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U. S. NAVAL TECHNICAL MISSION TO JAPAN
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E-28

29 December 1945

RESTRICTED

From: Chief, Naval Technical Mission to Japan.
To : Chief of Naval Operations.

Subject: Target Report - Japanese Electronics - General.

Reference: (a) "Intelligence Targets Japan" (DNI) of 4 Sept. 1945.

1. Subject report, covering general electronics outlined by Target E-28 of Fascicle E-1, of reference (a), is submitted herewith.

2. The investigation of the target and the target report were accomplished by Comdr. Fred M. Myers, USNR, with the assistance of Comdr. M. C. Mains, USN, (Ret.), and Lieut. E. E. Schwalm, USNR.



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Captain, USN

30620

RESTRICTED

E-28

JAPANESE ELECTRONICS - GENERAL

"INTELLIGENCE TARGETS JAPAN" (DNI) OF 4 SEPT. 1945

FASCICLE E-1, TARGET E-28

DECEMBER 1945

U.S. NAVAL TECHNICAL MISSION TO JAPAN

SUMMARY

ELECTRONICS TARGETS

JAPANESE ELECTRONICS - GENERAL

The Second Naval Technical Institute of the Imperial Japanese Navy was the organization responsible for the design, development, procurement and prototype installation of all electronic equipment for the Japanese Navy. Figure 1 shows where the Institute fitted into the Navy Ministry table of organization, and Figure 2 shows the breakdown of the Institute into its various departments and laboratories. A general decentralization of laboratories and experimental stations which follows the procedures established early in 1945, is shown on the map of Figure 3.

A list of all seized documents pertinent to electronics gives an excellent idea of the extent and detail of Japanese research. Because of the large number of documents involved, no attempt has been made to translate other than the title and general subject matter. All documents have been sent, via ATIS, to the Washington Document Center, Washington, D.C., and will be available there for detailed study should the data included with the various electronics reports prove to be insufficient.

A complete list of all equipment shipped to the United States represents those equipments found to be of more than casual interest. It is regretted that neither enough time, nor sufficient laboratory equipment was available to make detailed engineering reports while the Mission was in Japan; however, the equipment being shipped, together with the technical data, research reports, and operational and maintenance manuals, should permit as detailed an examination as may be desired by interested activities in the Navy Department in the United States.

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REFERENCES

Location of Target:

Second Naval Technical Institute, MEGURO, Tokyo

Warehouses at Sasebo Navy Yard

Warehouses at Kure Naval Base

Warehouses at Yokosuka Naval Base

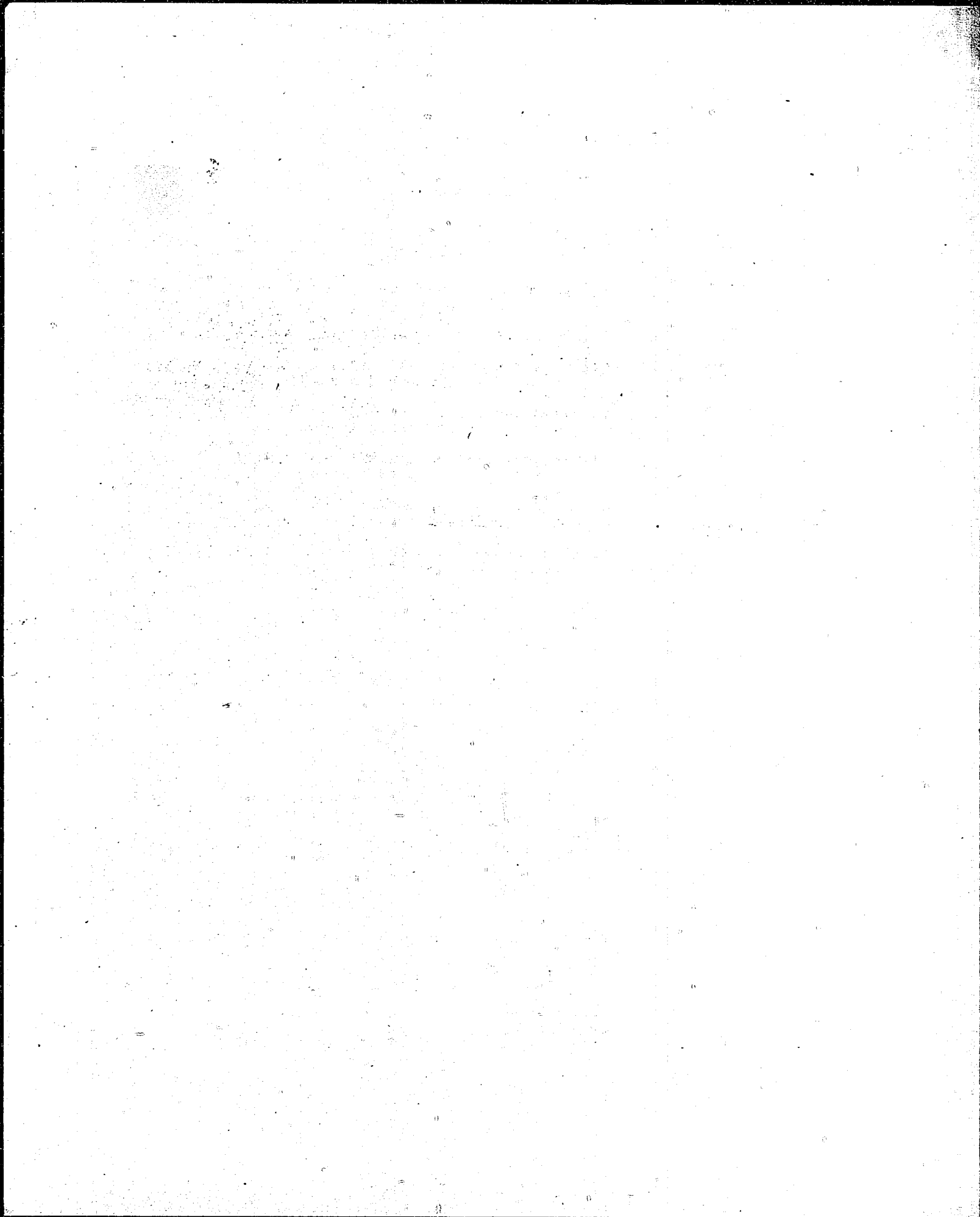
Japanese Personnel Interrogated:

As listed in Enclosure (A)

INTRODUCTION

To provide for a more complete understanding of the progress of the Japanese Navy in the field of electronics, it was determined that concurrent with the investigations on specific items, a study should be made of the general organization for design and research on electronic matters. It was further determined that a complete bibliography of electronic reports and manuals should be compiled, and all available documents be seized; in addition, that a collection of those items of equipment having unusual features should be made and shipped to the United States for further analysis and evaluation.

The report that follows, is general in covering Japanese electronics, and was compiled from data accumulated during interrogations of various Japanese naval officers, and from the analysis and cataloguing of the documents and equipments listed in Parts II and III of the report.



THE REPORT

Part I

ORGANIZATION OF JAPANESE NAVAL ELECTRONICS

Because of the speed and intensity with which the war developed, and because of the dependence placed on aviation during what proved to be the closing year of the war, the Navy Minister, in a reorganization of the Navy's research and development facilities, established the Second Naval Technical Institute (hereafter called "Institute") as the center of all electronic activity. It was made primarily responsible to the Naval Air Headquarters with secondary responsibility to the Navy Technical Department. All electronics personnel formerly with the Naval Technical Research Institute and the Aeronautical Research Institute were transferred to the new organization. The Aeronautical Research Institute became the First Naval Technical Institute, and was responsible for engines, air frames, armament, aviation instrument and aviation ordnance items. The organization chart, shown in Figure 1, indicates the positions occupied by these groups in February 1945 in the newly reorganized Navy Ministry.

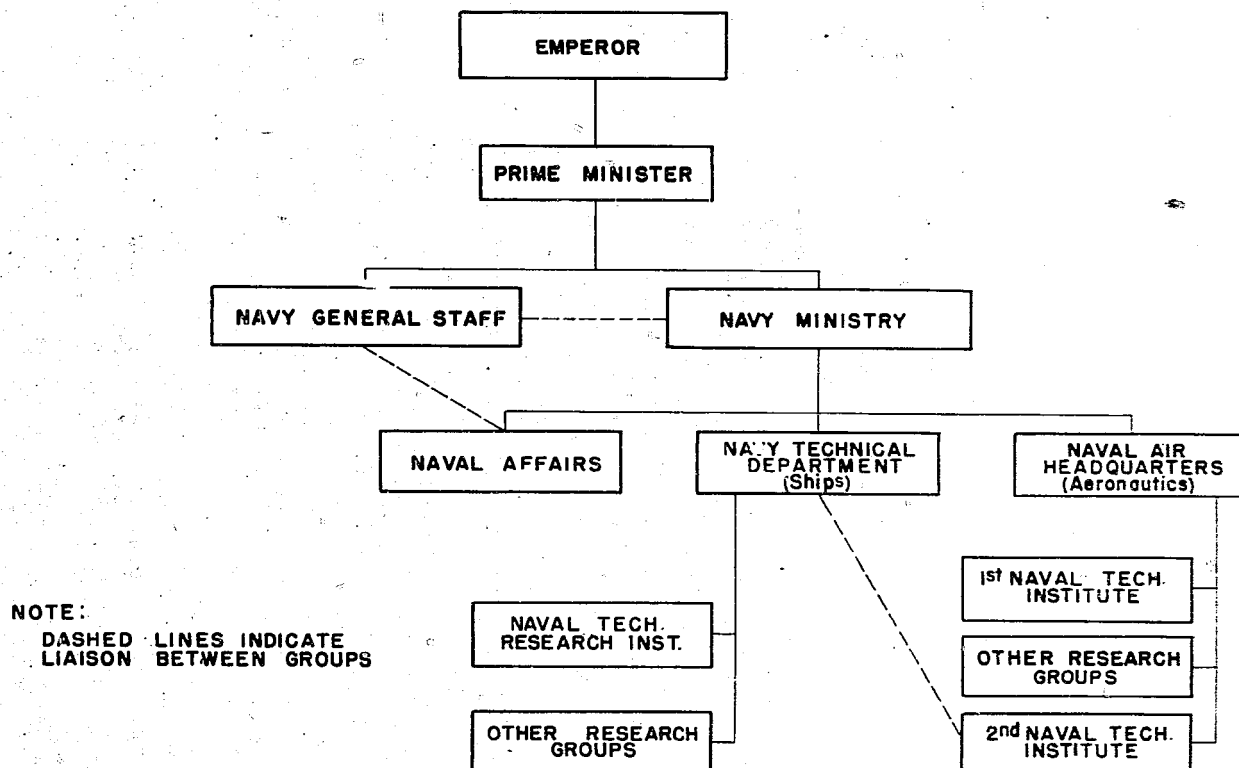


Figure 1
ORGANIZATION CHART OF JAPANESE NAVAL ELECTRONIC RESEARCH

Chief of the Institute: Vice Admiral MITSUNAGA, Sadaichi

Department	Department Head	Head Office	Location	Activities	Remarks
Administration	KOBE, Yuji Rear Admiral	Head Office Branch Office	KANAZAWA (Yokohama) MEGURO (Tokyo)		1. Administration of general affairs 2. General control of research 3. Liaison with 1st Naval Technical Inst.
Radar and Communication	NAWA, Takeshi Vice Admiral, Technical	Head Office Branch Office Experimental Stations	KANAZAWA (Yokohama) MEGURO (Tokyo) SHIZUOKA (Shizuoka) TOKOROZAWA (Saitama) DAITO (Chiba) TSUKUSHIMA (Tokyo) HIRATSUKA (Kanagawa) NEGISHI (Yokohama) KANAWA (Chiba)	General office, radar and radar detector General office, communication apparatus and IFF Theoretical study of radar Direction finders, radar detectors Radar Radar Wave propagation Radar Beacons	1. Electronic apparatus research 2. Communication apparatus research
Acoustic	YASUDA, Yasuo Vice Admiral	Head Office Branch Office Experimental Stations	NUMAZU (Shizuoka) MEGURO (Tokyo) ENOURA (Numazu) IWASHIMA (Shizuoka) SHIMATOGARI (Shizuoka) OSE (Shizuoka) TABI (Numazu)	General office and all research General office work Office work concerning experimental boat Part of sea experiment Not in use Part of sea experiment Underground laboratory	Acoustical apparatus research
Light and Heat	IZUTSUI, Kanji Captain	Head Office Branch Office Experimental Station	ZUSHI (Yokosuka) MEGURO (Tokyo) AJIRO (Shizuoka)	General office, ultra violet ray beacon, heat ray detector Photophony, IFF Infra red ray communication	Light and heat communication apparatus
Magnetic Detection	YASUDA, Yasuo Vice Admiral	Head Office Branch Office	NUMAZU (Shizuoka) HAYAMA (Kanagawa)	Infra red ray communication Line detection, magnetic igniter Submarine detector and hit recorder	Magnetic apparatus research
Yokosuka Division	TANI, Keiichi Rear Admiral, Technical	Head Office Experimental Stations	MAGAWA (Yokosuka) NEGISHI (Yokohama) HATSUSE (Kanagawa) KINUGASA (Yokosuka)	General office Radar installation Shipboard installation Test Laboratory	1. Research on shipboard installation and fitting of radar and communication apparatus 2. Checking practicability and performance of equipment.
Pay Masters	AKI, Takichi Captain, Pay Master	Head Office Branch Office	KANAZAWA (Yokohama) MEGURO (Tokyo)		Disbursing, purchasing, stocking and assignment of materials
Medical	Acting: SUGIYAMA, Akira Captain, Medical	Head Office Branch Office	KANAZAWA (Yokohama) NUMAZU (Shizuoka)		Health, medical and medical insurance

