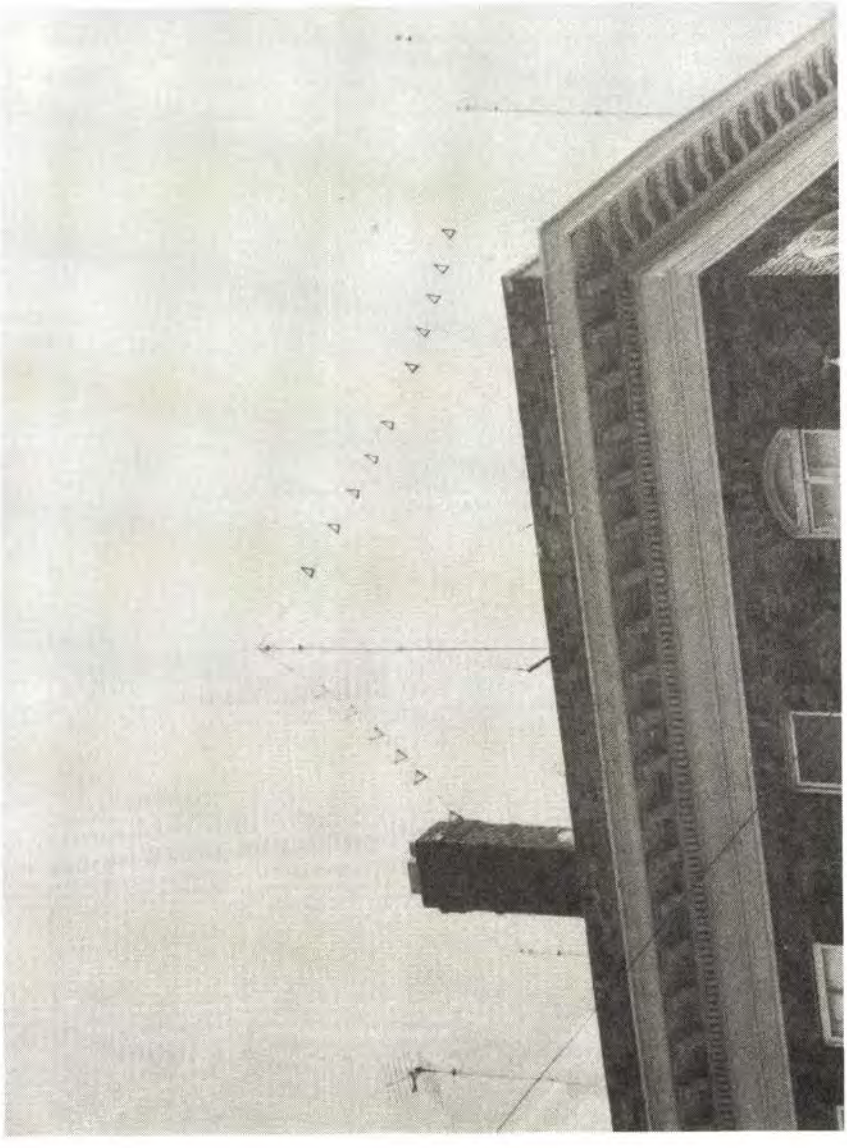


FIGURE 33
SOVIET DIPLOMATIC ESTABLISHMENTS WITH SATCOM ANTENNAS

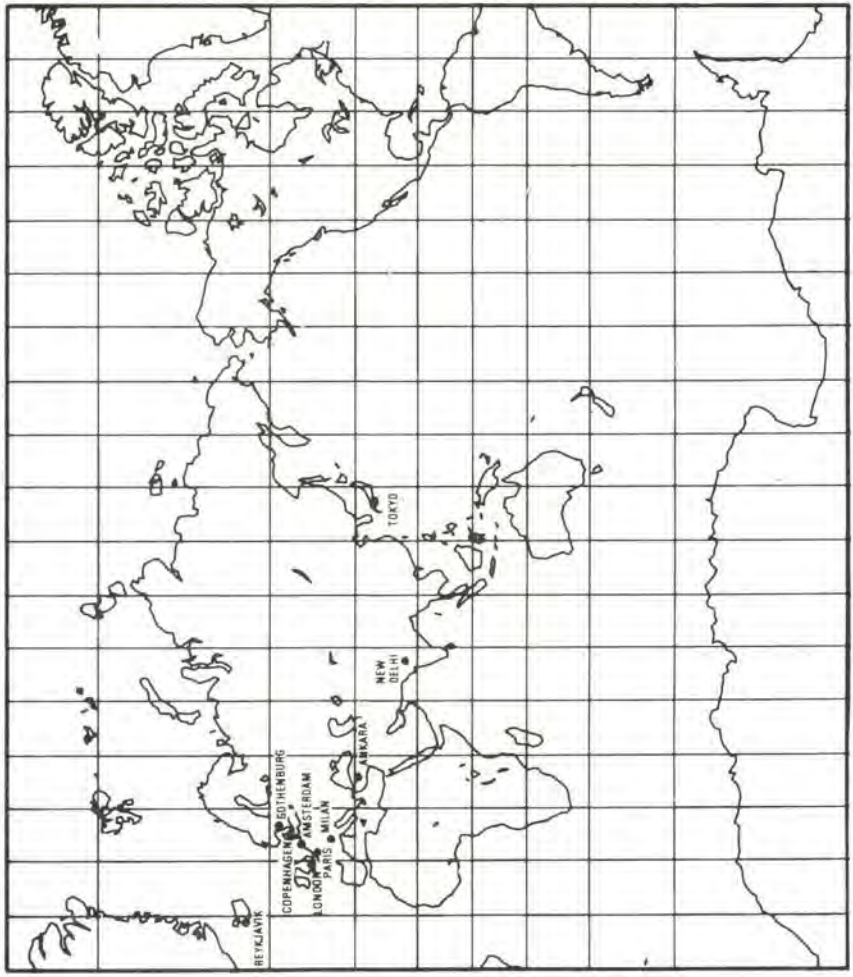


FIGURE 34
SOVIET EMBASSY, COPENHAGEN,
JUNE 1988

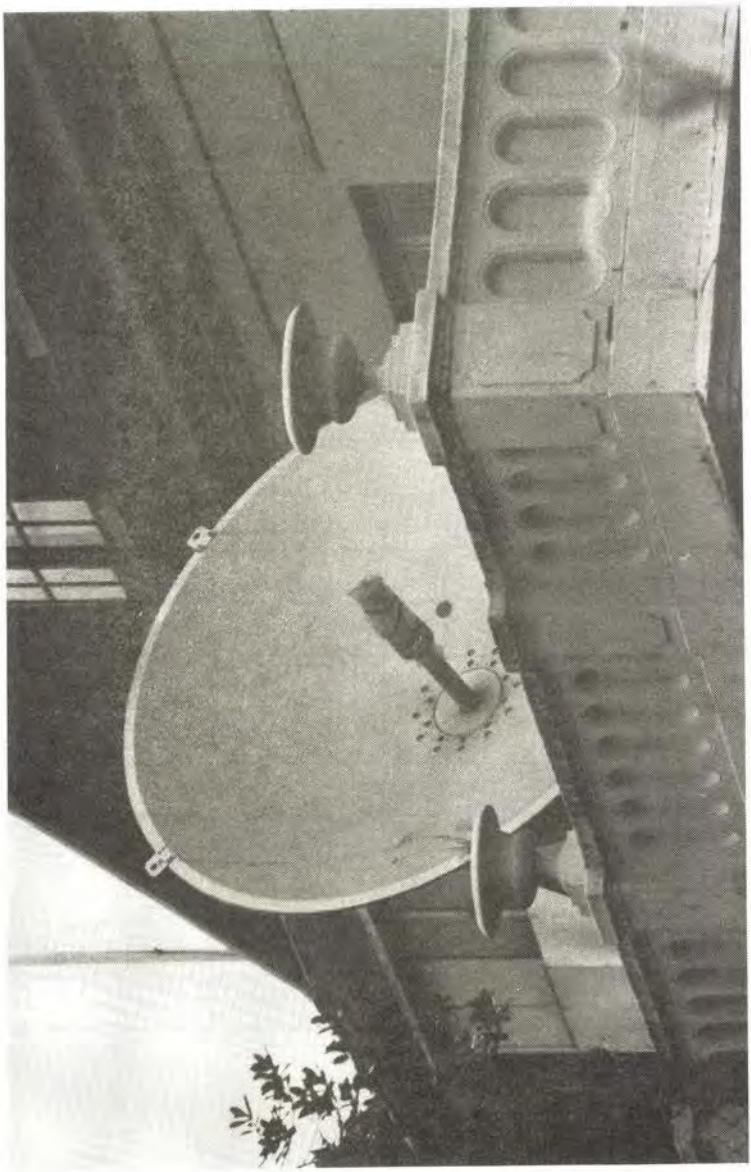
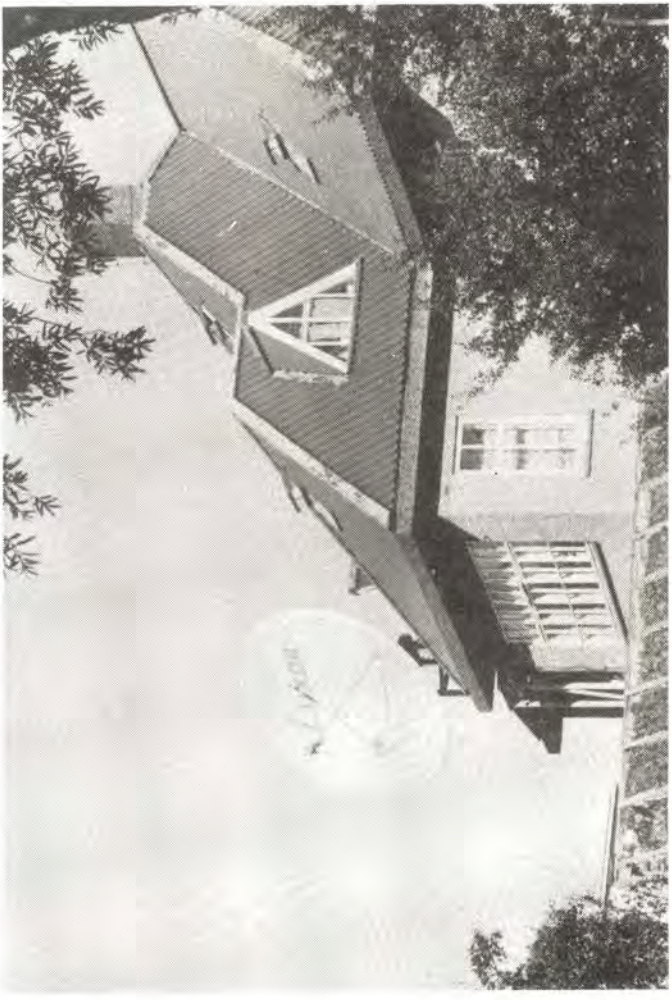


FIGURE 35
SOVIET EMBASSY, REYKJAVIK, AUGUST 1988



Source: Bjorn Bjarnason, *Morgunbladet*, Reykjavik, Iceland.

FIGURE 36
SOVIET TRADE MISSION, AMSTERDAM,
SEPTEMBER 1988

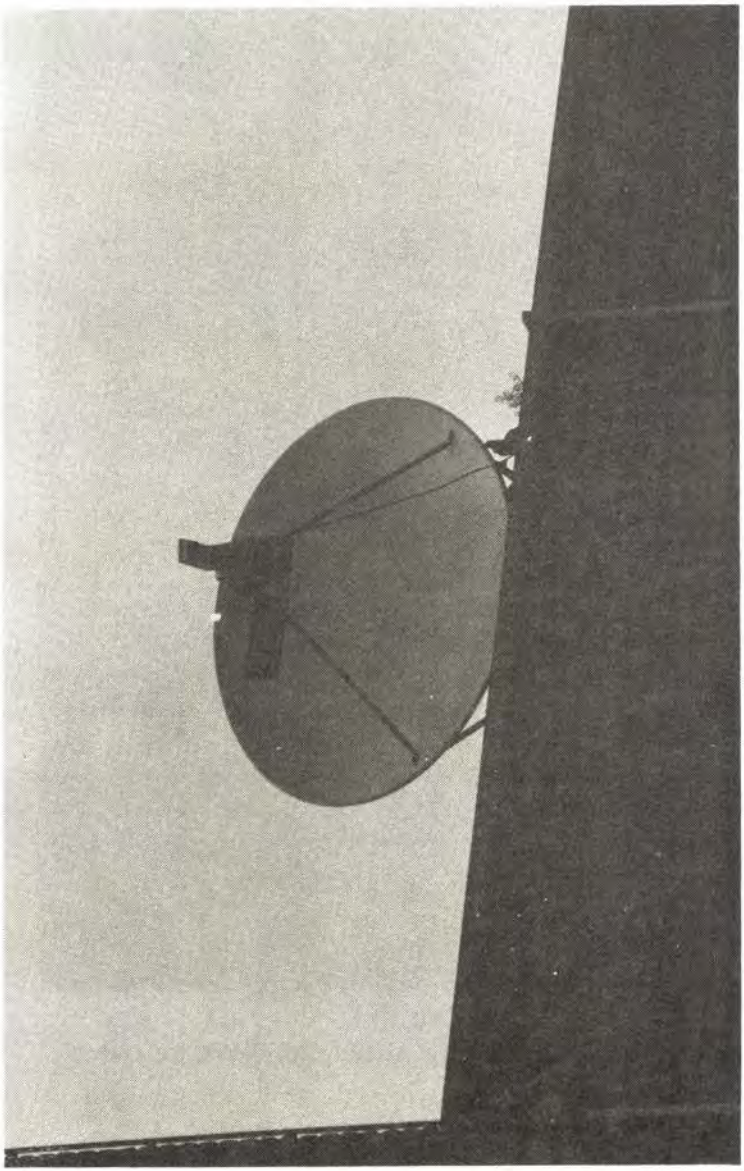


FIGURE 37
SOVIET CONSULATE, GOTHENBURG, SWEDEN,
JUNE 1988

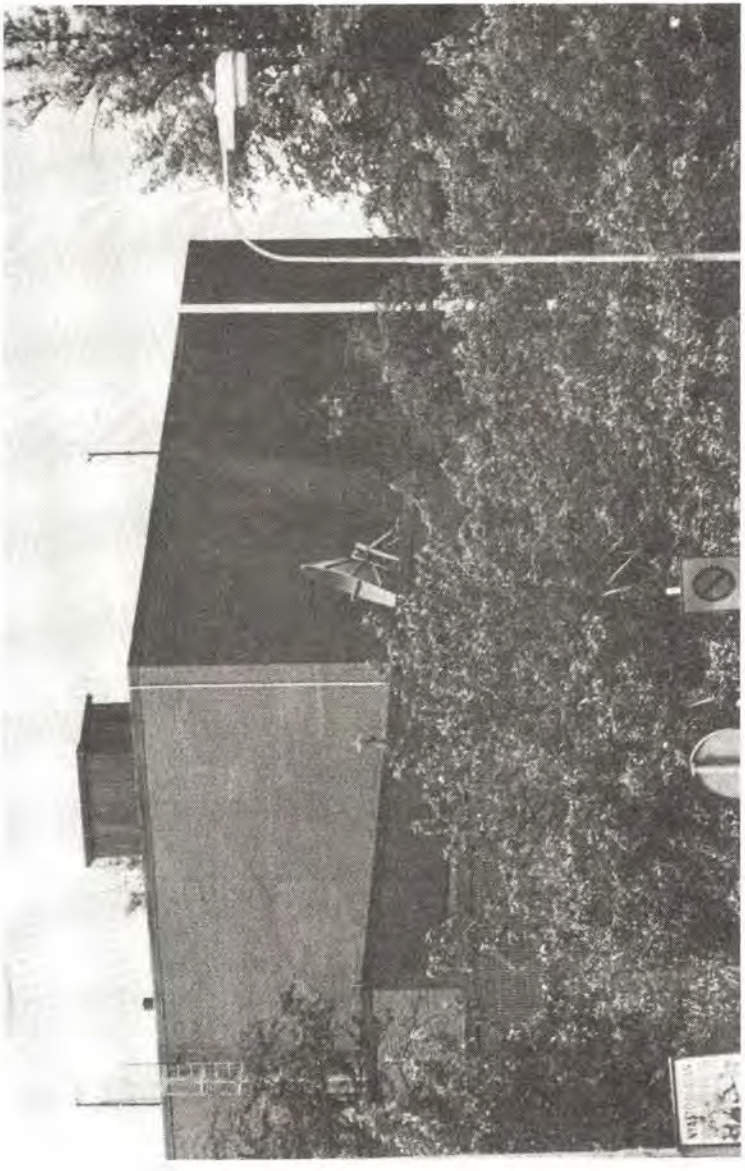
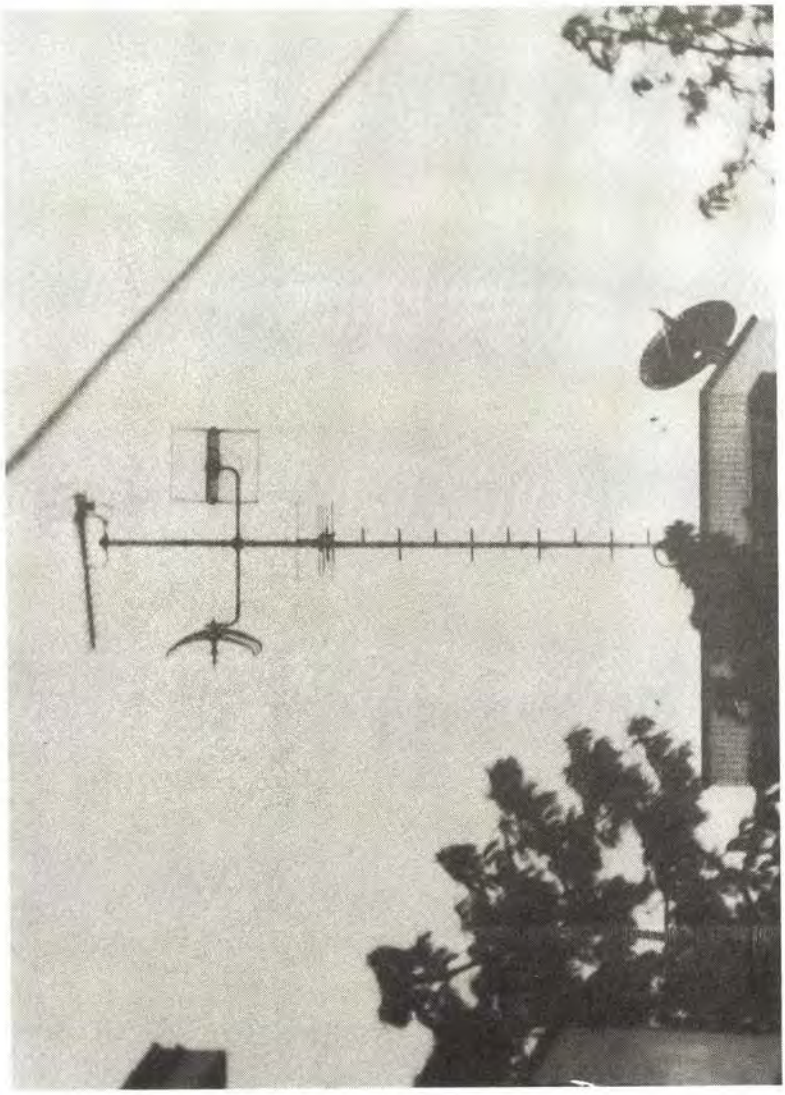


FIGURE 38
SOVIET CONSULATE, MILAN, ITALY,
NOVEMBER 1987



Source: Fabrizio Tonello, *Il Mondo*, Milan, Italy.

