JPRI
JAPAN POLICY RESEARCH INSTITUTE

WORKINGPAPER

JPRI Working Paper No. 103 (September 2004)

In the Miura Listening Room: Radio Surveillance under Japan's "Friendly Authoritarianism"

by Desmond Ball and Richard Tanter

In the 1930s and the first half of the 1940s the Miura peninsula that encloses Tokyo Bay on its southernmost point in Kanagawa Prefecture was closed to all except local residents, lest citizens hiking through its lovely low mountains and little bays glimpse the workings of the giant Yokosuka naval base that nestled into the eastern side of the peninsula . These days, at every possible excuse, Japanese hikers escape the grey concrete of Tokyo for the beautiful mountains and temples of the Miura Peninsula.[1] Modern guides for hikers only warn them not to be startled when they descend from the hills of Tateyama to the vegetable fields of the village of Hassemachi on the border of Miura City and Yokosuka City to see three giant log periodic antennas[2] amidst a field of cabbages. Moreover, behind the towering antennas, rising above a cluster of substantial official looking buildings, loom two large white parabolic antennas pointing skywards, and beyond them, a small silver-domed optical telescope observatory. This is the Japanese government's Miura Space and International Radio Surveillance Centre. Besides the log periodic antennas which monitor high frequency and very high frequency transmissions from stations in any direction, and the parabolic antennas which monitor transmissions from hundreds of satellites, this facility also houses the Miura Listening Room, the control centre that monitors and directs five DEURAS-H high-frequency radio direction-finding facilities strung across the archipelago from Shiraho on the island of Ishigaki in the far south of the archipelago to Chitose in Hokkaido. (See **Figure 1**: Map of Five DEURAS-H stations and Miura and **Figure 2**: Miura International Radio Surveillance Centre log periodic antennas.)

Normally the Miura Centre is not open to the public, and patrol cars pass by frequently. According to government explanations the Miura Surveillance Centre is engaged in monitoring radio transmissions 24 hours a day, seven days a week, but local residents report that in terms of visible human activity it is very much a weekdays-only operation, with gates locked at the weekend and few lights to be seen at night. One viewer of a television program on the centre felt that "the place had a 'country' feel", with staff in ordinary street clothes, "and even sandals"![3] In fact, the Miura Centre houses at least two distinct facilities operated by the Kanto Bureau of Communications on behalf of the Radio Environment Division in the Ministry of Public Management, Home Affairs, Posts and Telecommunications. One is made up of the Space Radio Surveillance and Investigation Sections, and the other, which control of the DEURAS-H high-frequency monitoring system is made up of the International Radio Surveillance and Investigation Sections. (See **Figure 3**: Miura Listening Room: international radio monitoring section.)

The DEURAS System

Yet the Miura Centre is just one part of the Japanese government's system for surveillance of the airwaves. The space communications surveillance facility in fact sits beside the much

larger DEURAS (Detect Unlicenced Radio Stations) domestic and international radio monitoring and direction-finding system. This DEURAS system is operated by the Ministry of Public Management, Home Affairs, Posts and Telecommunications, through the Radio Planning and Monitoring Department of the Kanto Joint Bureau of Communications, to locate domestic and foreign sources of radio interference, and to locate illegal radio transmitters. It also enables Japan to meet its obligations as a member of the International Telecommunications Union to monitor compliance with international radio regulations.

The Japanese DEURAS system is extraordinary in size and scope, with more than 328 fixed and mobile direction-finding sensor stations throughout the country monitoring every part of the radio and telecommunications spectrum, from 100 KHz in the low frequency band to 2 – 3 GHz at the top of the ultra-high frequency (UHF) band. It amounts to a highly unusual intensity of nominally civilian airwave and communications surveillance.

The DEURAS system, which was built between 1993 and 2001, is made up of 328 sensor stations dotted all over Japan, each linked to regional processing and control centres, and from there to two control centres, both of which are under the Kanto Regional Bureau of Communications. One as already mentioned, in Miura, Kanagawa Prefecture, deals with the monitoring of high-frequency transmissions. The other in Iikura in downtown Tokyo deals with the monitoring of the dense very high frequency (VHF) and ultra-high frequency bands. In addition to the five DEURAS-H high frequency direction-finding stations, the system includes 171 DEURAS-D VHF/UHF sensor stations, mainly in dense population centres in the Kanto and Kansai regions and along the Inland Sea, and in all prefectural capitals; 137 DEURAS-R VHF/UHF sensor stations in all prefectures and regional centres greater than populations of 50,000 people outside the area covered by the DEURAS-D system; and 15 mobile UHF/VHF direction-finding vans.[4] There is also a UHF/VHF monitoring facility at Tokyo's Narita airport known as the Narita Surveillance Room, which appears to be organizationally linked to the Miura Surveillance Centre. A marine radio surveillance unit is also maintained at Yokohama. And as already mentioned, the Miura Centre also carries out surveillance of space radio communications. (See **Figure 4**: Japan's civilian radio surveillance system, **Figure 5**: Organization of Japan's civilian radio surveillance, **Figure 6**: DEURAS system and organization, **Figure 7**: Joint Communications Bureau management system: facilities and their functions, **Figure 8**: Ministry of Public Management, Home Affairs, Posts and Telecommunications, Kanto Joint Communications Office, Radio Planning and Monitoring Department, **Figure 9**: Map of DEURAS facilities, and **Figure 10**: DEURAS project schedule.)