Figure 2
THE SECOND NAVAL TECHNICAL INSTITUTE ORGANIZATION CHART

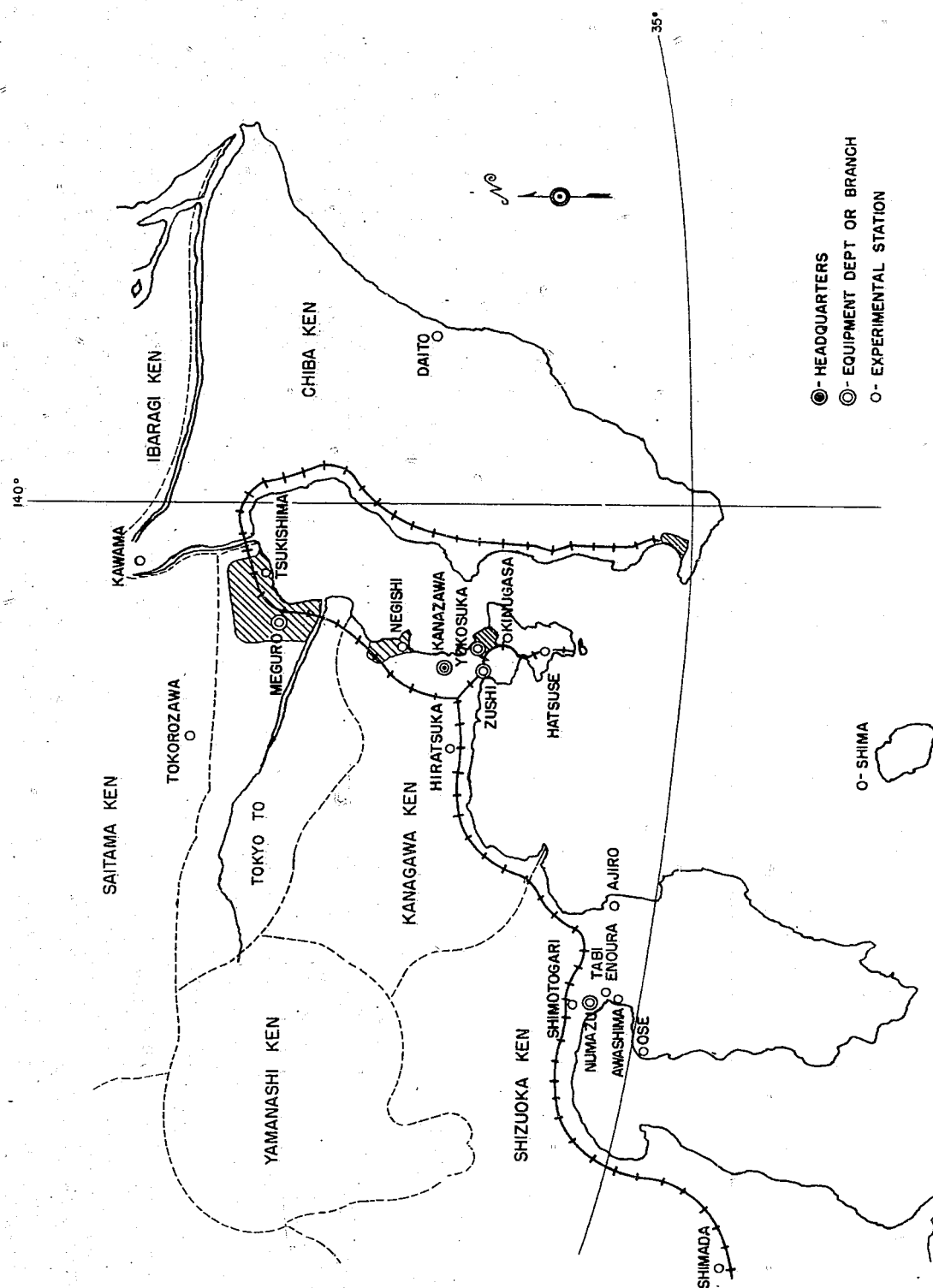


Figure 3
SECOND NAVAL TECHNICAL INSTITUTE
Chart Showing Location of
Laboratories and Experimental Stations

The Navy Technical Department and the Naval Air Headquarters were concerned only with technical matters; all operations were handled by the General Staff. In brief, the function of the organization was this: The General Staff would recognize the need for certain specific items, and would ask the Department of Naval Affairs for an opinion on the design and production problems involved. Naval Affairs, in turn, would assemble the necessary data and inform the General Staff that it could or could not be done. If the plan was feasible, the Navy Ministry would be directed to take the necessary steps to put the plan into action, and the proper department would be given its orders. All items of an electronic nature came to the Institute, where it was screened by the Administrative Section and passed on to the proper technical section. The head of the technical section would then assign the work to the engineer most fitted for the project. Figure 2 gives the organization of the Institute, while Figure 3 shows the location of the various laboratories under the control of the Institute.

All design, development, production, testing, and prototype installations were the responsibility of the section or department to which the particular item was assigned. The Project Engineer wrote specifications, and, in collaboration with the head of the section, assigned the design and development work to some associated laboratory where a prototype was made. Rarely was a complete system designed by one laboratory; instead the major components were assigned in accordance with the capabilities of the individual research groups.

When all component prototypes were complete, they were assembled for tests, and if satisfactory, the manufacturing companies were called in, shown the complete unit, and contracts were drawn up for production. Here again a complete system was rarely made by one company; individual components were made by several companies in accordance with their abilities. Company engineers would adapt the prototypes to production methods in accordance with space and weight specifications established by the Institute.

For quality control, samples were taken from production, assembled at various experimental stations, and complete checks made against specifications. Any modifications necessary were either made by the manufacturer, or if a quantity of units had been shipped to a remote point for storage, the Navy would make the modifications.

The chief engineers of the various companies concerned usually had complete knowledge of the entire system; however, subordinate engineers in the companies rarely knew the system as a whole. It is from these subordinate engineers that the comments "we didn't know-they wouldn't tell us-their secrecy prevented our best efforts" were heard.

Priorities were usually handled in the Administrative Division of the Institute and the system functioned quite well until demands exceeded the overall manufacturing facilities of Japan. Then a joint committee made up of Army and Navy personnel decided what steps should be taken. By the beginning of summer in 1945, this system no longer worked, and allocations were made on a "personality" basis.

Civilian engineers, university professors, private laboratories, etc. were used by the services in an advisory capacity, and their assignment depended largely on personal friendship with either Army or Navy engineers. When naval personnel were asked the nature of certain scientists' contributions, full accounts were given if he were a Navy man. However, if his allegiance was to the Army, the reply usually was "He is an Army man, we do not know".

As early as 1943, it was recognized that some neutral advisory group was needed to coordinate Army and Navy technical progress. This group was formed and served until the end of the war. Because of their position and acquaintance with top military and naval personnel, this group, unofficially,

influenced operations in many cases. Apparently this did not please the lower echelons in the Army and Navy, and their advice was disregarded more and more as the war drew to a close.

Prior to February 1945, electronics design and research in the Navy was handled by two separate groups. The Naval Technical Research Institute was under the Navy Technical Department and was charged with all shipborne or shorebased equipment. The Aeronautical Research Institute was concerned with all airborne electronics. When it became evident that concentrated effort should be placed on aviation (due to loss of ships, lack of operating material, etc.) all available personnel were transferred to the new organization. Japan at this time was suffering from a lack of qualified electronics engineers, and no program was in effect to give other electrical and mechanical engineers the special training needed to acquaint them with radio, radar, and sonar problems.

Part II

BIBLIOGRAPHY OF CAPTURED JAPANESE DOCUMENTS

Knowing the Japanese predilection for detailed notes and reports, every effort was made to collect documents pertinent to electronic design and research. Usually the personnel had burned on 15 August 1945 all information of this sort in accordance with instruction from "headquarters". However, most engineers had their own personal notes and were prevailed upon to produce these. Also, because of the decentralization of electronic activity, it was felt that somewhere there would be a quantity of such information that had not been destroyed. It was from such resources that the following documents were accumulated.

Because of the great number of documents seized, lack of time and personnel, no attempt has been made to translate these publications into English. All were identified by number, however, and a translation made of the title. These documents have been forwarded to the Washington Document Center, Washington D.C., via ATIS, and will be available there for further examination, should the need exist. Included are instruction books, operating manuals, and acceptance test data on various equipments; manufacturing drawings on certain items; detailed reports on specific research problems; tube manuals; allowance lists; and a wealth of associated information.

* * * * *

<u>NavTechJap</u> <u>Document No.</u>	<u>ATIS No.</u>	
ND21-6000-1 -2	3232	Studies of Electromagnetic Field Disturbances: Part 1- Electromagnetic Field Disturbance of Vertically Grounded Conductor Stimulated by Vertically Polarized Waves.
ND21-6000.1-1 -2	3232	Studies of Electromagnetic Field Disturbances: Part 2- Electric Field Disturbances of a Vertical Conductor and its Effect on Direction Finding.
ND21-6000.2-1 -2	3232	Studies of Electromagnetic Field Disturbances: Part 3- Errors in Direction Finding Due to Disturbances of Vertical Conductor.
ND21-6000.3-1 -2	3232	Studies of Electromagnetic Field Disturbances: Part 4- Investigation of Electromagnetic Field Disturbances of Ship's Hull using a Model Ship's Hull.

<u>NavTechJap Document No.</u>	<u>ATIS No.</u>	
ND21-6000.4-1 -2	3232	Studies of Electromagnetic Field Disturbances: Part 4- Supplement.
ND21-6000.5-1 -2	3232	Studies of Electromagnetic Field Disturbances: Part 5- Methods of Correcting for Deviation Errors.
ND21-6000.6-1 -2	3232	Studies of Electromagnetic Field Disturbances: Part 6- Azimuth Errors of Parallel Type Antennae.
ND21-6000.7-1 -2	3232	Studies of Electromagnetic Field Disturbances: Part 7- Night Errors Due to Free Space Disturbances of Electromagnetic Field.
ND21-6000.8-1 -2	3232	Studies of Electromagnetic Field Disturbances: Part 8- The Disc Body as Used with the Direction Finder.
ND21-6000.9-1 -2	3232	Studies of Electromagnetic Field Disturbances: Part 9- Azimuth Errors of the 8 Element Adcock Antenna.
ND21-6000.10-1 -2	3232	Studies of Electromagnetic Field Disturbances: Part 10- The 45° Adcock Direction Finder.
ND21-6000.11-1 -2	3232	Studies of Electromagnetic Field Disturbances: Part 11- Investigation of Electromagnetic Disturbances in Vicinity of Ship's Hull using a Model Ship's Hull.
ND21-6000.12-1 -2	3232	Studies of Electromagnetic Field Disturbances: Part 11- Supplement.
ND21-6000.13-1 -2	3232	Studies of Electromagnetic Field Disturbances: Part 12- Electromagnetic Disturbances of Vertical Cylindrical Body.
ND21-6000.14-1 -2	3232	Studies of Electromagnetic Field Disturbances: Part 13- Errors in Direction Finding Due to Adcock Method (part 2).
ND21-6001	3301	Research Experiments on the Experimental Adcock Type Medium Wave Land Based Direction Finder.
ND21-6002	3255	Studies on Spherically Polarized Electromagnetic Waves.
ND21-6003	3381	Studies on Potentiometer Type Range Determination, used with Radar.
ND21-6004	3469	Study of the Polyphase Crystal Oscillator.
ND21-6005	3382	Plans for Transmitter Wave Form Charging Equipment.
ND21-6006	3413	Results of Experiments Designed to Determine Depths of Underwater Radio Receiver using a Watertight Antenna.
ND21-6008	3480	Comparative Test Results on Electrolytic Capacitor.
ND21-6009	3515	Wave Absorption Type Wave Meter.
ND21-6010	3470	The Noise and Interference Limiter in Mechanical Reception.

NavTechJap
Document No. ATIS No.

