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# U. S. NAVY RADAR SYSTEMS SURVEY

[UNCLASSIFIED TITLE]

THIRD EDITION

Edward Ornstein

High Resolution Branch  
Radar Division

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Declassification Team

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# U. S. NAVY RADAR SYSTEMS SURVEY

[UNCLASSIFIED TITLE]

## THIRD EDITION

Edward Ornstein

High Resolution Branch  
Radar Division

November 22, 1957

*Note: For a similar listing which included other  
radars than Navy System (as well as Navy) refer to  
"A Radar Directory" by E.O. Saltwedel (Rand Corp)  
RM-2000, ASTIA wloc # AD 150674 (SECRET)  
NRL wloc # X200499*

*Wtd Aug 13, 1957*



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NHL Report 4863

# U. S. NAVY RADAR SYSTEMS SURVEY

[UNCLASSIFIED TITLE]

THIRD EDITION

Edward Ornstein

High Resolution Branch  
Radar Division

November 23, 1987

For a number of years, the Navy has been conducting a survey of radar systems (as well as many other) in the U.S. Navy. This report is a summary of the results of this survey. It is intended to provide a general overview of the current state of radar systems in the U.S. Navy. The report is divided into two main sections: a description of the current state of radar systems and a description of the future state of radar systems. The first section describes the current state of radar systems in the U.S. Navy, including the types of radar systems in use, the capabilities of these systems, and the challenges facing the Navy in maintaining and upgrading these systems. The second section describes the future state of radar systems in the U.S. Navy, including the types of radar systems that are being developed, the capabilities of these systems, and the challenges facing the Navy in developing and testing these systems. The report is intended to provide a general overview of the current state of radar systems in the U.S. Navy and to provide a basis for the development of future radar systems.



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**ABSTRACT**  
[Unclassified]

A summarization has been compiled of approximately 200 radar systems for which Navy nomenclature exists. This summary is the third in a series which began with NRL Report 3544, "U. S. Navy Radar Systems Survey," by D. J. McLaughlin and L. M. Johnson (Secret), Sept. 1949, and which was continued with NRL Report 4128, "U. S. Navy Radar Systems Survey, Second Edition," by C. B. Upp (Secret), April 1953. The present summary is actually a revision of the second edition. For each of the systems given, some 20 or more technical and operational characteristics are included. Where available, performance data is also included.

**PROBLEM STATUS**

This is a final report on one phase of the problem; work is continuing on the problem.

**AUTHORIZATION**

NRL Problem R02-12  
Projects NR 412-000, NR 412-003,  
NL 430-014-1, EL 43001, NO 051-631,  
and B4f-246-9-56

Manuscript submitted May 28, 1957

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## PREFACE

This report is the third in a series which began with NRL Report 3544, "U. S. Navy Radar Systems Survey."<sup>1</sup> It is, actually, a revision of NRL Report 4128, "U. S. Navy Radar Systems Survey, Second Edition,"<sup>2</sup> and includes substantially the same materials, with additions and deletions for the purpose of reflecting the current state of Naval radar. Some 200 models are now covered in full.

An additional section, Section 11, has been added to give a brief indication of the present status of Naval radar systems which would otherwise not have been mentioned in the present volume. In addition, each section now includes a column showing the source from which additional information on any radar can be obtained. Blank pages have been inserted in each section so that information can be added by the holders of this volume if they so desire.

Inclusion or deletion of material was based on equipment nomenclature and on the likelihood of future interest in any specific system. Some of the choices were necessarily arbitrary, as was the arrangement and ordering of the data included. It seems inevitable that inadvertent omissions have occurred, and the author would appreciate both omissions and errors being called to his attention.

The outstanding cooperation and courtesy shown by the personnel of the Navy Department's bureaus and field stations were major factors in making this report possible. The author wishes to express his gratitude for their unfailing help.

<sup>1</sup>McLaughlin, D. J., and Johnson, L. M., "U. S. Navy Radar Systems Survey," NRL Report 3544 (SECRET), Sept. 1949

<sup>2</sup>Upp, Charles B., "U. S. Navy Radar Systems Survey, Second Edition," NRL Report 4128 (SECRET), April 1953

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## Section 1

### Shipboard Search Radars

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## SECTION 1

### SHIPBOARD SEARCH RADARS

The column headed "Calculated Range" in Section 1 and Section 2 contains values of detection ranges on a one-square-meter target calculated by L. V. Blake and A. G. Ferris of the Naval Research Laboratory, according to procedures more fully discussed in NRL Memorandum Report 611 (Confidential). The range values were obtained from the formula:

$$R_{50} = 30 \left[ \frac{P_t \tau G_t G_r L F^4}{f^2 \overline{NF} V} \right]^{1/4}$$

$P_t$  - transmitted pulse power

$R_{50}$  - 50% blip-scan range, nautical miles

$\tau$  - pulse length, microseconds

$G_t$  - transmitting antenna power gain

$G_r$  - receiving antenna power gain

$L$  - power loss factor (line and duplexer, antenna pattern shape, atmosphere, etc.)

$f$  - radar frequency, megacycles

$\overline{NF}$  - receiver noise figure

$V$  - visibility factor (minimum detectable signal-to-noise power ratio)

Unless otherwise noted, the value  $F = 1$  (free-space propagation) was assumed. In some cases, however, a larger value was used where sea reflection interference should be taken into account. In such cases, the value used is shown parenthetically in the charts under "Calculated Range." When the value  $F = 2$  is indicated, the range figure is for a target in an interference-lobe maximum.

The parameters used for these calculations were taken as stated in the table. In the case of some radars, receiver noise-figure information was not available, and it was estimated. Typical estimated values at different frequencies are: 200 Mc, 5 db; 1300 Mc, 10 db; 3000 Mc, 10 db; 9000 Mc, 15 db. Antenna pattern loss factor for scanning radars is taken as 1.6 db, and an additional 0.5 db to 1.0 db is allowed for duplexer and line losses in the absence of specific information on actual losses. No atmospheric attenuation is assumed, although there would be some for the long-range radars.

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SHIPBOARD  
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MODEL	Function	General Facts	Sec. Class.
AN/BPA-2	Antenna Assembly	Dual antenna assembly. Surface coverage same as BPS-1. Air coverage same as SV-3.	C
AN/BPS-1	Surface Attack	Short exposure submarine attack radar.	C
AN/BPS-2	Air Search	Air search system for use on picket submarines. Used with AN/BPS-3 for interception control. Similar to AN/SPS-6B series radars, uses VK-2 indicators.	C
AN/BPS-3	Height Finder	Height-finder for use on picket submarines. Used with AN/BPS-2 for interception control. Uses AN/SPA-8A(PPI) and VL-1(RHI) indicators.	C
AN/BPS-4	Air Search	Submarine air search radar. VK-2 indicators. 563 class only.	C
AN/BPS-5	Surface Search	Surface search radar for 250-ton submarines. Uses AN/SPA-4A(PPI) indicators.	C
AN/SPN-4	Surface Navigation	Raytheon Pathfinder. Commercial radar; characteristics subject to change, 7-in. nonstandard PPI.	U
AN/SPN-5	Surface Navigation	Radiomarine Corp. of America Model CR-101. Commercial radar; characteristics subject to change, 12-in. nonstandard PPI.	U
AN/SPN-11	Surface Navigation	Radiomarine Corp. of America Model CR-103. Commercial radar; characteristics subject to change, 7-in. nonstandard PPI.	U
AN/SPN-13	Surface Navigation	General Electric Model MN-5. Commercial radar; characteristics subject to change, 17-in. nonstandard rectangular PPI.	U
AN/SPN-18	Surface Navigation	Radiomarine Corp. of America Model CR-104. Commercial radar; characteristics subject to change, 16-in. nonstandard PPI.	U
AN/SPN-21	Surface Navigation	Raytheon Pathfinder Model 1500. Commercial radar; characteristics subject to change, 10-in. nonstandard PPI.	U
AN/SPN-22	Surface Navigation	Radiomarine Corp. of America Model CR-105. Commercial radar; characteristics subject to change, 10-in. nonstandard PPI.	U
AN/SPS-2 (XN-1)	Air Search and Height	Long range search and intercept control. Multiple overlapping vertical beams. Multiple VK-3A and AN/SPA-7 (RHI) indicators.	C
AN/SPS-4	Surface-Zenith Search	Surface and zenith search antennas on same pedestal. Similar to SG-6 except for frequency. VJ repeaters; 5-in. "A" standard remotes.	U

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Frequency (Mc)	Pulse Length ( $\mu$ sec)	Pulse Rate (pps)
-	-	-
8740-8890	0.5	600 $\pm$ 10% (adjustable)
1250-1350	1 4	600 150
6275-6575	1.3	625-650
3400-3750	1	400 $\pm$ 5% (adjustable)
8740-8890	0.5	600 $\pm$ 10% (adjustable)
3010-3100	0.4	1000
9320-9430	0.25 1.0	3000 750
9320-9430	0.4	1000
3030-3110 9320-9430	0.25	1200
9320-9430	0.25 0.65	2000 800
9320-9430	0.2	1500
9320-9430	0.2	2000 1500
1250-1350	7	244
5450-5825	0.37 1.3	650

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Peak Power Output (kw)	Maximum Range (Miles)			Calculated* Range (Miles)
	2200 T DD	20 m <sup>2</sup> Aircraft	1 m <sup>2</sup> Aircraft	
-	-	-	-	-
75-110	10	-	-	5
500	20	-	60	49
125	-	40	-	16
500	-	15 at 10,000 ft	-	14
75-110	-	-	-	5
15	11	-	-	antenna 2 gains estimated
30	12	-	-	antenna 6 gains estimated
30	10	-	-	antenna 5 gains estimated
20 50	12	-	-	2 (3070 Mc) 7 (9375 Mc) Antenna gains estimated
40	12	-	-	6
7	8	-	-	3
7	8	-	-	3
6500	Horizon Limited	-	165 at 40,000 ft	170 (Beam No. 1)
200	20	Surf: 20 Zen: 15	-	18

\* See note, page 6

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Scan Coverage (Degrees)		Scan Rate (rpm)	
Hor.	Vert.	Hor.	Vert.
360 360	16 60	0-8 0-6	- -
360	16	0-8	-
360	20 (csc <sup>2</sup> )	0-12	-
360	35	0.7 auto. sector scan 10°, 20°, 40°	3-8 scans per sec. (adjustable)
360	60 (csc <sup>2</sup> )	0-6	-
360	16	0-8	-
360	-	7	-
360	-	10	-
360	-	17	-
360	-	10	-
360	-	8.5	-
360	-	20	-
360	-	20	-
360	23	3.3 MTI and 10	-
360	14 ± 12 csc <sup>2</sup> θ 50	5-15	-