The Iikura Surveillance Room and the DEURAS-D and DEURAS-R Systems

The centre of the DEURAS-D and DEURAS-R network is the Iikura Surveillance Room in one of the Tokyo facilities of the Kanto Bureau of Telecommunications. The Bureau, which is part of the Ministry of Public Management, Home Affairs, Posts and Telecommunications, has its main offices in the Tokyo Postal Bureau Building in Otemachi, Chiyoda-ku. However the Iikura Surveillance Room, which houses the Radio Surveillance Divisions 1 and 2 and Radio Investigation Divisions 1 and 2, is located in Iikura, Azabu-dai, Minatoku.[5] From the Iikura Surveillance Room ministry authorities can monitor the location and content of any form of domestic telecommunications using the UHF and VHF bands. (See **Figure 11**: Kanto Joint Communications Bureau headquarters, Otemachi, Tokyo.)

The DEURAS-D system, which involves 171 "sensor stations" installed atop steel towers and buildings in Japan's major city areas, and connected to Centre Stations at Regional

Telecommunications Bureaus (and thence to the Iikura Listening Room) via high-speed digital lines, detects shorter-range transmissions (including digital telecommunications) across the radio spectrum from 25 MHz to 3 GHz: i.e. the top part of the high frequency (HF) band through the very high frequency (VHF) and ultra-high frequency (UHF) bands. The coverage includes recently developed communications systems such as digital cell phones, digital Multi-Channel Access (MCA) terrestrial mobile wireless systems (in the 800 MHz range), and personal hand phone systems (PHS), such as cordless telephones (operating in the 1.88 – 1.93 GHz band). The DEURAS-D system can also automatically detect unlicensed VHF and UHF radio transmissions that interfere with mobile communications.[6] This system gives the Japanese authorities the capacity to listen to and locate the source of any telephone calls made on or to mobile phones anywhere in the country. By 2001, DEURAS-D sensor stations were installed in every town with a population larger than 50,000 inhabitants in the densely populated and flat Kanto and Kansai regions, and in the Inland Sea regions. (See **Figure 12**: Schematic of the DEURAS-D and –M direction-finding systems, and **Figure 13**: DEURAS-D sensor station.)

The less sophisticated DEURAS-R system, which also monitors the 25 MHz to 2-3 GHz range, has 137 sensor and direction-finding stations covering the less populated areas, including even the small southern island community of Ishigaki. Its capabilities are limited to monitoring the VHF/UHF radio bands – rather than digital telecommunications. (See **Figure 14**: DEURAS-R sensor station.)

The DEURAS-M (Mobile) system consists of 17 vehicles, which are equipped with direction-finding systems, satellite communications processing equipment, radio wave interception and direction-finding facilities, radio wave quality measuring instruments, etc. They are able to serve as sensor and remote control stations in the DEURAS-D system. They are also equipped with a GPS system for determining their own positions and precisely locating transmissions in their areas of operation. The DEURAS-M receivers cover the frequency range from 25 MHz to 2 GHz, allowing them to detect illegal VHF and UHF radio transmissions as well as analogue and digital mobile/cell phone communications.[7] See **Figure 15**: DEURAS-M mobile sensor station and **Figure 16**: Local radio surveillance: government publicity.)

While the existing DEURAS-D and –R systems would appear to be geographically comprehensive in their coverage, in fact only about three-quarters of the population in 2001 fell under parts of the system that can be remotely controlled.[8] Spending on the radio surveillance system is in fact continuing, virtually unabated from the rush to establish the DEURAS system in the 1990s. (See **Figure 17**: Radio surveillance expenditures, Ministry of Public Management, Home Affairs, Posts and Telecommunications, 1993 - 2002.)

