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U. S. NAVAL TECHNICAL MISSION TO JAPAN  
CARE OF FLEET POST OFFICE  
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22 December 1945

RESTRICTED

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

Subject: Target Report - Japanese Radio Equipment.

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

1. Subject report, dealing with Target E-08 of Fascicle E-1 of reference (a), is submitted herewith.

2. The investigation of the target and the preparation of the report were accomplished by Lt. Comdr. M.C. Mains, USN(Ret).



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30608

**RESTRICTED**

**E-08**

**JAPANESE RADIO EQUIPMENT**

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

**FASCICLE E-1, TARGET E-08**

**DECEMBER 1945**

**U.S. NAVAL TECHNICAL MISSION TO JAPAN**

# SUMMARY

## ELECTRONICS TARGETS JAPANESE RADIO EQUIPMENT

The study of radio equipment proved to be interesting mainly from the standpoint of comparison, in determining how far behind the United States the Japanese actually were in this field. Some ingenious uses of radio and television had been proposed, but lack of personnel and difficulties in procurement prevented proposals from being carried out.

In ranges above 100 megacycles there were only three radio systems, two of which were still in the experimental stage, and had no very remarkable features. The third, a fighter-director system, actually had been used in the Tokyo area. These three systems are described in reports referred to herein.

All available documents on radio equipment were obtained and forwarded to the Washington Document Center, and samples of such equipment as appeared worthy of further study were shipped to the Naval Research Laboratory or to appropriate Air Corps or Signal Corps laboratories.

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## REFERENCES

## Location of Target:

Second Naval Technical Institute Laboratories at KANAZAWA and Meguro, TOKYO.

Naval Bases at YOKOSUKA, KURE, and SASEBO.

## Japanese Personnel Interviewed:

Vice Admiral Takaishi NAWA, head of the Radar and Communications Division of the Second Naval Technical Institute.

Various members of Admiral NAWA's staff, including Capt. YAJIMA, secretary to the admiral, and Fred K. UYEMINAMI, civilian engineer, who acted as interpreter.

## Reports of Other Intelligence Agencies:

Air Technical Intelligence Group (ATIG), Advanced Echelon, Far Eastern Air Forces (copies to BuOrd and Wright Field):

- ATIG #14 - Japanese Airborne Radar and Communications Equipment.
- ATIG #32 - Control System for Pilotless Aircraft.
- ATIG #35 - Aircraft Antenna Design.
- ATIG #89 - Television Equipment for Radio-Controlled Tanks.
- ATIG #114 - Radio-Controlled Flying Bomb, "I-Go".
- ATIG #253 - Survey of Japanese Airborne Radio Research and Development.
- ATIG #255 - Japanese FM Radio Relay Equipment in the Range 530-670 Mc.
- ATIG #276 - Catalogue of Radio, Radar, and Special Devices.
- ATIG #277 - List of Miscellaneous Electronics Documents Sent to Air Documents Division T-2, Wright Field.
- ATIG #278 - Organization, List of Reports and List of Equipments Shipped.

Technical Liaison and Investigation Department, office of the Chief Signal Officer, Supreme Commander Allied Powers (available through G-2, War Department, Washington, D.C.):

TLID Letter of 3 December 1945, (G-2, SCAP #38) - Pulse-Communication System.