FIGURE 39
POLISH CONSULATE, CHICAGO,
JUNE 1987

Washington, D.C., and the Polish Consulate in Chicago.[9] In Ottawa, the antennas (including microwave receivers) on the roof of the Polish Embassy are even more remarkable than those on the Soviet Embassy.[10]

The East German use of diplomatic establishments for SIGINT purposes is particularly noticeable in Africa - in, for example, Tripoli, Libya; Antananarivo, Madagascar; Maputo, Mozambique; and Accra, Ghana. According to a report on East German intelligence activities in Ghana in 1983,

> [These activities have] recently been emphasised by the sprouting of an unusually vigourous growth of antennae from the roof of the East German embassy in Accra - rivalling those of the Ghana Broadcasting Corporation and far exceeding normal diplomatic needs.[11]

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9 Neil A. Lewis, 'Experts Assert Soviet Monitors Capital Phones', *New York Times*, 3 May 1987, p.1.

10 'The KGB Connections', Canadian Broadcasting Corporation, 8 June 1981, transcript, p.8.

11 'East Germany's Game in Ghana', *Foreign Report*, 9 June 1983, pp.1-2.

CHAPTER 5

SOVIET VEHICULAR SIGINT OPERATIONS

Soviet and allied use of vehicles for SIGINT purposes is particularly widespread in Europe and North America. Operations have been specifically identified in France, Turkey, West Germany, Belgium, the Netherlands, Finland, Denmark, Sweden, Norway, Switzerland, Austria, Canada, Mexico and the United States; they have involved mobile SIGINT units of both the KGB and GRU. In addition to Soviet vehicular SIGINT activities, SIGINT-equipped vehicles are also used by Bulgaria, East Germany, Hungary, Poland, Czechoslovakia, and, to a lesser extent, Romania. The types of vehicles used include vans and lorries, long-distance transport trucks, Winnebago's or mobile homes, and ordinary cars. The activities include counter-espionage and counter-intelligence operations as well as the monitoring of governmental and military communications centres, military exercises, weapons research and development facilities, and test ranges.

Vehicles have a number of important attractions as SIGINT platforms. They are very cheap as compared to other systems. They can be parked close to emission sources and hence monitor signals which would otherwise be inaccessible. They can be operated clandestinely to avoid direct counter-action. And if detected by counter-intelligence authorities, they can frequently claim diplomatic or other immunity from inspection or physical obstruction.

The Soviet use of SIGINT vehicles outside the USSR itself began on a large scale in the mid-1950s in connection with various counter-espionage and counter-intelligence operations. The most important - and successful - of these involved the use of vans equipped with interception and DF systems for locating the sources of clandestine radio transmissions; the use of cars and vans to monitor the radio communications of the security and counter-intelligence services in situations where those services are conducting surveillance of Soviet intelligence operations; and the use of vans designed to detect the operation of radio receivers by suspected agents or the presence of receivers and other signal monitoring equipment in

buildings occupied by agencies of other governments (such as US or British Embassies in Eastern Europe).

Within Western Europe, there are a number of inter-governmental and commercial agreements and conventions which have long allowed virtually unconstrained access to Soviet and other Eastern European SIGINT-equipped vehicles. In the case of West Germany, for example, East Germans are not considered foreigners and hence are able to drive around the country at will.[1] The GRU is allowed relatively free movement throughout West Germany under a 1947 agreement between the United States, the Soviet Union, France and Britain which permits the Soviets to maintain three Soviet Military Liaison Missions (SMLMs) - in Frankfurt, Baden Baden, and Bunde - and to observe military activities within the Federal Republic. The cars used by the Missions are reportedly 'heavily laden' with electronic surveillance devices and tape recorders.[2]

More generally, since the Soviet Union and its Eastern European allies joined the Geneva-based International Road Transport Union (IRTU) in the mid-1970s, the number and scope of espionage operations involving trucks and lorries in Western Europe has increased enormously. Members of the IRTU are entitled to send trucks bearing 'TIR' (Transports International Routiers) licence plates on international routes with a minimum of customs formalities.[3] The number of trips is limited by bilateral accords. In the case of Belgium, for example, the allowances are 2,200 per year from Czechoslovakia, 1,800 from the Soviet Union, 900 from Poland, 650 from Hungary, 500 from Romania, and 300 from Bulgaria.[4]

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1 'East Bloc Truckers Are Accused of Spying', *Philadelphia Inquirer*, 10 January 1986, p.18C.

2 Alice Siegert, 'Hundreds of Soviets Scout West Germany', *Chicago Tribune*, 29 March 1985, p.3; and James M. Markham, 'Patrols in Germany: Postwar Vestige', *New York Times*, 29 March 1985, p.11.

3 'Soviet Truckers Suspected of Spying', *Washington Times*, 23 December 1982, p.8.

4 *Ibid.*

The number of Soviet and Eastern European trucks entering Western Europe in recent years has reached some 350,000 per year.[5]

Western European security and intelligence officials are disinclined to have published their specific estimates of the number of these trucks typically engaged in intelligence collection, but it is generally agreed to be of the order of 1-2 per cent - i.e. 3,500 to 7,000 per year. These vehicular intelligence collection operations involve a wide range of activities, including systematic reconnaissance of road networks and other transportation systems;[6] reconnaissance of areas which are off-limits to accredited Military Attaches (and the SMLMs in the case of West Germany); photographic observation of major strategic installations, such as military headquarters, ammunition and fuel depots, communication centres, etc.; monitoring of exercises and troop movements; familiarisation tours by Spetznaz personnel; and locating precisely particular military and infrastructure facilities for purposes of targeting and/or calibration of electronic and other monitoring systems. A large proportion of these trucks are equipped with some sort of electronic monitoring equipment. In most cases, however, this consists of little more than radar detectors and frequency scanners designed to avoid detection of any illegal or suspicious behaviour or to otherwise support the primary espionage missions. The proportion of espionage trucks dedicated primarily to SIGINT collection is probably around 10-20 per cent - i.e. some 700 per year. Given that these SIGINT vehicles stay in Western Europe for some two weeks or more, this means that on average there are about two trucks collecting SIGINT in each country in Western Europe at any given time.

In practice, of course, not all the countries in Western Europe are subject to equal attention. West Germany is the single most important target country. Special attention is accorded to recording airfield traffic control radar emissions; to monitoring communications to and from military bases, weapons storage sites, and early-warning

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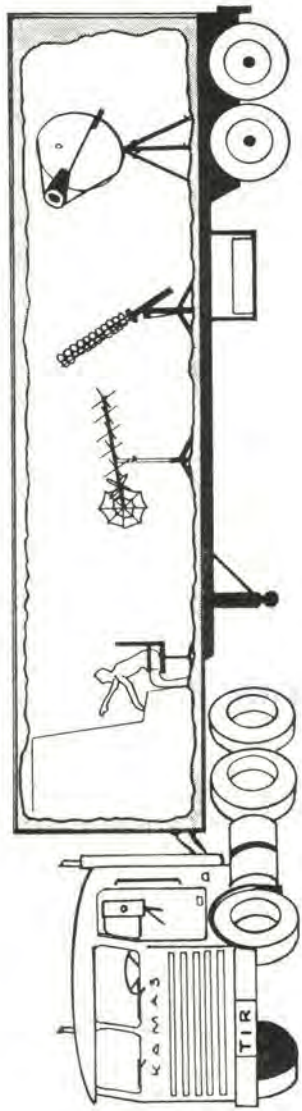
5 James M. Markham, 'Soviet Bloc Commandos Said to Infiltrate West', *New York Times*, 2 November 1986, p.23.

6 'Ende der Affare Um Einen Sowjetischen Camion: Controlle des "Diplomatengepacks" in Bonn', *Neue Zuricher Zeitung*, 23 July 1984, p.2.

FIGURE 40
SCHEMATIC OF TIR TRUCK WITH SIGINT EQUIPMENT



and intelligence facilities; and to monitoring major strategic communications centres (such as Frankfurt, Augsburg and Pirmasens) and relay towers in the public telephone and telegraph (PTT) system.

Scandinavia is also a major target for vehicular SIGINT operations, with missions being undertaken in Finland, Sweden, Norway and Denmark, and involving Soviet, East German, Polish, Hungarian and Romanian Trucks. In Sweden, vehicular espionage operations have become a major national issue, and numerous instances of vehicular SIGINT activities have been cited in the Parliament (Riksdag) and the media[7] - of which the following are intended to illustrate the scope and character of these activities:

- Covert Swedish examinations of Warsaw Pact trucks used for SIGINT purposes have found broad-band antennas mounted on the sides of the trailers, and

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7 See, for example, Carl-Olof Ryden, 'I Forarhytten: Ryska Militarer', *Aftenbladet*, 26 September 1982; Thomas Kristiansson, 'Ryska Lastbilarna Mal For Spionsatellit?', *Aftenbladet*, 20 February 1983; 'Ostlastbilar Pa Spaningsturer', *Svenska Dagbladet*, 23 November 1986; 'Ubatar Pa Hjul', *Svenska Dagbladet*, 24 November 1986; 'De Rullande Spionskeppen', *Eskilstuna-Kuriren*, 24 November 1986; 'Mobiliseringstorrad Kartlaggs', *Vestmanlands - Lanstidnig*, 24 November 1986; 'Krig Pa Svenska Vagar', *Gefle Degblad*, 25 November 1986; 'Star Vi Handfallna Nar Ost Rekognoserar?' *Hallandsposten*, 26 November 1986; Sune Olsson, 'Tullen Ville Stoppa Ostlangtradare', *Svenska Dagbladet*, 30 November 1986; Ake Ekdahl, 'Inte Var Sak Stoppa Spioner', *Dagens Nyheter*, 5 December 1986, p.12; Colonel Einar Lyth, 'Satt Stopp For Spioneriet!', *Dagens Nyheter*, 4 March 1987, p.5; Thore Davidson, 'Farliga Spioner Pa Vagen', *Dagens Nyheter*, 7 March 1987, p.42; 'Forst Ubatar Nu Lastbilar', *Dagens Nyheter*, 11 March 1987, p.38; Gudrun Norberg, 'Fp Kraver Atgard Mot Spionaget', *Dagens Nyheter*, 19 March 1987, p.5; Viktor Samochvalor, 'Ogrundade Beskyllningar', *Dagens Nyheter*, 6 April 1987, p.5; and Sune Olsson, 'Ostlangtradare Leder Rymdspionaget Ratt', *Svenska Dagbladet*, 6 December 1987, pp.1, 6.

receivers and tape recorders inside the trailers. The equipment is particularly sensitive, and is designed to scan the HF, VHF and UHF bands, to record radio signals and radar emissions, and to monitor telecommunications.[8]

- The meanderings around the Swedish countryside of Eastern European trucks 'fully equipped with signal equipment' takes them 'suspiciously close to restricted military zones' and has 'apparently coincided with the testing of the latest radio equipment by the army'.[9]

- In an incident near Kristianstad, in southern Sweden, a Soviet semi-trailer was observed parked on a minor road, and local Swedish truck drivers concocted a ruse to 'accidentally' pull off the tarpaulin covering the trailer. Inside the trailer were five men and extensive electronic equipment. The site was well-suited for monitoring signals from various Defence installations and Army units in the area, as well as the Navy base at Karlskrona and Navy vessels operating in the area between the Islands of Oland and Bornholm.[10]

- On 25 November 1986, a Soviet semi-trailer was observed randomly driving on minor roads near Bergslagen, before parking next to a military training and live-firing range. Tests were underway involving remote-controlled robots. The Soviet semi-trailer was 'within easy radio monitoring distance'.[11]

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8 Peter Spalti, 'Lastwagen Der Ostblockstaaten Auf Schweizer Strassen: Ungebetene Gaste Und Konkurrenz Fur Das Schweizerische Transportgewerbe', *Schweizer Soldat*, No.11, 1986, pp.10-11.

9 'Spy Season Puts Swedes on Alert', *Financial Times*, 25 March 1987, p.2.

10 Sune Olsson, 'Tullen Ville Stoppa Ostlangtradare', *Svenska Dagbladet*, 30 November 1986.

11 *Ibid.* This incident was also described by Gudrun Norberg in the Riksdag on 4 December 1986.

In the Western hemisphere, Soviet and Eastern European vehicles involved in SIGINT operations have been reported in Canada, Mexico and the United States, as well as in Nicaragua, where they are used in support of Nicaraguan military planning and operations. For example, a complex of intercept vans is located at the SIGINT facility at Santa Maria, just south of Managua.[12]

In the case of Mexico, which is used by both the KGB and GRU as a major base for operations against the United States, Winnebagos or self-contained mobile homes belonging to personnel from the Soviet Embassy in Mexico City are a fairly common sight at various placed along the US-Mexico border - such as Ciudad Juarez, Naco, San Luis Rio Colorado, and Tijuana.

Ciudad Juarez is about 8 miles south-west of Fort Bliss and about 40 miles south of Holloman Air Force Base and the White Sands Missile Range (WSMR) in New Mexico. The WSMR has been involved in the development of every Army nuclear missile, including the Pershing IRBM, the Sprint anti-ballistic missile (ABM), the Patriot air defence missile, and tactical and anti-tactical missiles. According to Major General J.M. Bunyard, Patriot Project Director,

> Every time there is a missile test at White Sands, the vans with telemetry-intercept equipment roll right up to the border.[13]

Within the United States, stringent restrictions of movement have been applied against Soviet diplomatic and other official personnel since the mid-1940s, and these were extended to officials from other Eastern Bloc Missions in December 1985. Since then, vehicular SIGINT operations have principally involved Eastern European 'tourists'.

Perhaps the most extraordinary recent incident involved a Czechoslovak **Tatra** truck which toured the United States from 17 July

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12 US Department of State and Department of Defense, *The Sandinista Military Build-up,* (US Government Printing Office, Washington, D.C., May 1985), p.15.

13 Major General J.M. Bunyard, Patriot Project Director, in interview with Robert Windrem, NBC Nightly News, February 1983.

FIGURE 41
CZECH TATRA TRUCK

to 2 December 1987. The truck, which was in the course of a round-the-world tour to celebrate the 90th anniversary of the manufacture of the first Tatra automobile in Czechoslovakia, was manned by a crew of five, including a driver, a military pilot and two Czech Communist Party officials. It carried an ultralight aircraft and was equipped with extensive electronic equipment.[14]

The truck arrived in the United States at Niagara Falls on 17 July 1987, and was trailed by a large contingent of FBI and NSA agents as it toured through some 17 states, parking near numerous military bases, communications stations and defence industries on the way. According to NBC Nightly News for example,

> Agents assigned to the case say when the Czechs came to San Diego, they parked [t]here for days, just a few hundred feet from a key naval communications center for the Pacific fleet, and just across the water from the big North Island Naval Air Station.[15]

The FBI and NSA agents were even more disturbed by the fact that on at least two occasions the ultralight aircraft was flown by the Czech pilot in the vicinity of two major US strategic military complexes - Omaha, Nebraska, location of Strategic Air Command (SAC) headquarters and numerous ancillary installations; and Durango, Colorado, some 180 miles southwest of the US Air Force Space Command and North American Air Defense (NORAD) complex in the Colorado Springs area.[16]

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14 'Soviet Bloc Espionage', NBC Nightly News, 23 December 1987, transcript; and information provided by Robert Windrem, NBC Nightly News, New York.