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Stabilization				Antenna	
Type	Accuracy (deg)	Roll Limit (deg)	Pitch Limit (deg)	Type	Size (H x W ft)
-	-	-	-	Linear (retractable) paraboloid	0.75 x 3 + 2 x 4
-	-	-	-	Linear (retractable)	0.75 x 3 +
-	-	-	-	paraboloid	5 x 15
Mk 8 Mod 4 2 axis	1 min.	±20/10 sec	±10/6 sec	zoned lens	5.5 x 7.5
-	-	-	-	paraboloid (retractable)	2 x 4
-	-	-	-	Linear (non- retractable)	0.75 x 3 +
-	-	-	-	parabolic section	1.5 x 7
-	-	-	-	parabolic section	1.5 x 5.17
-	-	-	-	parabolic section	1 x 4.7
-	-	-	-	parabolic section	1.5 x 9
-	-	-	-	parabolic section	1 x 4.17
-	-	-	-	parabolic section	1 x 4.17
-	-	-	-	parabolic section	1 x 4.17
Stable base	±1/3	25	8	diamond paraboloid	20 x 40
-	-	-	-	parabolic sections	2 x 7 4.5 x 4.75

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Beamwidths (Degrees)		Main Lobe Gain (db)	Minor Lobe Down (db)
Hor.	Vert.		
2.0 5.5	16 60	24 - Surf. 23.5 - Air	24 26
2.0	16	24	24
4 ± 0.2	10 ± 0.5	27	26
2	1.4	34	Hor. 21 Vert. 21, 18
5.3	10	23.5	24
2.6	16	24	24
3.5	13.5	-	-
1.8	19	-	-
1.9	20	28	25
3.4 1.2	20	-	-
1.9	20	28	25
2.2	16	28	25
1.9	20	28	25
1.8	2.8 on each of 7 beams	36.6	28
2 2.2	14 + 12 csc <sup>2</sup> θ to 50	Surf. - 30 Zen. - 23	25 20

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Transmission Line	Antenna Weight (lb.)	Total System Weight (lb.)
-	-	-
RG-51/U	300	3750
RG-69/U	1500	4939
RG-50/U	16,500	20,000
RG-48/U	300	2570
RG-51/U	300	2122
RG-48/U	150	750
RG-51/U	150	750
RG-51/U	150	600
RG-48/U RG-51/U	240	575
RG-51/U	160	850
-	140 (includes transmitter)	230
-	110 (includes transmitter)	240
CAY-14ACM	52,000	94,272
RG-49/U	630	3256

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Supplier	No. in Use or Tent. Available Date	Source of Information	MODEL
Western Electric	105	BuShips, Code 821	AN/BPA-2
Western Electric	6	BuShips, Code 821	AN/BPS-1
Raytheon	14	BuShips, Code 821	AN/BPS-2
Western Electric	14	BuShips, Code 821	AN/BPS-3
Westinghouse	172	BuShips, Code 821	AN/BPS-4
Stavid Engineering Company	2	BuShips, Code 821	AN/BPS-5
Raytheon	MDAP and MSTs	BuShips, Code 821	AN/SPN-4
RMCA	MDAP and MSTs	BuShips, Code 821	AN/SPN-5
RMCA	MDAP and MSTs	BuShips, Code 821	AN/SPN-11
GE	2 USN 20 MSTs	BuShips, Code 821	AN/SPN-13
RMCA	Sig. Corps	BuShips, Code 821	AN/SPN-18
Raytheon	1	BuShips, Code 821	AN/SPN-21
RMCA	2	BuShips, Code 821	AN/SPN-22
GE	2	BuShips, Code 821	AN/SPS-2 (XN-1)
Raytheon	67	BuShips, Code 821	AN/SPS-4

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MODEL	Function	General Facts	Sec. Class.
AN/SPS-5 -5B	Surface Search	Small craft radar. Four XN-1 models with auxiliary bridge repeaters, specifically for PT boats. 10-in. PPI; 5-in. PPI auxiliary in XN-1. Only 5B has 20° vertical coverage.	U
AN/SPS-6B -6C	Air Search	Uses any standard Navy PPI. AN/SPS-6C has improved receiver and more rugged antenna drive.	U
AN/SPS-7	Surface Search	Millimeter wavelength system for ice pack navigation. 10-in. SPA-4 as system indicator. Standard remotes.	C
AN/SPS-8 -8C	Height Finder	Rapid vertical scan of 11° while rotating in azimuth. Any 11° scan may be chosen from 0° - 36°. AN/SPS-8C uses antenna similar to AN/SPS-8D; AN/SPS-8 is retrofitted to AN/SPS-8C.	U
AN/SPS-8A	Height Finder	AN/SPS-8 with new magnetrons, new receiver, new antenna pedestal. To be field-changed to AN/SPS-8D.	U
AN/SPS-8B -8D	Search Height Finder	Modified AN/SPS-8A to incorporate large antenna with organ pipe scanner. Rapid vertical scan of any 12° between 0° and 36°. AN/SPS-8D differs from AN/SPS-8B only in minor mechanical details on antenna.	U
AN/SPS-10 -10X	Surface Search	AN/SPS-10 uses 115 VAC; AN/SPS-10X uses 115 VDC. Integral IFF antenna and beacon operation. VJ or AN/SPA-4 used as master indicator.	U
AN/SPS-12	Air Search	Capable of being modified for 2 Mw. 2 MTI kits available (Confidential). Uses any standard Navy PPI.	U MTI-C
AN/SPS-13	Air Search and Height Finding	Intermediate-to-long-range, stacked beam radar for search and interception control.	C
AN/SPS-17 (XN-2)	Air Search	VHF long range early warning radar for ships larger than DD. Uses any standard Navy PPI. 41 x 13 ft antennas on later models for 350 mile slant range capability.	C
AN/SPS-18 (XN)	Surface Search	(XN-1) has 10-in. indicator similar to AN/SPS-5 (XN-2) has 12-in. deck-mounted indicator.	C
AN/SPS-21	Surface Search & Navigation	Small boat radar. Own master indicator, but can use standard repeaters. Transmitter mounting on mast is optional.	U
AN/SPS-26	Search & Height Finder	Frequency-shift vertical scanning. Nonstabilized antenna, data stabilized by computer. "Frescanar."	C
AN/SPS-28	Air Search	SRa transmitter, AN/SPS-17 type antenna and receiver. Uses any standard Navy PPI.	C
AN/SPS-29	Air Search	Similar to AN/SPS-17 but with different, smaller, transmitter chain. Suitable for DD.	C

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Power Source				Smallest Ship
Volts	Phase	Freq.	KVA	
-	-	-	-	-
115	1	60	3	SS
115	1	60	5	SS
440 115	3 1	- 60	- -	SS
115	1	60	-	SS
115	1	60	2.7	SS
motor generator of any ship			1.0-1.5	-
motor generator of any ship			1.5-2.3	-
motor generator of any ship			1.0-1.2	-
115	1	60	0.8	-
motor generator of any ship			1.5-2.0	-
motor generator of any ship			0.6-1.0	LCPL
motor generator of any ship			0.6-1.0	LCPL
440	3	60	300	CLC
440 220 or 115	1	60	4.0	DD

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DATE	TIME	LOCATION	REMARKS
10/10/64	10:00	100-100	100-100
10/11/64	10:00	100-100	100-100
10/12/64	10:00	100-100	100-100
10/13/64	10:00	100-100	100-100
10/14/64	10:00	100-100	100-100
10/15/64	10:00	100-100	100-100
10/16/64	10:00	100-100	100-100
10/17/64	10:00	100-100	100-100
10/18/64	10:00	100-100	100-100
10/19/64	10:00	100-100	100-100
10/20/64	10:00	100-100	100-100
10/21/64	10:00	100-100	100-100
10/22/64	10:00	100-100	100-100
10/23/64	10:00	100-100	100-100
10/24/64	10:00	100-100	100-100
10/25/64	10:00	100-100	100-100
10/26/64	10:00	100-100	100-100
10/27/64	10:00	100-100	100-100
10/28/64	10:00	100-100	100-100
10/29/64	10:00	100-100	100-100
10/30/64	10:00	100-100	100-100
10/31/64	10:00	100-100	100-100



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Frequency (Mc)	Pulse Length ( $\mu$ sec)	Pulse Rate (pps)
6275-6575	0.37	683
1250-1350	1, 4	600, 150
34,550-35,050	0.16	1500
3430-3570 (tunable)	1 or 2	1000 or 500
3430-3570 (tunable)	2	450 700
3430-3570 (tunable)	2	450 700
5450-5825	0.25 1.3	650
1250-1350	1 4	600 300
2770-2830	10	400
215-225	10	300
5450-5825	0.15 and 1.0	683
5500-5600	0.2	1500
2910-3060 at 40 cycles	4 (1.2 momentary)	400 to 4000
215-225	4	120
215-225	10	300

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Peak Power Output (kw)	Maximum Range (Miles)			Calculated * Range (Miles)
	2200 T DD	20 m <sup>2</sup> Aircraft	1 m <sup>2</sup> Aircraft	
200	15	15	-	8
500	6B: 20 6C: 20	-	6B: 55 6C: 60	57 (F=1.5) 69 (F=1.5)
40	10	-	-	4
650	-	-	65	65: 12-sec data rate
1000	-	-	75	70: 12-sec data rate
1000	-	-	110	100: 15-sec data rate
200	20	20	-	11 17
500	20	-	65	83 (F=1.5)
2000	Line of Sight	-	140	140
750	20	-	200	230 (F=2)
200	20	20	-	12
10	14	-	-	4
1000	-	-	90	68
300	Line of Sight	-	90	124 (F=2)
750	Line of Sight	-	200	230 (F=2)

\*See note, page 6

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Scan Coverage (Degrees)		Scan Rate (rpm)	
Hor.	Vert.	Hor.	Vert.
360	9 5B: 20	15	Manual
360	30	5-15	-
360	10	1.75 60	-
360	36	Manual, 1,2,3,5,10, or sector scan	0,5,10, or 20 per sec
360	36	Manual, 1,2,3,5,10, or sector scan	0,5,10, or 20 per sec
360	36	Manual, 1,2,4,5, 10	Manual, 6,12,16 per sec
360	$14 + 12 \csc^2 \theta$	16	-
360	30	2.5-15	-
360	23 (to 90,000 feet)	6 3	-
360	36	0-15	-
360	20	17	-
360	-	20	-
360	0-50	Manual, 15	40 per sec
360	-	5-15	-
360	-	7.5 and 15	-

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Stabilization				Antenna	
Type	Accuracy (deg)	Roll Limit (deg)	Pitch Limit (deg)	Type	Size (H x W ft)
-	-	-	-	Parabolic Section	2 x 7
-	-	-	-	Parabolic Section	5.75 x 17.2
-	-	-	-	Parabolic Section	0.75 x 5
Stable base	$\pm 1/3$	25	6	Parabolic Section	15 x 5
Stable base	$\pm 1/3$	25	6	Parabolic Section	15 x 5
Stable base	$\pm 1/3$	25	6	Asymetric Parabolic	15 x 12
-	-	-	-	Parabolic Section	2 x 10
-	-	-	-	Parabolic Section	5.75 x 17.17
Hyd. stable base	$\pm 0.33$	30	6	Diamond Contour Paraboloid	9.25 x 20
-	-	-	-	Mattress	8.5 x 17.5
-	-	-	-	Cylindrical Parabola	2.17 x 7
-	-	-	-	Parabolic Section	1.5 x 8
Com- puter	$\pm 20$ min.	20° deck tilt		Parabolic Cylinder	12 x 9
-	-	-	-	Mattress	8.5 x 17.5
-	-	-	-	Mattress	8.5 x 17.5