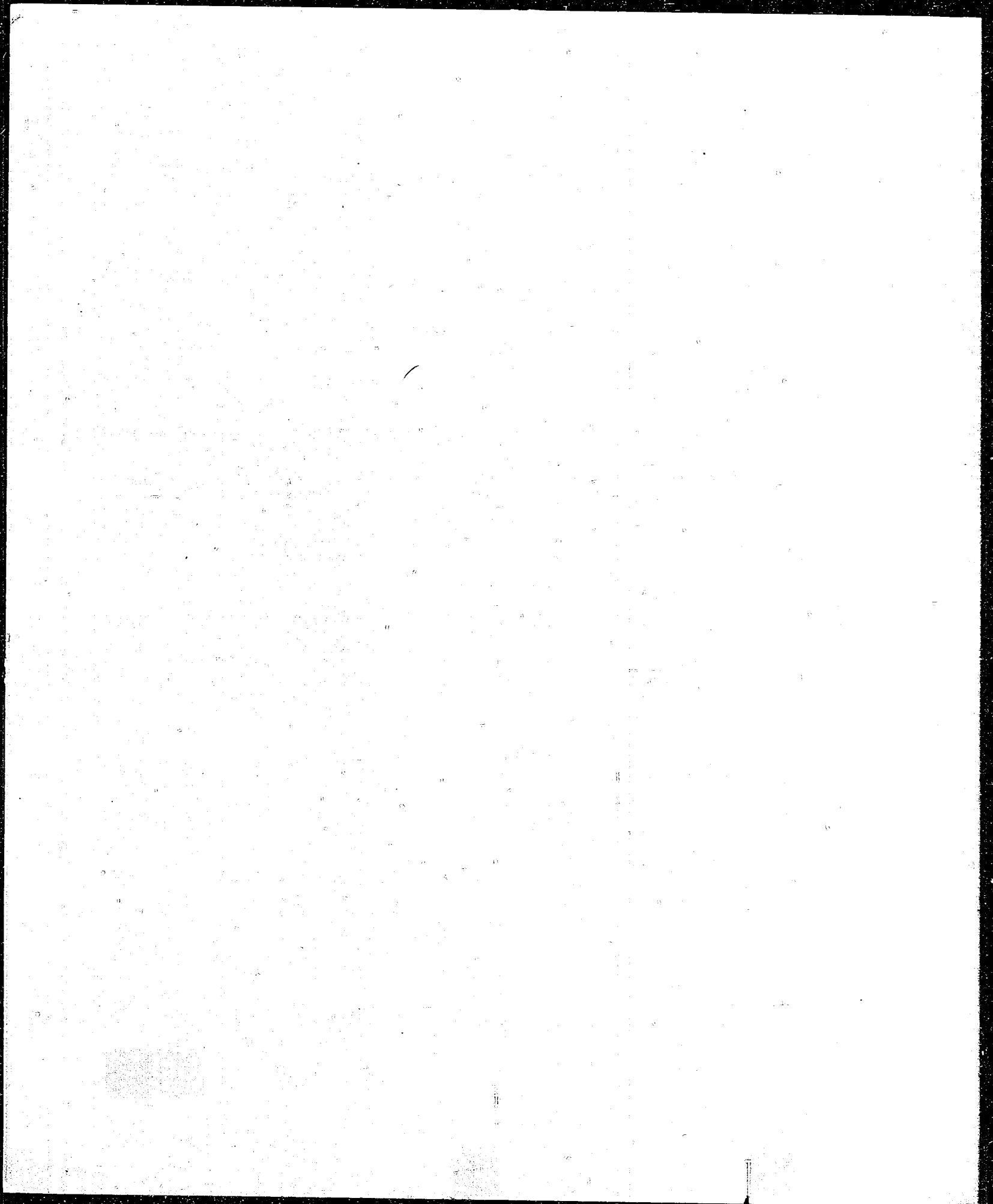
## LIST OF ENCLOSURES

- (A) List of Documents Shipped by NavTechJap to Washington Document Center.
- (B) List of Equipment Shipped by ATIG to Freeman Field, Seymour, Indiana.
- (C) List of Equipment Shipped by NavTechJap to Naval Research Laboratory, Anacostia, D.C.

## INTRODUCTION

Intelligence reports and examinations of captured equipment during the course of the war had given no indication that the Japanese had evolved any special techniques or unique applications of radio. Accordingly, it did not appear worthwhile to spend much time on equipment known to be conventional and obsolete or obsolescent. Since it was possible, however, that there were some items of equipment of intelligence value in the laboratory or pre-production stage, all known sources of information on such equipment were investigated. In addition, information was collected on the latest types in actual service, and a number of items of equipment not previously studied were examined.