15 'Soviet Bloc Espionage', NBC Nightly News, 23 December 1987, transcript.

16 Information provided by Robert Windrem, NBC Nightly News, New York.

CHAPTER 6

SOVIET NAVAL SIGINT SYSTEMS AND OPERATIONS

In 1981, the Chairman of the US Joint Chiefs of Staff, General David C. Jones, reported that 'the Soviet navy is the world's best equipped in the field of EW [electronic warfare] and provides support to the worldwide SIGINT collection program'.[1]

In fact, the Soviet Union has far more SIGINT collection ships than the rest of the world combined. As of mid-1987, the Soviet Union had 63 SIGINT vessels, formally known as AGIs (Auxiliary General-Intelligence).[2] There are 11 classes of AGIs, some of which were originally designed for other purposes and then modified for SIGINT collection and some of which were purpose-built for this role. (See Table 6.)

The **Vishnya, Balzam** and **Primorye** vessels have been designed specifically for SIGINT collection. The **Vishnya** made its maiden voyage in the Baltic Sea in July 1986;[3] a second ship of this class has recently also entered service. The three **Balzam** class vessels were completed in 1980, 1981 and 1984. Their most notable feature is two large, spherical radomes, which house antennas for the interception of satellite communications. The three main masts and the small mast forward of the bridge bristle with passive antennas, including several different types of direction-finding (DF) systems. The large displacement provides considerable space for equipment for

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1 General David C. Jones, *United States Military Posture for F.Y. 1982*, (US Government Printing Office, Washington, D.C., 1981), p.107.

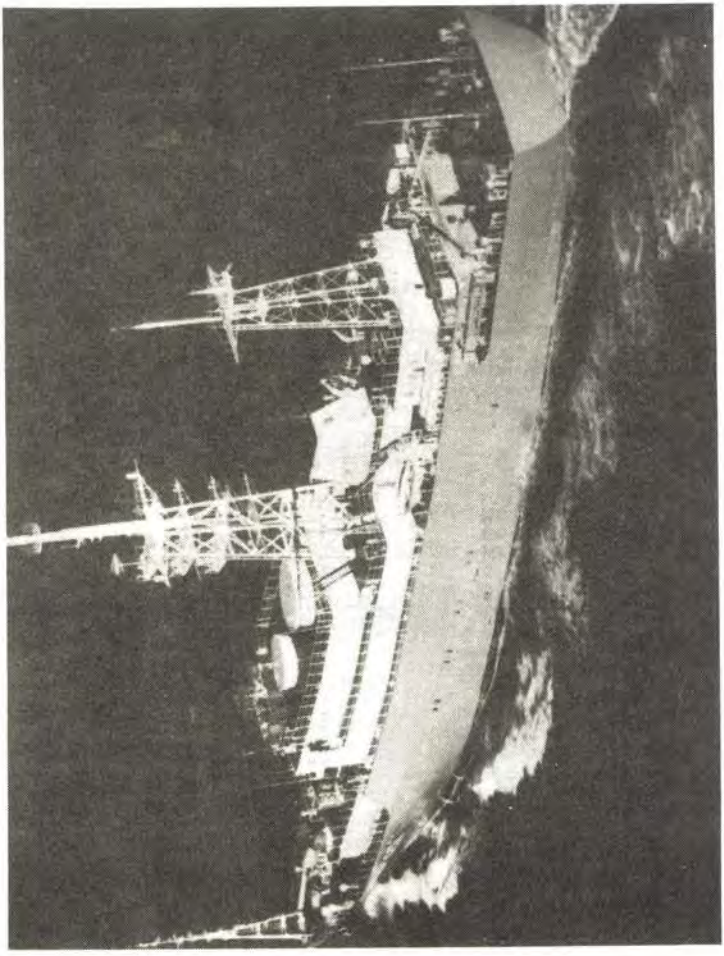
2 Captain John Moore (ed.), *Jane's Fighting Ships 1987-88*, (Jane's Publishing Company Limited, London, 1987), pp.617-620.

3 Peter Almond, 'Marines in Huge NATO Drill Have Hearts in Middle East', *Washington Times*, 10 September 1986, p.9B.

TABLE 6
SOVIET SIGINT SHIPS (AGIs)

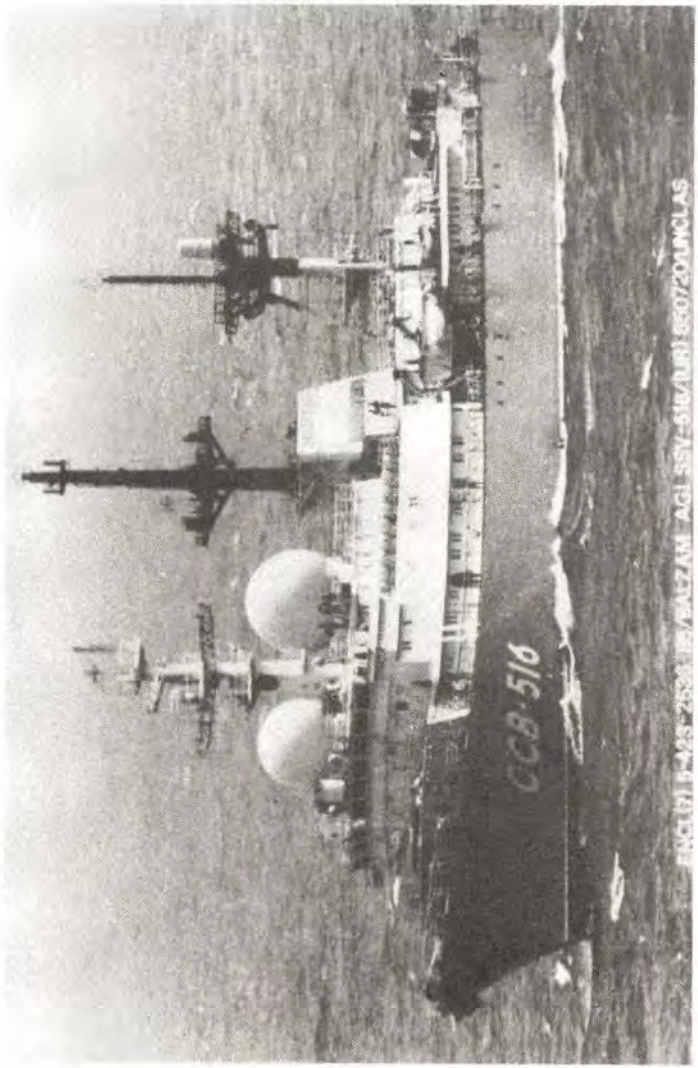
No.	Class	Name
2	Vishnya	SSV-520
3	Balzam	Balzam SSV-516 SSV-493 SSV-80
6	Primorye	Primorye SSV-465 Kavkaz SSV-591 Krym SSV-590 Zabaykalye SSV-464 Zakarpatye SSV-502 Zaporozhye SSV-501
3	Nikolay Zubov	Gavriil Sarychev (Mod) SSV-468 Khariton Laptev SSV-503 Semen Chelyushkin SSV-469
2	Modified Pamir	Gidrograf SSV-480 Peleng SSV-447
9	Moma	Arkhipelag SSV-512 Ekvator Ilmen (Mod) SSV-472 Kildin Nakhodka SSV-506 Pelorus (Mod) SSV-509 Śeliger (Mod) SSV-514 Vega SSV-474 Yupiter (Mod)
4	Mirny	Bakan (Mod) Lotsman (Mod) Val (Mod) Vertikal
4	Alpinist	GS-7 GS-8 GS-19 GS-39
8	Mayak	Aneroid Khersones (Mod) Kurs (Mod) Kursograf (Mod) Ladoga (Mod) GS-239 GS-242 (Mod) Girorulevoy (Mod)
15	Okean	Alidada Ampermetr Barograf Barometr Deflektor Ekholot Gidrofon Krenometr Linza (Mod) Lotlin (Mod) Reduktor (Mod) Repiter Teodolit Traverz Zond (Mod)
7	Lentra	GS-34 GS-36 GS-41 GS-43 GS-46 GS-55 GS-59 (Mod)

FIGURE 42
SSV 520, VISHNYA CLASS AGI,
SEPTEMBER 1986



Source: US Navy.

FIGURE 43
BALZAM SSV 516 AGI,
20 JULY 1985



Source: US Navy.

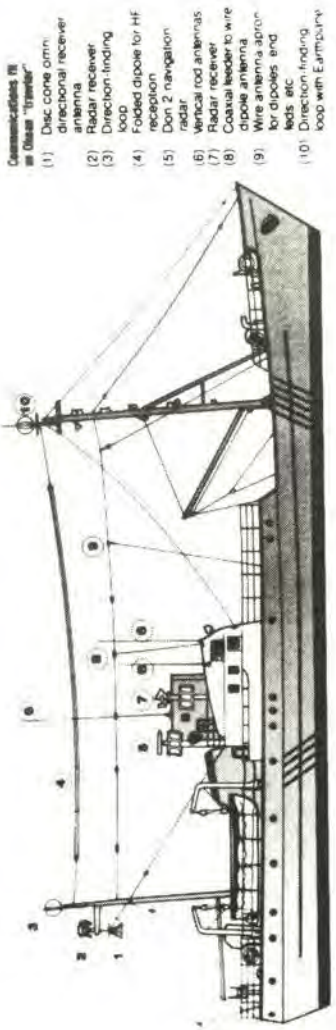
FIGURE 44
ZAPARPATYE SSV 502, PRIMORYE CLASS AGI,
17 FEBRUARY 1985

Source: US Navy.

FIGURE 45
REDUKTOR, OKEAN CLASS AGI

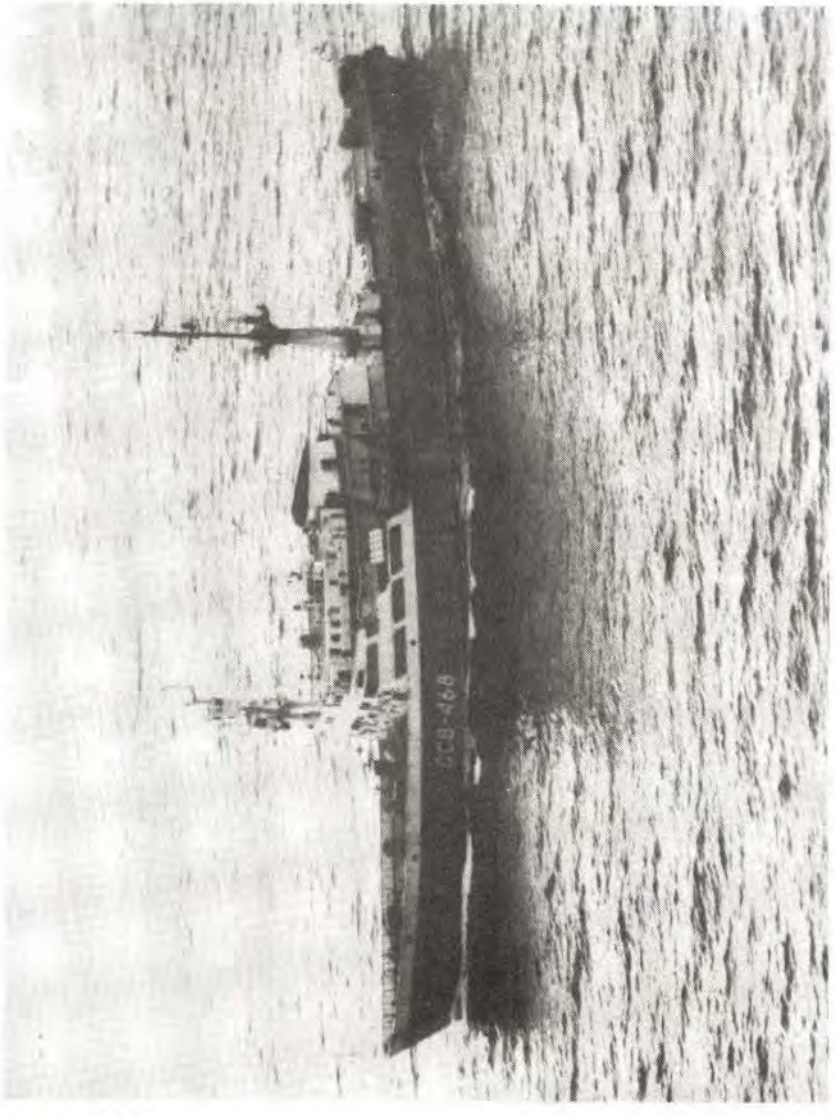
Source: US Navy.

FIGURE 46
COMMUNICATIONS SYSTEMS ON OKEAN CLASS AGI



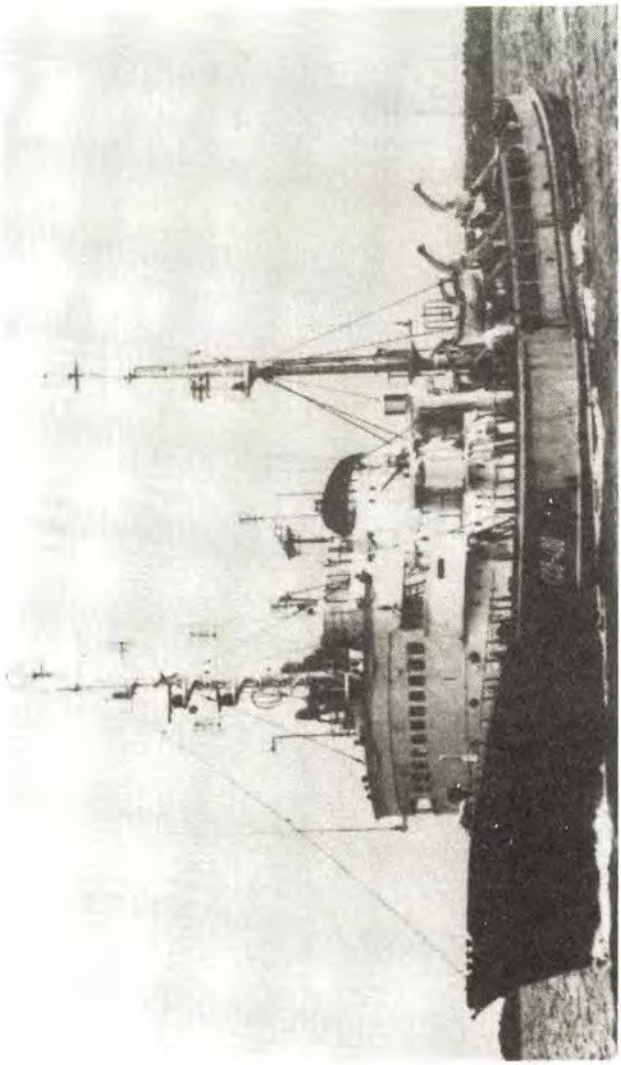
Source: Colonel William V. Kennedy, *Intelligence Warfare*, (Crescent Books, New York, 1983), p.173.

FIGURE 47
GAVRIIL SARYCHEV SSV 468, NIKOLAY ZUBOV CLASS AGI, NOVEMBER 1985



Source: US Navy.

FIGURE 48
GIDRGRAF SSV 480, PAMIR CLASS AGI

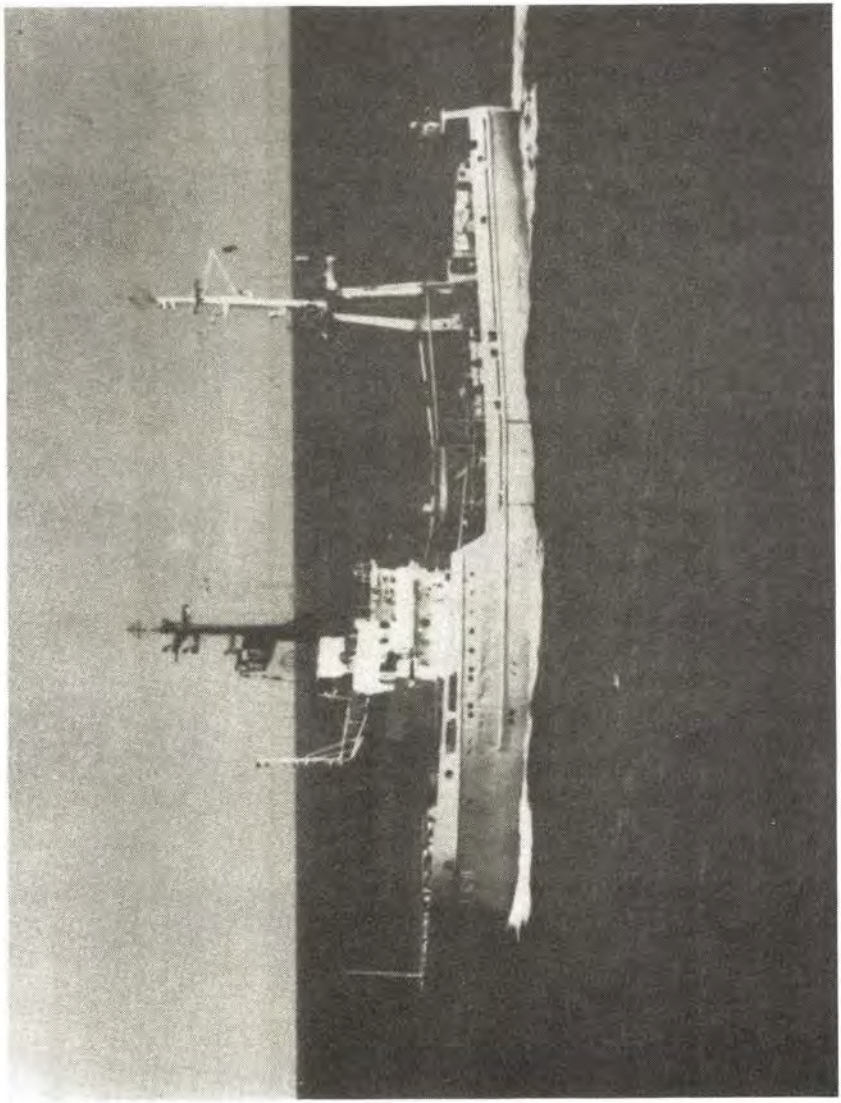


Source: US Navy.