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Beamwidths (Degrees)		Main Lobe Gain (db)	Minor Lobe Down (db)
Hor.	Vert.		
1.5	$14 + 12 \csc^2 \theta$	28	25
3.5	30	27.5	23 side 26 back
0.6	10	35	30
3.5	1.2	37	17
3.5	1.2	37	17
1.6	1.3	41	19
1.5	$14 + 12 \csc^2 \theta$	32	29
3.3	30	27.5	23 side 26 back
1.5	7 beams $2.8^\circ$ each	37.5	30
18.5	27	18.5	27
1.6	14 fan $12 \csc^2 \theta$	29.5	28
2	15	28	26
2.4	3	35	20
18	27.5	18.5	27
18	27.5	18.5	27

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Transmission Line	Antenna Weight (lb.)	Total System Weight (lb.)
RG-50/U	165 5B: 105	1200
6B:CAY-14ACM 6C:RG-132/U	6B: 800 6C: 924	6B: 2685 6C: 2800
0.75" circular waveguide	160	1000
RG-75/U	4000	12,000
RG-75/U	4000	12,000
RG-75/U	4700	14,000
RG-49/U	335	1600
CG-925/U	990	4700
RG-75/U	9300	36,000
RG-154/U	1240	8435
RG-50/U	100	XN-1: 1090 XN-2: 1200
RG-49/U	169 209 with transmitter	312
S-band waveguide	1800	8000
RG-154/U	1240	4440
RG-154/U	1000	4000

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Power Source				Smallest Ship
Volts	Phase	Freq.	KVA	
115	1	60	2.25	PT
115	1	60	5.5	DD
115	1	60	1.7	PC
440	3	60	20	DER
440	3	60	20	DER
440	3	60	20	DER
115	1	60	3.5	DE
440	3	60	9	CL
440	3	60	110	CL
440	3	60	22	CL
115	1	60	30	PT
115	1	60	0.6	LCPL
440	3	60	20	DE
440	3	60	-	DD
440	3	60	16-18	DD

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Supplier	No. in Use or Tent. Available Date	Source of Information	MODEL
Raytheon	500	BuShips, Code 821	AN/SPS-5 -5B
Westinghouse	6B: 180 6C: 301 U.S. 33 for allies	BuShips, Code 821	AN/SPS-6B -6C
Sylvania	2	BuShips, Code 821	AN/SPS-7
GE	77	BuShips, Code 823	AN/SPS-8 -8C
GE	88	BuShips, Code 823	AN/SPS-8A
GE	8B: 8 to be delivered starting August 1957 8D: 6 to be ordered	BuShips, Code 823	AN/SPS-8B -8D
Sylvania	479	BuShips, Code 821	AN/SPS-10 -10X
RCA	136	BuShips, Code 821	AN/SPS-12
Sperry Gyro.	1 in fiscal year 1958	BuShips, Code 823	AN/SPS-13
GE	2 prototype in fiscal year 1956	BuShips, Code 821	AN/SPS-17 (XN-2)
Raytheon	20 in 1957	BuShips, Code 821	AN/SPS-18 (XN)
Raytheon	10	BuShips, Code 821	AN/SPS-21
Hughes Aircraft	6 for delivery Apr. - Oct. 57	BuShips, Code 823	AN/SPS-26
Westinghouse	55 on order, delivery starts 1957	BuShips, Code 821	AN/SPS-28
Westinghouse	74 on order, delivery starts June 1958	BuShips, Code 821	AN. SPS-29

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MODEL	Function	General Facts	Sec. Class.
AN/SPS-30	Search and height finder	Modernization of existing SPS-8 series by adding high-power klystron transmitter, anti-jam features, 6 second data rate and long pulse with "pulse compression."	C
AN/SPS-31 (XN-1)	Air Search	UHF long-range early warning. Uses any standard Navy PPI.	C
AN/SPS-32	Air Search	400-mile radar for Nuclear Ships. Four stationary arrays integral to ship's structure, each electronically scanning 90° in azimuth. Two-dimensional data only. Parameters subject to change before delivery.	C
CXR X	Target Indicator	AN/SPS-8 modified for wide-angle scanning, and higher prf for short-range hemispheric coverage.	C
SC-5	Air Search	12-in. PPI, 5-in. A-scope, standard remotes, AVC.	U
SG-1B	Surface Search	5-in. A-scope, 7-in. PPI. Standard remotes. Now being replaced by AN/SPS-10.	U
SG-6 -6b	Surface and Zenith Search	Similar to AN/SPS-4, except for frequency. SG-6b uses different antenna and waveguide. Surface and zenith antennas on same pedestal. Standard remotes.	U
SK-2 SK-3	Air Search	Similar except for antenna.	U
SRa SRb	Air Search	7-in. PPI, 5-in. A-scope, standard remotes. SRb is SRa with improved receiver and noise figure monitor.	U
SR-3C	Air Search	SR-3 with AN/SPS-6b antenna. All of SR-3 series converted to SR-3C.	U
SR-6B	Air Search	SR-6 with SPS-6B antenna. All of SR-6 series converted to SR-6B.	U
SS-2	Surface Torpedo Fire Control	Field changed SS-1. 5-in. PPI, 3-in. A/B indicator console.	U
SS-2a	Surface Torpedo Fire Control	SS-2 antenna replaced by AN/BPS-1 antenna and control box. Quick look feature deleted.	C (modification kit only)
ST-1	Range only	SS-2 below-deck components. Antenna in periscope.	U
SU SU-1	Surface Search	5-in. A-scope, 5-in. PPI. SU is 115 v AC, SU-1 is 115 VDC.	U

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Peak Power Output (kw)	Maximum Range (Miles)			Calculated* Range (Miles)
	2200 T DD	20 m <sup>2</sup> Aircraft	1 m <sup>2</sup> Aircraft	
2500	-	-	395 (est)	151: 6-sec data rate 198: 30-sec data rate
2000	Line of Sight	-	225	279 (F = 2)
2000 (each of 4 transmitters)	Horizon Limited	-	300 (est)	-
650	-	-	25	35
200	8	-	40	64 (F = 2)
50	15	10	-	9
200	Srch:15 Zen: 0	Srch:15 Zen: 12	-	8 ( $\tau = 0.37$ ) 11 ( $\tau = 1.33$ )
200	12	-	50	114 (F = 2)
300	-	-	75	114 (F = 2)
500	-	-	50	54 (F = 1.5)
500	-	-	50	52 (F = 1.5)
85	12	-	-	5
85	12	-	-	4
85	12	-	-	1 (Search-lighting A-scope)
50	15	-	-	10

\* See note, page 6

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Frequency (Mc)	Pulse Length ( $\mu$ sec)	Pulse Rate (pps)
3430-3570 (tunable)	12 synthetic (resolu- tion of 0.25 pulse)	200 300
420-450	6	300
216.5 to 224.5 continuously scanning	20	50 $\pm$ 5 or 200
3400-3570 (tunable)	0.67	2000
195-205 215-225	5	60
3019-3100	2	750 800 850
6275-6575	0.37 1.3	650
215-220	5	60
175-185 195-205 215-225	1 and 4 at 200 pps 20 at 60 pps	200 and 60
1244-1350	1 4	600 150
1244-1350	2	300
8740-8890	0.5	600
8740-8890	0.5	600
8740-8890	0.5	600
9000-9160	0.5 1	600

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Scan Coverage (Degrees)		Scan Rate (rpm)	
Hor.	Vert.	Hor.	Vert.
360	11 (steerable 0-36)	Manual, 2,3,5,10	8,12,20, 40 (sec)
360	-	7.5 and 15	-
360° four antennas each cover 90°	Aircraft Operational Heights (csc <sup>2</sup> )	8.3 to 66 scans per min.	None
360	0-73	15	29 per sec
360	60	4	-
360	15	4,8, or 16	-
360	Sch: 14 ± 12 csc <sup>2</sup> θ Zen: 50	5-15	-
360	20	4	-
360	50	7	-
360	20	5-15	-
360	30	5-15	-
360	16	0-8	-
360	16	0-8	-
360	12	Hand	-
360	3.8	6	-

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SEARCH  
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Stabilization				Antenna	
Type	Accuracy (deg)	Roll Limit (deg)	Pitch Limit (deg)	Type	Size (H x W ft)
4 Axis	± 20 min.	25	6	Asymetric Parabola	15 x 12
-	-	-	-	Parabolic Section	8.5 x 17.5 (approx.)
None	-	-	-	Four fixed arrays in ship's structure	20 x 40 ft (each array)
4 Axis	± 20 min.	25	6	Parabolic Cylinder	11 x 17
-	-	-	-	12-Dipole Mattress	4 x 15
-	-	-	-	Parabolic Section	1.25 x 4
-	-	-	-	Parabolic Section	Sch: 1.5 x 5 Zen: 4.17 x 4.5
-	-	-	-	17-ft. Round Dipole Fed Paraboloid	-
-	-	-	-	Mattress	6 x 15
-	-	-	-	Parabolic Section	6 x 17.5
-	-	-	-	Parabolic Section	6 x 17.5
-	-	-	-	Parabolic Section	0.75 x 2.5
-	-	-	-	Linear (retractable)	0.75 x 3+
-	-	-	-	Leaky Waveguide Window	0.5 x 0.25
2 Axis	± 2.5	± 45	± 7	Circular Parabola	2 ft. diameter

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Beamwidths (Degrees)		Main Lobe Gain (db)	Minor Lobe Down (db)
Hor.	Vert.		
1.6	1.3	41	19
10	20	23	30
5.7 normal to array 8.4 at 45	15	24 (average)	0.24
3.0	4.5 hor. 12 max. elev.	33	15
22	60	13.5	18.4
5	15	23	19
Sch: 2.5 Zen: 2.2	Sch: 14 + 12 $\csc^2 \theta$ Zen: 50	Sch: 28 Zen: 23	Sch: 25 Zen: 20
22	20	18.6	26
22	50	15	18
3.2	20	27.3	22
3.2	30	27.0	26
2.6	16	24	21
2.0	16	24	24
30	16	14	16
3.8	3.8	33	25

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Transmission Line	Antenna Weight (lb.)	Total System Weight (lb.)
S-band waveguide	4700	16000
RG-154/U	1100	3750
RG-154/U 3 1/8-in. air coax	5000 per array	52,250
S-band waveguide	4500	12000
RG-18/U	600	2425
RG-48/U	340	2120
6: RG-50/U 6b: RG-49/U	600	3042
1.625-in. Coax.	SK-2: 1600 SK-3: 1655	3583 4257
RG-20/U	711	2678
CAY-14 ACM	930	4410
CAY-14 ACM	930	2561
RG-51/U	100	3315
RG-51/U	480	3725
RG-51/U	525	3709
RG-51/U	210	1275 1900