ND21-6011	3471	Experimental Report on the Experimental Model Photo Electric Cell Audio Frequency Equipment.
ND21-6012	3488	Study of the Velocity Modulated Tube using Retardation Fields.
ND21-6013	3256	Revolving Oscillator Tuning Circuits: General Study of the Revolving Oscillator Antenna.
ND21-6014	3257	Free Wave Form Revolving Oscillator Antenna.
ND21-6015	3258	Stimulation of Infinite Phase Oscillation from Finite Phase Oscillation.
ND21-6016	3693	Report of Experimental Results on the Temporarily Designated Type 97 Portable CW Radio.
ND21-6017	3302	Experimental Research on the Small Type Medium Wave Radio Navigation Beacon.
ND21-6018	3481	Report of the Standards Committee on Smapp Paper and Mica Capacitors.
ND21-6019	3449	Comparative Test Results of Laminated Phenol Resin Plates and Phenol Resin Moulded Powder.
ND21-6020	3303	Experimental Report on the Ultra Short Wave Radio Navigation Beacon.
ND21-6021	3694	Study of the Duplex Transceiver.
ND21-6022	3695	Report on Test Results of Special Type 97 Short Wave Mark 2 Transmitter.
ND21-6023	3482	Comparative Test Results of Enamel Coated Fixed Resistors.
ND21-6024	3450	Test Results of High Frequency Insulator manufactured by Tokyo Radio Mfg. Co., Ltd.
ND21-6025	3451	Test Results of "HITLEX" Manufactured by Hitachi Mfg. Co.
ND21-6026	3489	Test Results of Small Ferric Anode Tubes.
ND21-6027	3383	Selection of Impulse Frequency in Radar Equipment.
ND21-6028	3696	Study of Linear Type Long Wave Receiver: Experimental Type 97 Long Wave Receiver.
ND21-6029	3452	Report on Test Results of Styrol Resin.
ND21-6030	3259	Experimental Study of CW Wave Form Distortion.
ND21-6031	3697	Experimental Study of Interchange of Aircraft Crystal Oscillator and Shipboard Crystal Oscillator.
ND21-6032	3698	Study of Stability of Type 92 Special Receiver.

NavTechJap Document No.	ATIS No.	
ND21-6033	3304	Study Concerning Improving the Performance of the Present Short Wave Direction Finder.
ND21-6034	3699	Test Results of the Type 92 Special Receiver Modification 3.
ND21-6035	3700	Study on the Use of Radio Equipment for Shell Spotting: Code Transmitter.
ND21-6036	3701	Test Results on the Improved Version of the Experimental Type 97 Long Wave Receiver.
ND21-6037	3702	Test Results on the Temporarily Designated Mark 2 Portable Carrier Telephone Equipment.
ND21-6038	3703	Plans for the Experimental High Frequency Mark 2 Transmitter.
ND21-6039	3472	Study of High Frequency Amplifiers: First Report (Test Model RE-3).
ND21-6040	3516	Test results on the Improved Version of the Temporarily Designated Type 97 Precision Wave Meter.
ND21-6041	3473	Study on the Stability of Receiver Local Oscillators: Second Report (Stable oscillator.)
ND21-6042	3704	Examination of the U.S. Navy Long Wave 2 kw Transmitter.
ND21-6043	3260	Radiation Characteristics of the Polyphase Vertical Antenna.
ND21-6044-1 -2	3261	Radiation Characteristics of the Star and Ring Shaped Polyphase Horizontal Antennae.
ND21-6045	3705	Test Results on the Temporarily Designated Mark 1 Portable Carrier Telephone Equipment.
ND21-6046	3262	Radiation Resistance of the Rotating Oscillation Antenna.
ND21-6047	3263	Rotating Oscillation Antenna (Infinite Phase Antenna).
ND21-6048	3264	Horizontally Fixed Symmetrical Polyphase Antenna.
ND21-6049	3706	Experimental Report on the Temporarily Designated Type 97 Mark 2 Model 2 Short Wave Transmitter.
ND21-6050	3517	Research Report on Improving the Type 92 Short Wave Meter.
ND21-6051	3518	Test Results on the Temporarily Designated Zero type Ultra Short Frequency Wave Meter.
ND21-6052	3265	Theory of Design and Calculation of the Branching Wave Guide.
ND21-6053	3490	Experiments on Detector Tubes.

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Document No. ATIS No.

ND21-6054	3492	Tests on Detector Tubes: Part 1.
ND21-6055	3492	Tests on Detector Tubes: Part 2.
ND21-6056	3414	Investigation of the Formation and Electrical Conductivity of Sea-Water.
ND21-6057	3519	Test Equipment for Measuring Allowable Grid Voltages for High Frequency Receiving Tubes.
ND21-6058	3707	Latest Communication Developments in Europe and America.
ND21-6059	3474	Outline of Feed-Back Amplifier Circuits.
ND21-6060	3475	Study of Constant Signal Generator.
ND21-6061	3483	Standard Radio Parts.
ND21-6062	3484	Standard Radio Parts.
ND21-6063	3493	Comparative Tests on Radio Receiving Tubes.
ND21-6064	3453	Study of Special Insulators (Method of Producing Polystyrol).
ND21-6065	3266	Antenna Arrays with Closely Spaced Elements.
ND21-6066	3494	Magnetrons: Study of Magnetron Oscillator (Report No. 5).
ND21-6067	3495	Trisected Anode Magnetron and the 3 phase Electric Oscillator Study of the Magnetron Oscillator (Report No. 6).
ND21-6068	3496	Discussion of the Polyphase Electric Oscillator: Study of the Magnetron Oscillator (Report No. 7).
ND21-6069	3485	Comparative Tests on the Variable High Resistors.
ND21-6070	3423	Underwater Listening and Underwater Communications: Part 1.
ND21-6072	3497	Report of the Small Type Receiving Tube Standardization Committee.
ND21-6075-1	3330	Instruction Book, Temporarily Designated Type 3 Mark 1 Model 1 Radar.
ND21-6101-1 -2	3384	Report on Installation of Type 3 Mark 2 Radar Aboard the TAKAO.
ND21-6106	3385	Radar Maintenance.
ND21-6107-1 -2	3386	Typical Protection for Use by Land Forces and Precautions in Operation. Radar.
ND21-6108-1 -2	3387	Radar Typical Protection for Use by Land Forces.

NavTechJap Document No.	ATIS No.	
ND21-6109-1 -2	3388	Special Lookout Station - typical protection construction.
ND21-6110-1 -2	3389	Tests on Submarine Radar.
ND21-6111-1 -2	3390	Radar Installations for Land Forces.
ND21-6112	3391	Radar Blind Spots.
ND21-6113	3392	Table of Radar Tubes.
ND21-6114-1 -2	3393	Radar Standard Nomenclature - shipboard and land base use.
ND21-6115	3524	Instruction Book - Radar Intercept Receiver.
ND21-6123	3520	Centimeter Wave, Absorption Type Wavemeter.
ND21-6124	3305	Loop Model RDF Installation and Errors due to Installation.
ND21-6125	3306	Lorentz Long Wave Model U Adcock Bearing Gauge.
ND21-6126	3307	Experimental Report Type O Ultra-Short Wave Direction Finder.
ND21-6127	3709	Installation of Model 2 Mark 1 Transmitter used with Type 96 Mark 1 Radio Beacon.
ND21-6128	3308	Test Report on Ultra-Short Wave Radio Beacon.
ND21-6129-1 -2	3309	Study of the Effects of the Ship's Whistle, Pipe and Calibration Errors of the Long Wave Direction Finder and Counter Measures Against.
ND21-6130	3310	Blind Radio Landing Equipment.
ND21-6131-1 -2	3311	Tests of Aircraft Radio Beacon.
ND21-6132	3312	Tests of Aircraft Radio Beacon.
ND21-6133-1 -2	3313	Short Wave RDF - Installation and Maintenance - for Land Use.
ND21-6136	3314	RDF Land Use, Medium Wave Installation Methods and Precautions in Operation.
ND21-6139	3315	Research Relative to Errors in Shipboard RDF.
ND21-6142	3415	Experimental Underwater Receiving Antenna Type 3 Installation.
ND21-6144	3416	Underwater Wireless Reception.
ND21-6145-1 -2	3417	Underwater Wireless Reception Material.

<u>NavTechJap Document No.</u>	<u>ATIS No.</u>	
ND21-6146	3710	Study of Special Radio Communication Methods using Phase Displacement.
ND21-6147	3711	Revisions on Portable Radio Charts for Handling.
ND21-6148	3316	Experimental Research regarding Installation of Loop Antenna.
ND21-6150	3424	Measurement of Attenuation Ratio of Vertically Polarized Supersonic Waves on the Surface of the Sea, and their Reflection Ratios from the Bottom of the Sea.
ND21-6151	3425	Study of Propagation of Supersonic Waves.
ND21-6152	3426	Study of Substitute Magnetostriction Materials.
ND21-6153	3427	Study of Effect of Bubbles in Underwater Listening.
ND21-6160-1 -2	3394	Radar and Radar Intercept Receivers Installation Instruments.
ND21-6161	3531	Intercept Receiver METOKKUSU Model R-600 Operating Instruments.
ND21-6163	3395	Table of Naval Radar.
ND21-6167	3396	Radar Installed on German Cruisers.
ND21-6168	3397	German Radar Indicators and Bisuma Antenna.
ND21-6169	3398	German Radar Lookout Methods.
ND21-6170	3399	Installation of Rotterdam Radar on British Planes and German Countermeasures.
ND21-6171	3400	Installation on British Planes of Anti-German Air Attack Rotterdam Radar.
ND21-6172	3401	Outline of MEDDO radar used on British Planes.
ND21-6173	3267	Measurement of Intensity of Interference Waves.
ND21-6174	3268	Ring Wave Guides and Reflectors.
ND21-6175	3269	Circularly Polarized Electromagnetic Waves - Study.
ND21-6176	3270	Tables and Charts of Short and Medium Range Short Wave Propagation in the South Seas Area.
ND21-6177	3271	Study of Wave Propagation in the South Seas.
ND21-6178	3272	Study of Propagation Characteristics of Circularly Polarized Electromagnetic Waves in the Atmosphere.
ND21-6179	3273	Measurements of Spherical Conditions of Radio Directional Antenna.
ND21-6180	3317	Collection of Errors of Adcock Antenna and Goniometer used in Wireless Course Detection Gear.

NavTechJap Document No.	ATIS No.	
ND21-6181	3274	Theoretical Research on the KAJIUIDO Type Directional Antenna (TAMA Mark 3).
ND21-6182	3275	Studies of the Rotating Antenna.
ND21-6183	3402	List of Vacuum Tubes used in Japanese Radar.
ND21-6184	3498	Vacuum Tube Characteristics.
ND21-6185	3276	Summary of Geometric Circuits in CM Wave Technique.
ND21-6186	3499	Magnetron Tubes Studies. Simultaneous Rotating Oscillator in Split Anode Magnetrons.
ND21-6187	3500	Magnetron Tube Studies. Excitation Forms and Characteristics Oscillation in the Magnetron.
ND21-6188	3501	Super-Heterodyne Detection with the Osaka Tube.
ND21-6189	3502	Regenerative Detection Characteristics of the Osaka Tube.
ND21-6190	3503	Influence of Construction upon Relationship between Voltage and Wave-length in Design of the Osaka Tube.
ND21-6191	3504	The Electromagnetic Field within the Osaka Tube.
ND21-6192	3505	Theory of Super-Regenerative Detection with Receiving Tube, using Electron Periodicity.
ND21-6193	3506	Theory of Frequency Switching Tube Using Electron Periodicity.
ND21-6194	3507	Theory of Super-Heterodyne Detection with Receiving Tubes using Electron Periodicity.
ND21-6195	3508	Standards of Vacuum Tubes used for Reception.
ND21-6196	3509	Chrysanthemum Type Magnetron.
ND21-6197	3454	Study of Composition of Polyethelene.
ND21-6198-1 -2	3455	Study of the Maintenance of Water Repellency of Paraffin in Sea-water.
ND21-6199	3456	Experiments on the Deterioration of Steatite Cable Insulators due to Sea-water.
ND21-6200	3457	Experiments on Laminated Phenol Resins.
ND21-6201	3458	Comparative Test Results of Japanese Manufactured Steatite.
ND21-6202	3521	Research Methods of Measuring High Frequency Cable.
ND21-6203	3459	Results of Polystyrol Tests.
ND21-6204	3460	Tests of Rubber Insulated Wire for Navy Use.

<u>NavTechJap Document No.</u>	<u>ATIS No.</u>	
ND21-6205-1 -2	3461	Experiments on Rubber Insulated Wire for Navy Use.
ND21-6206	3462	High Frequency Cables Handling of Simple Terminals.
ND21-6207	3463	Methods of Moisture Proofing H.F. Cables.
ND21-6209	3428	Underwater Listening.
ND21-6210	3522	Instruction Manual for Testing Radiation Characteristics.
ND21-6212	3430	Account of Research Progress in Field of Echo Ranging.
ND21-6213	3403	English Radar.
ND21-6214	3431	Experiments in Adjusting Hydrophones.
ND21-6216.1-1 -2	3318	Installation Report on Type 3 Medium Frequency RDF.
ND21-6216.2-1 -2	3404	Type 2 Mark 1 Model 2 Modification 3 Radar and Type 2 Mark 1 Model 2 Modification 3 (1.5 m Wavelength) and Radar Using Submarine Antenna RDF. Experimental Report.
ND21-6213.3	3404	Installation Report on Type 3 Mark 1 Model 1 (11 k) Radar.
ND21-6216.4	3404	Experimental Report on D6 Rotating Mechanism and Manual Equipment.
ND21-6216.5	3404	Report on Tuning the S ₃ Installed at CHICHIJAMA.
ND21-6216.6-1 -2	3404	Report on Installation of Temporarily Designated Type 3 Mark 1 Model 3 Radar Antenna Rotation Mechanism on Special Picket Boats.
ND21-6216.7	3404	Tuning Procedure for Mark 4 Radar.
ND21-6206.8-1 -2	3532	Experimental Report on Submarine Intercept Receiver Covered Antenna.
ND21-6216.9	3404	Installation Report No. 13 Radar Antenna (Shipboard).
ND21-6217	3523	Static Measurement Results.
ND21-6218	3464	Studies on Temperature Characteristics of High Frequency Insulators (First Report) Characteristics Surface Resistance of Steatite.
ND21-6219	3465	Test Results on NIPOREKUSU (Niplex ?) Electrical Insulating Material.
ND21-6220	3486	Test Results on Oil Filled Capacitors used in Communications Manufactured by Sumitomo Electric Co.
ND21-6221	3510	Test Results on Special Tubes Manufactured by Kawanishi Machine Mfg. Co.