FIGURE 49
JUPITER, MOMA CLASS AGI, 1986

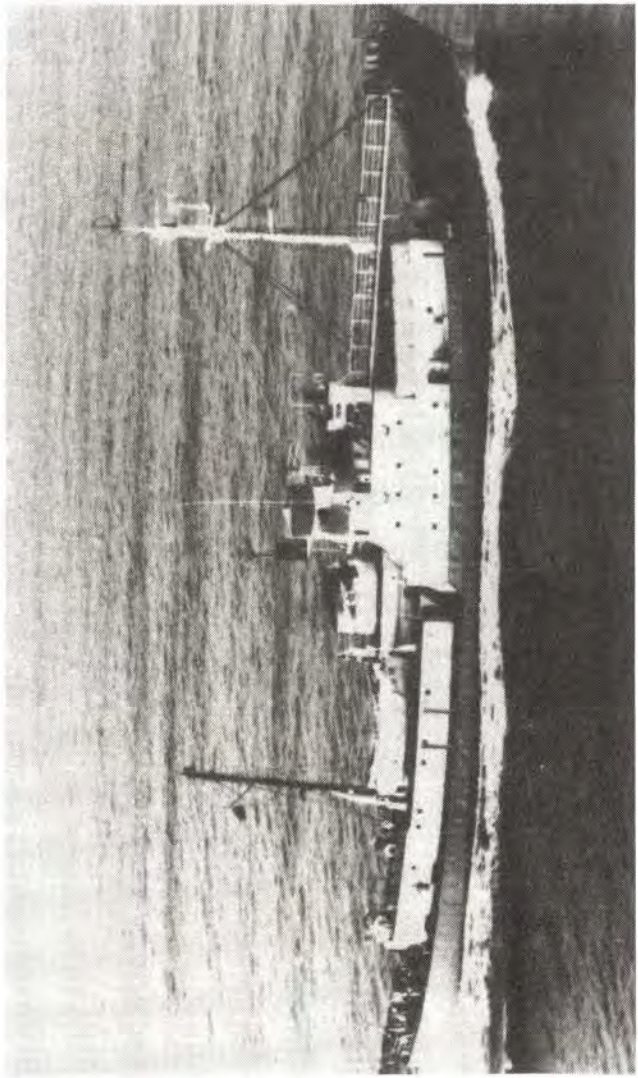
Source: US Navy.

FIGURE 50
GS-8, ALPINIST CLASS AGI, 1985



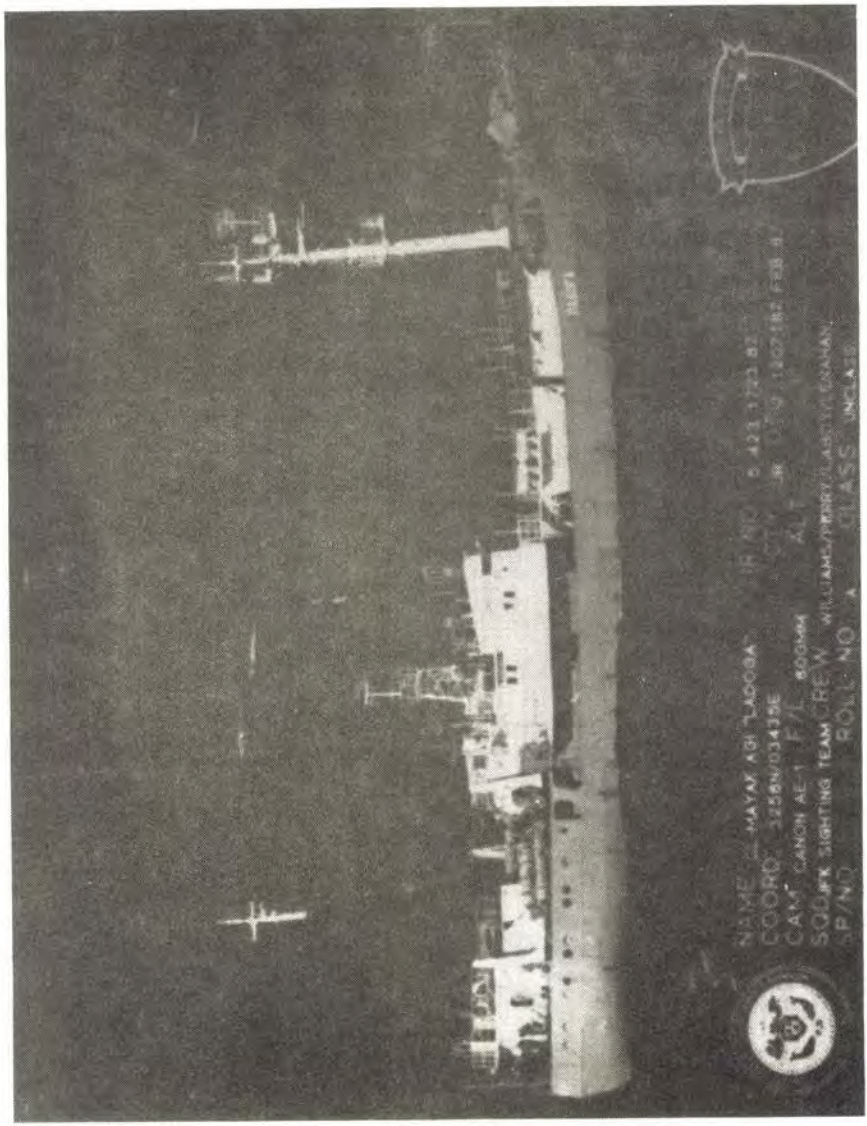
Source: US Navy.

FIGURE 51
BAKAN, MIRNY CLASS AGI, MARCH 1986



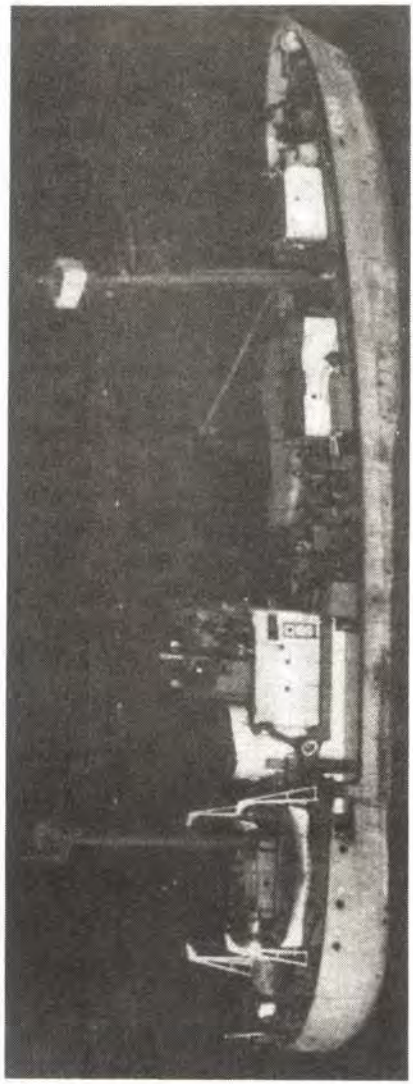
Source: US Navy.

FIGURE 52
LADOGA, MAYAK CLASS AGI, FEBRUARY 1987



Source: US Navy.

FIGURE 53
GS-43, LENTRA CLASS AGI



Source: US Navy.

on-board data-processing and signals analysis.[4] The **Primorye** class ships were the first to be custom-built for SIGINT collection and analysis. Each ship is 'a huge floating intelligence station', linked by elaborate communication systems to sensors on smaller ships, on aircraft and on surveillance satellites. The interiors contain extensive SIGINT processing and analysis equipment, the product of which is transmitted back to Moscow by a secure satellite data link.[5]

The other AGIs were originally built for other purposes (trawlers, whale catchers, salvage tugs) and modified for SIGINT collection. Nevertheless, their SIGINT capabilities are extensive. The **Okean** 'trawlers', for example, are equipped with about a dozen different signals monitoring systems.[6]

In addition to these AGIs, there is an enormous number of other Soviet ships with significant SIGINT capabilities. The use of naval research ships, naval survey ships, and naval supply and depot ships for SIGINT purposes is commonplace. For example, the Bashkiriya, a naval research ship in the Abkhaziya-class, has been reported conducting intelligence collection operations south-west of Tahiti in French Polynesia.[7] A Soviet naval support and depot ship stationed in the Indian Ocean, the Taman, a vessel of the Vytegrales-class, was stationed off the Iran coast at the eastern end of the Strait of Hormuz for several months in 1979-80; with its masts and superstructure reportedly bristling with 'scores of aerials of all kinds and shapes', it was evidently monitoring radio and other signal

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4 Captain John Moore (ed.), *Jane's Fighting Ships 1983-84*, (Jane's Publishing Company Limited, London, 1983), p.552; *International Defense Review*, 8/1980, p.1187; and 'Soviet Spy Ship on the Prowl', *Sydney Morning Herald*, 1 October 1980, p.19.

5 Moore (ed.), *Jane's Fighting Ships 1983-84*, p.552; and Ray Bonds (ed.), *The Soviet War Machine*, (Salamander Books Ltd., London, 1980), p.136.

6 Moore (ed.), *Jane's Fighting Ships 1983-84*, p.554; and Colonel William V. Kennedy, *Intelligence Warfare*, (Crescent Books, New York, 1983), p.173.

7 Moore (ed.), *Jane's Fighting Ships 1983-84*, pp.553-554.

traffic through the Strait and between ships and countries in the Persian Gulf.[8]

All Soviet naval combatants are also equipped with extensive SIGINT capabilities. These typically include crossed loop HF-DF antennae used to find the bearing of hostile radio transmissions, as well as other electronic support measures (ESM) systems.[9]

Soviet Naval SIGINT deployments

1. *Patrolling off US SSBN Bases:* One of the principal functions of Soviet AGI vessels is monitoring the movements of US nuclear ballistic missile-carrying submarines (SSBNs). AGIs have been stationed in the immediate vicinity of SSBN submarine bases since 1961, when surveillance of the Polaris base at Charleston, South Carolina, was begun. A similar AGI surveillance patrol was established off the SSBN bases at Rota, Spain, and Apra Harbor, Guam, in 1964, and Holy Loch, Scotland, in 1965.[10] According to one study of this AGI mission,

> The intensity of surveillance appears to depend on the proximity of the [SSBN] bases to likely SSBN patrol areas. Thus, the Guam, Rota, and Holy Loch patrol stations are manned continuously, while the US east coast station is manned by an AGI that also has other surveillance responsibilities.[11]

And according to official US naval testimony on this AGI mission, presented to Congress by Admiral Donald P. Harvey, the Director of Naval Intelligence (DNI), on 5 April 1977,

> [The Soviets] maintain patrol with these ships in the proximity of Guam, Holy Loch, Rota, and frequently off Charleston where our SSBNs are based.

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8 Henry Tanner, 'Soviet Ship Anchors Off Iran Coast and Monitors Persian Gulf Traffic', *New York Times* 23 January 1980, p.1; and Moore (ed.), *Jane's Fighting Ships 1983-84*, p.552.

9 See, for example, the antennae suite on the **Kara**-class cruiser, in Kennedy, *Intelligence Warfare*, pp.178-179.

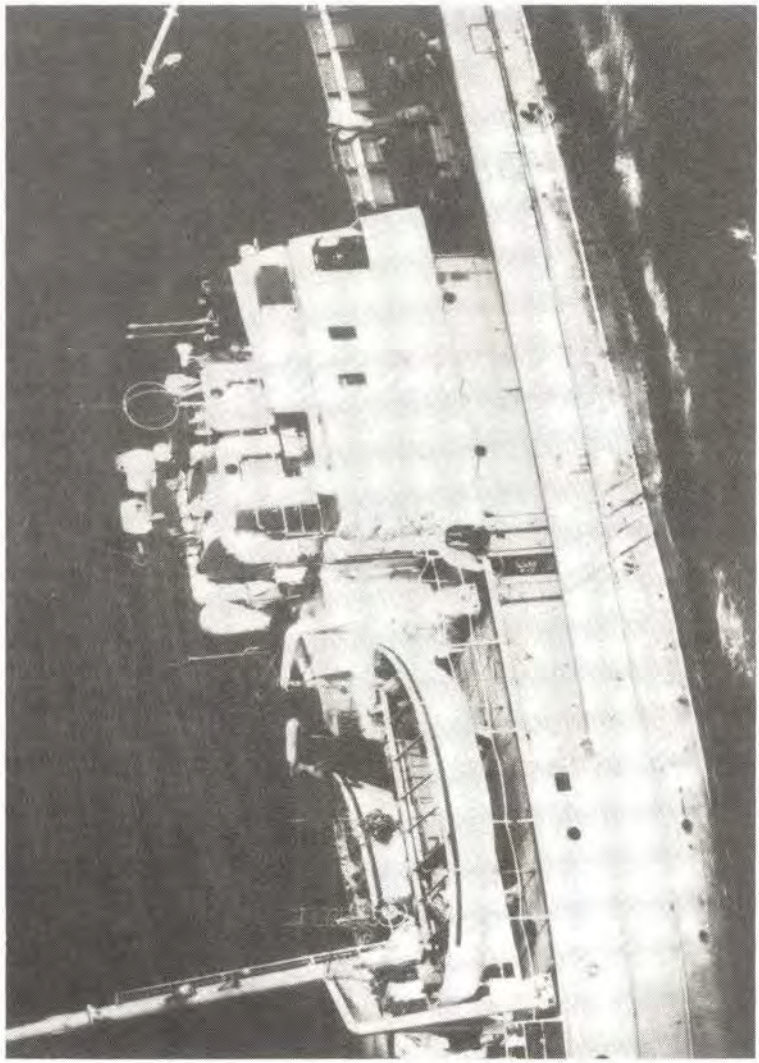
10 Charles C. Petersen, 'Trends in Soviet Naval Operations', in Bradford Dismukes and James M. McConnell (eds.), *Soviet Naval Diplomacy*, (Pergamon Press, New York, 1979), pp.52-53.

11 *Ibid.*, p.52.

FIGURE 54
SOVIET 'GATEKEEPER' PATROLS

Source: Charles C. Petersen, 'Trends in Soviet Naval Operations', in Bradford Dismukes and James M. McConnell (eds), *Soviet Naval Diplomacy*, (Pergamon Press, New York, 1979), p.55.

FIGURE 55
VEGA SSV 474 AGI, MONITORED SEA TRIALS OF THE USS GEORGE WASHINGTON SSBN, JULY 1960



Source: US Navy.

FIGURE 56
EKVATOR AGI, MONITORED SEA TRIALS OF THE USS OHIO SSBN, JUNE 1981

Source: US Navy.

> I checked this morning... and as of late yesterday we had a Soviet AGI lingering off Rota, one in the Marshall Islands [in the proximity of Guam], and not one but two off Holy Loch. They are going through a change of station. They have had one for a while and new ones come out and the old one, we expect will be leaving today.[12]

2. *'Gatekeeping':* A second important mission of Soviet SIGINT vessels is monitoring the entrances into critical seas and other maritime 'choke points'. There is an AGI continuously on patrol in the English Channel. At least two SIGINT vessels are always stationed at the eastern end of the Strait of Hormuz to monitor the naval traffic through the Strait. Other patrol stations for SIGINT-equipped vessels are the North Cape area, the Skagarrak Strait linking the North Sea and the Baltic Sea, the Strait of Gibraltar, the Strait of Sicily, and the La Perouse, Tsugara and Tsushima Straits linking the Sea of Japan and the Pacific Ocean.[13]

3. *Monitoring US Navy SSBN Sea Trials:* Since 1960, when the first US Fleet Ballistic Missile (FBM) submarine, the USS **George Washington**, was commissioned, Soviet AGIs have monitored the sea trials of all US FBM submarines. In July 1960, the sea trials of the **George Washington** in the FBM submarine test area off Long Island were monitored by the **Vega** SSV-474, an AGI in the **Moma** class.[14] In June 1981, more than two decades later, the sea trials of the first Trident submarine, the USS **Ohio**, were monitored in the same test

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12 Testimony of Admiral Donald P. Harvey, Director of Naval Intelligence, in Senate Armed Services Committee, *Fiscal Year 1978 Authorization for Military Procurement, Research and Development, and Active Duty, Selected Reserve, and Civilian Personnel Strengths*, (US Government Printing Office, Washington, D.C., 1977), Part 10, p.6617.

13 Petersen, 'Trends in Soviet Naval Operations', pp.54-55.

14 Jack Raymond, 'Soviet Trawler Called Spy Ship', *New York Times*, 14 July 1960, p.8; and 'The Pilot and the Prosecutor', *Newsweek*, 22 August 1960, p.25.

area by the **Ekvator**, another AGI in the **Moma** class.[15] The SIGINT equipment on these AGIs is able to determine many of the performance parameters of these FBM submarines, including their radar signatures, underwater sound characteristics, and ECM and ESM emissions.