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Power Source				Smallest Ship
Volts	Phase	Freq.	KVA	
440	3	60	50	DER
440	3	60	25-30	DD
440	3	60	300 (est)	Special for CVAN and CGN
440	3	60	20	CAG
115	1	60	3.5	DD
440 220 115	1	60	30	DD
440 220 115	1	60	4	DD
115	1	60	4.75	CL
115	1	60	7.5	DD
115	1	60	5.0	CL
115	1	60	5.0	DD
115	1	60	3.8	SS
115	1	60	3.0	SS
115	1	60	3.8	SS
115 115	1 DC	60 DC	2.3 4	DE

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Sample No.	Power Factor			
	Volt	Phase	Power	kVA
100	100	0	80	80
101	100	0	80	28-30
102	100	0	80	100 (est)
103	100	0	80	10
104	115	1	80	2.2
105	100	0	80	80
106	115	1	80	4
107	115	1	80	4.15
108	115	1	80	7.8
109	115	1	80	8.8
110	115	1	80	8.0
111	115	1	80	8.8
112	115	1	80	8.8
113	115	1	80	8.0
114	115	1	80	8.8
115	115	1	80	8.8
116	115	1	80	8.8
117	115	1	80	8.8
118	115	1	80	8.8
119	115	1	80	8.8
120	115	1	80	8.8



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Supplier	No. in Use or Tent. Available Date	Source of Information	MODEL
GE	1 dev. for Nov. 1957	BuShips, Code 823	AN/SPS-30
Stavid	April 1958	BuShips, Code 821	AN/SPS-31 (XN-1)
Hughes Aircraft	One in 1958 One in 1960	BuShips, Code 821	AN/SPS-32
GE	2	BuShips, Code 823	CXRX
GE	16 Fleet 27 Reserve	BuShips, Code 821	SC-5
Raytheon	300 (Now being re- placed by AN/SPS-10)	BuShips, Code 821	SG-1B
Raytheon	6: 48 6b: 63	BuShips, Code 821	SG-6 -6b
GE	8 in active fleet, 45 reserve fleet	BuShips, Code 821	SK-2 SK-3
Westinghouse	100	BuShips, Code 821	SRa SRb
Westinghouse	19	BuShips, Code 821	SR-3C
Westinghouse	40	BuShips, Code 821	SR-6B
Western Electric	66	BuShips, Code 821	SS-2
Western Electric	19	BuShips, Code 821	SS-2a
Western Electric	30	BuShips, Code 821	ST-1
Raytheon	126	BuShips, Code 821	SU SU-1

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\* See note, page 6

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## SHIPBOARD SEARCH RADARS

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Supplier	No. in Use or Tent. Available Date	Source of Information	MODEL
Raytheon	3	BuShips, Code 821	SU-2

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## Section 2

### Landbased Search Radars

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MODEL	Function	General Facts	Sec. Class
AN/KPQ-1 AN/SPQ-6	Mortar Locator	Locates high-trajectory projectiles and their sources. 5 stationary beams. AN/SPQ-6 is ship-board version.	C
AN/MPS-4	Height Finder	RHI, PPI, and A-scope in operations center.	U
AN/MPS-21 (XN-1)	Air Search and Height Finding	V-beam height-finder.	C
AN/MPS-24	Air Search	Helicopter transportable, very-long-range, VHF air search radar. Uses modified SK-1M transmitter.	C
AN/MSQ-3	Airfield Surveillance	Combination of AN/TPS-1D, AN/UPX-1, AN/UPA-25, AN/CPN-6, and communications.	C
AN/TPS-1D -1G	General Search	AN/TPS-1G is improved model with csc <sup>2</sup> antenna.	U
AN/TPS-21	Battle-field Surveillance	Personnel and vehicle detector. Converts video scintillation into audio signal (Butterfly).	C
AN/UPS-1 (XN-1)	General Search	Miniature techniques, transportable. Intended to replace AN/TPS-1D.	C
SO-12M/N	Surface Search	Limited present use.	U

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Frequency (Mc)	Pulse Length ( $\mu$ sec)	Peak Power (kw)
2800-3000	1.0	KPQ-1: 250 SPQ-6: 750
6275-6575	1.3 or 3.7	220
1250-1350	5.0	5000 (each beam)
200-225	5.0	1000
-	-	-
1220-1350	2.0	500
9375	0.4	8
1220-1350	1.4 4.2	1000
9000-9160	1.0	50

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Pulse Rate (pps)	Maximum Range (Miles)			Calculated* Range (Miles)
	2200 T DD	20 m <sup>2</sup> Aircraft	1 m <sup>2</sup> Aircraft	
2000	-	-	4 on 81 mm mortar	-
615-650 motor driven	-	65	-	45
360	-	280	-	235
170-190	-	200	-	277 (F = 2) (over water)
-	-	-	-	-
380-400	-	1D: 100 1G: 130 (est)	-	75 (F = 1.5) 73 (F = 1.5)
1600	-	-	11.3 on vehicle, 0.57 on man	2
800 267	-	-	78 (est)	105 (F = 1.5)
465	35	-	-	24

\* See note, page 6

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Scan Coverage (Degrees)		Scan Rate (rpm)	
Hor.	Vert.	Hor.	Vert.
20	5	Lobing	Sequential
360	-5 to 25	6	1-1.5 scan/sec.
360	30	0-6	None
360	22	5	None
-	-	-	-
360	-	0-15	-
360	5	-	-
360	11	0-15	None
360	2 or 6	6	None

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Total System Weight (lbs)	Antenna		Beamwidth (Degrees)	
	Type	Size (ft)	Hor.	Vert.
1800	Parabolic Sections (5)	3 x 4 (com- plete)	0.5	0.3
10,000	Parabolic Section	3 x 15	4	0.8
35,500	Bipolarized Parabola - $\text{csc}^2$	32 x 20	1.8	30
60,000	Cylindrical Paraboloid	33 x 11	9	22
-	-	-	-	-
3000	1D: Paraboloid 1G: $\text{csc}^2$	4 x 15 6 x 15.75	4 3.7	12 40
250	Parabolic Section	3 x 1	10	3
1800	Paraboloid	4 x 15	3	11
2590	Paraboloid	3 x 5	1.5	2 or 6

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Transmission Line	Main Lobe Gain (db)	Minor Lobe Down (db)
Guide	-	-
RG/50	36.5	Coma Lobe 9 db
Guide	34	-
Coax	21	-
-	-	-
Coax	1D: 28 1G: 27	-
Guide	-	-
Guide	28	-
Guide	36.9	-

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Power Source				Number in Use or Tentative Available Date	Supplier	Source of Information	MODEL
Volts	Phase	Freq.	KVA				
-	-	-	-	3 exp.	Emerson Electric	BuShips, Code 828	AN/KPQ-1 AN/SPQ-6
115	1 or 3	60	4.2	Approx. 100	Hazeltine	BuShips, Code 828	AN/MPS-4
440	3	400	120	One in May 1959	Sperry	BuShips, Code 827	AN/MPS-21 (XN-1)
115	3	60	20	12	Hazeltine	BuShips, Code 827	AN/MPS-24
120 120 115 26	3 1 1 DC	60 60 400 DC	10 10 10 5	-	Adler Engineering	BuShips, Code 827	AN/MSQ-3
115	1	400	5	1G: 200 starting 1957	1D: Raytheon 1G: Hazeltine	BuShips, Code 827	AN/TPS-1D -1G
115	1	400	0.5	-	Hoffman Laboratories	BuShips, Code 827	AN/TPS-21
115	3	400	7.5	3	RCA	BuShips, Code 827	AN/UPS-1 (XN-1)
115	1	60	2.5	-	Raytheon	BuShips, Code 828	SO-12M/N

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1. ANALYSIS  
2. EVALUATION  
3. SUMMARY