NavTechJap Document No.	ATIS No.	
ND21-6222	3533	Performance Tests on Type 2 Mark 2 Model 1 Antenna, used for Radar Antenna used for Intercept purposes.
ND21-6223	3405	High Voltage Power Supply for Radar Transmitter.
ND21-6224	3466	Polyethelene Polymer used for High Frequency Electric Cable.
ND21-6225	3487	Test Results, Small Type Electrolytic Capacitors.
ND21-6226-1 -2	3319	Ultra-Short Wave Aircraft Navigation Beacon. (Fourth Exp. 0)
ND21-6227	3511	Velocity Modulated Tubes (First Report).
ND21-6228	3512	Elimination of Shadows From the Supports in Circular Sweep CRT.
ND21-6229.1 thru .35	3326	Map of Japanese Radar Installations.
ND21-6230.1 thru .8	3227	Typical Installation of Radar and RCM.
ND21-6232.1 thru .2	3406	Radar #32 Installation and Waveguide Prints.
ND21-6232.3-1&2 thru .11-1&2	3406	Radar #32 Installation and Waveguide Prints.
ND21-6234.1-1&2 thru .4	3534	Intercept Receiver and Antenna Installation Prints.
ND21-6234.5-1&2 thru .10-1&2	3534	Intercept Receiver and Antenna Installation Prints.
ND21-6237	3411	Instruction Book, Temporarily Designated Mark 2 Model 2 Radar (microfilm).
ND21-6238	3433	Plans for U/W Sound Equipment for 1945.
ND21-6239	3434	
ND21-6240	3435	Absolute Measurement of U/W Sound.
ND21-6241	3436	Study of Rochelle Salt Oscillation.
ND21-6242	3437	Theory of Oscillation of X45° - cut Rochelle Salt Crystal.
ND21-6243	3438	Binaural Listening.
ND21-6244	3439	Noises Emanated by a Submarine Underway.
ND21-6245	3440	
ND21-6246	3441	Study of U/W Listening - Capt. Tanio KUYANA.
ND21-6248	3442	Hydrophone Arrangement for Sound (general) - Collected Note.

<u>NavTechJap Document No.</u>	<u>ATIS No.</u>	
ND21-6252	3418	Report on Research into Sound and Vibration Absorbing Material.
ND21-6258	3213	Standard Types and Sizes of Vibration Preventing Rubber Blocks.
ND21-6260	3212	Methods of Installing Rubber Shock Absorbers on Ships.
ND21-6262	3443	
ND21-6263	3444	
ND21-6264	3445	Experiments on Construction of U/W sound Training Equipment.
ND21-6265	3446	Circular Hydrophone Arrangement for Sound Reception.
ND21-6266	3447	Underwater Supersonic Propagation - 1943.
ND21-6267	3476	Operation of Multipolar High Frequency Amplifier-1942.
ND21-6268	3477	Powdered Cores for High Frequency - 1943.
ND21-6269	3277	Research on Wave Transmission.
ND21-6270	3467	Research on Special Insulating Materials.
ND21-6271-1 -2	3478	Research on Oscillating Circuits.
ND21-6272-1 -2	3513	Research on Magnetrons.
ND21-6273	3514	Research on Magnetrons - 1941.
ND21-6275-1 -2	3407	Instructions for Installing Radar and Radar Intercept Equipment (proposed) Land Installations - April 1945.
ND21-6276	3408	Instructions for Installing Radar and Radar Intercept Equipment - Shipboard Installations.
ND21-6278	3409	Experiments on the Temporarily Designated Mark 6 Model 1 Radar.
ND21-6280	3410	Performance of Experimental Parabolic Antenna for Radar Intercept Equipment.
ND21-6282	3468	Test Results of Special 2-Conductor Rubber High Frequency Cable - April 1945.
ND21-6283-1 -2	3712	List of Radio Equipment Scheduled for Ships #5491 and #5572 - 1945.
ND21-6284	3479	Experiments on Torque Amplifier Characteristics.
ND21-6285	3448	Underwater Sound Listening Devices - 1945.
ND21-6286	4241	Experimental 19 Air Mark 3 Radio Operators Manual.

NavTechJap Document No.	ATIS No.	
ND21-6287-1 -2	4242	Type 3 Air Mark 6 Model 4 Modification 3 Radar Instruction Manual.
ND21-6288-1 -2	4243	Temporarily Designated Model 1 Radio Altimeter (FH), Instruction book.
ND21-6289	4244	Type 3 Air Mark 1 Modification 1, 2, 3 Radio Telephone Equipment-Instruction book.
ND21-6073	3328	Instruction book - Temporarily Designated Mark 1 Radar.
ND21-6074	3329	Modification and Repair - Temporarily Designated Type 3 Mark 1 Radar.
ND21-6075-2	3330	Instruction Book, Temporarily Designated Type 3 Mark 1 Model Radar.
ND21-6076	3331	Installation Report, Temporarily Designated Mark 1 Model 1 Radar.
ND21-6077-1 -2	3332	Installation Instructions - Temporarily Designated Mark 1 Model 1 Radar.
ND21-6078-1 -2	3333	Instruction Book - Coupling Device and Wavemeter used with Temporarily Designated Type 3 Mark 1 Model 1 Radar.
ND21-6081-1 -2	3336	Instruction - Installation Temporarily Designated Mark 1 Model 2.
ND21-6082-1 -2	3337	Modification Reports Radar Type 2 Mark 1 Model 2 Modification 2.
ND21-6083-1 -2	3338	Modification Reports Type 2 Mark 1 Model 2 Antenna.
ND21-6084-1 -2	3339	Operating Instructions - Temporarily Designated Mark 1 Model 2 and Mark 2 Model 1.
ND21-6085-1 -2	3340	Instruction Book for KO(A) Model 1 Indicator used with Type 3 Mark 1 Model 3.
ND21-6086-1 -2	3341	Instruction Book - Radar Type 3 Mark 1 Model 3 Shipboard.
ND21-6087-1 -2	3342	Instruction Book - Radar Type 3 Mark 1 Model 3 Land Based.
ND21-6088	3343	Installation and Maintenance Temporarily Designated Mark 1 Model 4.
ND21-6089	3344	Instruction Book - Antenna Switching Device used with Temporarily Designated Type 3 Mark 2 Model 1 Radar.
ND21-6090-1 -2	3345	Antenna Coupling Device used with Type 2 Mark 2 Model 1.
ND21-6091	3346	Instruction Manual Voltage Regulator for Mark 2 Model 1.

<u>NavTechJap Document No.</u>	<u>ATIS No.</u>	
ND21-6092	3347	Instruction Book for Receiver used with Temporarily Designated Type 3 Mark 2 Model 1.
ND21-6093-1 -2	3371	Instruction Book - Radar Temporarily Designated Mark 2 Model 2.
ND21-6094	3348	Operating Instructions - Radar Temporarily Designated Type 3 Mark 2 Model 3.
ND21-6095-1 -2	3349	Operating Instructions - Radar Mark 2 Model 2 Modification 2.
ND21-6096-1 -2	3350	Operating Instructions - Radar Mark 2 Model 2 Modification 3.
ND21-6097-1 -2	3351	Instruction Book - Radar Mark 4 Model 1.
ND21-6098-1 -2	3352	Instruction Book - Temporarily Designated Mark 4 Model 3.
ND21-6099-1 -2	3353	Instruction Book - Radar Mark 4 Model 3 Modification 1.
ND21-6100	3354	Instruction Book for Wave Meters used with Radars Mark 1 and 3.
ND21-6102-1 -2	3355	Instruction Book - Wave Meters Model 1 used with Radars Mark 1 and 2.
ND21-6103	3690	Instruction Book for 2½ KVA Automatic Voltage Regulator.
ND21-6105-1 -2	3356	Instruction Book - Automatic Voltage Regulator 5KVA.
ND21-6116	3525	Tests on Temporarily Designated Radar Intercept Receiver.
ND21-6117-1 -2	3526	Experimental Oscillator for Radar Intercept Receiver Operating Procedure.
ND21-6118-1 -2	3527	Operating Instructions Radar Intercept Receiver.
ND21-6119-1 -2	3528	Operating Instructions - Temporarily Designated Improved Type of Intercept Receiver.
ND21-6120-1 -2	3529	Improved Installation - Radar Intercept Receiver.
ND21-6122-1 -2	3530	Operating Instructions - Radar Intercept Receiver.
ND21-6134-1 -2	3320	RDF Type 91 Mark 2 - Operating Instructions.
ND21-6135	3321	RDF Type 93 Mark 1 - Operating Instructions.

<u>NavTechJap</u> <u>Document No.</u>	<u>ATIS No.</u>	
ND21-6137-1 -2	3322	RDF Type 2 Model 1 Installation and Maintenance.
ND21-6138-1 -2	3323	RDF Type 97 Mobile Operating Instructions.
ND21-6141-1 -2	3325	Experimental Type 5 Model 1A RDF Installation and Maintenance.
ND21-6143		Echo Ranging Equipment - Block Diagram.
ND21-6154-1 -2	3535	E-27 Intercept Receiver - Automatic. (Schematic)
ND21-6155-1 -2	3357	Radar Mark 1 Model 1 Modification 2 Installation Drawings.
ND21-6156	3358	Radar Mark 2 Model 2 Modification 2 Receiver Operating Instrument.
ND21-6157	3359	Radar Type 3 Mark 2 Model 1 Indicator.
ND21-6158	3360	Radar Mark 4 Model 1 Operating Instruction.
ND21-6159	3361	Reinstallation of Type 3 Mark 2 Radar on TAKAO.
ND21-6162	3420	Experimental Radio Altimeter.
ND21-6164	3362	Performance Tests on Radar Model (After Installation).
ND21-6165-1 -2	3421	Radar Air Mark 6 Model 4 - Instruction Book.
ND21-6166-1 -2	3422	Instructions for Handling on Land the Type 3 Mark 6 Model 4 and Type 3 Model 4 Antenna.
ND21-6208	3363	Radar 105 all Installations Instructions.
ND21-6211	3429	Explanatory Tables and Diagrams Type 93 Hydrophone.
ND21-6215	3432	Installation Outline for Experimental Hydrophone Model OTSU ("B").
ND21-6231.1 thru .4	3364	Radar Mark 2 Model 2 Installation and Wiring Prints.
ND21-6233-1 -2	3372	Radar Type 2 Mark 1 Model 2 Modification 3 External Wiring.
ND21-6235-1 -2	3365	Radar Mark 4 Model 3 Modification 3 (L2).
ND21-6236-1 -2	3366	Radar Mark 4 Model 2 External Wiring.
ND21-6274	3368	Trouble Shooting Table for Temporarily Designated Mark 2 Radar - June 1945.
ND21-6277-1 -2	3367	Modifications in Installing Temporarily Designated Type 3 Mark 1 Model 1 Radar - February 1945.

<u>NavTechJap Document No.</u>	<u>ATIS No.</u>	
ND21-6279	3369	Temporarily Designated Mark 4 Model 3 Radar.
ND22-2686	4101	Compound Type Mark 3 Underwater Signal Equipment - (Blueprint).
ND22-2687	4100	Compound Type Mark 2 Underwater Signal Equipment - Block Diagram. (Blueprint)
ND22-2701	4099	Compound Type Mark 3 Underwater Signal Equipment - (Blueprint).
ND22-2703	4087	Type 99 Submarine Hydrophone Protector and Receiver Equipment (Blueprint).
ND22-2704	4098	Type 93 Submarine Hydrophone Model 2-A - Connection Diagram (Blueprint).
ND10-0500	3076	Manual for 6-Digit Automatic Sending Machine.
ND50-4000(b)	3930	"Teson No. 1", Report on Tests of the General Characteristics.
ND50-4001(b)	3931	Results of Measurements on Steatite Samples.
ND50-4002	3932	"Teson No. 1", Table of Constructional Tolerances.
ND50-4000(a)	3150	Type 3 Mark 1 MAD Equipment Instruction Book. (Annex).
ND10-6000.1	3068	Capabilities and Designations of Japanese Navy Radar.
ND10-6000.2	3068	Performance Figures on Mark 2 Model 2 Modification 2 Radar.
ND10-6000.3	3068	E-27 Radar Intercept Receiver, Naval Technical Research Institute, 2 May 1943. (Incomplete engineer's notebook).
ND10-6000.4	3068	Naval Technical Research Laboratory Instruction Book on Temporarily Designated Type 3 Mark 1 Model 3 (Mark 13) Radar Transmitter. Also schematic and list of parts.
ND10-6000.5	3068	Sasebo Naval District Blueprint Schematic on Mark 13 Indicator Unit, with list of Parts.
ND50-4001(a)	3149	Type 3 Mark 1 MAD Equipment Instruction Book.
ND22-0040	4314	Anti-Radar Paint.
ND22-0042	4315	Sound Absorbent Paint.
ND22-3000	4332	Temporarily Designated 3 Mark 1 Model 3 Radar- Handling Instructions.
ND22-3001	4333	Temporarily Designated Mark 4 Model 1 Radar - Handling Instructions.
ND22-3002	4334	Temporarily Designated Mark 4 Model 1 Radar - Handling Instructions.