4. *Monitoring US SLBM Tests:* Soviet AGIs also regularly monitor the test launches of US submarine-launched ballistic missiles (SLBMs). The first launching of **Polaris** SLBMs from the **George Washington** in July 1960 was monitored by the **Vega** SSV-474.[16] On 17 January 1982, the launch of a **Trident** C-4 SLBM from the **Ohio** was delayed for some 41 minutes because of the intrusion of the **Seliger** SSV-514, another **Moma**-class AGI, to within 1,500-2,000 yards of the submerged submarine.[17] On 9 June 1983, the launch of two **Polaris** SLBMs from the submerged British submarine HMS **Revenge** off Cape Canaveral was monitored by the **Kavkaz** SSV-591, an AGI in the **Primorye** class,[18] while two days later, on 11 June 1983, the launch of a further two **Polaris** SLBMs from the **Revenge** was again monitored by the **Seliger** SSV-514.[19]

The principal purpose of these AGI operations is the interception of telemetry transmitted from the antenna masts protruding from the submerged submarines, and the telemetry from the SLBMs themselves, to the US Navy telemetry and range instrumentation ships and shore-based stations. The interception of this elemetry provides an enormous amount of intelligence about the

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15 Ned Steele, 'Soviet Spy Ship in Sub's Test Area', *New York News*, 13 June 1981, p.7; and 'Soviet Spy Ship Lurks Offshore To Study New US Trident Sub', *Washington Star*, 12 June 1981, p.5.

16 Jack Raymond, 'Soviet Trawler Called Spy Ship', *New York Times*, 14 July 1960, p.8.

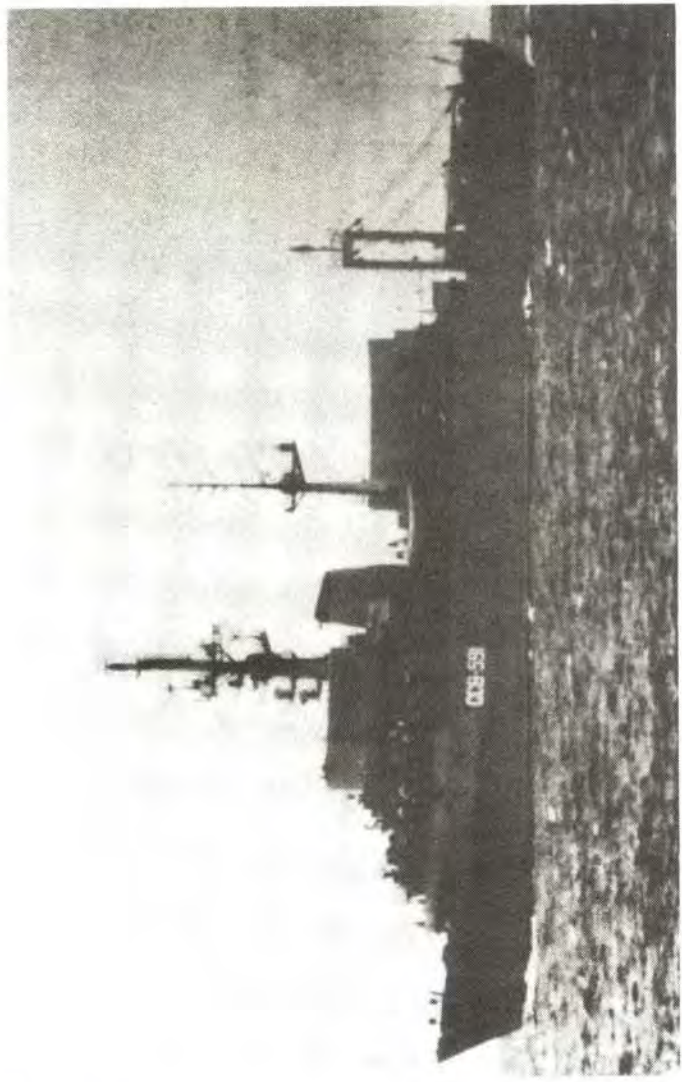
17 Edward H. Kolcum, 'Soviet Intelligence Ship Intrudes on Trident Test', *Aviation Week and Space Technology*, 25 January 1982, pp.20-22.

18 'Soviets Track Launch of British Missiles', *Aviation Week and Space Technology*, 20 June 1983, p.26.

19 *Ibid.*

FIGURE 57
SELIGER SSV 514 AGI. ON 17 JANUARY 1982, THE SELIGER MONITORED THE LAUNCH OF A TRIDENT SLBM FROM THE USS OHIO, OFF CAPE CANAVERAL

FIGURE 58
KAVKAZ SSV 591, PHOTOGRAPHED MONITORING POLARIS MISSILE LAUNCH FROM HMS REVENGE, CAPE CANAVERAL, 9 JUNE 1983



Source: US Navy.

fire control systems and launch procedures on the FBM submarines as well as about the performance of the SLBMs - their engines, stage separation systems, fuel consumption, guidance systems, and their warhead and penetration aid (penaid) release systems.[20]

5. *Monitoring Naval Communications:* Soviet SIGINT vessels are frequently deployed to monitor the signals from US and other naval communications stations. For example, it is reportedly

> not unusual for Soviet intelligence vessels to operate off the West Australian coast where they monitor the US and Australian signals traffic from the joint base [Naval Communications Station Harold E. Holt] at North West Cape. This is transmitted to Moscow for cryptoanalysis.[21]

6. *Monitoring of Other Communications:* In addition to naval communications, Soviet SIGINT ships are able to monitor a wide range of other communications and signals. For example, the AGIs stationed off Malin Head at the northern tip of Northern Ireland, whose primary mission is to monitor the passage of US and British FBM submarines through the Firth of Clyde to and from Holy Loch, are reportedly also able to intercept British telephone calls transmitted by microwave stations in the area,[22] as well as to 'monitor British Army and Royal Ulster Constabulary radio nets [in Northern Ireland]'.[23]

7. *Monitoring Western Naval Exercises:* All major Western naval exercises are invariably monitored by at least one Soviet SIGINT

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20 See Edward H. Kolkum, 'Soviet Intelligence Ship Intrudes on Trident Test', *Aviation Week and Space Technology*, 25 January 1982, pp.20-22.

21 Frank Cranston, 'Soviet "Satellite" Down; Task Force Searches', *Canberra Times*, 5 June 1982, p.1.

22 Peter Hennessy, '32 Soviet Spies on Polaris Watch Evade Navy Hunt', *The Times* (London), 30 November 1981, p.4.

23 Kennedy, *Intelligence Warfare*, p.173.

vessel. In September 1980, for instance, the **Balzam** SSV-516 monitored the NATO exercise code-named **Teamwork**.[24] In October 1981, Soviet SIGINT trawlers monitored the major ANZUS bi-annual exercise **Kangaroo-81** off the coast of Queensland.[25] In March 1984, six 'surface intelligence collector ships' monitored a major NATO naval exercise in the North Sea.[26] And in September 1986, the NATO **Exercise Northern Wedding 86** was monitored by the new **Vishnya** SSV-520 as well as a new **Balzam**-class AGI.[27]

8. Combatant Surveillance: The Soviet Union has used SIGINT vessels to monitor communications and other signals in several recent wars and, where its own allies have been involved, has apparently passed at least some of the SIGINT product to them.

For example, a continuous AGI deployment was maintained in the Gulf of Tonkin from 1965 to 1973, the primary purpose of which was to monitor US aircraft carrier operations and US Air Force bomber missions against North Vietnam.[28] As one commentator has observed,

> During the Vietnam War, there was reason to believe these intelligence trawlers let their friends in Hanoi know when the B-52s left Guam; certainly, they monitored the communications traffic having to do with that war.[29]

During the Sino-Vietnam War in 1979, Soviet SIGINT vessels also assisted Hanoi with the provision of signals intelligence. According to Sheldon Simon, the Soviets dispatched to the Gulf of Tonkin 'a fifteen-ship contingent to monitor Chinese radio traffic and

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24 *International Defense Review*, 8/1980, p.1187.

25 Frank Cranston, '"Univited Guests" at Exercise', *Canberra Times*, 21 October 1981, p.3.

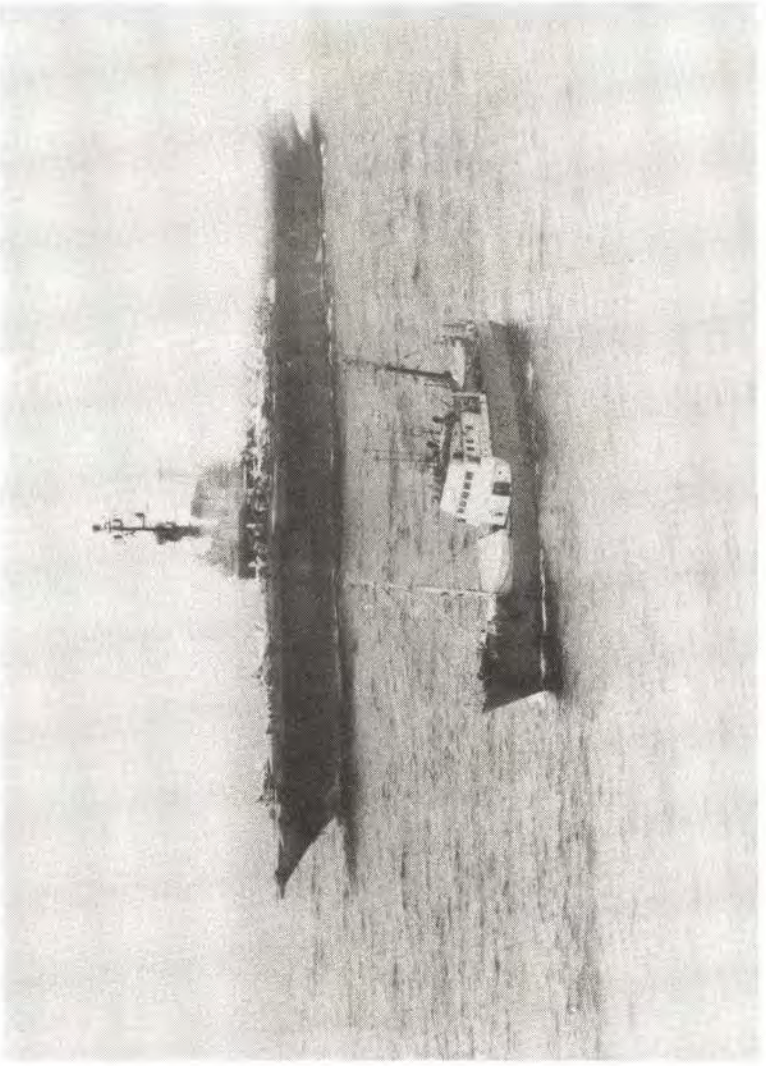
26 'Soviet Spy Ship Catches Fire', *Sydney Morning Herald*, 16 March, 1984, p.6.

27 Peter Almond, 'Marines in Huge NATO Drill Have Hearts in Middle East', *Washington Times*, 10 September 1986, p.9B.

28 Petersen, 'Trends in Soviet Naval Operations', p.52.

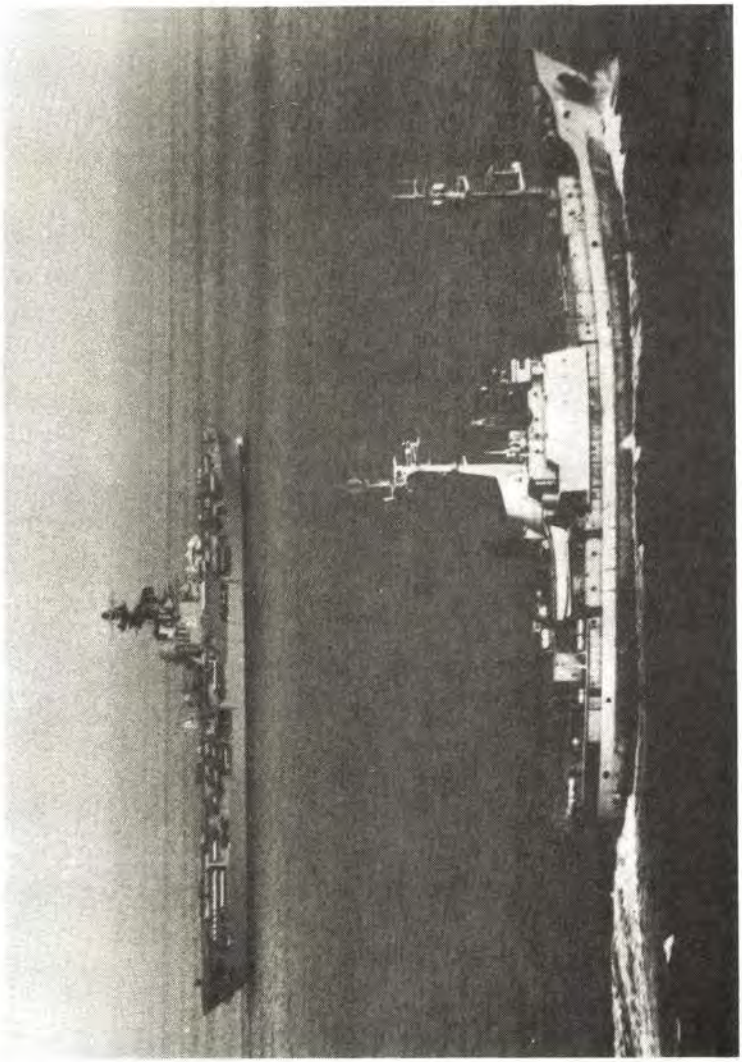
29 General T.R. Milton, USAF, 'Crime and Nonpunishment', *Air Force Magazine*, November 1983, p.38.

FIGURE 59
GIDROFON, OKEAN CLASS AGI, PHOTOGRAPHED UNDERWAY WITH THE ATTACK AIRCRAFT CARRIER USS CORAL SEA CV-43, GULF OF TONKIN, 1969



Source: US Navy.

FIGURE 60
MOMA CLASS AGI SHADOWING HMAS MELBOURNE, SOUTH CHINA SEA, JULY 1981



Source: Australian Department of Defence.

transmit field intelligence to the Vietnamese'.[30]

During the Falklands War in 1982, the Soviet Union deployed more than a dozen SIGINT-equipped vessels to monitor British communications and other signals. The **Primorye** SSV-465 followed the British fleet as it sailed for the Falklands in April 1982, evidently attempting to intercept, process and analyze the signal traffic between London and the fleet.[31] The **Akademik Knipovich**, a 'fishery research' vessel anchored at the Argentine naval base of Ushuia at the time, was used to gather electronic intelligence in the South Atlantic.[32] Several Soviet SIGINT vessels actually violated the 350-mile 'exclusion zone' which Britain had proclaimed around the Falklands.[33]

9. *'Shadowing'*: Finally, the Soviet Union maintains sufficient SIGINT ships to permit it to trail or 'shadow' Western naval vessels on their normal or routine operations. In June 1981, for instance, the then flagship of the Australian fleet, HMAS **Melbourne**, was shadowed by a **Moma**-class AGI as it passed through the South China Sea on passage from Hong Kong to Singapore.[34] In November-December 1982, the USS **Independence** on patrol off Lebanon was shadowed by another type of AGI. According to an officer aboard the **Independence**,

> It's a Mirny-Y, a converted whaling vessel now used for intelligence gathering. He'll stay with us.
>
> We call him tattle-tale. He watches our flight operations and listens in to our radio.[35]

---

30 Sheldon Simon, 'The Soviet Union and Southeast Asia; Interests, Goals and Constraints', *Orbis*, (Vol.25, No.1), Spring 1981, p.74.

31 Drew Middleton, '2 Soviet Subs Reported in Crisis Area', *New York Times*, 14 April 1982, p.14.

32 Bryan Boswell, 'East and West Practise Their Spying Techniques', *The Australian*, 16 April 1982, p.4.

33 'Soviet Fishing in the Falklands', *Newsweek*, 17 May 1982, p.27.

34 'While a Russian Spy Ship Eavesdrops on Us...', *The Australian*, 3 July 1981, p.2; and *Canberra Times*, 3 July 1981, p.1.

35 'Soviets Observe US Air "Attacks" in Mediterranean', *Washington Times*, 2 December 1982, p.8.

CHAPTER 7

SOVIET AIRBORNE SIGINT OPERATIONS

The Soviet Union employs a wide range of aircraft either specifically designed or extensively modified for electronic intelligence (ELINT) collection. Some 20 Soviet aircraft types, with several additional variants, are involved in ELINT activities. These include three variants of the Tu-16 **Badger**; two variants of the M-4 **Bison**; two variants of the Yak-28R **Brewer**; the Tu-95 **Bear D**; some Tu-26 **Backfires**; the Tu-22 **Blinder-C**; the Tu-126 **Moss** and Il-76 **Mainstay** SUAWACS; the MiG-21R; the MiG-25R (Foxbat D); the Il-14; the Il-18 **Coot A**; the Il-38 **May**; the An-12 **Cub B** and **C**; the An-24 **Coke**; the Mi-8 **Hip-D** helicopter; and the Mi-4 **Hound-C** helicopter.

Strategic, long-distance ELINT collection operations are principally the responsibility of the Soviet Naval Air Force or AV-MF (Aviatsiya Voenno-Morskovo Flota), which operates about 350 aircraft (including supporting tankers) for this purpose.[1] These include Tu-95 **Bear-D** aircraft, backed up by much larger numbers of Tu-16 **Badgers**, a few M-4 **Bisons**, and, most recently, some Tu-26 **Backfires**.