The DEURAS-H System

On the east coast of the island of Shiraho, the largest of the Yaeyama group in the far south of Japan, lies the town of Shiraho. About two kilometers northwest of the town there is a roadside field amidst the small sugar-cane farms that cover the gently rising hill that looks out towards Shiraho's famous coral reefs. In this field a farm of nine large crossed-loop antennas rise from the carefully mown grass, interspersed with two very small concrete buildings. Seven of the loop antennas make up a large circle in the middle of the field. One loop is in the centre of the circle, and the last stands beside the small concrete building beside the road. A large sign facing the narrow country road asks people to not enter the grounds of the facility, lest they disturb the functioning of delicately calibrated buried elements. Apart from the occasional farmer and passing car, no one is to be seen. This is the Shiraho loop farm, a high-frequency

radio receiving and direction-finding (DF) facility operated by the Ministry of Public Management, Home Affairs, Posts and Telecommunications. Apparatuses of this type are technically known as circularly-disposed antenna arrays (CDAAs). Built in the mid-1990s, the present Shiraho facility replaced an earlier 24-element CDAA high frequency direction-finding system operated by the Ministry of Posts and Telecommunications, which had a similar function and public rationale. (See **Figure 18**: DEURAS-H site at Shiraho, Ishigaki, February 2003, **Figure 19**: Sign at the Shiraho DEURAS-H site, February 2003, and **Figure 20**: Communications and surveillance facilities on Ishigaki.)

The ostensible purpose of the Shiraho station is to monitor high frequency transmissions to determine compliance with national and international radio broadcast regulations and to determine the location of illicit transmissions, especially those causing interference with registered transmitters. The Shiraho DEURAS-H station provides a capability for monitoring high frequency radio signals at ranges out to thousands of kilometres, and is the southernmost component of the Japanese government's nationwide radio monitoring and radio direction-finding system that make up Japan's formidable civilian and military signals intelligence capacity. Sitting just 250 kms east of Taiwan, at the end of the Ryukyu Archipelago, the Shiraho direction-finding station almost certainly has important military applications for Japan's Self Defence Forces. See **Figure 21**: East and Southeast Asia centred on Ishigaki and **Figure 22**: DEURAS-H high-frequency direction-finding facilities.)

The Shiraho facility is one of five DEURAS-H sensor stations – or Joint Communications Stations - in the prefectures of Hokkaido, Ishikawa, Chiba, Kumamoto, and Okinawa. Three of these were built in 1993-95, another in 1996-98, and the fifth in Ishikawa in 2000.[9] The DEURAS-H system monitors transmissions from 100 KHz in the low frequency (LF) band through the medium wave band (which includes for example, commercial radio broadcasts) up to 30 MHz in the high frequency (HF, or short wave) band. (See **Figure 23**: Schematic of DEURAS-H high frequency radio direction-finding system.)

The five DEURAS-H sensors or Joint Communications Stations each consist of 9 crossed-loop DF antennas and a remote control building. Seven of the loops, which have a diameter of 1.5-metres, are configured in an 80 - 100 metre diameter circle, with another loop in the centre. A 2-metre diameter loop, a high-speed sweep reception antenna, is located near the control building. Underground cables link the seven circularly-disposed loops to each adjacent loop and to the central loop, and the central loop to the 2-metre high-speed sweep antenna and thence to the direction-finding system in the control building. High-speed digital lines connect the stations to their Regional Centre Offices and thence to the control centre in the Miura Listening Room. (See **Figure 24**: Shiraho DEURAS-H site, crossed-loop high-speed sweep antenna, adjacent to the control building.)

The most important function of the DEURAS-H system is to provide reliable bearings for intercepted high frequency transmissions. Systems such as this provide a capacity to intercept surface waves out to about 250-300 km and for sky waves beyond 3,000 km, with a typical accuracy for sky waves of less than 2°.[10] A television program in June 2000 showed the example of the staff in the International Radio Surveillance Section in the Miura listening room using the DEURAS-H system to locate and identify a transmission at 17.51 MHz from a station in Honolulu which was monitored by the four of the DEURAS-H direction-finding stations then operational.[11] The circularly-disposed antenna array determines the bearing of the transmission, as does the high-speed sweep antenna. If the bearing from the Shiraho station on a transmission whose location is unknown is triangulated with a bearing from another high

frequency direction-finding station, then the position of the transmitter can be determined with considerable precision. In the case of the Shiraho station, triangulation could be effected by matching bearings from the Kumamoto DEURAS-H station, or from the giant “elephant cage” CDAA at the Ground Self Defence Force’s Miho Communications Station.

The three log periodic antennas at the Miura facility are also operated by the International Surveillance and Investigation Sections at Miura, and are effectively part of the DEURAS-H system. By their nature log periodic antennas are designed less for direction-finding purposes than for listening to the content of transmissions from stations whose location is already known. Consequently the three antennas are oriented in different directions (see Figure 2), covering high frequency and very high frequency bands.

The content of transmissions intercepted by the DEURAS-H stations can be recorded in the “listening room” at the Miura DEURAS–H control station.[12]

The Miura Space Radio Surveillance Centre

As already mentioned, the Kanto Telecommunications Bureau also maintains facilities for monitoring communications and other electronic emissions transmitted by geostationary satellites and low earth orbit (LEO) satellites. The official purpose of this facility is to determine the source of interference with Japanese communications. The ground station and control system in the Miura Listening room are located at Miura, Kanagawa Prefecture (35°12'24"N, 139°39'03"E), just a few kilometers from the corporate and government Yokosuka Research Park, described as “the world’s largest concentration of mobile communications technology” and “a Mecca for mobile technology-related research and development”.[13] (See **Figure 25**: DEURAS facilities Tokyo region and **Figure 26**: Local map of Miura Space and International Radio Surveillance Centre, Koenbo, Hassemachi-cho, Miura, Kanagawa Prefecture [1:25,000].)