The field of airborne radio equipment was thoroughly covered by the Electronics Section, Air Technical Intelligence Group, Far Eastern Air Forces; and the field of military and commercial land-based equipment was investigated by the Technical Liaison and Investigation Department, office of the Chief Signal Officer, Supreme Commander Allied Powers. Close liaison was maintained with these agencies to insure that all items of intelligence value were covered either in their reports or in the reports of this Mission.





# THE REPORT

## A. TECHNIQUES

Japanese radio techniques were conventional and in large part obsolete. For example:

1. Modulation: Control-grid, suppressor-grid, and plate modulation were used. Pulse-modulation was used in one experimental equipment. (See TLID report).
2. Broad band amplifiers: Some attempt was made at broad-banding by the use of metallic dust cores, overcoupling, and video amplification.
3. Noise elimination: This was accomplished by means of an audio band-pass filter, or by a shunt-diode type of audio noise suppressor.
4. Frequency stability: All late model aircraft radio transmitters and receivers were crystal controlled. Stability of better than one in 1000 was claimed.
5. Rapid frequency change: The transmitter and receiver of the prototype Type 19, Air Mark 1, radio telephone were crystal controlled, multi-channel, frequency change being accomplished by relays. The shipborne Type 99, Mark 4 transmitter and the Type 1, Mark 5 transmitter had one control for coil switching and one for the variable condensers. By means of magnetic clutches on the condenser shafts, they could be re-set to any predetermined angle.
6. Speech privacy: In 1935, a multi-channel radio telephone circuit was set up between TOKYO, KURE, and SASEBO. This was abandoned in 1944 owing to operational difficulties and with the installation of a land-wire circuit. For speech privacy, inversion and transposition were used. Frequency wobbling was tried but given up, because of difficulties in synchronization and poor articulation.
7. VHF and UHF: The Japanese Navy had no communication equipment in use or in development above 100 mc. There was a pulse communication system, in the laboratory stage, on 200 mc. There was also an FM system in the range 530-670 mc. ATIG report No. 225 contains photographs and circuit diagram.
8. Television and facsimile: These were not used by the Navy. Research had been planned but was not carried out because of shortage of personnel.
9. Materials, components, and methods of construction: See the following NavTechJap reports:
  - "Japanese Electron Tubes", Index No. E-13.
  - "Power Supply for Japanese Electronics", Index No. E-15.
  - "Japanese Radio, Radar, and Sonar Equipment", Index No. E-17.
  - "Japanese Electronic Equipment Construction Materials", Index No. E-19.
  - "Japanese Insulation Materials", Index No. E-23.

**B. APPLICATIONS**

There were no unique applications of radio equipment or techniques by the Japanese Navy. They had no expendable radio equipment and no radio-controlled devices beyond the laboratory stage.

Further discussion of general applications of radio will be found in NavTech-Jap Reports, "Japanese Radio and Radar Direction Finders", Index No. E-05, and "Japanese Communication Systems", Index No. E-11, and in the reports of other agencies.

A description of a radio controlled bomb, the Mark I, will be found in ATIG Reports No. 32 and No. 114, and of television equipment for radio controlled tanks in ATIG Report No. 89. Guided missiles also are described in NavTechJap Report "Japanese Guided Missiles", Index No. O-02.