Topic	Source	Date	Author	Title	Reference	Notes	Comments	Action	Status
1.1	1.1.1	1.1.1.1	1.1.1.1.1	1.1.1.1.1.1	1.1.1.1.1.1.1	1.1.1.1.1.1.1.1	1.1.1.1.1.1.1.1.1	1.1.1.1.1.1.1.1.1.1	1.1.1.1.1.1.1.1.1.1.1
1.2	1.2.1	1.2.1.1	1.2.1.1.1	1.2.1.1.1.1	1.2.1.1.1.1.1	1.2.1.1.1.1.1.1	1.2.1.1.1.1.1.1.1	1.2.1.1.1.1.1.1.1.1	1.2.1.1.1.1.1.1.1.1.1
1.3	1.3.1	1.3.1.1	1.3.1.1.1	1.3.1.1.1.1	1.3.1.1.1.1.1	1.3.1.1.1.1.1.1	1.3.1.1.1.1.1.1.1	1.3.1.1.1.1.1.1.1.1	1.3.1.1.1.1.1.1.1.1.1
1.4	1.4.1	1.4.1.1	1.4.1.1.1	1.4.1.1.1.1	1.4.1.1.1.1.1	1.4.1.1.1.1.1.1	1.4.1.1.1.1.1.1.1	1.4.1.1.1.1.1.1.1.1	1.4.1.1.1.1.1.1.1.1.1
1.5	1.5.1	1.5.1.1	1.5.1.1.1	1.5.1.1.1.1	1.5.1.1.1.1.1	1.5.1.1.1.1.1.1	1.5.1.1.1.1.1.1.1	1.5.1.1.1.1.1.1.1.1	1.5.1.1.1.1.1.1.1.1.1
1.6	1.6.1	1.6.1.1	1.6.1.1.1	1.6.1.1.1.1	1.6.1.1.1.1.1	1.6.1.1.1.1.1.1	1.6.1.1.1.1.1.1.1	1.6.1.1.1.1.1.1.1.1	1.6.1.1.1.1.1.1.1.1.1
1.7	1.7.1	1.7.1.1	1.7.1.1.1	1.7.1.1.1.1	1.7.1.1.1.1.1	1.7.1.1.1.1.1.1	1.7.1.1.1.1.1.1.1	1.7.1.1.1.1.1.1.1.1	1.7.1.1.1.1.1.1.1.1.1
1.8	1.8.1	1.8.1.1	1.8.1.1.1	1.8.1.1.1.1	1.8.1.1.1.1.1	1.8.1.1.1.1.1.1	1.8.1.1.1.1.1.1.1	1.8.1.1.1.1.1.1.1.1	1.8.1.1.1.1.1.1.1.1.1
1.9	1.9.1	1.9.1.1	1.9.1.1.1	1.9.1.1.1.1	1.9.1.1.1.1.1	1.9.1.1.1.1.1.1	1.9.1.1.1.1.1.1.1	1.9.1.1.1.1.1.1.1.1	1.9.1.1.1.1.1.1.1.1.1
1.10	1.10.1	1.10.1.1	1.10.1.1.1	1.10.1.1.1.1	1.10.1.1.1.1.1	1.10.1.1.1.1.1.1	1.10.1.1.1.1.1.1.1	1.10.1.1.1.1.1.1.1.1	1.10.1.1.1.1.1.1.1.1.1
1.11	1.11.1	1.11.1.1	1.11.1.1.1	1.11.1.1.1.1	1.11.1.1.1.1.1	1.11.1.1.1.1.1.1	1.11.1.1.1.1.1.1.1	1.11.1.1.1.1.1.1.1.1	1.11.1.1.1.1.1.1.1.1.1
1.12	1.12.1	1.12.1.1	1.12.1.1.1	1.12.1.1.1.1	1.12.1.1.1.1.1	1.12.1.1.1.1.1.1	1.12.1.1.1.1.1.1.1	1.12.1.1.1.1.1.1.1.1	1.12.1.1.1.1.1.1.1.1.1
1.13	1.13.1	1.13.1.1	1.13.1.1.1	1.13.1.1.1.1	1.13.1.1.1.1.1	1.13.1.1.1.1.1.1	1.13.1.1.1.1.1.1.1	1.13.1.1.1.1.1.1.1.1	1.13.1.1.1.1.1.1.1.1.1
1.14	1.14.1	1.14.1.1	1.14.1.1.1	1.14.1.1.1.1	1.14.1.1.1.1.1	1.14.1.1.1.1.1.1	1.14.1.1.1.1.1.1.1	1.14.1.1.1.1.1.1.1.1	1.14.1.1.1.1.1.1.1.1.1
1.15	1.15.1	1.15.1.1	1.15.1.1.1	1.15.1.1.1.1	1.15.1.1.1.1.1	1.15.1.1.1.1.1.1	1.15.1.1.1.1.1.1.1	1.15.1.1.1.1.1.1.1.1	1.15.1.1.1.1.1.1.1.1.1
1.16	1.16.1	1.16.1.1	1.16.1.1.1	1.16.1.1.1.1	1.16.1.1.1.1.1	1.16.1.1.1.1.1.1	1.16.1.1.1.1.1.1.1	1.16.1.1.1.1.1.1.1.1	1.16.1.1.1.1.1.1.1.1.1
1.17	1.17.1	1.17.1.1	1.17.1.1.1	1.17.1.1.1.1	1.17.1.1.1.1.1	1.17.1.1.1.1.1.1	1.17.1.1.1.1.1.1.1	1.17.1.1.1.1.1.1.1.1	1.17.1.1.1.1.1.1.1.1.1
1.18	1.18.1	1.18.1.1	1.18.1.1.1	1.18.1.1.1.1	1.18.1.1.1.1.1	1.18.1.1.1.1.1.1	1.18.1.1.1.1.1.1.1	1.18.1.1.1.1.1.1.1.1	1.18.1.1.1.1.1.1.1.1.1
1.19	1.19.1	1.19.1.1	1.19.1.1.1	1.19.1.1.1.1	1.19.1.1.1.1.1	1.19.1.1.1.1.1.1	1.19.1.1.1.1.1.1.1	1.19.1.1.1.1.1.1.1.1	1.19.1.1.1.1.1.1.1.1.1
1.20	1.20.1	1.20.1.1	1.20.1.1.1	1.20.1.1.1.1	1.20.1.1.1.1.1	1.20.1.1.1.1.1.1	1.20.1.1.1.1.1.1.1	1.20.1.1.1.1.1.1.1.1	1.20.1.1.1.1.1.1.1.1.1
1.21	1.21.1	1.21.1.1	1.21.1.1.1	1.21.1.1.1.1	1.21.1.1.1.1.1	1.21.1.1.1.1.1.1	1.21.1.1.1.1.1.1.1	1.21.1.1.1.1.1.1.1.1	1.21.1.1.1.1.1.1.1.1.1
1.22	1.22.1	1.22.1.1	1.22.1.1.1	1.22.1.1.1.1	1.22.1.1.1.1.1	1.22.1.1.1.1.1.1	1.22.1.1.1.1.1.1.1	1.22.1.1.1.1.1.1.1.1	1.22.1.1.1.1.1.1.1.1.1
1.23	1.23.1	1.23.1.1	1.23.1.1.1	1.23.1.1.1.1	1.23.1.1.1.1.1	1.23.1.1.1.1.1.1	1.23.1.1.1.1.1.1.1	1.23.1.1.1.1.1.1.1.1	1.23.1.1.1.1.1.1.1.1.1
1.24	1.24.1	1.24.1.1	1.24.1.1.1	1.24.1.1.1.1	1.24.1.1.1.1.1	1.24.1.1.1.1.1.1	1.24.1.1.1.1.1.1.1	1.24.1.1.1.1.1.1.1.1	1.24.1.1.1.1.1.1.1.1.1
1.25	1.25.1	1.25.1.1	1.25.1.1.1	1.25.1.1.1.1	1.25.1.1.1.1.1	1.25.1.1.1.1.1.1	1.25.1.1.1.1.1.1.1	1.25.1.1.1.1.1.1.1.1	1.25.1.1.1.1.1.1.1.1.1
1.26	1.26.1	1.26.1.1	1.26.1.1.1	1.26.1.1.1.1	1.26.1.1.1.1.1	1.26.1.1.1.1.1.1	1.26.1.1.1.1.1.1.1	1.26.1.1.1.1.1.1.1.1	1.26.1.1.1.1.1.1.1.1.1
1.27	1.27.1	1.27.1.1	1.27.1.1.1	1.27.1.1.1.1	1.27.1.1.1.1.1	1.27.1.1.1.1.1.1	1.27.1.1.1.1.1.1.1	1.27.1.1.1.1.1.1.1.1	1.27.1.1.1.1.1.1.1.1.1
1.28	1.28.1	1.28.1.1	1.28.1.1.1	1.28.1.1.1.1	1.28.1.1.1.1.1	1.28.1.1.1.1.1.1	1.28.1.1.1.1.1.1.1	1.28.1.1.1.1.1.1.1.1	1.28.1.1.1.1.1.1.1.1.1
1.29	1.29.1	1.29.1.1	1.29.1.1.1	1.29.1.1.1.1	1.29.1.1.1.1.1	1.29.1.1.1.1.1.1	1.29.1.1.1.1.1.1.1	1.29.1.1.1.1.1.1.1.1	1.29.1.1.1.1.1.1.1.1.1
1.30	1.30.1	1.30.1.1	1.30.1.1.1	1.30.1.1.1.1	1.30.1.1.1.1.1	1.30.1.1.1.1.1.1	1.30.1.1.1.1.1.1.1	1.30.1.1.1.1.1.1.1.1	1.30.1.1.1.1.1.1.1.1.1
1.31	1.31.1	1.31.1.1	1.31.1.1.1	1.31.1.1.1.1	1.31.1.1.1.1.1	1.31.1.1.1.1.1.1	1.31.1.1.1.1.1.1.1	1.31.1.1.1.1.1.1.1.1	1.31.1.1.1.1.1.1.1.1.1
1.32	1.32.1	1.32.1.1	1.32.1.1.1	1.32.1.1.1.1	1.32.1.1.1.1.1	1.32.1.1.1.1.1.1	1.32.1.1.1.1.1.1.1	1.32.1.1.1.1.1.1.1.1	1.32.1.1.1.1.1.1.1.1.1
1.33	1.33.1	1.33.1.1	1.33.1.1.1	1.33.1.1.1.1	1.33.1.1.1.1.1	1.33.1.1.1.1.1.1	1.33.1.1.1.1.1.1.1	1.33.1.1.1.1.1.1.1.1	1.33.1.1.1.1.1.1.1.1.1
1.34	1.34.1	1.34.1.1	1.34.1.1.1	1.34.1.1.1.1	1.34.1.1.1.1.1	1.34.1.1.1.1.1.1	1.34.1.1.1.1.1.1.1	1.34.1.1.1.1.1.1.1.1	1.34.1.1.1.1.1.1.1.1.1
1.35	1.35.1	1.35.1.1	1.35.1.1.1	1.35.1.1.1.1	1.35.1.1.1.1.1	1.35.1.1.1.1.1.1	1.35.1.1.1.1.1.1.1	1.35.1.1.1.1.1.1.1.1	1.35.1.1.1.1.1.1.1.1.1
1.36	1.36.1	1.36.1.1	1.36.1.1.1	1.36.1.1.1.1	1.36.1.1.1.1.1	1.36.1.1.1.1.1.1	1.36.1.1.1.1.1.1.1	1.36.1.1.1.1.1.1.1.1	1.36.1.1.1.1.1.1.1.1.1
1.37	1.37.1	1.37.1.1	1.37.1.1.1	1.37.1.1.1.1	1.37.1.1.1.1.1	1.37.1.1.1.1.1.1	1.37.1.1.1.1.1.1.1	1.37.1.1.1.1.1.1.1.1	1.37.1.1.1.1.1.1.1.1.1
1.38	1.38.1	1.38.1.1	1.38.1.1.1	1.38.1.1.1.1	1.38.1.1.1.1.1	1.38.1.1.1.1.1.1	1.38.1.1.1.1.1.1.1	1.38.1.1.1.1.1.1.1.1	1.38.1.1.1.1.1.1.1.1.1
1.39	1.39.1	1.39.1.1	1.39.1.1.1	1.39.1.1.1.1	1.39.1.1.1.1.1	1.39.1.1.1.1.1.1	1.39.1.1.1.1.1.1.1	1.39.1.1.1.1.1.1.1.1	1.39.1.1.1.1.1.1.1.1.1
1.40	1.40.1	1.40.1.1	1.40.1.1.1	1.40.1.1.1.1	1.40.1.1.1.1.1	1.40.1.1.1.1.1.1	1.40.1.1.1.1.1.1.1	1.40.1.1.1.1.1.1.1.1	1.40.1.1.1.1.1.1.1.1.1
1.41	1.41.1	1.41.1.1	1.41.1.1.1	1.41.1.1.1.1	1.41.1.1.1.1.1	1.41.1.1.1.1.1.1	1.41.1.1.1.1.1.1.1	1.41.1.1.1.1.1.1.1.1	1.41.1.1.1.1.1.1.1.1.1
1.42	1.42.1	1.42.1.1	1.42.1.1.1	1.42.1.1.1.1	1.42.1.1.1.1.1	1.42.1.1.1.1.1.1	1.42.1.1.1.1.1.1.1	1.42.1.1.1.1.1.1.1.1	1.42.1.1.1.1.1.1.1.1.1
1.43	1.43.1	1.43.1.1	1.43.1.1.1	1.43.1.1.1.1	1.43.1.1.1.1.1	1.43.1.1.1.1.1.1	1.43.1.1.1.1.1.1.1	1.43.1.1.1.1.1.1.1.1	1.43.1.1.1.1.1.1.1.1.1
1.44	1.44.1	1.44.1.1	1.44.1.1.1	1.44.1.1.1.1	1.44.1.1.1.1.1	1.44.1.1.1.1.1.1	1.44.1.1.1.1.1.1.1	1.44.1.1.1.1.1.1.1.1	1.44.1.1.1.1.1.1.1.1.1
1.45	1.45.1	1.45.1.1	1.45.1.1.1	1.45.1.1.1.1	1.45.1.1.1.1.1	1.45.1.1.1.1.1.1	1.45.1.1.1.1.1.1.1	1.45.1.1.1.1.1.1.1.1	1.45.1.1.1.1.1.1.1.1.1
1.46	1.46.1	1.46.1.1	1.46.1.1.1	1.46.1.1.1.1	1.46.1.1.1.1.1	1.46.1.1.1.1.1.1	1.46.1.1.1.1.1.1.1	1.46.1.1.1.1.1.1.1.1	1.46.1.1.1.1.1.1.1.1.1
1.47	1.47.1	1.47.1.1	1.47.1.1.1	1.47.1.1.1.1	1.47.1.1.1.1.1	1.47.1.1.1.1.1.1	1.47.1.1.1.1.1.1.1	1.47.1.1.1.1.1.1.1.1	1.47.1.1.1.1.1.1.1.1.1
1.48	1.48.1	1.48.1.1	1.48.1.1.1	1.48.1.1.1.1	1.48.1.1.1.1.1	1.48.1.1.1.1.1.1	1.48.1.1.1.1.1.1.1	1.48.1.1.1.1.1.1.1.1	1.48.1.1.1.1.1.1.1.1.1
1.49	1.49.1	1.49.1.1	1.49.1.1.1	1.49.1.1.1.1	1.49.1.1.1.1.1	1.49.1.1.1.1.1.1	1.49.1.1.1.1.1.1.1	1.49.1.1.1.1.1.1.1.1	1.49.1.1.1.1.1.1.1.1.1
1.50	1.50.1	1.50.1.1	1.50.1.1.1	1.50.1.1.1.1	1.50.1.1.1.1.1	1.50.1.1.1.1.1.1	1.50.1.1.1.1.1.1.1	1.50.1.1.1.1.1.1.1.1	1.50.1.1.1.1.1.1.1.1.1
1.51	1.51.1	1.51.1.1	1.51.1.1.1	1.51.1.1.1.1	1.51.1.1.1.1.1	1.51.1.1.1.1.1.1	1.51.1.1.1.1.1.1.1	1.51.1.1.1.1.1.1.1.1	1.51.1.1.1.1.1.1.1.1.1
1.52	1.52.1	1.52.1.1	1.52.1.1.1	1.52.1.1.1.1	1.52.1.1.1.1.1	1.52.1.1.1.1.1.1	1.52.1.1.1.1.1.1.1	1.52.1.1.1.1.1.1.1.1	1.52.1.1.1.1.1.1.1.1.1
1.53	1.53.1	1.53.1.1	1.53.1.1.1	1.53.1.1.1.1	1.53.1.1.1.1.1	1.53.1.1.1.1.1.1	1.53.1.1.1.1.1.1.1	1.53.1.1.1.1.1.1.1.1	1.53.1.1.1.1.1.1.1.1.1
1.54	1.54.1	1.54.1.1	1.54.1.1.1	1.54.1.1.1.1	1.54.1.1.1.1.1	1.54.1.1.1.1.1.1	1.54.1.1.1.1.1.1.1	1.54.1.1.1.1.1.1.1.1	1.54.1.1.1.1.1.1.1.1.1
1.55	1.55.1	1.55.1.1	1.55.1.1.1	1.55.1.1.1.1	1.55.1.1.1.1.1	1.55.1.1.1.1.1.1	1.55.1.1.1.1.1.1.1	1.55.1.1.1.1.1.1.1.1	1.55.1.1.1.1.1.1.1.1.1
1.56	1.56.1	1.56.1.1	1.56.1.1.1	1.56.1.1.1.1	1.56.1.1.1.1.1	1.56.1.1.1.1.1.1	1.56.1.1.1.1.1.1.1	1.56.1.1.1.1.1.1.1.1	1.56.1.1.1.1.1.1.1.1.1
1.57	1.57.1	1.57.1.1	1.57.1.1.1	1.57.1.1.1.1	1.57.1.1.1.1.1	1.57.1.1.1.1.1.1	1.57.1.1.1.1.1.1.1	1.57.1.1.1.1.1.1.1.1	1.57.1.1.1.1.1.1.1.1.1
1.58	1.58.1	1.58.1.1	1.58.1.1.1	1.58.1.1.1.1	1.58.1.1.1.1.1	1.58.1.1.1.1.1.1	1.58.1.1.1.1.1.1.1	1.58.1.1.1.1.1.1.1.1	1.58.1.1.1.1.1.1.1.1.1
1.59	1.59.1	1.59.1.1	1.59.1.1.1	1.59.1.1.1.1	1.59.1.1.1.1.1	1.59.1.1.1.1.1.1	1.59.1.1.1.1.1.1.1	1.59.1.1.1.1.1.1.1.1	1.59.1.1.1.1.1.1.1.1.1
1.60	1.60.1	1.60.1.1	1.60.1.1.1	1.60.1.1.1.1	1.60.1.1.1.1.1	1.60.1.1.1.1.1.1	1.60.1.1.1.1.1.1.1	1.60.1.1.1.1.1.1.1.1	1.60.1.1.1.1.1.1.1.1.1
1.61	1.61.1	1.61.1.1	1.61.1.1.1	1.61.1.1.1.1	1.61.1.1.1.1.1	1.61.1.1.1.1.1.1	1.61.1.1.1.1.1.1.1	1.61.1.1.1.1.1.1.1.1	1.61.1.1.1.1.1.1.1.1.1
1.62	1.62.1	1.62.1.1	1.62.1.1.1	1.62.1.1.1.1	1.62.1.1.1.1.1	1.62.1.1.1.1.1.1	1.62.1.1.1.1.1.1.1	1.62.1.1.1.1.1.1.1.1	1.62.1.1.1.1.1.1.1.1.1
1.63	1.63.1	1.63.1.1	1.63.1.1.1	1.63.1.1.1.1	1.63.1.1.1.1.1	1.63.1.1.1.1.1.1	1.63.1.1.1.1.1.1.1	1.63.1.1.1.1.1.1.1.1	1.63.1.1.1.1.1.1.1.1.1
1.64	1.64.1	1.64.1.1	1.64.1.1.1	1.64.1.1.1.1	1.64.1.1.1.1.1	1.64.1.1.1.1.1.1	1.64.1.1.1.1.1.1.1	1.64.1.1.1.1.1.1.1.1	1.64.1.1.1.1.1.1.1.1.1
1.65	1.65.1	1.65.1.1	1.65.1.1.1	1.65.1.1.1.1	1.65.1.1.1.1.1	1.65.1.1.1.1.1.1	1.65.1.1.1.1.1.1.1	1.65.1.1.1.1.1.1.1.1	1.65.1.1.1.1.1.1.1.1.1
1.66	1.66.1	1.66.1.1	1.66.1.1.1	1.66.1.1.1.1	1.66.1.1.1.1.1	1.66.1.1.1.1.1.1	1.66.1.1.1.1.1.1.1	1.66.1.1.1.1.1.1.1.1	