NavTechJap Document No.	ATIS No.	
ND22-3003	4335	Temporarily Designated Mark 4 Model 3 Radar - Instruction Manual.
ND22-3004	4336	Temporarily Designated Mark 4 Model 3 Modification 1 Radar Circuit Diagrams.
ND22-3005	4337	Shipboard Installation Procedures for Radar and Radar Intercept Receivers.
ND22-3006	4338	Land Installation Procedures for Radar and Radar Intercept Receivers.
ND22-3007	4339	Experimentally Manufactured Type 4 Model 3 Modification 1 Radar Intercept Receiver - Handling Instructions.
ND22-3008	4340	Details of 10cm Radar RF System.
ND22-3009	4341	Details of RCM Antennas Under Development.
ND22-3010	4342	List of Electronic and Sonar Equipment.
ND22-3011	4343	List of Radars, with Characteristics.
ND22-3012	4344	List of Radar Intercept Receivers.
ND22-3013	4345	Temporarily Designated Type 3 Model 2 Radar, Instruction Manual.
ND22-3014	4346	Temporarily Designated Type 3 Model 2 Radar, Schematic Diagram.
ND22-3015	4347	Standard Installations for Ships of Radio, Radar and Underwater Sound Equipment.
ND22-3017	4348	Infra-red Signal Equipment, Schematic Diagram.
ND22-3018	4349	Complete List of Radars, IFF and Intercept Equipment for Airplane use, with Characteristics.
ND22-3022	4350	Experimental Model K Simple Radar Indicator, Circuit Diagram.
ND22-3023	4351	Mark 4 Model 4 Modification 2 Radar, Schematic Diagram.
ND22-3024	4378	Wiring Diagram for Type 2 Mark 2 Modification 3 Radar Transmitter.

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Part III

SEIZED ELECTRONIC EQUIPMENT

To enable a more complete study of Japanese naval electronics, a number of representative equipments were collected and shipped to the Naval Research Laboratory via OIL. Some of the equipments are obviously of little interest in regard to design; however they are typical of production units, and offer an opportunity for thorough examination of components. Others embody features that reflect the design trend at the conclusion of the war.

The attempt has been made to collect complete equipments, with an adequate supply of spare parts and tubes, to enable detailed analysis in the United States. The numbering system used is self-explanatory, and should identify all units that go together to make up a complete system.

In general, only shipborne items have been collected, although some shore-based equipments that are peculiar to the Navy have been included. Other agencies operating in this theatre, FEAF, ATIG, TLID, TAIU, C of E, as well as other units of the U.S. Navy, collected equipments pertinent to their investigations and made their own distribution. As a result, not many airborne electronics, or Army equipments will be found in this listing. Wherever possible a notation of the samples shipped by other agencies is included in the various electronics reports of the Mission.

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NavTechJap
Equipment No.

Item

JE10-6101 E-27 Radar Intercept Receiver (Mark 2 Modification 1)
JE10-6102

JE10-6101.1	JE10-6102.1	spare parts
.2	.2	rectifier
.3	.3	receiver
.4		antenna

JE22-6100 Mark 2 Model 2 Modification 3 Radar

JE22-6100-A	Transmitter
-B	Control Unit
-C	Improved Receiver
-D	Pulse Modulator
-E	Indicator
-F	Cooling System
-G	D-10 Antenna
-H	Duplexer
-I	Spare Parts
-J	Spare Parts
-K	Spare Parts
-L	Coaxial Conductor
-M	Wave Guide Flange
-N	M.G. Set (500 ⁿ)

JE10-6000 Mark 2 Model 2 Modification 4 Radar
JE10-6001
JE10-6002
JE10-6104

JE10-6000.1	JE10-6001.1	Transmitter
.2	.2	Rectifier
.3	.3	Cooling Pump
.4	.4	Pulse Modulator
.5	.5	Transmitter Control
.6	.6	Receiver
.7	.7	Receiver Control
.8	.8	Transmitter Synchronizer
.9	.9	Indicator
.10	.10	Range Indicator
.11	.11	Voltage Indicator
.12	.12	Regulated Rectifier
.13	.13	Spare Parts B (2 of 2)
.14	.14	Spare Parts A (1 of 2)
.15	.15	Induction Regulator for Power Supply
.16	.16	Switch Board
.17	.17	Motor Starter (Rheostat)

NavTechJap
Equipment No.

Item

JE10-6000 Mark 2 Model 2 Modification 4 Radar

JE10-6000				
JE10-6001				
JE10-6002				
JE10-6104				
	JE10-6000.18	JE10-6001.18	Motor Field Regulator	
	.19	.19	Horn Antenna	
	.20		Motor Generator	
	.21	.21	M312A Magnetrons (10)	
	.22	.22	Miscellaneous	
	.23		Tubes for Two Sets	
	JE10-6002.1		Transmitter	
	.2		Transmitter Control	
	.3		Transmitting Wave Guide Coupling	
	.4		Transmitter Rectifier Power Supply	
	.5		Transmitter Synchronizer	
	.6		Receiver	
	.7		Receiver Control	
	.8		Indicator (60 kilometer range)	
	.9		Range Indicator (any 10 kilometer section)	
	.10		Pulse Modulator	
	.11		Voltage Regulator for Power Supply	
	.12		Regulated Rectifier	
	.13		Voltage Regulator	
	.14		Wavemeter	
	.15		Spare Parts B	
	.16		Magnetron Cooling Pump	
	.17		Magnetrons - Receiver Local Oscillator	
	JE10-6104-A		Range Indicator	
	-B		Indicator Voltage Regulator	
	-C		Pulse Generator	
	-D		Receiver	
	-E		Torque	
	-F		Bearing Indicator	
	-G		Transmitter Rectifier	
	-H		Pulse Generator Voltage Regulator	
	-I		D-6 Antenna	
	-J		Indicator Voltage Regulator	
	-K		Pulse Modulator	
	-L		Receiver Power Control	
	-M		Transmitter Frequency Meter	
	-N		Transmitter	
	-O		Automatic Voltage Regulator	
	-P		Water Cooling Pump	
	-Q		Transmitter Power Control	
	-R		Spare Parts and Miscellaneous	
	-S		Antenna Selsyn #1	
	-T		Antenna Selsyn #2	
	-U		Bearing Indicator	
	-V		D-6 Antenna	
	-W		Antenna Motor	
	-X		Antenna Parts	

JE10-6010 Type 3 Mark 1 Model 3 Radar

JE10-6010	6010.1	6011.1	6012.1	6013.1	Transmitter
JE10-6011				.2	Transmitter Rectifier
JE10-6012	.2	.2	.2	.3	Indicator
JE10-6013	.3	.3	.3	.4	Receiver
JE10-6117	.4	.4	.4	.5	Receiver Power Supply
	.5	.5	.5	.6	Spare Parts
	.6	.6	.6		

NavTechJap
Equipment No.

Item

JE10-6010
JE10-6011
JE10-6012
JE10-6013
JE22-6117

Type 3 Mark 1 Model 3 Radar

6010.7	6011.7	6012.7	6013.7	Cables and Selector Switch
.8	.8	.8	.8	Antenna
.9	.9	.9	.9	Antenna Train Control
.10	.10	.10	.10	Antenna Supports (5 parts)
.11				Tubes for Four Sets

JE22-6117-A Indicator
-B Transmitter
-C Receiver
-D Receiver Rectifier
-E Transmitter Rectifier and Modulator
-F Spare Parts
-G Box Miscellaneous Parts
-H Antenna
-I Antenna Elements
-J Conductor Elements
-K Submarine Antenna

JE21-6343

Type 3 Air Mark 6 Model 3 Radar (H-6)

JE21-6343 Receiver

JE10-6103
JE10-6104
JE10-6105
JE10-6106

Type 4 Model 3 Modification 1 Radar Intercept Receiver

6103.1	6104.1	6105.1	6106.1	Antenna
.2	.2	.2	.2	Receiver
.3				Tubes for Four Sets

JE21-6349

Experimental 19 Air Mark 1 Model 12 Radar (FK-3)

JE21-6349.1 Transmitter
.2 Dynamotor
.3 Antenna Unit
.4 Dynamotor-Transmitter Cable
.5 Transmitter-Receiver Cable
.6 Receiver-Remote Indicator Cable
.7 Receiver
.8 Remote Indicator

JE10-6066

Lobe Switching Unit and Wave Guide for Mark 32 Radar

JE22-6137

Output Meter for Meter Wave Radars

JE21-6345

Experimental 19 (Fp) Direction Finder

JE21-6345.1 Loop Antenna for Small Plane
.2 Loop Antenna for Large Plane
.3 Receiver
.4 Loop Rotating Mechanism

JE22-6130

Special Radio Direction Finder Receiver (120 to 10,000 KC)

NavTechJap
Equipment No.Item

JE10-6027 Type 90 Radio Telephone Transmitter (25 to 80 mc MCW)

 JE10-6027.1 Transmitter
 .2 Antenna
 .3 Coils and Two Microphones
 .4 Microphone Selector and Keying Unit
 .5 Switchboard
 .6 Tubes

JE22-6112 Type 90 Model 1 Modification 1 Receiver
JE22-6113

 JE22-6112-A JE22-6113-A Receiver
 -B Transmitter
 -C Antenna Trimmers
 -D Control Panel
 -E Beat Oscillator
 -F Spare Coils

JE22-6111 Type 92 Model 3 Receiver

 JE22-6111-A Receiver
 -B Rectifier
 -C Filament Transformer
 -D Coils
 -E Coils

JE22-6110 Type 92 Model 4 Receiver

 JE22-6110-A Receiver
 -B Rectifier
 -C Filament Transformer
 -D Receiver Coils
 -E Receiver Coils

JE22-6133 Type 92 Mark 4 Model 1 Long Wave Transmitter

 JE22-6133-A Transmitter
 -B Switch Panel
 -C Motor Generator Set
 -D Control Box and Spares (5)

JE10-6024 Type 93 Radio Telephone Transmitter (28.7 to 81.5 mc)

 JE10-6024.1 Transmitter
 .2 Antennas (2)
 .3 Microphone Selector and Keying Switch
 .4 Coils
 .5 Spare Parts
 .6 Antenna Switching Unit
 .7 Antenna Feed-Through Insulators
 .8 Microphone
 .9 Tubes
 .10 UX-860 (Mark 12) Transmitter Tubes (10)

JE22-6114 Type 93 Ultra-Short Wave Transmitter
JE22-6115

 JE22-6114-A Transmitter
 -B Spare Parts
 -C Receiver
 -D Transmitter Spares

NavTechJap
Equipment No.

Item

JE22-6114
JE22-6115Type 93 Ultra-Short Wave Transmitter

- JE22-6114-A Antenna Switch
- F Motor Generator Set
- G Transmitter Voltage Controller
- H Motor Generator Speed Controller
- I Motor Generator Field Rheostat
- J Motor Generator Starting Resistor
- K Receiver Coils

JE22-6115-A Transmitter

- B Receiver
- C Music Parts
- D Antenna Switch
- E Transmitter Parts
- F Receiver Coils
- G Motor Generator Power Panel
- H Motor Generator Speed Controller
- I Motor Generator Field Rheostat
- J Motor Generator Starting Resistor

JE10-6028

Type 94 Mark 6 Radio-Telephone Transceiver (28 to 31 mc)

- JE10-6028-A Four Transceivers, Two Generators,
- B Headphones, Cables, and Tubes

JE22-6124
JE22-6125Type 95 Mark 5 Short Wave Transmitter

JE22-6124-A Transmitter

- B Spares
- C Rectifier
- D Rectifier Spares

JE22-6125-A Transmitter

- B Transmitter Spares
- C High Voltage Motor Generator
- D Switch Panel
- E Low Voltage Motor Generator
- F Control and Junction Box

JE22-6109

Type 97 Short Wave Receiver

JE22-6134

Type 97 Mark 5 All-Wave Transmitter

JE22-6134-A Transmitter

- B Rectifier
- C Spares

JE22-6138

Type 99 Model 4 Transmitter

JE22-6138-A Transmitter

- B Antenna Loading Coil

JE10-6025
JE22-6105
JE22-6106Type 1 Model 1 Receiver (30 to 80 mc)

- JE10-6025.1 Receiver
- .2 Speaker
- .3 Coils
- .4 Headphones
- .5 Tubes

NavTechJap
Equipment No.