## ENCLOSURE (A)

## LIST OF DOCUMENTS SHIPPED TO WASHINGTON DOCUMENT CENTER

<u>NavTechJap No.</u>	<u>ATIS No.</u>	<u>Title</u>
ND22-3010	4342	List of radio and radar equipment used by the Japanese Navy, including specifications and operating characteristics.
ND21-6010	3470	The noise and interference limiter in mechanical reception.
ND21-6016	3693	Report of experimental results on the temporarily designated Type 97 portable CW radio.
ND21-6021	3694	Study of the duplex transceiver.
ND21-6022	3695	Report on test results on special Type 96 short-wave Mark 2 transmitter.
ND21-6028	3696	Study of linear type long-wave receiver (Experimental Type 97).
ND21-6031	3697	Experimental study of interchange of aircraft crystal oscillator and ship-board crystal oscillator.
ND21-6032	3698	Study of stability of Type 92 special receiver.
ND21-6034	3699	Test results of the Type 92 special receiver Modification 3.
ND21-6035	3700	Study of 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 4 transmitter.
ND21-6039	3472	Study of high frequency amplifiers. First report (Test Model RT-3).
ND21-6045	3705	Test results on the temporarily designated Mark I portable carrier telephone equipment.
ND21-6049	3706	Experimental report on the temporarily designated Type 97 Mark 2 Model 2 short wave transmitter.
ND21-6059	3474	Outline of feedback-amplifier circuits.

## ENCLOSURE (A), continued

<u>NavTechJap No.</u>	<u>ATIS No.</u>	<u>Title</u>
ND21-6283	3712	List of radio equipment scheduled for ships No. 5491, 5522 (May 1945).
ND21-6146	3710	Study of special radio communication methods using phase displacement.

## ENCLOSURE (B)

LIST OF EQUIPMENT SHIPPED BY ATIS TO  
FREEMAN FIELD, SEYMOUR, INDIANA

Type 23 Radio Receiver  
Type HI-4 Radio Transmitter and Receiver  
Type 23 Radio Transmitter  
Type 63 Radio Receiver with Remote Control  
Type 3 Transmitter  
Type 95-2 Radio Receiver  
Type HI-2 Airborne Command Set

## ENCLOSURE (C)

LIST OF EQUIPMENT SHIPPED BY NAVTECHJAP TO THE  
NAVAL RESEARCH LABORATORY, ANACOSTIA, D.C.

<u>NavTechJap No.</u>	<u>Quantity</u>	<u>Description</u>
JE22-6000,6001	2	Type TM Model 4 portable short wave transmitter, receiver, and rectifier.
JE22-6004,6005	2	Type 92 Model 3 Modification 4 all wave receiver.
JE22-6006,6007	2	Type TM Model 2 portable transmitter and receiver.
JE22-6011,6012	2	Type 97 Mark 5 transmitter.
JE22-6013	1	Type 99 Mark 4 transmitter.
JE22-6014,6015	2	Model 1 portable special purpose wireless telegraph set.
JE10-6024(1-10)	1	Type 93 radio telephone transmitter, 28.7-81.5 mc.
JE10-6027(1-6)	1	Type 90 radio telephone transmitter, 25-80 mc.
JE22-6105,6106 JE10-6025	1	Type 1 Model 1 receiver, 30-80 mc.
JE10-6028	2	Type 94 Mark 6 phone transceiver, 28-31 mc.
JE10-6029(1-4)	1	Type 5 phone transceiver, 28-31 mc.
JE22-6131,6103	2	Ultra long wave submarine receiver.
JE22-6120,6121	2	Mark 2 medium-wave transmitter.
JE22-6138	1	Type 99 Model 4 transmitter.
JE22-6114,6115	2	Type 93 ultra short wave transmitter.
JE22-6107,6108	2	Type 3 special receiver.
JE22-6109	1	Type 97 short wave receiver.
JE22-6110	1	Type 92 Model 4 receiver.
JE22-6111	1	Type 92 Model 3 receiver.
JE22-6105,6106	2	Type 1 Model 1 receiver.
JE22-6124,6125	2	Type 95 Mark 5 short wave transmitter.
JE22-6122,6123	2	Type 2 Mark 5 Model 1 medium wave transmitter.
JE22-6135	1	Type 92 Mark 4 Mod. 1 long wave transmitter.
JE22-6134	1	Type 97 Mark 5 all wave transmitter.