About 50 Tu-95 **Bear-D** ELINT aircraft are in service with the Soviet Naval Air Fleet. In addition to bases in the Soviet Union itself, **Bear-D** ELINT aircraft operate from bases in Cuba, Guinea, Angola and Vietnam. Those which operate from Cuba and Angola are capable of covering the North and South Atlantic from the Mediterranean approaches westward to the US east coast, and southward to the Cape of Good Hope.[2]

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1 Bill Sweetman and Bill Gunston, *Soviet Air Power: An Illustrated Encyclopedia of the Warsaw Pact Air Force Today*, (Salamander Books Limited, London, 1978), p.33.

2 John W.R. Taylor (ed.), *Jane's All The World's Aircraft, 1982-83*, (Jane's Publishing Company Limited, London, 1982), p.229; Fred S. Hoffman, 'US Reports Soviets Tracking British Fleet', *Philadelphia Inquirer*, 14 April 1982, pp.10-11; and Charles C. Petersen, 'Trends in Soviet Naval Operations', in Bradford Dismukes and James M.McConnell (eds), *Soviet Naval Diplomacy*, (Pergamon Press, New York, 1979), pp.54-59.

There are numerous examples of Tu-95 **Bear-D** ELINT operations. These aircraft are encountered frequently over the North Sea by the RAF and RN.[3] A **Bear-D** on an ELINT mission from Cuba was photographed off the Virginia coastline while monitoring sea trials of the new US nuclear-powered aircraft carrier **Carl Vinson.**[4] In March 1981, Tu-95Ds equipped for ELINT collection monitored the US-South Korean **Team Spirit 81** exercises in South Korea.[5] Tu-95Ds from airfields in Cuba, Guinea and Angola were also used to provide electronic surveillance of the British Fleet during the Falklands War.[6]

The AV-MF maintains three variants of the Tu-16 **Badger** in ELINT configurations - the **Badger-D** maritime reconnaissance/ ELINT aircraft, the **Badger-F**, and **Badger-K.** The AV-MF Tu-16 Badgers engaged in ELINT missions frequently work in pairs, with the **Badger-D** and the **Badger-F** evidently being complementary.[7] There are 50 **Badger-D** and **Badger-F** ELINT aircraft.[8]

There are two ELINT versions of the M-4 Bison - the **Bison-B** strategic reconnaissance and ECM aircraft and the **Bison-C** multi-role reconnaissance bomber. Since 1967, ELINT variants of the Bison have been frequently encountered on probing missions far over the Arctic, Atlantic, Pacific and elsewhere, at both high and low altitudes.[9]

In addition, the AV-MF also operates about 60 Il-38 **May** maritime patrol/ASW aircraft which have an ELINT capability.[10] These aircraft operate widely over the Atlantic and Mediterranean;[11] they operate over the Indian Ocean from an airfield in South Yemen;[12]

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3 John W.R. Taylor (ed.), *Jane's All The World's Aircraft, 1982-83*, p.229.

4 *Ibid.*, p.228.

5 *Aviation Week and Space Technology*, 13 April 1981, p.15.

6 Fred S. Hoffman, 'US Reports Soviets Tracking British Fleet', *Philadelphia Inquirer*, 14 April 1982, pp.10-11.

7 Sweetman and Gunston, *Soviet Air Power*, p.164.

8 *Ibid.*, p.88.

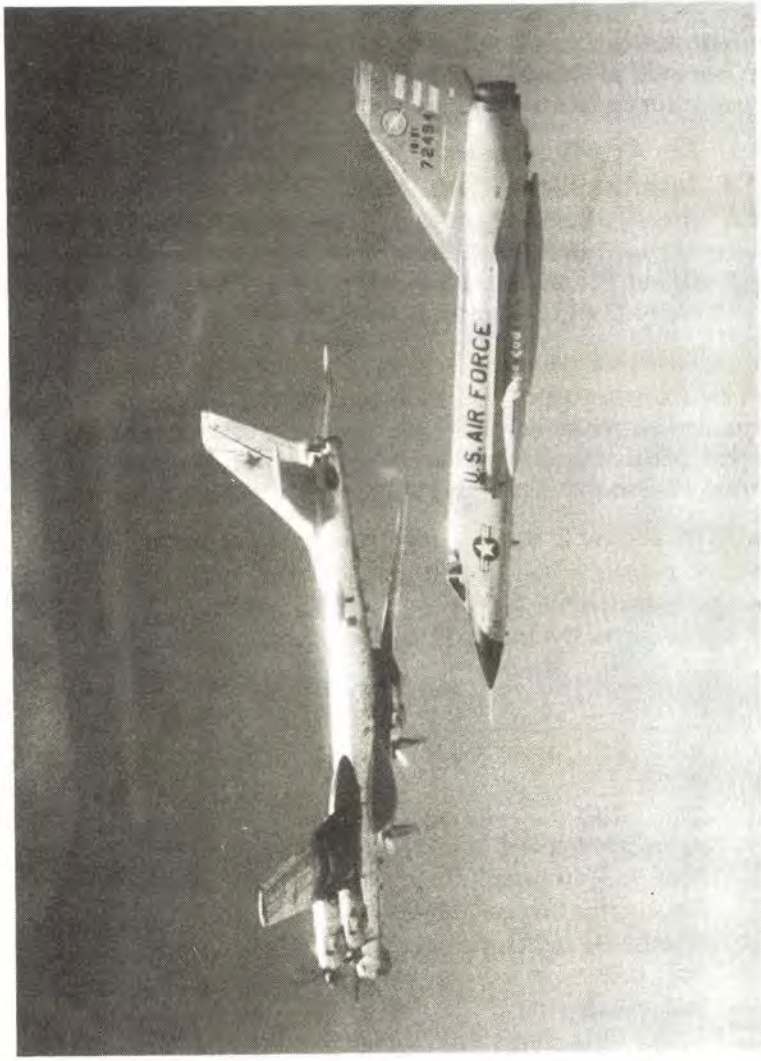
9 *Ibid.*, p.148.

10 Taylor (ed.), *Jane's All The World's Aircraft, 1982-83*, p.198.

11 *Ibid.*

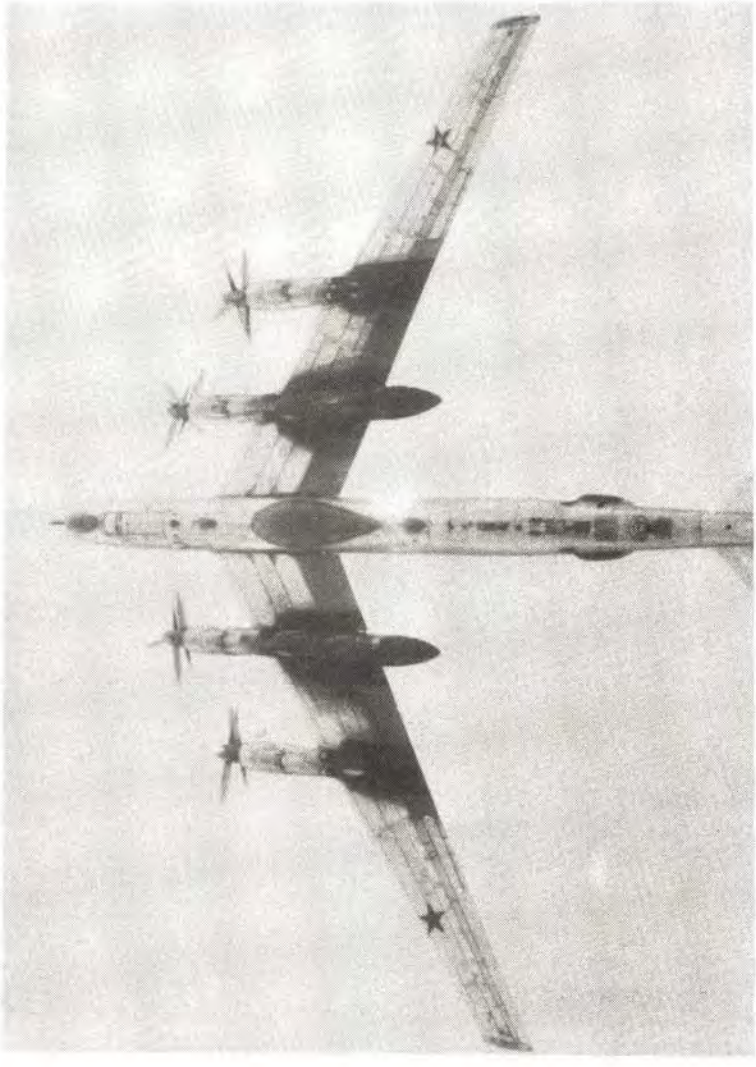
12 *Ibid.*

FIGURE 61
SOVIET BEAR D ELINT AIRCRAFT INTERCEPTED OFF CAPE COD, MASSACHUSETTS



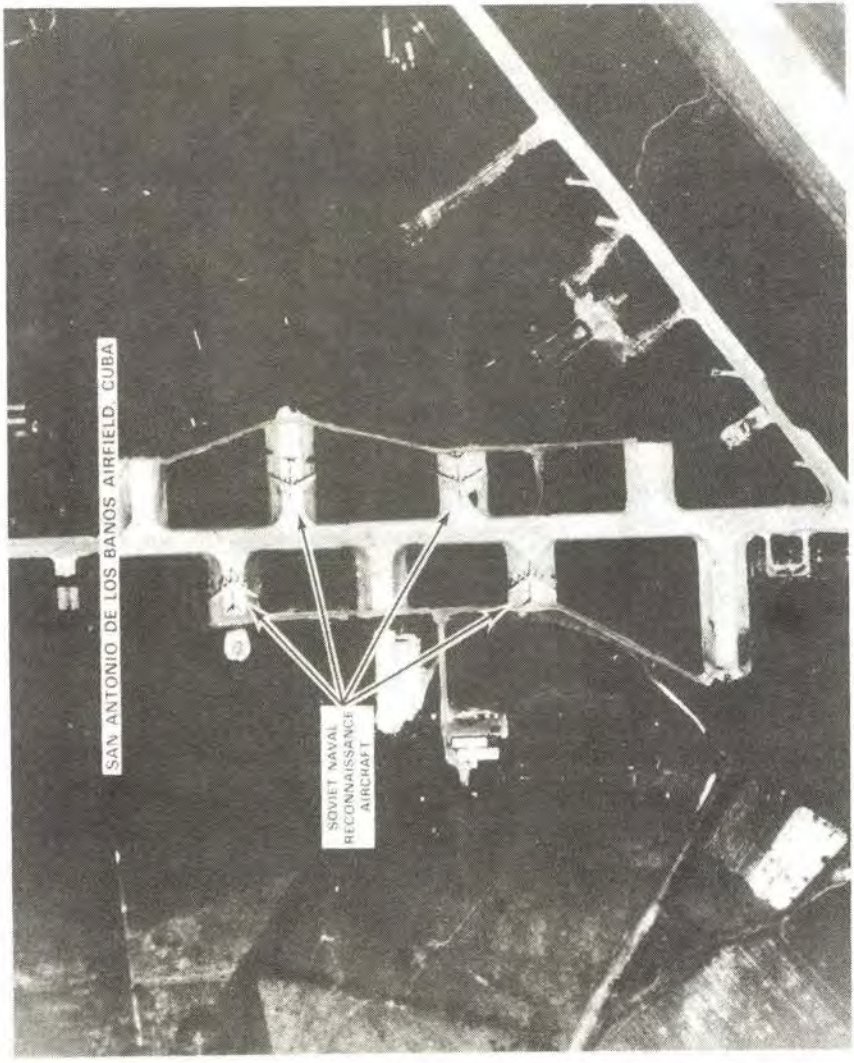
Source: US Air Force.

FIGURE 62
SOVIET BEAR D ELINT AIRCRAFT INTERCEPTED OFF CAPE COD, MASSACHUSETTS



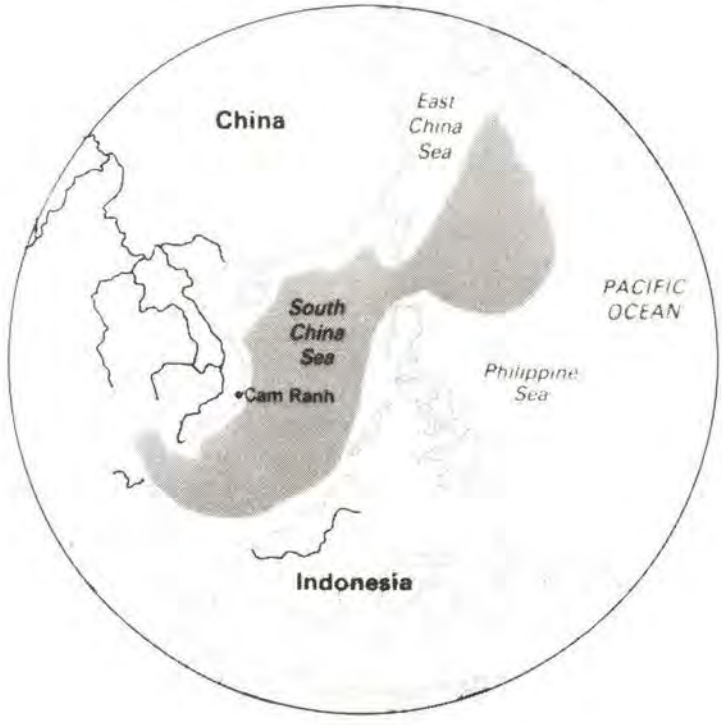
Source: US Air Force.

FIGURE 63
SOVIET BEAR D ELINT AIRCRAFT AT SAN ANTONIO DE LOS BANOS AIRFIELD, CUBA



Source: US Department of Defense.

FIGURE 64
SOVIET BEAR D ELINT AIRCRAFT OPERATING AREA IN THE PACIFIC

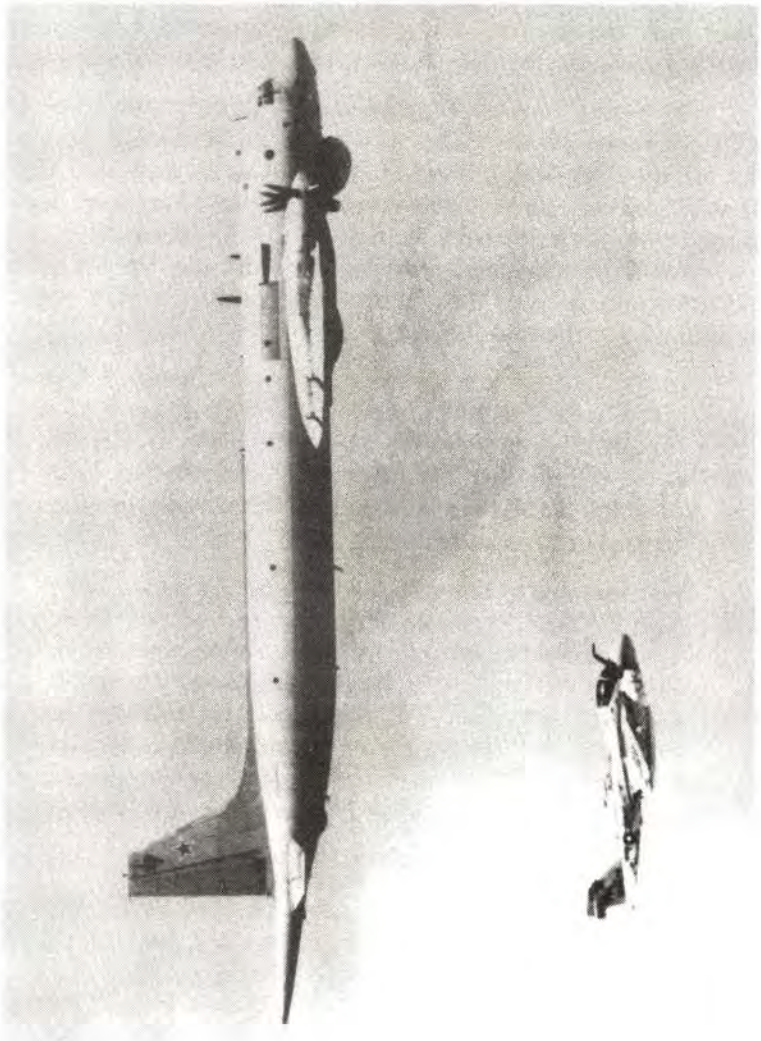


Source: US Department of Defense.

FIGURE 65
SOVIET COOT A ELINT AIRCRAFT

Source: US Navy.

FIGURE 66
SOVIET Il-38 MAY ANTI-SUBMARINE/MARITIME PATROL AIRCRAFT IN THE PACIFIC, AUGUST 1981



Source: US Navy.

and they were involved in ELINT missions together with Tu-95Ds during exercise **Team Spirit 81**.[13]

About 40 Tu-22 **Blinder-C** aircraft are also used by AV-MF for maritime ELINT operations. These operate from bases in the southern Ukraine and Estonia and are primarily concerned with electronic monitoring of the north-western sea approaches to the Soviet Union.[14]

The Soviet Tactical Air Force or FA (Frontovaya Aviatsiya or Frontal Aviation) also operates several airborne ELINT platforms - including the Yak-28R Brewer-D, the MiG-21R and the MiG-25R (Foxbat D). Some 200 of the **Brewer-D** aircraft have been deployed with multiple sensor systems, including ELINT systems.[15] The MiG-25R (Foxbat-D) is used primarily for high-altitude, very-high speed ELINT missions, such as those frequently conducted over Israel and other countries in the Middle East.