Item

JE10-6025	<u>Type 1 Model 1 Receiver (30 to 80 mc)</u>	
JE22-6105		
JE22-6106	JE22-6105-A	JE22-6106-A Receiver
	-B	-B Dynamotor
	-C	-C Coils
	-D	-D Voltage Controller
JE22-6120	<u>Mark 2 Medium Wave Transmitter</u>	
JE22-6121		
	JE22-6120-A	JE22-6121-A Transmitter and Modulator
	-B	-B Rectifier
	-C	-C Spares
JE22-6122	<u>Type 2 Mark 5 Modification 1 Medium Wave Transmitter</u>	
JE22-6123		
	JE22-6122-A	JE22-6123-A Transmitter
	-B	-B Rectifier
	-C	-C Spares
JE22-6107	<u>Type 3 Special Receiver (Radar Intercept)</u>	
JE22-6108		
	JE22-6107-A	JE22-6108-A Receiver
	-B	-B Rectifier
	-C	-C Filament Transmitter
	-D	-D Box of Coils
	-E	-E Box of Coils
	-F	-F Box of Crystals
JE21-6341	<u>Type 3 Air Mark 1 Model 3 (N-1) Transceiver</u>	
JE21-6342		
JE21-6344	JE21-6341.1	JE21-6342.1 Microphone
	.2	.2 Keys
	.3	.3 Dynamotor-Transceiver Cable
	.4	Control Unit
	.5	.5 Transceiver
	JE21-6344	Dynamotor-Battery Test Cable
JE22-6132	<u>Type 4 Model 3 Intercept Receiver</u>	
	JE22-6132-A	Receiver
	-B	Rotating Antenna
	-C	Fixed Mast Antenna
	-D	Fixed Submarine Antenna
JE22-6101	<u>Type 4 Model 3 Modification 1 Intercept Receiver</u>	
JE22-6102		
	JE22-6101-A	JE22-6102-A Receiver
	-B	-B Antenna
JE10-6029	<u>Type 5 Radio Telephone Transceiver (28 to 31 mc)</u>	
	JE10-6029.1	Transceiver (4)
	.2	Microphones (4)
	.3	Headphones (4)
	.4	UZ31MC Tubes

NavTechJap
Equipment No.

Item

JE21-6350

Experimental 18 Air Mark 8 Model 2 (N-8) Radio Equipment

JE21-6350.1 Dynamotor
 .2 Transmitter
 .3 Experimental Receiver
 .4 Receiver
 .5 Earphones

JE21-6351

Experimental 18 Air Mark 8 Model 3 (N-8) Transceiver

JE21-6351.1 Transceiver
 .2 Battery Box

JE21-6352

Experimental 19 Air Mark 1 (P-1) Transceiver

JE21-6353

JE21-6352.1	JE21-6353.1	Control Units
.2	.2	Calibration Units
.3	.3	Dynamotors
.4	.4	Microphones
.5	.5	Dynamotor-Transceiver Cables
.6	.6	Transmitter-Control Unit Cables
.7	.7	Transceivers

JE21-6346

Experimental 19 Air Mark 3 Transceiver (R3) (12 volt)

JE21-6347

JE21-6346.1	JE21-6347.1	Dynamotors
.2	.2	Transceivers
.3	.3	Loading Coil Units
.4	.4	Dynamotor-Transceiver Cables
.5	.5	Transmitter-Coil Cables
.6	.6	Modulators
.7	.7	Microphones

JE21-6348

Experimental 19 Air Mark 3 Transceiver (R3) (24 volt)

JE21-6348.1 Transceiver
 .2 Loading Coil

JE21-6340

Experimental 19 Air Mark 4 (R-4) Transceiver

JE21-6340.1 Dynamotor
 .2 Transceiver
 .3 Dynamotor-Transceiver Cable
 .4 Control Unit
 .5 Modulator
 .6 Loading Coil
 .7 Microphone

JE22-6131

Ultra-Long Wave Submarine Antenna

JE22-6103

JE22-6131-A	JE22-6103-A	Receiver
-B	-B	Audio Amplifier
-C	-C	Switch Box
	-D	Antenna

NavTechJap
Equipment No.

Item

JE21-6354 Temporarily Designated Model 1 (FA-1) Altimeter

JE21-6355
JE21-6360

JE21-6354.1	JE21-6355.1	JE21-6360.1	Transmitters
.2	.2	.2	Receivers
.3	.3	.3	Control Units
.4	.4	.4	Indicators
.5	.5	.5	Dynamotors
.6	.6	.6	Antenna Units

JE22-6128 Type 90 Model 2 Modification 1 Fathometer

JE22-6128-A	Indicator
-B	Amplifier
-C	Frequency Regulator
-D	Filter
-E	4,000mfd Capacitor
-F	Spark Gap Modulator
-G	Direct Current Generator
-H	Control Box
-I	Junction Box
-K	Spare Parts
-L	Indicators
-M	Selector Switch
-N	Circuit Breaker
-O	Junction Box

JE10-6071 Type 93 Model A Echo Ranging Equipment

JE10-6071.1	Relay and Fuse Box
.2	Range Indicator Repeater
.3	Range Indicator
.4	Range Repeater
.5	Bearing Repeater
.6	Bearing Repeater
.7	Relative Bearing Indicator
.8	Hydraulic Gear (Two Parts)
.9	Keying Box
.10	Bearing Indicator
.11	Spare Parts (1 of 2)
.12	Spare Parts (2 of 2)
.13	Hoist Train Steering Wheel
.14	Hoist Train Steering Wheel Support
.15	Receiver
.16	Motor Control
.17	Automatic Control Unit
.18	Relay Box
.19	Automatic Starter
.20	Motor-Generator control
.21	Spare Parts
.22	Motor-Generator Spare Parts
.23	Hoist Train Motor
.24	Transmitter
.25	Control Unit
.26	Magnetic Brakes (2)
.27	Wavemeter
.28	Receiver
.29	Transmitter Filter
.30	Motor Generator (Two Parts)
.31	Bearing Indicator Switch
.32	Bearing Indicator Spare Parts

NavTechJap
Equipment No.Item

JE10-6071

Type 93 Model 1 Echo Ranging Equipment

- JE10-6071.33 Ship's Roll Indicator
- .34 Ship's Pitch Indicator
- .35 Headphone Jackbox
- .36 Headphone Switch
- .37 Earphones
- .38 Receiver Mounting Brackets (4)
- .39 Sea-Well Pump (Two Parts)
- .40 Sea-Well Opening Control
- .41 Pilot Light
- .42 Foot Switch
- .43 Motor-Generator Speed Regulator
- .44 Indicator Voltage Regulator
- .45 Dome
- .46 Tubes
- .47 Projector
- .48 Control Box Spare Parts
- .49 Chemical Recorder and Paper
- .50 Recorder Amplifier
- .51 Hoist-Train Mechanism (Seven Parts)

JE22-6129

Type 93 Model 1 Sonar

- JE22-6129-A Motor Generator Control
- B Outout and Frequency Meter
- C Oscillator
- D Receiver
- E Filter
- F Transmitter-Receiver Change-Over Switch
- G Distribution Panel
- H Sound Head Bearing Transmitter
- I Bearing Repeater
- J Bearing Repeater
- K Range Indicator
- L Range Transmitter
- M Range Repeater
- N Sound Head
- O Training Control Wheel
- P Training Control Shaft
- Q Hydraulic Train Control
- R Hydraulic Train Control
- S Chemical Recorder
- T Chemical Recorder Amplifier
- U Sound Head (Spare)

JE10-6110

Type 93 Model 5 Echo Ranging Gear

- JE10-6110.1 Driver
- .2 Receiver
- .3 Rectifier
- .4 Magnetostriction Head

JE22-6119

Type Zero Model 1 Modification 1 Hydrophone

- JE22-6119-A Listening Gear Phasing Mechanism
- B Filter Box
- C Amplifier Filter Box
- D Hydro Junction Box
- E Hydro Junction Box

NavTechJap
Equipment No.

Item

JE22-6119 Type Zero Model 1 Modification 1 Hydrophone

JE22-6119-F Hydro Junction Box
 -G Hydro Junction Box
 -H Underwater Microphone

JE22-6127 Type 3 Model 1 Echo Ranging Equipment

JE22-6127-A Receiver Rectifier
 -B Indicator (B)
 -C Indicator (A)
 -D Exciter Rectifier
 -E Exciter Rectifier
 -F Receiver Rectifier (B)
 -G Chemical Recorder
 -H Chemical Recorder
 -I Exciter (A)
 -J Exciter (B)
 -K Condenser Box
 -L Range Control
 -M Oscillator (A)
 -N Oscillator (B)
 -O Oscillator (Main)
 -P Oscillator Rectifier
 -Q Power Control Panel
 -R Receiver (B Left)
 -S Receiver (B Right)
 -T Sound Head
 -U Sound Head
 -V Condenser Box
 -W Relay Box
 -X Junction Boxes (3)

JE22-6126 Type 3 Model 2 Echo Ranging Equipment

JE22-6126-A Projector Housing
 -B Polarizer
 -C Receiver
 -D Indicator Repeater
 -E Indicator
 -F Oscillator
 -G Filter Box
 -H Transmitter-Receiver Relay
 -I Receiver-Oscillator Junction Box
 -J Phasing Relay
 -K Field Exciter
 -L Motor Generator
 -M Motor Generator Control Panel

JE10-6070 Type 3 Model 2 Echo Ranging Equipment

JE10-6070.1 Range Indicator (Used on Bridge)
 .2 Range Indicator
 .3 Driver for Oscillator
 .4 Condenser Box
 .5 Exciter
 .6 Relay Box
 .7 Relay Box
 .8 Transmitter-Receiver
 .9 Transmitter-Receiver Power Supply

NavTechJap.
Equipment No.Item

JE10-6070

Type 3 Model 2 Echo Ranging Equipment

- JE10-6070.10 Exciter Driver
- .11 Dome
- .12 Two Vibrators
- .13 Vibrator Holders
- .14 Transformers
- .15 Bearing Repeater
- .16 Oscillator
- .17 Spare Parts
- .18 Control Box
- .19 Train Mechanism (Three Parts)
- .20 Tubes
- .21 Hoist Mechanism Drum
- .22 Miscellaneous

JE10-6020

Type 3 Model 3 Echo Ranging Equipment

JE10-6058

JE10-6057

- JE10-6020.1 Driver
- .2 Driver Power Supply
- .3 Receiver
- .4 Polarizer
- .5 Polarizer Power Supply
- .6 Receiver Power Supply
- .7 Transmitter-Receiver Relay Box
- .8 Range Indicator
- .9 Bearing Indicator
- .10 Transformer
- .11 Test Cable
- .12 Condenser Box
- .13 Train Mechanism (In Sound Room)
- .14 Train Mechanism (On Projector Shaft)
- .15 Interconnecting Cables
- .16 Magnetostriction Projector
- .17 Dome
- .18 Headphones (2)
- JE10-6057.1 JE10-6058 Motor Generator.
- .2 .2 Motor Generator Control Box
- .3 .3 Projector Mount (Two Parts)
- .4 .4 Projector (Three Spares for Two Sets - Eight in All)
- .5 .5 Range Indicator
- .6 .6 Polarizer Power Supply
- .7 .7 Receiver
- .8 .8 Receiver Power Supply
- .9 .9 Polarizer
- .10 .10 Transmitter-Receiver Relay
- .11 .11 Driver Power Supply
- .12 .12 Bearing Repeater Transformer
- .13 .13 Bearing Repeater
- .14 .14 Driver
- .15 .15 Condenser Box
- .16 - Tubes for Two Sets
- Hoist Mechanism (Same as Type 3 Model 2)
- .18 .18 Train Mechanism (Three Parts)
- .20 .20 Transmitter-Receiver Spare Parts

NavTechJap
Equipment No.ItemJE22-6022 Type 3 Model 4 Modification 1 Echo Ranging Equipment

JE22-6022-A Indicator
 -B Calibrator Oscillator
 -C Oscillator Power Supply
 -D Listening Indicator
 -E Field Exciter
 -F Receiver Junction Box
 -G Sound Head Switching Relay
 -H Listening Amplifier
 -I Power Transmitter
 -J Field Polarizer
 -K Condenser
 -L Oscillator
 -M Sound Head
 -N Spare Parts

JE22-6118 Type 4 Hydrophone

JE22-6118-A Bearing Indicator
 -B Hydro Junction Box
 -C Rectifier
 -D Remote Bearing Indicator
 -E Hydro Junction Box
 -F Hydro Switch Box
 -G Hydro Switch Box
 -H Spare Parts
 -I Spare Parts
 -J Submarine Conductor
 -K Underwater Microphones (82)

JE10-6072 "Simple" Type Model 3 Echo Ranging Equipment

JE10-6072.1 Chemical and Paper
 .2 Driver
 .3 Receiver Power Supply
 .4 Magnetostriction Projector
 .5 Junction Box
 .6 Switch Box (Two)
 .7 Hoist Train Shaft
 .8 Spare Parts
 .9 Training Mechanism (Two Parts)
 .10 Amplifier
 .11 Hoist Mechanism

JE50-5836 Samples of Osaka TubesJE21-6356 FM2A05A Transceiver TubesJE21-6357 FB325A Transmitter TubesJE21-6358 FZ064A Transmitter TubesJE10-6026 TW512B Transmitting Tube (Water Cooled)

NavTechJap
Equipment No.