To mark the opening of the facility in November 1998, a workshop was held on space radio surveillance attended by more than 200 Japanese officials and scientists and representatives of manufacturers involved in the construction of the facility, which included Toshiba’s Radio Applied Systems Technology Division; Mitsubishi Electric’s Radio Surveillance Systems Group, No. 2 Control Systems Division; and KDD.[14] Facilities for monitoring the L, Ku and Ka bands were installed in 1996-98, and facilities for monitoring the S and C bands in 1999-2000.[15] In 2001, the satellite monitoring station consisted of two parabolic dishes[16], one measuring 3.2 meters in diameter monitoring the C, Ku and Ka bands, and another measuring 2.6 metres in diameter monitoring the L and S bands.[17] There is also a silver dome-covered optical telescope to determine the position of geostationary and orbiting satellites.[18] (See **Figure 27**: Miura Space Radio Surveillance Centre: parabolic satellite communications monitoring antennas, log periodic antenna and optical telescope, **Figure 28**: Parabolic antenna for monitoring satellite transmissions in the L and S bands, Miura Space Radio Monitoring System, **Figure 29**: Configuration of the Space Radio Monitoring System, **Figure 30**: Layout diagram of the Miura Space and International Radio Surveillance Centre, **Figure 31**: Miura space radio monitoring section, **Figure 32**: Miura Space Radio Surveillance Facility specifications, and **Figure 33**: Coverage of Miura space radio monitoring system.)

The station monitors signals from both civilian and military satellites, including those stationed in both geostationary orbits from 66.5&Mac176;E over the Indian Ocean to 147.2°W over the mid-Pacific Ocean and low earth orbit (LEO) satellites passing over Japan.[19] The facility

currently monitors more than 400 satellites of all nationalities, including more than 100 geostationary satellites dedicated to communications, weather and climate observation, early warning and other military purposes. The then Ministry of Posts and Telecommunications specified the goals of the Space Radio Monitoring System as[20]:

(1) elimination of jamming and other forms of interference;
(2) efficient use of geo-stationary orbit and frequencies;
(3) improvement of efficiency in international coordination of satellite systems; and
(4) identification of "paper satellites".[21]

The Miura Space Radio Surveillance Centre is one of four such facilities around the world participating in the ITU's international satellite communications monitoring system. The others are the US Federal Communications Commission Laurel/Columbia Monitoring Station near the National Security Agency's headquarters at Fort Meade in Maryland; the British Office of Communications' Baldock Monitoring Station in Hertfordshire; and the Leeheim Earth Monitoring Station, operated by the German Regulatory Authority for Telecommunications and Posts near the small town of Nierstein, southwest of Frankfurt.[22] (See **Figure 34**: ITU international satellite radio monitoring facilities.)

In addition to the performance of its ITU responsibilities, the Space Radio Surveillance Centre is able to compile an enormous amount of intelligence about the operational purposes of all satellites within its purview, including those of numerous sorts of foreign intelligence satellites whose functions are not publicly identified. The Centre is also able to intercept and record the content of the transmissions from all of these satellites. This includes, in the case of geostationary communications satellites, telephone calls, facsimiles, e-mail, and computer-to-computer data traffic. It also includes the monitoring of signals from navigation satellites, downloads of geostationary early warning satellites, and imagery from meteorological satellites. Furthermore, it would include the telemetry that all satellites transmit concerning their "house-keeping functions", including for example, the functioning of their (solar or battery) power systems, computers, and many other sub-systems. On occasion, some of this intercepted material would be used by the Defence Intelligence Headquarters' Radio Wave (or signals intelligence) Division to supplement the Self Defence Forces' dedicated satellite communications monitoring capacity, which itself collects a wide range of diplomatic, military and other intelligence communications. (See **Figure 35**: ITU international satellite radio monitoring facilities.)

After visiting the Centre in November 2001, the head of a visiting group from the Indonesian Communications Ministry saw a model for his own country: "we want to make good use [of this] for reform of our international surveillance in the future. We really want to build a space surveillance facility in our country."[23]

Foreign official visitors seem to often be taken to visit the Miura and Iikura centres, and study of the comprehensive surveillance system is a component of Japanese foreign aid to a number of developing countries, including Indonesia.

Conclusion: friendly authoritarianism, spy-catching and military direction-finding

Japan operates the world's third or fourth largest signals intelligence system, after the United States, Russia and China, in terms of comprehensive collection capacity.[24] The highly intensive civilian radio interception and direction-finding system is one aspect of this network.