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### **Section 3**

## **Airborne Search and Weapon Control Radars**

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MODEL	Function	General Facts	Sec. Class
AN/APG-30 30A	Airborne Range Only	Feeds radar range to optical fire control computers.	U
AN/APG-51 51A 51B	Intercept and Fire Control	For target search and track. AN/APG-51 was formerly designated E-10 fire control system. AN/APG-51A is used with Aero 19A. 51B with Aero 19G or Sparrow III.	C
AN/APN-59	Navigation	USAF navigation and search. None yet in use by USN.	U
AN/APQ-35 35A 35B	Intercept and Fire Control	Consists of AN/APS-21, AN/APG-26, and AN/ APS-28. Search, track, and tail warning.	C
AN/APQ-36	Missile Guidance	Search, intercept, and guidance for Sparrow I beam rider.	C
AN/APQ-47	Intercept and Fire Control	Transistorized all-weather AI. Monopulse for control of guns, rockets, and missiles. Research and development only.	C
AN/APQ-50	Intercept and Fire Control	Cylindrically packaged tracking radar. Part of Aero 13F.	C
AN/APQ-51	Missile Guidance	Search and limited tracking for optical Sparrow I beam rider.	C
AN/APQ-56	Reconnaissance	USAF side-looking strip map.	S
AN/APQ-67	Intercept and Fire Control	Research set for control of FM-CW equipment.	C

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Peak Power Output (kw)	Pulse Length ( $\mu$ sec)	Frequency (Mc)
30: 5 - 10 30A: 4	0.5	30: 9335-9415 30A: 9000-9600
51, 51A: 180 51B: 159	0.5, 2.35	9375 $\pm$ 40 8500-9400
70	0.35, 0.8 2.35, 4.5	9375 $\pm$ 40
21: 250 26: 40 28: 40	0.4, 1.75, 2.25 0.4 0.5	9375 $\pm$ 30 9245 $\pm$ 30 9245 $\pm$ 30
250	0.4, 0.67, 1.2 2.35, 3.1	9375 $\pm$ 30
250	0.5 2.2	9375 $\pm$ 30
180 150	0.5 1.75	9375 $\pm$ 30
250	Tracking: 0.42 Guidance: 0.66, 4/scan	9375 $\pm$ 30
100	0.1	35,000
0.2	CW	10,000 10,250

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Pulse Rate (pps)	Aircraft Installation	Maximum Range (yd)	
		20 m <sup>2</sup>	1 m <sup>2</sup>
800	F2H-2, F9F-2,4,5,6,8 FJ-3	3000	2000
910, 410, 330	51: F2H-4 51A: F2H-2N 51B: F3H-2	51, 51A: 22,000 (90% on F2H-2)	-
2000, 1025 180, 350	-	-	-
2400-2500, 300/550 2400-2500, 300/550 2000	F3D-1, 2	25 miles 2 miles 4 miles	-
325, 800 2400	F3D	23,000	-
2000 400	Experimental only	-	-
1200 330 or 550	F4D-1	32,000 (90% on F2H-2)	-
1200	F7U-3	-	2° off axis: 12,000 4° off axis: 3,000
4000	RB47 A3D (experimental)	15 miles ground mapping	-
-	-	-	-

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Minimum Range (yd)	Maximum Altitude (ft)	Scan Coverage (Degrees)	
		Hor.	Vert.
225	30: 45,000 30A: 60,000	-	-
150	50,000	Sch: $\pm 67.5$ Trk: $\pm 64$ ( $\pm 30$ steering)	51A: 13 51B: 11.5 ( $\pm 30$ steering)
-	50,000	360 or sector	+10 to -15
150	50,000	$\pm 85$ $\pm 60$ 144	$\pm 60$ , -30 $\pm 60$ 144
300	50,000	80	24
-	50,000	-	-
200	52,000	Sch: $\pm 56$ Trk: $\pm 45$	Sch: $\pm 56$ Trk: $\pm 45$
350	50,000	7	7
-	50,000 +	Aircraft Motion	0 to -35
-	-	-	-