Item

JE21-6335
JE21-6336
JE21-6337
JE21-6338Type 3 Mark 1 Magnetic Airborne Detectors

6335.1	6336.1	6337.1	6338.1	Search Coil
.2	.2	.2	.2	Search Coil Cover
.3	.3	.3	.3	Amplifier
.4	.4	.4	.4	Motor Generator (AC)
.5	.5	.5	.5	Motor Generator (DC)
.6	.6	.6	.6	Filter
.7	.7	.7	.7	Compensating Resistance
.8	.8	.8	.8	Power Switch
.9	.9	.9	.9	Outer Compensating Coils
.10	.10	.10	.10	Cables
.11	.11	.11	.11	Plugs
.12	.12	.12	.12	Vibrators (15)
.13	.13	.13	.13	Gain Testers
.14	.14	.14	.14	Tools
.15	.15	.15	.15	Assorted Tubes, Consisting of
				8 6ZAM1
				18 76
				8 6D6
				15 6001
				10 Pilot Lamp 20cp
				50 Pilot Lamp 1/2cp
				10 VRD 135/50
				10 VRD 90/50
				10 Ballast Tube
				25 Thermocouple

JE21-6339

"Special" Mark 1 Magnetic Airborne Detector

New Experimental Amplifier

JE21-6359

Crystals, Transmitting and Receiving (37)

JE10-6032

Type 92 Modification 1 UHF Wavemeter (3.4 to 21mc)

JE10-6032.1	Wavemeter
.2	Coils
.3	Calibration Charts

JE10-6030

Type 92 Modification 2 UHF Wavemeter (1.5 to 3.15mc)

JE10-6030.1	Wavemeter
.2	Speaker
.3	Calibration Charts

JE10-6031

Type 96 Model 1 UHF Wavemeter (25 to 88 mc)

JE10-6031.1	Wavemeter
.2	Coils
.3	Calibration Charts

JE10-6033

Type 99 Model 1 Wavemeter (95 to 210kc)

JE10-6033.1	Wavemeter
.2	Calibration Charts

NavTechJap
Equipment No.

Item

JE10-6041

Assorted Wavemeters and Meters

Type 92 UHF Wavemeter, Modification 2 (1.5-3.15mc)

- JE10-6041.1 Calibration Charts, Wavemeter, Speaker
- .2 Calibration Charts, Wavemeter, Speaker
- .3 Calibration Charts, Wavemeter, Speaker

Type 96 Model 1 UHF Wavemeter (25-88mc)

- JE10-6041.4 Calibration Charts, Wavemeter, Coils
- .5 Calibration Charts, Wavemeter, Coils
- .6 Calibration Charts, Wavemeter, Coils

Type 99 Model 1 Wavemeter (95-210kc)

- JE10-6041.7 Calibration Charts, Wavemeter
- .8 Calibration Charts, Wavemeter
- .9 Calibration Charts, Wavemeter

AC Ammeter

- JE10-6041.10 Range: 0-50-100-200 Amperes
- .11 Range: 0-50-100-200 Amperes
- .12 Range: 0-50-100-200 Amperes

DC Ammeter

- JE10-6041.13 Range: 0-50-100-200 Amperes
- .14 Range: 0-50-100-200 Amperes
- .15 Range: 0-50-100-200 Amperes

AC-DC Ammeter

- JE10-6041.16 Range: 0-1-5 Amperes
- .17 Range: 0-1-5 Amperes
- .18 Range: 0-1-5 Amperes

DC Voltmeter

- JE10-6041.19 Range: 0-0.3-3.0 Volts
- .20 Range: 0-0.3-3.0 Volts
- .21 Range: 0-0.3-3.0 Volts

DC Voltmeter

- JE10-6041.22 Range: 0-500-1500-3000 Volts
- .23 Range: 0-500-1500-3000 Volts
- .24 Range: 0-500-1500-3000 Volts

AC-DC Voltmeter

- JE10-6041.25 Range: 0-75-150-300 Volts
- .26 Range: 0-75-150-300 Volts
- .27 Range: 0-75-150-300 Volts

NavTechJap
Equipment No.Item

JE10-6034

Assorted Meters

- JE10-6034.1 AC Ammeter (0-50-100-200 amps)
 .2 DC Voltmeter (0-0.3-3.0 volts)
 .3 AC-DC Ammeter (0-1-5 amps)
 .4 DC Voltmeter (0-500-1500-3000 volts)
 .5 AC-DC Voltmeter (0-75-150-300 volts)
 .6 DC Ammeter (0-50-100-200 amps)

JE10-6051

Type 93 Model 2 Hydrophone

- JE10-6051.1 Compensator
 .2 High-Pass Filter
 .3 Amplifier
 .4 Microphones (40)
 .5 Amplifier
 .6 Bearing Repeater (4)
 .7 Junction Box
 .8 Microphone Switch Box
 .9 Waterproof Junction Box (2)
 .10 Power Switch
 .11 Bolts for Microphone
 .12 Spare Parts

JE10-6054

Type 97 Model 2 Hydrophone

- JE10-6054.1 Main Console
 .2 Waterproof Junction Box
 .3 Two Junction Boxes
 .4 Microphone Holders, Mounts, and Gaskets
 .5 Battery Charger
 .6 Charging Resistor
 .7 Battery
 .8 Microphones (16, Including 3 Spares)
 .9 Inter-Connecting Cable
 .10 Miscellaneous

JE10-6055

Type Zero Model 1 Hydrophone

JE10-6056

- | | | |
|-------------|-------------|-------------------------|
| JE10-6055.1 | JE10-6056.1 | Rectifier |
| .2 | | Junction Box |
| .3 | .3 | Compensator |
| .4 | .4 | Amplifier |
| .5 | .5 | Filter |
| .6 | .6 | Microphone Junction Box |
| .7 | .7 | Switch Box |
| .8 | .8 | Microphones |
| .9 | | Transformer |
| | | Repeater |
| .11 | | Filter |
| .12 | | Microphone Mounts |

JE10-6021

Type 3 Model 1 Hydrophone

- JE10-6021.1 Compensator
 .2 Microphones (12)
 .3 Spare Microphones (3)
 .4 Microphone Shock Mounts
 .5 Microphone Holders
 .6 Charging Resistors

NavTechJap
Equipment No.

Item

JE10-6021

Type 3 Model 1 Hydrophone

- JE10-6021.7 Junction Box
- .8 Speaker
- .9 Headphones (3)
- .10 Spare Parts

JE10-6059

Type 3 Model 2 Hydrophone

- JE10-6059.1 Compensator
- .2 Resistor
- .3 Filter
- .4 Microphone
- .5 Microphone
- .6 Microphone
- .7 Tubes
- .8 Microphone Holder
- .9 Microphone Buffers
- .10 Loud Speaker

JE10-6022

Type 3 Model 3 Hydrophone

- JE10-6022.1 Compensator
- .2 Amplifier
- .3 Microphones (20)
- .4 Microphone Holders
- .5 Microphone Junction Box (Underwater)
- .6 Battery
- .7 Spare Parts

JE10-6050

Type 4 Model 2 Hydrophone

JE10-6063

- JE10-6050.1 Microphones (81)
- .2 Switch Box
- .3 Rectifier
- .4 Compensator
- .5 Junction Box
- .6 Headphones (2)
- .7 Microphone Holders (45) with Shock Mounts

- JE10-6063.1 Rectifier (Spare)
- .2 Compensator (Spare)

JE10-6014

"Simple" Type Hydrophone

- JE10-6014.1 Amplifier
- .2 Microphone (2)
- .3 Tubes

JE10-6061

Hydrophone Head for Use with Type 92 Moored Mine

JE10-6053

Type 2 Model 1 Magnetic Loop Detector

- JE10-6053.1 Recorder
- .2 Compensating Network
- .3 Recording Paper
- .4 Amplifier for Photo-Electric Cell
- .5 Bell Alarm Box (3)
- .6 Galvanometer Light Source (3)
- .7 Scales (4)

NavTechJap
Equipment No.ItemJE10-6053 Type 2 Model 1 Magnetic Loop Detector

JE10-6053.8 Transformers (3)
 .9 Spare Parts
 .10 Galvanometers (6)
 .11 Tubes

JE10-6052 Type 2 Model 4 Magnetic Loop Detector

JE10-6052.1 Recorder
 .2 Recording Paper
 .3 Alternating Oscillator
 .4 "Zero Point" Controller
 .5 Wire
 .6 Charging Resister
 .7 Battery Charger
 .8 Spare Parts (2)
 .9 Alternator
 .10 Audio Amplifier
 .11 Final Amplifier
 .12 Wire (3 Rolls)

JE22-6116 Type 2 Infra-Red Transmitter and Receiver
JE22-6135

JE22-6116-A JE-22-A Transmitter and Receiver
 -B -B Switch Box
 -C -C Remote Key
 -D -D Junction Box
 -E -E Mark 1 Speaker
 -F -F Total Receiver, amp
 -G -G Mark 3 Speaker
 -H -H Total Receiver
 -I -I Switch Panel
 -J -J Spare Parts

JE22-6136 Type 3 Infra-Red Transmitter

JE22-6136-A Transmitter
 -B Receiver
 -C Low Voltage Control Box
 -D High Voltage Control Box
 -E Switch Box
 -F Key

JE10-6023 Type 93 Mark 1 Radio Direction Finder

JE10-6023.1 Receiver
 .2 Loop Antenna
 .3 Loop Antenna Rotating Mechanism
 .4 Coils
 .5 Rotating Mechanism Stays
 .6 Interconnecting Cables
 .7 Indicator
 .8 Tubes

* * * * *

List of Japanese Navy Magnetrons

Shipped to Office of:

Chief Signal Officer
Intelligence and Communications Branch
Holabird Signal Depot
Baltimore, Maryland
Shipment Order TC-102

By the Office of the Chief Signal Officer, SCAP.

* * * * *

<u>Number</u>	<u>Name of Type</u>	<u>Date of Manufacture</u> *	<u>Purpose</u>	<u>Reference</u>
A-1	Double B.K. Tube	1936	Communications	Push-Pull
A-2	3-phase B.K. Tube	1936	Research	
A-3	B.K. Tube	6/36	Communication	
A-4	4-Split Anode	5/37	Communication	Anode voltage modulation Nippon Wireless Company in Tokyo.
A-5	B.K. Tube	1936	Communication	
A-6	B.K. Tube	1936	Communication	Grid Damaged
A-7	B.K. Tube	7/36	Communication	Modification Telefunken
B-1	No-Split Type		Field strength Observation	
B-2	2-Split	1937	Research	By Captain Y. ITO Data on No. 5 Magnetron study
B-3	USM-79	1936		
B-4	With Grid	1936	Only research	By Captain Y. ITO
B-5	D-Type		Only research	Damaged. Cut-off characteristic so smooth
B-6	4-Split	1937	Research	
B-7	6-Split	1937	Research	
B-8	With Grid	6/37	Modulation by Grid	By Captain Y. ITO
B-9		1936	Research	By Captain Y. ITO
B-10	With Grid	1/38	Research	Grid Modulation
C-1		3/11/37	3-phase Oscillation test	
C-2		1938	3-phase Oscillation test	
C-3	5-Split Anode	16/4/38	For polyphase cm wave generation	By M. MIZUMA
C-4	Chrysanthemum	1938	Research	
C-5	Lap-Winding Type	16/4/38	For polyphase cm wave generation	By M. MIZUMA
C-6	Lap-Winding Type	31/8/39	Research	This tube is studied by Captain Y. ITO and Naval Engineer M. MIZUMA Pick Up Method; coupled capacity. Radio Wave
C-7	Chrysanthemum Type	6/38	Polyphase Magnetron Only research	By M. MIZUMA 12-Split Anode
C-8	3-Phase Magnetron	1938	Research	
C-9	Lily Type	10/12/40	Study of polyphase cm value	By M. MIZUMA and S. NAKAJIMA
C-10		10/35	Study of 3 phase Low frequency about 200 cycles	This tube is studied for 3 phase wave generated by Y. ITO and S. KATSURAI
C-11	Lap-Winding Type 8-Split	11/8/39	Research on polyphase oscillation mechanism	G-Type observer magnetron Oscillation spectrum by this tube

*Day/Month/Year

<u>Number</u>	<u>Name of Type</u>	<u>Date of Manufacture</u> *	<u>Purpose</u>	<u>Reference</u>
G-12	Chrysanthemum	14/3/39	2-phase (push-pull)	24-Split Anode Dia. 10mm
D-1	Chrysanthemum Type	9/5/39		
D-2	Lily Type	6/10/38	Polyphase generation	Radiated energy by each anode electrode
D-3		10/6/37		
D-4	Deformed Plum Flower Type (2-Splits)	10/12/44	Locator value Research	
D-5	Chrysanthemum Type	5/6/39	Research	
D-6		10/5/39		
D-7	Lap-Winding Type	1939	Research	
D-8		10/8/41		
D-9	Lily Type	10/6/38		
D-10		12/11/38	High power generation	
D-11	Lap-Winding Type	6/6/40	Research	Damaged
D-12		1937	Polyphase generation	
D-13		6/10/39		
D-14		27/2/42	Modulation	Modulation volt income output
D-15				Capacity anode circuit adjustable
D-16		12/10/38	Research	
D-17	Chrysanthemum	10/4/39	Research	
D-18	Lotus Type 12-Split anode	10/44	Receiving tube (Local oscillator)	(1) cavity L max 25mm (2) L 20mm L 3-5mm (3) oscillation pole 18
D-19	Chrysanthemum	3/6/38		
D-20	Chrysanthemum	1938		
D-21	Chrysanthemum	20/5/39		
D-22	Lily Type	10/6/40	For cm polyphase communication	
D-23	Mill Type	10/10/38	Research	
D-24		6/5/38		
D-25			Research	
D-26		20/4/39	Research	Study of pick up method
D-27		14/6/38	Research	
E-1	Sunrise Type	10/2/40	Research	
E-2		1940		Naval technical research
E-3	Mandarine Orange Type	1941		
E-4			Research	
E-5	Lily Type		Research	No test
E-6	Lily Type	10/10/38	Research	
E-7				Oscillation by side-plate Bad efficiency Another tube of this type was tested, but this tube not tested
E-8	Lotus Type (variable freq.) 12-Split Anode	8/45	Loss angle measurements	
E-9	Lily Type	10/6/40		
E-10	Chrysanthemum Type 12-Split Anode	1940	Theoretical research	
E-11	Chrysanthemum Type 12-Split Anode			Water cooling. This tube is damaged. No testing data
E-12		1/6/36		Anode Neutral Resonance circuit
E-13	Lily Type	1938	Research	
E-14	Mandarine Orange	1940	Research	
E-15		10/12/39	High power	Oscillation by side plate
E-16				Oscillation by side plate. The tube has bad efficiency. Research stopped.