Finally, Communist airlines such as Aeroflot, Cubana, Lot Polish Airlines, and CSA (the Czechoslovak airline) are also used for airborne SIGINT operations.[16] In mid-1980, following illegal overflights by Communist Bloc aircraft over restricted areas in the United States, the US Air Force issued the following memorandum to all its designated critical installations:

> There are indications that Communist airlines have SIGINT collection missions in Western Europe. There is no evidence to date that Aeroflot uses such collection capabilities in the United States' air space. However, the CONUS overflight capabilities of Aeroflot along with their unevaluated collection capabilities does present a threat of unknown dimensions. All recipients of this message are advised

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13 *Aviation Week and Space Technology*, 13 April 1981, p.15.

14 Taylor (ed.), *Jane's All The World's Aircraft, 1982-83*, p.230; and Sweetman and Gunston, *Soviet Air Power*, p.170.

15 Taylor (ed.), *Jane's All The World's Aircraft, 1982-83*, p.238; and Sweetman and Gunston, *Soviet Air Power*, p.183.

16 Ralph Ostrich, 'Aeroflot's Intelligence Activities', *Armed Forces Journal International*, May 1981, pp.54-56; and *Newsweek*, 12 September 1983, p.22.

> to take appropriate actions to safeguard sensitive communications and on-going operations.[17]

And the CIA has reported as follows:

> For a number of years, the Soviets have been suspected of using Aeroflot for [electronic] intelligence collection operations.
>
> The Soviets reportedly rescheduled the flight of an Il-62 Classic in 1974 to permit coverage of a US command post exercise.
>
> [A special Aeroflot charter flight over the CONUS in 1977] was viewed as having a collection mission, since signal intelligence [SIGINT] intercept gear was observed on the aircraft.
>
> [These examples] indicate a prolonged employment of Aeroflot for ... foreign collection purposes.[18]

And according to some US Air Force authorities, Aeroflot and other Communist airlines are involved in monitoring VHF and UHF transmissions at certain places along their scheduled flight paths in the US, as well as along 'unscheduled' flight paths. The favoured targets of these flights are evidently the electronic facilities in the Hudson Valley, naval facilities in Connecticut, and other sensitive areas in the north-east.[19] In 1981 and 1982 alone, Aeroflot flights from Moscow to Washington went off course some 16 times.[20] On 8 November 1981, for example, Aeroflot Flight 315 en route to Washington flew an unauthorised route over Pease Air Force Base near Plattsburgh, New York, and then overflew further sensitive facilities. The return flight, Aeroflot 316, flew the same unauthorised route northbound.[21] Other

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17 Ostrich, 'Aeroflot's Intelligence Activities', p.55.

18 Jack Anderson, 'Aeroflot Suspected of Espionage Flights', *Washington Post*, 1 December 1980, p.C-19.

19 Ostrich, 'Aeroflot's Intelligence Activities', p.55.

20 'US Halts Aeroflot's Flights After 2 Incidents of Straying', *Baltimore Sun*, 17 November 1981, p.7; and Special Report, 'A Ruthless Ambush in the Sky', *Newsweek*, 12 September 1983, p.22.

21 *Ibid.*

Aeroflot aircraft have 'strayed' over Otis Air Force Base, Cape Cod, the location of the new Pave Paws SLBM early-warning radar complex, and over Groton, Connecticut, at the precise moment when the first Trident FBM submarine was launched from the naval base at Groton.[22]

22 'US Halts Aeroflot's Flights After 2 Incidents of Straying', *Baltimore Sun*, 17 November 1981, p.7; and Special Report 'A Ruthless Ambush in the Sky', *Newsweek*, 12 September 1983, p.22.

CHAPTER 8

SOVIET SIGINT SATELLITE SYSTEMS

Although the Soviet Union did not launch its first SIGINT satellite until some five years after the United States, and although it has still been unable to develop a counterpart to the very highly sophisticated US geostationary SIGINT satellites (such as the Rhyolite/Aquacade and Chalet/Vortex satellites and their successors), the capabilities of the Soviet SIGINT satellite systems are in some ways more comprehensive than those of the United States. In particular, the Soviet Union has a much larger number of operational SIGINT satellites, deployed in configurations which permit fairly accurate direction-finding (DF) of the source of signal transmissions, as well as an advanced programme of ocean surveillance SIGINT satellites.

The first Soviet SIGINT satellite, Kosmos 189, was launched on 30 October 1967. More than 130 SIGINT satellites had been launched by the end of 1987. These include four successive generations of general SIGINT satellites, and, since 1974, a series of ELINT Ocean Reconnaissance Satellites (EORSATs) dedicated to monitoring the movements of US and other ships at sea.

Soviet General SIGINT Satellite Systems

The first generation SIGINT satellites were launched from Plesetsk aboard the C-1 or SL-8 launch vehicle. The orbital parameters of these satellites typically consisted of circular orbits at an altitude of about 330 km, with periods of 95.2 minutes and inclinations of 74 degrees. These satellites operated in constellations of four, each separated by 45 degree planes.[1] The last of these satellites was Kosmos 1345 launched on 31 March 1982.

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1 Descriptions of these satellites, and the details of their orbital parameters, are given in TRW, *TRW Space Log 1957-1982*, (Electronics and Defense Section, TRW Inc., Redondo Beach, California, December 1982); and D.G. King-Hele, J.A. Pilkington, H. Hiller, and D.M.C. Walker, *The R.A.E. Table of Earth Satellites 1957-1980*, (Published for the Royal Aircraft Establishment, Farnborough, by The Macmillan Press Ltd., London, 1981).

The second generation or ELINT-2 satellites, the first of which was Kosmos 895 launched on 26 February 1977, were launched from Plesetsk by the A-1 or SL-3 launch vehicle and were much larger and heavier than the first generation. The last of these was Kosmos 1441 launched on 16 February 1983. These satellites measured about 5 metres in length and 1.5 metres in diameter, and weighed about 2,000 kg. The ELINT-2 satellites were typically placed into circular orbits at about 600 km altitude, with periods of some 96-97 minutes and an inclination of 81.2 degrees. They were maintained in constellations of six, with 60 degree plane separations between them.

The third generation or ELINT-3 satellites, the first of which was Kosmos 1025 launched on 28 June 1978, were launched from Plesetsk by the F-2 or SL-14 launch vehicle. These satellites are cylindrical in shape, measure about 7.4 metres in length and 2.4 metres in diameter, and weigh about 2,200 kg. They are typically placed into circular orbits at altitudes between 635 and 665 km and inclinations of 82.5°. As with the ELINT-2 system, the ELINT-3 constellation consists of six satellites separated from one another by 60°. According to a classified study by the General Accounting Office (GAO) reported by Jack Anderson in February 1985,

> [The ELINT-3] satellites operate in a record-payback mode and can locate pulsed emitters to a best accuracy of about 10 kilometers.
>
> They can detect radars and operating airfields if using pulsed emitters, and possibly provide an after-the-fact assessment of the location of airborne warning and control systems [AWACS]. Repeated passes increase accuracy and the associate threat to US forces.[2]

According to analyses by Nicholas Johnson, the 6-satellite constellation 'ensures multiple listening opportunities within a short time and thereby provides a greater probability of detection and positioning accuracy'.[3]

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2 Jack Anderson, 'There's Nothing New About Military Satellites in Space', *Long Island Newsday*, 11 February 1985.

3 Nicholas L. Johnson, *The Soviet Year in Space 1987*, (Teledyne Brown Engineering, Colorado Springs, Colorado, 1988), p.74.

In November 1987, the US Department of Defense reported that Soviet 'space-based electronic-intelligence assets are being upgraded'.[4] This is evidently a reference to the fourth generation or Advanced ELINT satellites, the first of which was Kosmos 1603 launched from Tyuratam on 28 September 1984. These satellites are at least double the mass of the ELINT-3s, with a payload mass in the range of 4,500-6,000 kg.[5] These satellites are placed into circular orbits with an altitude of about 850 km and an inclination of 71°. Although the final orbital configuration of the ELINT-4 system is yet to be determined, it seems likely that it will consist of four satellites in orbital planes spaced 45° apart.[6]

The capabilities of the Advanced ELINT or ELINT-4 system are significantly better than those of the ELINT-3 system. According to the GAO study,

> Of particular concern are improvements in the data resolution (accuracy), the storage capacity and possibly the ability to transmit data in real time to tactical users.[7]

The primary mission of these various SIGINT satellites has been to pin-point the locations of US and other Western radars and to determine their ranges and signal characteristics - such as their operating frequencies, the speeds at which their antennas rotate, the pulse repetition rates, the pulse length, etc.

This intelligence is used for several purposes. In particular, it enables the Soviet Union to map the locations of and hence to target a wide range of early-warning stations, air defence systems, air bases, and satellite tracking and ground control stations. These installations could then be attacked - either physically or electronically - in the event of a conflict.

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4 US Department of Defense, *The Soviet Space Challenge*, (US Department of Defense, Washington, D.C., November 1987), p.7.

5 Nicholas L. Johnson, *The Soviet Year in Space 1985*, (Teledyne Brown Engineering, Colorado Springs, Colorado, 1986), p.45.

6 Johnson, *The Soviet Year in Space 1987*, p.75.

7 Jack Anderson, 'There's Nothing New About Military Satellites in Space', *Long Island Newsday*, 11 February 1985.

In general, satellites provide the only means of determining the characteristics of radars located deep inside Western borders, and hence of providing the details needed for the design of electronic counter-measure (ECM) equipment to be used to jam or otherwise interfere with these radars.[8]

ELINT Ocean Reconnaissance Satellites (EORSATs)

With the launch of Cosmos 699 on 24 December 1974, the Soviet Union began the deployment of a system of SIGINT satellites specifically designed for ocean surveillance. These EORSATs are cylindrical in shape, weigh 4,000-4,500 kg, and are launched from the Tyuratam launch complex on the F-1-m or SL-11 launch vehicle (which is based on the first two stages of the SS-9 Scarp missile). They are typically placed into near-circular orbits with perigees of about 430 km and apogees of about 450 km, and inclinations of 65.0 degrees; they are equipped with ion microthrusters which enable them to maintain orbital periods of precisely 93.3 minutes.[9]

Twenty-seven of these satellites had been launched as at the end of 1987 - an average of about two per year. They are equipped with solar panels and appear to have an operational longevity of about 180 days.[10]

These EORSAT's operate in pairs, with carefully chosen ground tracks lying precisely mid-way between those of their partners. During 1987, for example, Kosmos 1834 (launched on 8 April 1987) worked together with Kosmos 1735 (launched on 27 February 1987) and then with Kosmos 1890 (launched on 10 October 1987).[11]

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8 Geoffrey Perry, 'Soviet ELINT Satellites Cover the Globe', *Military Electronics/ Countermeasures*, January 1983, p.38; and Bhupendra M. Jasani, *Outer Space - Battlefield of the Future?*, (Taylor and Francis Ltd, London, 1981), pp.39-42.

9 G.E. Perry, 'Russian Ocean Surveillance Satellites', *The Royal Air Force Quarterly*, (Vol.18), Spring 1978, pp.62-65.

10 Stephen M. Meyer, 'Soviet Military Programmes and the New High Ground', *Survival*, (Vol.XXV, No.5), September/October 1983, p.210.

11 Johnson, *The Soviet Year in Space 1987*, pp.69-74.

In addition to being paired with a sister EORSAT, some EORSATs have evidently also been paired (with a 150 degree plane separation) with Soviet radar ocean reconnaissance satellites (RORSATs). For example, Kosmos 1355, an EORSAT launched on 29 April 1982, presumably to monitor the Falklands conflict, evidently had a close orbital relationship with two nuclear-powered RORSATs, Kosmos 1365 and Kosmos 1372, launched on 14 May and 1 June respectively.[12] (Kosmos 1355 overflew the Falkland Islands at 1220 GMT on 4 May 1982, some four hours before the successful Argentine attack on HMS Sheffield, but, as Geoffrey Perry has commented, 'it is hard to believe that this was more than a coincidence'.)[13]

The objectives of the Soviet EORSAT and RORSAT network have been succinctly summarised by Nicholas Johnson as follows:

> The objectives ... are to detect, identify, and track U.S. and Allied naval forces and to relay this information in real time directly to Soviet naval and air elements for targeting purposes. In peacetime and periods of world tension, this information enables Soviet military leaders to monitor the movements of Western naval forces and to warn of unusual or threatening formations. In wartime, ocean reconnaissance data will help direct Soviet weapons platforms or the munitions themselves against enemy vessels.[14]

According to the GAO report cited by Jack Anderson,

> The EORSAT is possibly the Soviet space-based system which is most capable of sea target detection. It provides targeting data of about two-kilometer accuracy to anti-ship missile platforms (on other ships, helicopters, etc.). In land or air warfare, it would also be used to detect airborne warning and control systems [AWACS], radar sites and operating airfields.[15]

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12 Perry, 'Soviet ELINT Satellites Cover the Globe', p.40.

13 *Ibid.*, p.38.

14 Johnson, *The Soviet Year in Space 1987*, p.69.

15 Jack Anderson, 'There's Nothing New About Military Satellites in Space', *Long Island Newsday*, 11 February 1985.

CHAPTER 9

COLLECTION OPERATIONS

The operations conducted by these numerous and various platforms and systems provide an extraordinary and increasing volume and range of signals. The coverage is comprehensive with respect to both geography and signal frequency - including HF, VHF, microwave relay and satellite systems. The SIGINT collected pertains to military activities, diplomatic communications, commercial communications, counter-intelligence operations, and political developments.

Military Activity

The KGB and GRU are known to monitor military signals from the highest national command levels through to tactical logistic movements - including communications from the NORAD Cheyenne Mountain Complex (NCMC), near Colorado Springs, to the National Military Command Center (NMCC) in the Pentagon; communications between the elements of the National Military Command System (NMCS) in Washington, DC, area; Strategic Air Command (SAC) Emergency Action Messages (EAMs) and other combat readiness checks; signals concerning the planning and progress of military operations during the Vietnam and Yom Kippur Wars; flight activity of airborne command posts; and air movements of personnel and supplies to combat and crisis theatres.

The GRU Technical Service (TS) Group in the Soviet Embassy on 16th Street in Washington has been extremely successful in monitoring official communications, both within the capital and between the capital and other important command authorities and facilities. According to one account, for example,

> After the Cuban missile crisis of 1962, Krushchev complimented the GRU for having provided him with information from telephone intercepts in Washington

> clarifying the events and discussions in official circles that led to the final resolution of the crisis.[1]

Command frequencies and circuits have been identified by the KGB and GRU SIGINT agencies and are continuously monitored. Both SAC and US Navy Current Traffic Message (CTM) and Emergency Action Message (EAM) communications to the strategic nuclear forces are broadcast on some 24 basic frequencies, of which the most active circuits are 4.725, 6.761, 9.027, 11.243, 13.241, 15.041, 17.975, 20.631 and 23.337 MHz.[2] In June 1980, for example, following one of the two false alarms of Soviet ballistic missile launches which occurred at the NORAD Cheyenne Mountain Complex that month, the E-4 National Emergency Airborne Command Post (NEACP) at Andrews Air Force Base in Maryland was moved to the end of the runway and readied for take-off; the signals relating to this activity were monitored and transmitted to Moscow in real-time. Bruce Blair has argued that

> By listening in on these same conversations during actual hostilities, the Soviets, even Moscow, might learn of American decisions on the launch of nuclear weapons even before our own forces do.[3]

The COMSEC assessment conducted by HQ USEUCOM following the Yom Kippur War showed that the GRU and KGB were able to use SIGINT posts in the US, Europe and the Near East to monitor combat readiness checks from the USCINCEUR Airborne Command Post; the real-time status of deploying forces, such as the departure of the Fleet Ballistic Missile (FBM) submarines **Kamehameha** (SSBN-642) and **Simon Boliver** (SSBN-641) from Rota following the declaration of DEFCON THREE on 25 October 1973; discussions relating to 'contingency planning operations and potential

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1 Harry Rositzke, *The KGB: The Eyes of Russia*, (Doubleday and Company Inc., Garden City, New York, 1981), p.197. See also William Parham, 'GRU Outspends KGB Seeking Military Data', *Washington Times*, 24 May 1985, p.8.

2 Mike Chabak, 'Communications Confidential: Your Guide to Shortwave Utility Stations', *Popular Communications*, (Vol.4, No.7), March 1986, pp.46-67.