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Accuracy		Maximum Track Rate		Indicator Scan	
Range	Azimuth	Range (knots)	Angular (deg)	Search	Track
±25 yd	-	1500	-	-	-
20 yd ±1% R	-	1200 closing 200 opening	20/sec	90° B-scope	F-scope
-	-	-	-	-	-
±100 yd ±25 yd -	±3° ±0.25° -	900 closing - -	- 45/sec -	170° x 30 170° x 15 120° cone	Conical
±25 yd	2 mils circular	-2000 +200 ft/sec	-	Step Wigwag	Conical
-	-	-	-	-	-
±25 yd or one percent to 10 mi., then 2 %	±5 mil	1600 closing 900 open	15/sec	90° B-scope	F-scope
±25 yd	2.5 mils rms	-	-	Range Voltage Meter	Range Voltage Meter
±50 ft (resolution)	0.15° (resolution)	-	-	Film Only	-
-	-	-	-	-	-

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Scan Rate		Beamwidths (degrees)		Reflector	
RPM	Looks Per Min.	Hor.	Vert.	Type	Size
-	2 per sec in range	18	18	Horn	4 in. x 6 in.
2400	-	51, 51A: 9 51B: 7	9 7	Parabola	21 in.
12-45	-	3.0	3.2 (csc <sup>2</sup> )	Modified Paraboloid	30 in. x 18 in.
4000 66.7 cps 1200	20, 40 continuous 40	2.9 18.8 cone 7.2	2.9 18.8 cone 7.2	Parabola	2.5 ft 0.75 ft 12.5 ft
3000 50 cps	3.4 sec frame time	4.5	4.5	Parabola	2 ft
-	-	-	-	Parabola	2 ft
-	30	3.6	3.6	Parabola	24 in.
Trk: 50 cps	Trk: 50 cps	4.2	4.4	Parabola	2 ft
Aircraft Motion		1.5	35 (csc <sup>2</sup> )	Linear Array	15 ft
-	-	-	-	-	-

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Power Source				Total System Weight (lb)	Indicators	
Volts	Phase or Amps.	Freq. (cps)	KVA		PPI	Others
28 102-124 102-124	3 amps 1 1	DC 380-420 320-1760	- 0.95 2.30	65 plus cable	-	-
115/200 28	3 DC	400 DC	2.7 0.36W	391	No	B-scope, augmented C- scope, artificial horizon.
115 115 27	- - 5.5 amps	380-1000 380-420 DC	1.1 0.25 -	175	2-5 in.	-
109-124 24-29	1 96 amps	380-420 DC	3.25 -	980	Yes	B, C, O-scope Pilots gun aim.
115 115	3 3	380-420 320-1000	2.5 9.0	1050	-	B and C-scope attack indicator with error indication.
115/200 28	3 -	320-420 DC	8.5 Kw 1 Kw	300	-	B and C-scope search. Range, range rate, time to go, horizon, attack.
115/200 28	3 -	400 DC	4.5 400 W	499 (radar only)	No	B-scope, augmented C- scope, artificial horizon.
115 28	3 12.5 amps	380-420 DC	2.0 -	500	No	Meter
-	-	-	-	650	-	Film only.
-	-	-	-			

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Display		Number in Use or Available Date	Supplier	Source of Information	MODEL
IFF	Beacon				
-	-	30: 25,000 30A: 200 per month	Admiral and Hoffman	BuAer, Code AV-33122	AN/APG-30 30A
Yes	51, 51A: Yes 51B: No	51: 100 51A: 225 51B: 25 plus 10 per month	Hughes	BuAer, Code AV-3310	AN/APG-51 51A 51B
-	Yes	USAF	Sperry	BuAer, Code AV-33222	AN/APN-59
Yes	Yes	-	Westinghouse and RCA	BuAer, Code AV-33111	AN/APQ-35 35A 35B
Yes	Yes	10	Sperry Gyro	BuAer, Code AV-33112	AN/APQ-36
Yes	Yes	-	North American	BuAer, Code AV-33112	AN/APQ-47
Yes	No	220 plus 30 per month	Westinghouse	BuAer, Code AV-3310	AN/APQ-50
No	No	250	Sperry Gyro	NRL, Code 5364	AN/APQ-51
No	No.	10 USAF 1956 1 USN 1957	Westinghouse	BuAer, Code AV-3322	AN/APQ-56
-	-	-	Raytheon	BuAer, Code AV-33111	AN/APQ-67

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MODEL	Function	General Facts	Sec. Class.
AN/APQ-72	Intercept and Fire Control	Modified APQ-50. Part of AMCS Aero 1A.	C
AN/APQ-74	Intercept and Fire Control	Part of AMCS Aero 1B.	C
AN/APS-19C -19D	Search	Surface search radar.	C
AN/APS-20C 20E	AEW	Used for AEW, ASW, and mine-laying.	C
AN/APS-31, A B, C	Reconnaissance	Forward only search for carrier based aircraft.	C
AN/APS-33A, F	Reconnaissance	Medium patrol aircraft 360° reconnaissance.	C
AN/APS-33B AN/APA-91	Reconnaissance	ASW and minelaying. Improved into AN/APS-38. Csc <sup>2</sup> antenna modification kit.	C
AN/APS-37 AN/APA-88	Anti-Snorkel and Mine Laying	North and ground stabilized indicators. Dark trace attack indicator. Integrated electronics display for radar, IFF, beacon.	C
AN/APS-38 38A	ASW	360° medium power anti-snorkel radar. Csc <sup>2</sup> antenna modification kit.	C
AN/APS-42 42B	Transport Search	AN/APS-42A used by USAF only.	U

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Peak Power Output (kw)	Pulse Length ( $\mu$ sec.)	Frequency (Mc)
180 150	0.5 1.75	9375 $\pm$ 30
180 150	0.5 1.75	9375 $\pm$ 30
40	2.35	9375 $\pm$ 40
C: 1000 E: 2000	2	2880 $\pm$ 30
70	0.5, 4.5 2.25 (Beacon)	9375 $\pm$ 55 9310 $\pm$ 10 (Beacon)
70	4.5, 0.5 2.25 (Beacon)	9375 $\pm$ 55 9310 $\pm$ 10 (Beacon)
70	4.5, 0.5 2.25 (Beacon)	9375 $\pm$ 55 9310 $\pm$ 10 (Beacon)
70	0.5, 2.25 3.25	9375 $\pm$ 55
70	4.5, 0.5 2.25 (Beacon)	9375 $\pm$ 55 9310 $\pm$ 10 (Beacon)
40	0.75, 3.5 2.25 (Beacon)	9375 $\pm$ 55 9310 $\pm$ 10 (Beacon)

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Pulse Rate (pps)	Aircraft Installation	Maximum Range (yd)	
		20 m <sup>2</sup>	1 m <sup>2</sup>
1200 330 or 550	F4H-1	32,000 (90% on F2H-2)	-
1200 330 or 550	F8U-3	32,000 (90% on F2H-2)	-
425	A2D, AD	40,000	-
300	C:AD-3W,4W,AF-2W,P2U- 3W, P2U-4, P2V-5  E:AD-5W, P2V-5,7,WV-2,3 ZPG-2, 2W	-	-
200, 800 400 (Beacon)	PBM-5, 5A,AF-2S P2V-4,UF-1,AJ-1	31A:50,000 31B:96,000	-
200, 800 400 (Beacon)	P2V-1, 2, 3, ZP2K	A:72,000 F:120,000	-
200, 800 400 (Beacon)	P2V-1, 2, 3, 6 ZP2K	120,000	-
800, 300	S2F-2	-	-
200, 800 400 (Beacon)	S2F-1, 2	140,000	-
200, 800 300 (Beacon)	R5D, R6D, R7V, R3Y, R4Q-1	-	-

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Minimum Range (yd)	Maximum Altitude (ft)	Scan Coverage (Degrees)	
		Hor.	Vert.
200	30,000	44: 360 44A: 170	5 Tilt
-	80,000	360	-5 +11
-	5,000	29 steerable	30 Tilt
-	80,000	360	-5 +11
300	60,000	±45	15
-	20,000	±40	±6 preset
4,000	80,000	-	-

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CONTROL RADARS

Scan Rate		Beamwidths (Degrees)		Reflector	
RPM	Looks Per Min.	Hor.	Vert.	Type	Size
-	6, 12, 24, 40	44: 0.9&1.6 44A:1.8&3.2	2.5&4.2 1.8&3.2	44:Modified Paraboloid 44A:Paraboloid	3 x 8 ft 54 x 54 in.
1 rpm PPI 5° or 16°/sec vertical on RHI	-	2.8	1	Paraboloid	3 x 8 ft
-	12-30/sec	0.36	1.9	Foster- Wilkenson Scanner	12 x 72 in.
PPI: 1 RHI: 5° or 16° per sec vertical	-	2.8	1	Paraboloid	3 x 8 ft
-	-	6.5	6.5	Paraboloid	14 in.
-	90	7	-	-	12 in.
6	-	-	-	Antenna installation varies with aircraft	

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Power Source				Total System Weight (lb)	Indicators	
Volts	Phase or Amps	Freq. (cps)	KVA		PPI	Others
115/208 28	3 100 amps	380-420 DC	10	1600	4 & 10 in.	44: 3 in. A 2-7 in. book 44A: 2-7 in. book
115	3	380-1000	3.3	1105	7 in.	7 in. (RHI)
115/208	3 37 amps	320-1000	4	2000	-	B-scope
115	3	380-1000	3.3	1105	7 in.	7 in. (RHI)
115	3	380-420	-	115	-	I-scope
115 28	1 1.5 amps	380-420 DC	0.5 -	75	1-3 in.	-
115 115	3 3	70:380-1000 70A:380-420	15	1800 (with- out antenna)	70: 7 in. 70A: 10 in. (Optional)	70A: direct feed to data processing equipment

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Display		Number in Use or Tentative Available Date	Supplier	Source of Information	MODEL
IFF	Beacon				
Yes	Yes	44: 1 in June 1956 44A: 300 in June 1956	Philco	BuAer, Code AV-3322	AN/APS-44 44A
No	No	200	Philco Texas Inst.	BuAer, Code AV-3321	AN/APS-45
No	No	1	RCA	BuAer, Code AV-3322	AN/APS-56 (XN-1)
No	No	-	LaVoie	BuAer, Code AV-3321	AN/APS-62
Yes	-	Being evaluated	Magnavox	BuAer, Code AV-33122 NRL Code 5364	AN/APS-67 (XN-1)
-	-	USAF 1958	RCA	BuAer, Code AV-33222	AN/APS-69
Yes	No	70: 10 in 1957 70A: 30 to be contracted	70: GE	BuAer, Code AV-3321	AN/APS-70 70A

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SHIPBOARD WEAPON  
CONTROL RADARS