All members of the International Telecommunications Union are obliged to monitor and regulate sources of illegal and unlicensed radio transmissions, and in any case, all face domestic sources of radio interference. Accordingly almost all governments operate some type of radio direction-finding system, which may or may not be integrated into a military signals intelligence system. But Japan's civilian monitoring system is extraordinarily comprehensive and intensive in pursuit of its apparently unobjectionable goals.

How are we to assess the functioning – and functions - of this system of surveillance? One of the ostensible main purposes of the DEURAS system is to regulate potential sources of radio interference, which, in truth, can on occasion be much more than simply annoying to radio listeners. Given the dependence of many complex and vital institutions such as railways, aircraft, and hospitals on radio communications, and the use of radio for search and rescue and other emergency purposes, the regulation of the airwaves is an important function of government, as recognized by many international agreements.

Yet the data on the actual outcome of the activities of this comprehensive and intensive Japanese radio surveillance system suggest that the number of serious violations is curiously small. In 2001, of the 2,017 cases of radio interference that were reported to the Japanese authorities, 585 involved "important" communications systems – defined as "telecommunication services, broadcast services, saving human life or assets or maintaining safety, weather services, electric services, railway services". Yet only three of these 2,017 cases of interference resulted in indictments. One resulted in an administrative penalty, and fourteen were subject to that particularly Japanese form of state intervention, an "administrative guidance".[25]

Even the second ostensible objective of the DEURAS system, the detection and regulation of unlicensed radio stations (in the broadest sense of the term, including citizen band radios) resulted in a surprisingly small number of interventions. Of 23,308 reports of unlicensed radio stations of all kinds in 2001, less than a quarter resulted in penalties of any kind, and in all, only 276 resulted in indictments.[26]

The intensity and extent of the DEURAS system of government surveillance of the airwaves, in addition to its undoubted military functions, would seem to go far beyond the requirements of dealing with significant radio interference and unauthorised transmissions. When compared to comparable systems in other democratic countries such as Britain, for example, it becomes clear that successive Japanese governments have sought the capacity for an extremely fine-grained monitoring of all Japanese communications through the airwaves – by radio, mobile phone or e-mail. The British Office of Communication's Radio Monitoring Station at Baldock, Hertfordshire, is home to a Terrestrial Monitoring Station with log periodic antennas like those at Miura, a Satellite Monitoring Station like Miura, a very small number of mobile direction-finders, and links to 21 unattended direction-finding facilities.[27] With a geographic, economic and demographic situation comparable to that of Japan, Britain makes do with less than one-tenth of the number of fixed radio surveillance facilities.

"Friendly authoritarianism" is the term used by the sociologist Sugimoto Yoshio to refer to the system of state surveillance and mutual surveillance he sees as endemic to almost all levels of Japanese society. Despite the existence of a formally representative cabinet system of democracy, Sugimoto emphasizes the pervasiveness in the present era of corporate capitalism of a "soft" authoritarian cast, or what some other Japanese critics have called "*kanri shakai*" or the "supervised society". Two qualities of Sugimoto's concept are helpful here. Firstly, as a

system, friendly authoritarianism institutes "an extensive range of mechanisms in which power is made highly visible and tangible". Secondly, it "legitimises various codes in such a way that superordinates use ambiguities to their advantage."[28]

Such a concept helps to make sense of the disparity between the scale of the telecommunications surveillance activities in Japan and in comparable societies. Again, it helps to explain the disparity between the scale and costs of the Japanese socio-technical system on the one hand and the minute number of legally-binding actions by the authorities. Moreover, Sugimoto's approach also draws our attention to one other characteristic of the Japanese system: the relatively large amount of publicity given to its existence and operations.

But there are still other functions of this system of surveillance of the airwaves. One undoubted military use for radio monitoring and direction-finding in Japan, as elsewhere, is counter-espionage: tracking down transmitters used by agents of foreign powers to communicate both within the country (for example, to their embassies) and abroad. One of the direct forerunners of the present Ministry of Public Management, Home Affairs, Posts and Telecommunications was the pre-war Ministry of Communications (Teishinsho), which amongst its other duties, also had responsibility for monitoring and locating the source of unauthorised radio transmissions. For this purpose it maintained a fleet of radio direction-finding vans in cooperation with the Special Higher Police or Tokko within the Home Ministry. In mid-1938, for example, the Teishinsho had monitored night-time, illegal radio transmissions from Tokyo, which were eventually traced to the Sorge espionage network.[29]

In the post-war years, the three principal counter-intelligence targets for the domestic radio direction-finding apparatus were undoubtedly Soviet and Chinese intelligence agents, and agents of North Korea – both those from North Korea itself, and amongst the zainichi chosen North Korean community born in Japan. The end of the Cold War did not lessen the attentions of Japanese counter-intelligence agencies to Russian attempts to acquire Japanese military secrets, as demonstrated by the expulsion of a Russian naval attaché following espionage charges against an MSDF lieutenant-commander named Hagisaki Shigehiro in 2000.[30]

With the extension of capacities of the DEURAS systems to monitor digital telecommunications, and mobile phones in particular, the Japanese counter-intelligence authorities are able to monitor the use of these media by foreign agents.