*Day/Month/Year

<u>Number</u>	<u>Name of Type</u>	<u>Date of Manufacture*</u>	<u>Purpose</u>	<u>Reference</u>
F-1			Locator	
F-2		1942	High power	
F-3		1943		
F-4		1940	Pick Up Method of Wave	
F-5		1940	Communication	
F-6			Pick Up Method of Wave	
F-7		1940	Mass Production	
F-8		3/2/41	High power	
F-9		1941	Research of No. of Split Anode	
F-10			Locator	
F-11		1942-3	Power pick-up	
F-12		10/6/40	Side plate effect	
F-13	Mandarine Orange Type	1940		
F-14		1939		Oxide filament life: 20 hours
F-15	Mandarine Orange (Asymmetry)	10/6/38	Research	
F-16	Mandarine Orange	1940	Research	Study of pick up method. This tube used solenoid magnet
F-17	Mandarine Orange	1938-44	Locator Receiving Tube	
F-18	Mandarine Orange	1938-44	Locator Receiving Tube	
F-19	Mandarine Orange (6-split)	1940	Locator Receiving Tube	
F-20	Mandarine Orange	1941	Locator Receiving Tube	
F-21	Mandarine Orange (8-split)	1942	Locator Receiving Tube	
F-22	Mandarine Orange	1940	Research	
G-1		19/9/39	Research	No oscillation
G-2	Vibration Electrode Type	1932		No data
G-3	Sentron	1942	High power	This tube manufactured by Tohoku Imperial University. No test
H-1	Mandarine Orange 8-Split Anode	10/44	For "A" Apparatus	Connected with wave guide and H wave is picked up
H-2				
H-3				
I-1	Mandarine Orange 8-Split	5/8/44	Locator valve research	experience results are bad
I-2	Mandarine Orange 6-Splits	20/9/44	Locator valve research	
I-3	Mandarine Orange 10-Splits	20/9/44	Locator valve research	
I-4	Mandarine Orange 8-Splits		Locator valve research	Made by Nippon Wireless Co.
I-5	Mandarine Orange		Locator valve research	Made by Nippon Wireless Co.
I-6	Mandarine Orange	20/9/44	Locator valve research	
I-7	Mandarine Orange		Locator valve research	Output power is conducted by coaxial line
I-8	Mandarine Orange 10-Splits	20/9/44	Locator valve research	
I-9	Mandarine Orange 12-Split		Locator valve research	Output power is conducted by coaxial line
I-10	Mandarine Orange 8-Split		Locator valve research	Output power is conducted by coaxial line
I-11	Mandarine Orange	20/9/44	Locator valve research	

*Day/Month/Year

<u>Number</u>	<u>Name of Type</u>	<u>Date of Manufacture*</u>	<u>Purpose</u>	<u>Reference</u>
I-12	Mandarine Orange		Locator valve Research	
I-13	Mandarine Orange	20/6/44	Locator valve Research	
I-14	Mandarine Orange	20/6/44	Locator valve Research	
I-15	Mandarine Orange 12-Splits	30/6/44	Locator valve Research	Output power is radiated directly from the electrode and conducted by wave guide
I-16	Inner Anode Mandarine Orange	11/44	Locator valve Research	Modification of Locator Valve in U.S.A. made by Tokyo Shibaura Co.
I-17	Mandarine Orange 12-Splits	30/9/44	Locator valve Research	Output power is radiated directly from the electrode and conducted by wave guide
I-18	Mandarine Orange 24-Splits	20/2/45	Locator valve Research	No test
I-19	Mandarine Orange 8-Splits	10/10/44	Locator Valve Research	
I-20	Mandarine Orange	10/10/44	Locator Valve Research	
I-21	Mandarine Orange	10/10/44	Locator Valve Research	
I-22	Mandarine Orange	10/10/44	Locator Valve Research	
I-23	Orange Type 24-Splits	10/3/45	Locator Valve Research	No test
I-24	Mandarine Orange 12-Splits	30/9/44	Locator Valve Research	
I-25	Deformed Plum Flower Type 24-Splits	10/12/44	Locator Valve Research	
I-26	Mandarine Orange	20/10/44	Locator Valve Research	
I-27	Enclosed Mandarine Orange Anode type	10/10/44	Investigation of enclosed case effect	No data
I-28	Enclosed Mandarine Orange Anode type	10/10/44	Investigation of enclosed case effect	No data
I-29	Mandarine Orange Type 10-Splits	20/10/44	Investigation of enclosed case effect	
I-30	Mandarine Orange Type 8-Splits	31/10/44	Investigation of enclosed case effect Power pick-up method	$\frac{1}{2}$ antenna stands on the electrode surface
I-31			Locator valve research	
I-32	Mandarine Orange 12-Splits	30/3/45	Locator valve research	Output in the form of H wave is radiated from the loop
I-33	Mandarine Orange 10-Split	4/11/45	Locator valve research	
I-34	Non Split Type			No test
I-35	Mandarine Orange	30/9/44	Locator valve research	Output power is radiated directly from electrode and conducted by wave guide
I-36	Orange Type 10-Splits	10/9/44	Locator valve research	Oscillation is obtained, but no data
I-37	Mandarine Orange 12-Splits	2/11/44	Locator valve research	
I-38	Mandarine Orange 8-Splits	2/10/44	Locator valve research	Output power is radiated directly from the electrode and conducted by wave guide
I-39		1943	Laminated anode Mass production	
I-40	Sleet Valve	10/11/44	Locator valve research	Decrease of magnetic field intensity in the iron case is about 10%
I-41	Sleet Valve Mandarine Orange Electrode 10-Splits	12/44	Locator valve research	

*Day/Month/Year

<u>Number</u>	<u>Name of Type</u>	<u>Date of Manufacture*</u>	<u>Purpose</u>	<u>Reference</u>
I-42	Deformed Plum Flower Type 24-Splits	10/12/44	Locator valve research	No test
I-43	Non Split Type			No test
I-44	Inner Anode Mandarin Orange	11/44	Locator	Modification of Locator valve in U.S.A. by Tokyo Shibaura Co.
				No data
I-45	Inner Anode Mandarin Orange	11/44	Locator	Modification of Locator Valve in U.S.A. by Tokyo Shibaura Co.
				No data
I-46	Inner Anode Mandarin Orange	11/44	Locator	Modification of Locator Valve in U.S.A. by Tokyo Shibaura Co.
				No data
I-47	Mandarine Orange	1942	Locator Valve Research	No data
I-48	Mandarine Orange 12-Splits	30/9/44	Locator Valve Research	
I-49	Mandarine Orange 8-Splits	17/10/44	Locator Valve Research	
I-50	Mandarine Orange	20/2/45	Valve research	No oscillation, data not evaluated
I-51	Mandarine Orange 24 Splits	20/2/45	Valve research	
I-52	Mandarine Orange	10/12/44	Valve research	Push-pull
I-53	Mandarine Orange	30/9/44	Valve research	Push-pull
I-54	Mandarine Ornage	10/3/45	Valve research	Push-pull

Total Number

A - 7
 B - 10
 C - 12
 D - 27
 E - 16
 F - 22
 G - 3
 H - 3
I - 54

Total 154

*Day/Month/Year

ENCLOSURE (A)

JAPANESE PERSONNEL INTERROGATED

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I.U. - Imperial University
 E.E.S. - Electric Engineering Section
 C.E.S. - Chemical Engineering Section
 S.S. - Science Section

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<u>Name</u>	<u>School and Year of Graduation</u>	<u>Specialities</u>
Vice Adm. (Tech) T. NAWA	Tokyo I.U.(E.E.S.)1917 Studied Chemistry in Tokyo I.U.(S.S.)1919-1922	Chief of the Radar and Communication Department
Capt. H. TAKAHARA	Naval Academy 1919 Tohoku I.U.(E.E.S.)1932	Head of Fourth Section (radar interceptor, radio beacons and direction finders)
Capt. (Tech) & Dr. Y. ITO	Tokyo I.U.(E.E.S.)1924 Technische Hochschule Dresden, Germany 1927	Head of First & Second Section (fundamental researches)
Capt. (Tech) Y. YAJIMA	Tohoku I.U.(E.E.S.)1924	Secretary to T. NAWA, Head of Production Section
Capt. I. ARISAKA	Naval Academy 1923 Tohoku I.U.(E.E.S.)1934	Head of Third Section of Communication Department (radio equipment)
Capt. K. NAGAI	Naval Academy 1924	Member of Administra- tion Department
Lt.Comdr. (Tech) T. HYODO	Tokyo I.U.(C.E.S.)1936	Researcher on materials and components for high frequency use
Lt.Comdr. (Tech) S. KATSURAI	Tokyo I.U.(E.E.S.)1936	Researcher on land and airborne radars (Type 51, 61, 63)
Lt.Comdr. (Tech) S. MORI	Tokyo I.U.(E.E.S.)1937	Researcher on ship- borne radar (cm wave i.e. 22)
Lt.Comdr. (Tech) H. TSUJITA	Kyoto I.U.(S.S. Physics) 1936	Researcher on airborne radar (meter wave, i.e FK-3, FH-1, FK-4, H-6)
Lt.Comdr. (Tech) K. KAMIYA	Tohoku I.U.(E.E.S.)1936	Researcher on compo- nents and tubes for high frequency

ENCLOSURE (A), continued

<u>Name</u>	<u>School and Year of Graduation</u>	<u>Specialities</u>
Lt.Comdr. (Tech) O. OKAMURA	Tokyo I.U.(E.E.S.)1940	Researcher on tubes for cm wave
Lt.Comdr. S. MATSUI	Naval Academy 1934 Osaka I.U.(S.S. Physics) 1942.	Head of research in Yokosuka Branch (research on installation of shipborne and land based radio and radar)
Lt.Comdr. (Tech) W. SUGIYAMA	Waseda University(E.E.S.) 1940	Researcher on high frequency cable in Yokosuka Branch
Lieut. (Tech) K. OGATA	Tohoku I.U.(E.E.S.)1941	Researcher on land based radar (cm wave) (i.e. 61)
Lieut. (Tech) S. KAWAZU	Tokyo I.U. (E.E.S.)1941	Researcher on land based radar (meter wave i.e. 14, 62)
Lieut. (Tech) S. YAMANE	Kyoto I.U.(E.E.S.)1942	Researcher on airborne radar, counter measures
Lieut. K. MORI	Naval Academy 1940	Teacher at Chogo Radar Training School, and Research at Second Naval Technical Institute
Dr. K. TAKAYANAGI	Kuramae Technical College 1921	Consultant to T. NAWA Head of Third Section (Radar)
Eng. H. SHINKAWA	Waseda University(E.E.S.) 1933	Researcher on radars (meter wave i.e. L-2, L-3, S-3, S-24, N-6, M-13)
Eng. M. HACHIYAMA	Tokyo I.U.(S.S. Physics) 1933	Researcher on high frequency circuits for cm wave.
Eng. S. SUZUKI	Tokyo Physical School 1929	Researcher on airborne (meter wave N-6) radar
Eng. F. K. UEMINAMI	Washington University U.S.A. 1934	Researcher on airborne radar interceptor and shipborne direction finder.

RESTRICTED

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ENCLOSURE (A), continued

<u>Name</u>	<u>School and Year of Graduation</u>	<u>Specialities</u>
Mr. R. KIMURA	Waseda University 1930	Consultant to H. TAKAHARA (researcher on radio frequency instruments in Electro Technical Laboratory of Japanese Government)
Lt.Comdr. T. OKAMOTO	Naval Academy 1932	Staff, GHQ, Grand Escort Fleet. Naval Aviator, specialist in anti-submarine warfare
Capt. S. INOUE		Navy Technical H.Q., Electrical Bureau. Previously in Educa- tional Bureau of Navy Ministry
Mr. S. NISHIYAMA	Uta University 1932	Interpreter (had no relation to Second Navy Technical Insti- tute until the end of the war) (belongs to Electro. Tech. Lab. of Japanese Government)
Comdr. F. MORI		Naval Aeronautical Headquarters. Radar Specialist