3 'Soviet Eavesdropping Techniques', NBC Nightly News, 19 August 1986, transcript.

task force compositions'; traffic concerning airlift departures from the continental United States (CONUS); the movement of 'war material' from the ports of Nordham and Bremenhaven in West Germany; numerous communications concerning the movement of fuel and other logistic activity in the Mediterranean region; and other related air and naval activities.[4]

Diplomatic Communications

The fact that Soviet diplomatic establishments are in many capitals located near other Embassies, Foreign Ministries, and other governmental agencies provides extensive access to diplomatic communications. In New York, for example, the Soviet Mission on East 67th Street is used to monitor telephone calls from the US Mission in the Waldorf Towers some 18 blocks to the south. Senator Moynihan, who was appointed US Ambassador to the United Nations in June 1975, has testified about a warning that he received from Vice President Nelson Rockefeller (who had chaired a report to the President on CIA activities in the United States which noted for the first time the extent of Soviet SIGINT activities in the US, and which was submitted on 6 June 1975), soon after his appointment:

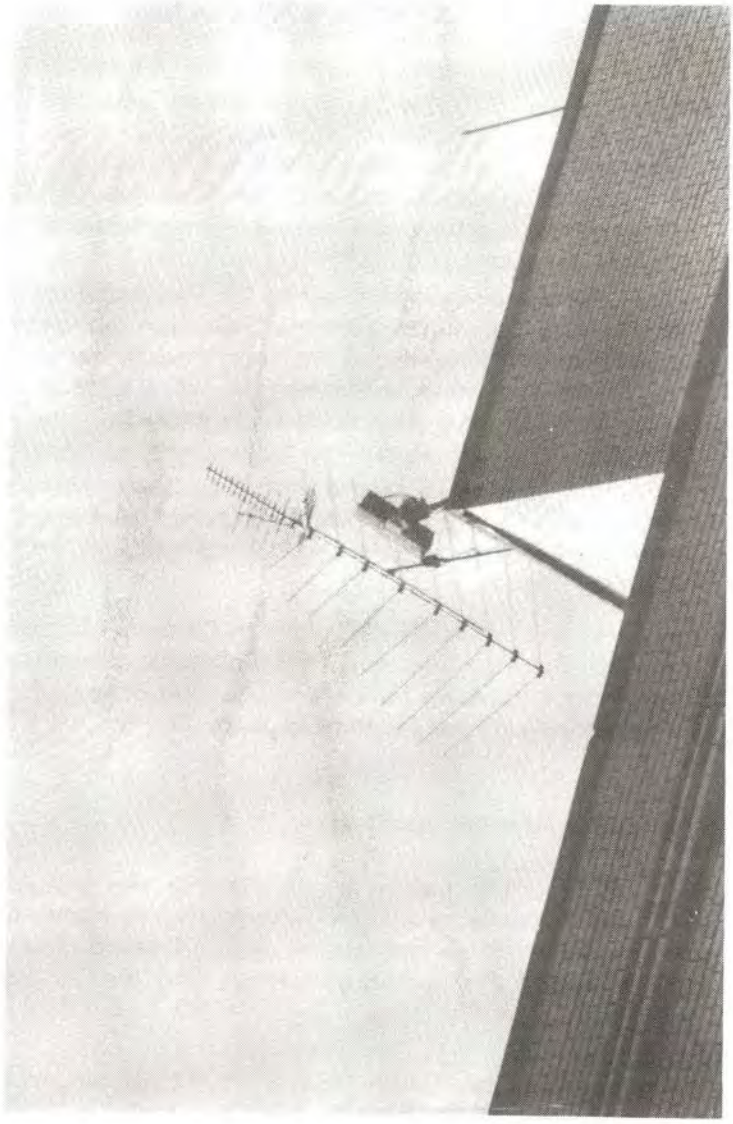
> Now, I have something to tell you that you must take with great seriousness. You are going to be the U.S. Representative at the United Nations, and you have to know that every word you say on the telephone will be listened to by the Soviet mission.
>
> In the Waldorf Towers, in the U.S. mission, they will be listening to your phone calls, and you must be extremely careful.[5]

---

4 HQ USEUCOM, *COMSEC Assessment During October 1973 Mid-East Conflict.*

5 US Congress, Senate Committee on Governmental Affairs, Permanent Subcommittee on Investigations, *Foreign Missions Act and Espionage Activities in the United States*, (U.S. Government Printing Office, Washington, D.C., 1986), p.104.

FIGURE 67
SOVIET MISSION TO THE UNITED NATIONS, EAST 67TH STREET, NEW YORK, SEPTEMBER 1985



According to Chapman Pincher, the Soviet Embassy in London has been used to monitor Foreign Office communications relayed through the London Post Office Tower:

> When the Post Office Tower was being built in London to transmit messages by microwaves, the Foreign Office was warned by the security authorities that the Russians would probably be able to intercept messages, especially as the tower would be in the direct line of sight from the top of the Soviet Embassy in Kensington Palace Gardens....
>
> It was soon found that the Russians were taping all the messages and sending the tapes back to Moscow for analysis there.
>
> This was realized at last by the Foreign Office in the 1970s, when the Foreign Secretary sent an important secret message via the Post Office Tower to the Secretary of State in Washington. In a stupidly short space of time, the Russian Ambassador was round with a complaining document, clearly indicating that the secret message had been intercepted. Only then, when so much had been lost, was it decided to send all such secret messages by undersea cable.[6]

It is also known that SIGINT posts in the Soviet Embassies in Helsinki and Vienna have intercepted US diplomatic communications concerning the Strategic Arms Limitation Talks (SALT) and other arms control negotiations conducted in those capitals.

Economic and Commercial Intelligence

The KGB has accorded particular attention to the collection of economic and commercial intelligence. Monitoring communications to and from large defence contractors and advanced technology companies is one of the highest priorities. The Soviets also use

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6 Chapman Pincher, *Their Trade is Treachery*, (Sidgwick and Jackson, London, 1981), p.186.

intercepted material to protect their enormous investments in the West and to manipulate certain commodity markets.

In the United States, it is clear that the SIGINT posts in the East 67th Street and Riverdale establishments in New York have a particular interest in communications concerning stock exchange and other financial transactions, while the Consulate in San Francisco and the 'recreational' facilities in Oyster Bay, Glen Cove, and Pioneer Point have special interest in defence contractors and high technology companies in Silicon Valley, Long Island and Connecticut, and Maryland. In 1978, the Senate Select Committee on Intelligence reported that the Soviet Embassy in Washington had probably intercepted a facsimile (FAX) transmission from the Boeing Company's office in Washington to its headquarters in Seattle concerning sensitive aspects of the MX ICBM program.[7]

According to several other former US intelligence officers, the Soviet Union also uses its SIGINT posts in diplomatic establishments to collect intelligence for commercial purposes. For example, Raymond Tate, former Deputy Director of the NSA, has stated:

> I firmly believe the Soviet Union has for years manipulated a lot of commercial markets in the world, commodities and other things. That has nothing to do with national security in the military sense. They have a significant cash flow problem. How do you make money in a cash flow problem? You can turn your intelligence system around and use it to get all sorts of data you can actually use in commercial ventures, etc.[8]

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7 Kenneth H. Bacon, 'Leak of Memo on MX Missiles, Possibly Helpful to Firm, May Also Benefit Russians', *Wall Street Journal*, 2 March 1979; Richard Burt, 'Boeing Aides Mishandled Secrets, Tried Cover-Up, U.S. Inquiry Finds', *New York Times*, 2 March 1979; and Harry F. Eustace, 'MX Fiasco: Will it Legislate a New Market', *Electronic Warfare/Defense Electronics*, April 1979, p.33.

8 Raymond Tate, 'Worldwide C3I and Telecommunications', in *Seminar on Command, Control, Communications and Intelligence*, (Center for Information Policy Research, Harvard University, Cambridge, Mass., 1980), p.45.

Some particular commodity markets which the Soviets have evidently manipulated with the assistance of SIGINT include oil, gold, diamonds, grain and sugar. The most commonly reported case concerns the 'Great Grain Robbery' in 1972, when the KGB intercepted microwave telephone communications between the Department of Agriculture in Washington, the Chicago Board of Trade, and other US government agencies, and was able to negotiate a grain purchase on terms which were not only very favourable to the Soviets ($1.63 a bushel) but which later created grain shortages and higher prices ($2.30 a bushel) for US consumers.[9] As Harry Rositzke, a former CIA officer, has reported,

> Perhaps the [KGB's] most lucrative contribution in the economic field was its monitoring of telephone calls into and out of the Department of Agriculture in the early seventies....
>
> The KGB coverage of telephonic reports by the graindealers to the Department of Agriculture clearly helped Moscow time its purchases before the full extent of U.S. grain requirements became apparent in Washington. As a colleague of mine put it, 'The Russians knew more about events in the American grain market than the White House did.'[10]

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9 Richard Davis, 'Scenario for Snooping: Soviets Picking Silicon Valley Clean', *Electronic Warfare/Defense Electronics*, May 1978, p.22; William J. Broad, 'Evading the Soviet Ear at Glen Cove', *Science* (Vol.217, No.4563), 3 September 1982, p.910; 'Nixon and the Soviet Grain Famine', *Foreign Report*, 18 October 1972, p.1-2; Martin E. Hellman, 'An Overview of Public Key Cryptography', *IEEE Communications Society Magazine*, November 1978, p.24; and Carolyn Meinel, 'Encryption: Can Spies and Thieves Break It?', *Technology Review*, November-December 1982, p.72.

10 Harry Rositzke, *The KGB*, pp.197-198.

Counter-Intelligence Activities

Almost all of the Soviet diplomatic establishments which maintain SIGINT operations include KGB and/or GRU posts concerned with monitoring the communications of the host country security surveillance agencies - known as KGB Zenith rooms and GRU Radio Monitoring Stations respectively. These posts correspond closely to the establishments involved in significant espionage activities. In the United States, the Soviet Embassy began 'spectrum scanning' of FBI and police radio-telephone channels in the Washington area from the 16th Street Embassy before the Second World War, and during the 1950s and 1960s the SIGINT posts in both the Embassy and the Glen Cove complex were primarily concerned with supporting Soviet espionage activities in Washington and New York by monitoring local police and FBI surveillance communications.

In 1980, the KGB's Zenith officers in the 16th Street Embassy were able to successfully frustrate FBI attempts to identify Ronald Pelton, a former NSA officer who supplied the KGB with information about NSA activities for nearly six years until he was arrested in November 1985. Pelton had telephoned the Embassy on 14 January 1980 to make initial contact with the KGB. The telephone conversation was recorded by the FBI, and when Pelton visited the Embassy on 15 January the FBI had established a tight cordon around the building, designed to identify the spy and arrest him as he left the Embassy. However, a Zenith officer 'had picked up a burst of radio activity from FBI walkie-talkies and car radios as Mr Pelton entered the embassy' and figured that the radio messages 'had been triggered by Mr Pelton's entry'. Pelton was then disguised as an Embassy worker and departed by a side door surrounded by several other Embassy employees and successfully escaped the FBI watch.[11]

The role and functions of the KGB Zenith activities in Paris, Tokyo and Ottawa are well known; they are similar to those of the GRU Radio Monitoring Station in Vienna. These counter-intelligence radio monitoring activities generally involve only two or three SIGINT

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11 William M. Careley, 'Spy Story: How The FBI, Tipped By A Russian, Tracked an Intelligence Leak: Agency Found an Old Tape on Ron Pelton's First Call to Soviets 7 Years Ago', *Wall Street Journal*, 17 March 1987, p.1.

FIGURE 68
RONALD PELTON

Convicted spy Ronald Pelton passed the Soviets no secret papers – he gave them secrets of U.S. communications intercepts that he kept in his head. (AP Wide World Photos)

officers in each post. The purpose of the Zenith room in Tokyo has been described as follows:

> In it a technician monitored the radio frequencies used by Japanese counter-intelligence and police surveillants. Whenever a [KGB] Residency officer was due to engage in a hazardous meeting with an agent, the technician came on duty and listened. If he heard a flurry or any other abnormality in Japanese communications, he transmitted a signal to a tiny bleeper in the officer's pocket and thereby told him to abort the meeting.[12]

Descriptions of the KGB's Zenith room in Paris are essentially identical.[13] The activities of the GRU Radio Monitoring Station in Vienna have been described as follows:

> The radio control group [i.e. the Radio Monitoring Station] were working only for the [GRU] residency, keeping watch on what the local police were doing. The group always knew what the Viennese police were up to, how their force had been distributed round the city, and whom their plain-clothes agents were following. The radio control could always tell us, forexample, today the police had been following a suspicious-looking Arab at the railway station or that yesterday the whole force had been put on catching a group of drug-peddlars. Very often it was not possible to work out what the police were up to, but even then the radio monitors were always ready to warn us where any particular police activity was going on.[14]

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12 John Barron, *KGB Today: The Hidden Hand*, (Reader's Digest Press, New York, 1983), p.92.

13 See Jean-Marie Pontaut, 'Le KGB a Paris: Les Hommes et les Methodes', *Le Point*, (No.620), 6 August 1984, p.48; and Thierry Walton, *Le KGB en France*, (Bernard Grasset, Paris, 1986), p.290.

14 Viktor Suvorov, *Aquarium*, p.182.

Private Communications

Included in the communications which are accessible to the SIGINT posts in Soviet diplomatic establishments is an enormous volume of personal telephone conversations. The first official public acknowledgement of this activity occurred in June 1975, when the Commission on CIA Activities Within the United States, chaired by Vice President Nelson A. Rockefeller, reported that

> the communist countries ... appear to have developed electronic collection of intelligence to an extraordinary degree of technology and sophistication for use in the United States and elsewhere throughout the world, and we believe that these countries can monitor and record thousands of private telephone conversations. Americans have a right to be uneasy if not seriously disturbed at the real possibility that their personal and business activities which they discuss freely over the telephone could be recorded and analysed by agents of foreign powers.[15]

In July 1977, Senator Daniel Patrick Moynihan, vice chairman of the Senate Select Committee on Intelligence, issued a press release in which he stated:

> I cannot stress too strongly that modern technology has given to foreign espionage a new dimension which needs to be understood in this country. The targets of Soviet interception of telephone communications now include our business, our banks, our brokerage houses, as frequently as our government agencies. Soviet espionage seeks to penetrate into other aspects of American life - commercial, intellectual, political - as much as it seeks illegal entry into the councils of governments. This is precisely why the problem is now one of interest to all

15 Commission on CIA Activities Within the United States, *Report to the President*, (Manor Books Inc., New York, 1975), p.8.

> Americans in their daily lives - not an abstract problem for intelligence operatives in trench coats.[16]

This Soviet activity represents an invasion of privacy of unprecedented magnitude. It also allows KGB and/or GRU manipulation of personal affairs. Information obtained from monitoring personal telephone conversations is used in blackmail operations, and has sometimes led to the recruitment of Western citizens as Soviet espionage operations. As Senator Moynihan testified in December 1985,

> Vice President Rockefeller ... warned about blackmail [in 1975]. He said blackmail is going to be the consequence, and I don't see how you can assume that there is no connection between the number of spies that have appeared in this country in the last couple of weeks and the fact that the Soviets have been listening to telephone conversations for 10 years.[17]

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16 News release from office of Senator Moynihan, 27 July 1977.

17 US Congress, Senate Committee on Governmental Affairs, Permanent Subcommittee on Investigations, *Foreign Missions Act and Espionage Activities in the United States*, (US Government Printing Office, Washington, D.C., 1986), p.113.

CHAPTER 10

CONCLUSIONS

The Soviet Union maintains by far the largest SIGINT establishment in the world. It is about five times the size of the US SIGINT establishment, and operates more than 500 SIGINT ground stations in the USSR, Eastern Europe, Cuba, South Yemen (PDRY), Vietnam, Mongolia, Nicaragua, and Afghanistan.

The ground-based SIGINT sites comprise the largest single collection element in the Soviet SIGINT establishment. However, the enormous investment in these sites is only a part of the overall Soviet SIGINT effort. Soviet SIGINT agencies maintain SIGINT operations in diplomatic establishments in some 62 countries; they maintain some 63 dedicated SIGINT ships and employ other vessels when opportune; they have specifically designed or modified some 20 aircraft types and drones for SIGINT activities; they have developed several types of SIGINT satellites for both ocean reconnaissance and world-wide SIGINT activities; and they have developed various sorts of trucks and other vehicles for SIGINT purposes.

The range of signals monitored by these systems is extremely wide. Almost the whole radio spectrum is covered. The types of signals intercepted include the diplomatic messages of other countries, the military communications of potential adversaries (including both strategic and tactical communications), and telephone conversations transmitted on microwave networks. These intercepts comprise the Soviet Union's principal means of surveillance and early-warning; they provide the great bulk of Soviet intelligence with respect to Western military capabilities and activities; and they are a major source of commercial information.

There must be a much greater public awareness of the vulnerability of telecommunications to Soviet interception. The targets of the Soviet SIGINT establishment and the capabilities of the Soviet SIGINT systems go far beyond official government signals. Private communications, involving discussion of commercial and personal matters, are now a prime target of Soviet SIGINT efforts. Hence, as the US Senate Select Committee on Intelligence reported in 1986,

> Public awareness of the hostile intelligence threat to domestic communications is essential, because there are real limits to what the U.S. Government can do to provide secure communications for the private sector.... The protection [of non-Government communications] must depend on the willingness of private organizations to invest in secure communications, not only for their immediate self-interest, but for the larger interests of the nation as a whole.[1]

The development of sound and clear policies and strategies for addressing the Soviet SIGINT effort can only take place within the context of a greater public appreciation of the Soviet SIGINT capabilities and operations.

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1 US Congress, Senate Select Committee on Intelligence, *Meeting the Espionage Challenge: A Review of United States Counterintelligence and Security Programs*, (U.S. Government Printing Office, Washington, D.C., 1986), p.34.

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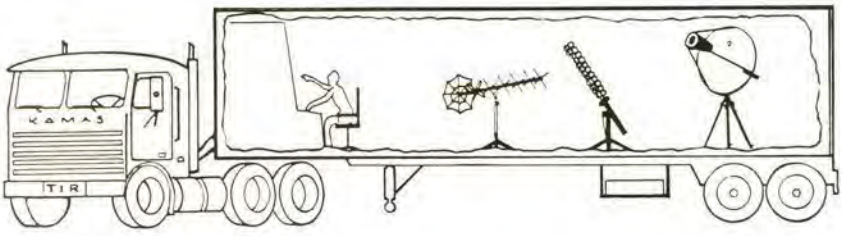
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