There is, however, at least one more non-civilian use of the DEURAS system. It is likely that the DEURAS-H array at Shiraho is also used remotely by the Defence Agency's Defence Intelligence Headquarters (DIH). It has been argued, for example, that the antenna array is used together with the much larger "elephant cage" CDAA at Miho for location of transmissions through triangulation in the zone between Japan and Guam, and that it is also well situated for intercepting signals from both mainland China and Taiwan.[31]

ENDNOTES

1. U.S. Navy, Chief of Naval Operations, Environmental Readiness Division, Commander, Fleet Activities, Yokosuka Award Nomination, Cultural Resources Management – Installation, at http://web.dandp.com/n45/fy02Awards/crm/i/fy02/fleact/yokosuka/crm/award/nomination.pdf [Return to text.]

2. A log periodic antenna is one which has several elements (metal rods) on the same mast, the length of each rod being logarithmically proportional to the next, so that a wide section of the high frequency (HF) and very high frequency (VHF) bands can be monitored with a single antenna. [Return to text.]
3. Yokohama DX! , June 2000, BBS at http://yokohama.cool.ne.jp/dxing/bbslog/2000/l1000602.htm. [Return to text.]
4. The differing numbers of sensor stations in the DEURAS-H system (5 stations), and in DEURAS-D (171 stations) and DEURAS-R (137 stations) systems derive from the technical characteristics of the different parts of the radio spectrum which these monitoring systems are designed to intercept. The propagation characteristics of a radio wave can be described by either its wavelength, or its frequency. Its wavelength is the distance between identical points on two adjacent waves. Its frequency describes the number of waves that occur each second - the units of frequency are Hertz (Hz). The frequency is inversely related to the wavelength. The lower frequencies (including what are called the Low Frequency [LF] band and the somewhat confusingly named High Frequency [HF] band) travel over thousands of kilometres, and the very high frequencies (the upper parts of the Very High Frequency [VHF] band through the Ultra High Frequency [UHF] travel only tens of kilometres. When a transmitter emits a radio wave it spreads out in all directions. Some of the energy stays near the ground in a so-called ground wave, while some heads skyward in a sky wave. In the case of HF transmissions, the sky wave is then reflected back to the ground from the ionosphere, enabling reception over long distances. Because of this very large area of effective reception, HF transmissions can be intercepted with a relatively small number of stations. However, in the case of the higher frequencies (the higher parts of the VHF band through the UHF band), the transmitting antenna is invariably designed to focus the emission into a beam. Interception of these higher frequencies requires that the receiver be positioned within line of sight of the transmitter (i.e. within the beam). Hence the much larger number of sensor stations. [Return to text.]
5. Until December 2002, the Radio Surveillance Divisions 1 and 2 and Radio Investigation Divisions 1 and 2 within the Regulatory Monitoring (Otemachi Office) were located in the Third Otemachi Government Office Building, 15F. This office was described on a Bureau website as the Otemachi Surveillance Room. But from the end of December 2002, the four domestic radio surveillance and investigation units moved to new quarters in the Postal Agency Building in Iikura, Azabu-dai, Minato-ku. See “General Information of the Kanto Bureau of Communications”, at http://www.kanto-bt.go.jp/en/org/index.html. [Return to text.]
6. “DEURAS Direction finder (DEURAS-D)”, at http://www.tele.coumu.go.jp/e/monitoring/moni/type/deurasys/deuras.d.htm. [Return to text.]
7. “DEURAS Direction finder (DEURAS-M)”, at http://www.tele.soumu.go.jp/e/monitoring/moni/type/deurasys/deuras_m.htm. [Return to text.]
8. According to an internal ministry review, at the end of 2001, 73% of the population fell under the DEURAS system coverage, up 1.4% from the previous year. 2001 marked the end of the third phase of the original plan for the system. See Jisseki hyokasho yoshi (Outline of the Capacity Appraisal Report), by Sogo Tsushin Kiban-kyoku (Joint Communications Basic Bureau), Denpa-bu (Radio Department), Denpa Seisaku-ka (Radio Policy Section), Kanshi Kanri-shitsu (Surveillance Management Room), Denpa Kankyo-ka (Radio Environment Section), Denpa Riyo-ryo Kikaku-shitsu (Radio Use Fee Planning Room), Date of Appriasal: Heisei 14, shichi-gatsu (July 2002). at http://www.soumu.go.jp/s-news/2002/pdf/020830_2_c44.pdf
[Return to text.]
9. See “Nihonkai-gawa hajimete no tampa kanshi shisetsu ga kansei” (Completion of the First Short-wave Radio Monitoring Facility on the Japan Sea Coast), *Denpa Shinbun Hiroiyomi*,

April 2000 at http://www.cqham.com/jk1bch/denpa/topics/topics28.html [Return to text.]

10. When a radio wave leaves the transmitting antenna, it spreads out in all directions. Some of the energy stays near the ground in a so-called ground wave, while some heads skyward in a sky wave (and, in the case of HF transmissions, is then reflected back to the ground from the ionosphere). [Return to text.]

11. See the report of an unspecified cable television (CATV) Japanese television documentary broadcast on 12 June 2000 on the Miura facility reported the same day by a contributor labelled 7600G on the Yokohama DX! Bulletin board at http://yokohama.cool.ne.jp/dxing/bbslog/2000/l1000602.htm. This was followed by a number of responses on the same topic on the same day, the most reliable of which was by "Toshiaki", at the same URL. [Return to text.]

12. Reportedly the DEURAS-H facilities are manufactured by Mitsubishi Electric. The same report maintained that the Miura facility included one manufactured by JRC, one part of which could monitor radio fax transmissions and another amateur radio. *Ibid*. [Return to text.]

13. Hitachi Kokusai Electric, *Yokosuka R&D Center*, at http://www.h-kokusai.com/e_product/e_ke/yrp/e_index.htm. More than 40 research facilities are located within the YRP, including the government's Yokosuka Radio Communications Research Centre within the Communications Research Laboratory, which was involved in the development of the DEURAS system. See M. Mizuno, *Research Strategy of Yokosuka Radio Communications Research Center*, at http://www2.nict.go.jp/kk/e414/shuppan/kihou-journal/journal-vol48no4/toku2.pdf. [Return to text.]

14. Ministry of Public Management, Home Affairs, Posts and Telecommunications press release, "Opening of the Space Radio surveillance Centre, 27 August 1998", at http://www.soumu.go.jp/joho_tsusin/pressrelease/japanese/denki/981027j601.html [Return to text.]

15. The L-band ranges from 390 MHz to 1.55 GHz; the Ka-band from 10.9 to 36 GHz; the Ku-band from 12.5 to 18 GHz; the S-band from 1.55 to 5.2 GHz; and the C-band from 3.9 to 6.2 GHz. [Return to text.]

16. The two parabolic antennas of the Space Radio Monitoring Division at the Miura Radio Monitoring Centre shown in Figure 27 should not be confused with another 11-metre parabolic antenna which was operated nearby from the mid-1990s until 2001. The latter was one component in the Crustal Deformation Monitoring system for the Tokyo Metropolitan Area, known as the Key Stone Project. Four stations surrounding Tokyo were "equipped with both Very Long Baseline Interferometry (VLBI) and Satellite Laser Ranging (SLR) facilities and daily routine geodetic VLBI/SLR observations are performed in this network to detect precursory crustal movement that may occur pre-seismically." The Miura Key Stone station was closed in 2001. See the Key Stone Project homepage at http://www2.crl.go.jp/t/team6/ksphome.html. [Return to text.]

17. Each of the two parabolic antennas consists of ten elements arranged in a triangular array. For technical details of the Miura facility, see Yoshimasa Oh-hashi and Morio Higa, "Space Radio Monitoring System", *Mitsubishi Electric Advance*, June 1999, pp. 8-10 at http://www.global.mitsubishielectric.com/ pdf/advance/vol86/Vol86.pdf [Return to text.]

18. "The Space Radio Surveillance System", *Mitsubishi Denki Giho* [Mitsubishi Electric Technology Report], No. 8/98, at http://www.mitsubishielectric.co.jp/giho/9808/9808_b.html. [Return to text.]

19. See "Space Radio Monitoring Facility" and "Maintenance Plans on Radio Monitoring Facilities", at http://www.tele.soumu.go.jp/e/monitoring/moni/type/space.htm. [Return to text.]

20. "Inauguration of Space Radio Monitoring", *MPT News*, Vol. 9, No.17, November 30, 1998, p.2. [Return to text.]

21. The term “paper satellites” refers to satellites which do not in fact exist, but have been allocated an orbital and radio frequency “slot” in the increasingly crowded skies. The International telecommunications Union, the UN agency which regulates access to satellite orbits, described this “rush for prime orbital real estate” which originate from “requests for coordination for orbital positions and frequencies that are not actually needed, with a view to "reserving" those positions and frequency bands for possible future use, or for commercial resale to another user at a later date.” See ITU, *Paper Tigers: The Scramble for Space Spectrum*, 2003, http://www.itu.int/newsarchive/pp02/media_information/feature_satellite.html [Return to text.]
22. Details of the four stations are listed by the Korean Central Radio Monitoring Office (in Korean language) at http://crmo.mic.go.kr/jsp/l_history/history_23.jsp. There is close cooperation between the British and German stations. See Radiocommunications Agency (U.K.) at http://www.radio.gov.uk/about/document/annual/01_02/object2.htm [Return to text.]
23. See “Miura Denpa Kanshi Senta” (“The Miura Radio Surveillance Center”), *Komufo Kanto*, Vol. 101, No. 12 (December 2001) at http://www.kanto-bt.go.jp/komfo/h13/1312/miura.htm. [Return to text.]
24. See Desmond Ball, *Signals Intelligence in the Post-Cold War Era: Developments in the Asia-Pacific Region*, (Singapore: Institute of Southeast Asian Studies, 1993), pp. 42-48, and Desmond Ball and Euan Graham, *Japanese Airborne SIGINT Capabilities*, (Canberra: Strategic and Defence Studies Centre, Australian National University, Working Paper 353, 2000) [Return to text.]
25. See Ministry data at “Reports of Interferences” at http://www.tele.soumu.go.jp/e/monitoring/summary/decla.htm [Return to text.]
26. See Ministry data at “Number of Unlicensed Radio Stations Detected and Dealt With”, at http://www.tele.soumu.go.jp/e/monitoring/summary/ad_pro.htm. [Return to text.]
27. United Kingdom, Radiocommunications Agency, *Annual Report and Accounting, 1998-1999, Annual Report: Monitoring*, at http://www.radio.gov.uk/about/document/annual/98_99/page8.htm. [Return to text.]
28. Yoshio Sugimoto, *Introduction to Japanese Society*, (Cambridge University Press, Cambridge, second edition, 2003), pp.270-285. The other two elements of the definition of friendly authoritarianism as a system are the “use of small groups as the basis of mutual surveillance and deterrence of deviant behaviour” and the inculcation of “various forms of moralistic ideology into the psyche of every individual with a particular stress upon minute and trivial details”. Ibid, p. 271-2. [Return to text.]
29. Chalmers Johnson, *An Instance of Treason: Ozaki Hotsumi and the Sorge Spy Ring*, (Stanford University Press, Stanford, California, 1990), p.189; and Raymond Lamont-Brown, *Kempeitai: Japan’s Dreaded Military Police*, (Sutton Publishing, Phoenix Mill, Gloucestershire, 1998), p.95, and “Zoruge Jiken: Gokuchu shuki,” by Rihiarudo Zoruge, Tokyo: Iwanami Gendai Bunko, 2003 (Richard Sorge, Prison Memoir, Iwanami Gendai Bunko, Tokyo, 2003). [Return to text.]
30. “Russian military attaché leaves Japan”, *Washington Post*, September 9, 2000. [Return to text.]
31. Jeffrey T. Richelson, *Foreign Intelligence Organizations*, pp.256-257. [Return to text.]

Acknowledgements
The authors are very grateful to Owen Wilkes, who first tracked down the two stations in Ishigaki in the late 1980s, and who generously shared his field notes and photographs; to Yamazato Setsuko, who provided the authors with valuable

assistance during their fieldwork on Ishigaki in 2003, and for many photographs and other materials; to the Cartography Unit of the Research School of Pacific Studies at the Australian National University for drawing the maps; and to Kim Keuk-mi of Kyoto Seika University.

DESMOND BALL is a Professor in the Strategic and Defence Studies Centre at The Australian National University, Canberra. (He was Head of the Centre from 1984 to 1991.) Professor Ball is the author or editor of more than 40 books or monographs on technical intelligence subjects, nuclear strategy, Australian defence and security in the Asia-Pacific region. His latest publication is entitled *The Boys in Black: The Thahan Phran (Rangers), Thailand's Para-military Border Guards*. Other recent publications include *Burma's Military Secrets: Signals Intelligence (SIGINT) from the Second World War to Civil War* and *Cyber Warfare; Signals Intelligence in the Post-Cold War Era: Developments in the Asia-Pacific Region*; *Presumptive Engagement: Australia's Asia-Pacific Security Policy in the 1990s* (with Pauline Kerr); *Breaking the Codes: Australia's KGB Network, 1944-50* (with David Horner); and *Death in Balibo, Lies in Canberra* (with Hamish McDonald). He has also written articles on issues such as the strategic culture in the Asia-Pacific region and defence acquisition programs in the region.

RICHARD TANTER is a Research Associate at the Nautilus Institute. From 1989-2003 he was Professor of International Relations at Kyoto Seika University. His publications include *Bitter Flowers, Sweet Flowers: East Timor, Indonesia and the World Community* (co-edited with Mark Selden and Stephen Shalom) and *Masters of Terror: Indonesia's Military in East Timor in 1999*. He was the principal expert witness for the plaintiffs in the successful civil action for war crimes against Lt-Gen Johny Lumintang for his role as Deputy Chief of Staff of the Indonesian Army in 1999.