Model	Function	General Notes	Sec. Class
AN-SPG-1	Missile Guidance	Permits tracking and control of Rogues I. Submarine installation.	C
AN-SPG-2	Missile Guidance	Tracking and control of Rogues I & II. Submarine installation. Mark X IFF integral.	S
AN-SPG-3A	AA Fire Control	Similar to MK 34 Mod 10, with improved target acquisition features and a new operator's console.	C
AN-SPG-4A	AA Auto Track Fire Control	Automatic reflector on gun mount.	C
AN-SPG-4B	Missile Control	Furnishes precision target tracking and target identification for missile launchers.	S
AN-SPG-50	AA Fire Control	Improved version of MK 34 radar with automatic range tracking.	C
AN-SPG-51 (XN-1)	AA Fire Control	Completely automatic pulse doppler with illumination (terminal) guidance for Tartar.	S
AN-SPG-52	AA Fire Control	Range only radar for manual director with optical angle tracking.	C
AN-SPG-53	Surface and AA Auto Track Fire Control	Formerly AN-SPG-4B (XN-4). Adapted to Gun Director MK 58.	C
AN-SPG-55 55A	Missile Control	Beam rider with monopulse tracking. AN-SPG-55A also contains X-band burning. All AN-SPG-55's will be retrofitted to AN-SPG-55A on installation.	C
AN-SPG-56	Missile Tracking Radar	Tracking radar used with AN-SPW-3 for Talos missile. "Emergency comparison" for range restriction. Related to AN-SPG-55.	C
AN-SPG-57	Missile Control	Similar to AN-SPG-55, but without beam rider.	C
AN-SPG-58	AA Auto Track Fire Control	Modified SP to include stabilization. Maximum ranges will now depend on missile.	C

## Section 4

## Shipboard Weapon Control Radars

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SHIPBOARD WEAPON  
CONTROL RADARS

MODEL	Function	General Facts	Sec. Class.
AN/BPQ-1	Missile Guidance	Permits tracking and control of Regulus I. Submarine installation.	C
AN/BPQ-2	Missile Guidance	Tracking and control of Regulus I & II. Submarine installation. Mark X IFF integral.	S
AN/SPG-34	AA Fire Control	Similar to Mk 34 Mod 16, with improved target acquisition features and a new operator's console.	C
AN/SPG-48	AA Auto Track Fire Control	Antenna reflector on gun mount.	C
AN/SPG-49	Missile Control	Furnishes precision target tracking and target illumination for Talos missile. Two transmitters.	S
AN/SPG-50	AA Fire Control	Improved version of Mk 34 radar with automatic range tracking.	C
AN/SPG-51 (XN-1)	AA Fire Control	Completely automatic pulse doppler with illumination terminal guidance for Tartar.	S
AN/SPG-52	AA Fire Control	Range only radar for manual director with optical angle tracking.	C
AN/SPG-53	Surface and AA Auto Track Fire Control	Formerly AN/SPG-48 (XN-4). Adapted to Gun Director Mk 68.	C
AN/SPG-55 55A	Missile Control	Beam rider with monopulse tracking. AN/SPG-55A also contains X-band homing. All AN/SPG-55's will be retrofitted to AN/SPG-55A on installation.	C
AN/SPG-56	Missile Tracking Radar	Tracking radar used with AN/SPW-2 for Talos missile. "Frequency comparison" for range resolution. Inflated radome.	C
AN/SPG-57	Missile Control	Similar to AN/SPG-55, but without beam rider.	C
AN/SPQ-2	Auto Missile Tracking	Modified SP to include stabilization. Maximum ranges will use beacon in missile.	C

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SHIPBOARD WEAPON  
CONTROL RADARS

Frequency (Mc)	Peak Power (kw)	Pulse Length ( $\mu$ sec.)
3400-3700 (Secret)	500	1.0
3400-3700	500	1.0 4.0
8740-9168	50	0.3
8500-9600	250	0.25
5400-5900	3000	0.3 and 3.0
8500-9600	40-50	0.25
Track: 5450-5825 Illumination: 10250-10500	30 2	2.0 or 3.0 cw
16,300-16,500	50	0.5
8500-9600	250	0.25
Track & Acq: 5400-5900 Cap. & Guid: 5400-5900 cw 10250-10500	300 30	2 0.2
Track: 5250-5750 Home: 5850-6000 (Secret)	30 Joules 2-5 kw	20 (est.) cw
Track & Acq: 5400-5900 cw 10,250-10,500	300 2	2 cw
3400-3700	500	1

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SHIPBOARD WEAPON  
CONTROL RADARS

Pulse Rate (pps)	Smallest Ship	Display
400 $\pm 5\%$	SS	PPI and 2 B-scopes
400 200	SS	-
1800 $\pm 10\%$ (variable)	DE	5 in. A-scope 2 - 2 in. F-scope
1320 $\pm 10\%$	DL	5 in. A/R-scope 5 in. B-scope 5 in. E-scope 2 in. F-scope
900 and 500	CL	5 in. B-scope (3D), 5 in. E/R-scope 5 in. R-scope, 10 in. PPI
2000 $\pm 10\%$	DE	3 in. A/R-scope 2 - 2 in. F-scope
10.2, 11.0, 15.2, or 16.3 kc cw	DDG	Monitor A-scope
1500 with 400 cps modulation	Aux.	A-scope
1320 $\pm 10\%$	DD	5 in. A/R-scope 5 in. B-scope 5 in. E-scope 2 in. F-scope
450-900 cw	CLG & DLG	-
250 cw	-	5-plane B-scope, R-scope, Angle Error Scope, TV scope
450 cw	DDG	-
205 or 820	AV-11	A-scope PPI

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SHIPBOARD WEAPON  
CONTROL RADARS

Reflector		Beamwidth (Degrees)		Transmission Line
Type	Size (ft)	Hor.	Vert.	
Parabolic Section	2 x 4	4	csc <sup>2</sup> to 60	RG-48/U
Parabolic Section	2.5 x 5.6	3.5	-	RG-48/U
Paraboloid	3.33	2.6	2.6	RG-51/U
Paraboloid	3.33	2.6	2.6	RG-51/U
"Egg-crate" Lens	8 x 8	1.6	1.6	Waveguide
Paraboloid	3.33	2.6	2.6	RG-51/U
Paraboloid	8 x 7.5	1.9 cw 0.9	1.9 0.9	Waveguide
Off-set Paraboloid	0.75	5	5	RG-53/U
Paraboloid	5	1.6	1.6	RG-51/U
Guid: Paraboloid Cap: Paraboloid	8 8 26 in.	1.5 1.5 6	1.5 1.5 6	RG-49/U
Paraboloid with Subreflector	15.5	0.8	0.8	RG-49/U
Paraboloid cw uses same ant.	8 8	1.5 -	1.5 -	RG-49/U
Paraboloid	8	3	3	RG-48/U

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SHIPBOARD WEAPON  
CONTROL RADARS

Associated Control or Director System	Acquisition Scan			
	Type	Rate (cps)	Coverage (Degrees)	
			Hor.	Vert.
Regulus I	Sector	-	15, steer- able 360	Csc <sup>2</sup> to 60
Regulus I & II	360°	-	360	-
GFCS Mk 63 Mod 14, 18, 20, 21, 22	Spiral	30-cps nuta- tion and 2- cps spiral	12.6	12.6
Gunar Mk 1, 2, 3 GFCS Mk 69	Spiral	30-cps nuta- tion and 2- cps spiral	12.6	12.6
Talos Weapon System	Raster	-	10	5
GFCS Mk 63 Mod 23, 24, 25 GFCS Mk 75	Spiral	30-cps nuta- tion and 2- cps spiral	12.6	12.6
GFCS Mk 74, Mod 0 for Tartar	Conical scan on receive only	10-70	Program Beam	Program Beam
GFCS Mk 70	None	None	5	5
GFCS Mk 68	Spiral	30-cps nuta- tion and 2- cps spiral	11.6	11.6
GFCS Mk 76 (Terrier)	Program Search	-	4	6
Talos	5 x 5	Average acquisition time 5 sec	5	5
Tartar	Program Search	-	4	6
Regulus I	-	24	-	-

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SHIPBOARD WEAPON  
CONTROL RADARS

Tracking Scan		Maximum Tracking Range (yd)	
Type	Coverage (Degrees)	DD	F6F
Sector	15	-	300,000 on beacon
Lock on beacon	-	-	400,000 on beacon
Conical	4.1	-	20,000
Conical	4.1	-	30,000
Monopulse	1.6	-	112,000
Conical	4.1	-	20,000
Receiver Phasing	2.6	-	85,000
None	5	-	8,500
Conical	3.1	Horizon	45,000
Monopulse	1.5	Horizon	100,000 (est)
Monopulse	0.8	-	325,000 (est)
Monopulse	1.5	Horizon	100,000 (est)
Conical	2	Horizon	100,000

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SHIPBOARD WEAPON  
CONTROL RADARS

Resolution		Tracking Accuracy		
Range (yd)	Bearing (Degrees)	Range (yd)	Bearing (mil)	Elevation (mil)
200	5	±50 at 200 miles	±0.5	-
200	5	± 50 at 200 miles	6 min at 200 miles	-
200	2.2	± 15 ± 0.1% R	±0.75 Reset	±0.75 Reset
80	2.2	±10 ±0.025% R	±0.75 Reset	±0.75 Reset
50	1.3	±15 ±0.025% R	±0.2	±0.2
200	2.2	± 50 ± 0.025 % R	±0.75 Reset	±0.75 Reset
50	1.0	±50 ±0.1 % R	+0.8	±0.8
98	5	±20 or ±2% R	-	-
80	1.3	±10 ± 0.025 % R	0.5 (RMS)	Above 1° 0.5 (RMS)
300	0.75	±15 ± 0.025 % R	0.25 (est)	0.25 (est)
10	0.4	±33 w/SPW-2	0.25 (est)	0.25 (est)
300	0.75	±15 ±0.025 % R	0.25 (est)	0.25 (est)
150	2.5	±25	1° at 10° per sec.	0.1° at 10° per sec.

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CONTROL RADARS

Bearing		Maximum Range (miles instrumented)	Minimum Range (yd)
Track Rate (deg/sec.)	Slew Rate (deg/sec.)		
-	-	200	300
-	-	200	300
Manual	Manual	18	350
30	30	20	300
78	3.5 sec for 180° start to stop	150	500
Manual	Manual	18	300
60	120	50	400
Manual	Manual	5	200
30	50	25	300
120	120	100	500
60	60	200	Track: 5000 Acq: 10,000
120	120	100	500
30	36	200	500

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**SHIPBOARD WEAPON  
CONTROL RADARS**

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Power Requirements				Weight (lb)		
Volts	Phase	Freq. (cps)	KVA	Topside	Lower Deck	Antenna
110	1	60	-	-	-	370
-	-	-	-	-	-	800
115 440	1 3	60 60	1.9 0.4	130	2580	130
115 440	1 3	60 60	3.3 0.4	130	4500	130
440 115 115 115 115 28	3 3 3 1 - -	60 60 400 400 DC DC	220 Amp 156 Amp 3 Amp 4 Amp 7.5 Amp 6.0 Amp	30,000	15,000	4,000
115 440	1 3	60 60	2 0.4	130	1200	130
440 115	3 -	400 60	30 8.5	1500	3100	300
115 50	1 3	60 DC	9.0 0.5			
440	3	60	2	200 (est)	750 (est)	2
115 440	1 3	60 60	3.3 0.4	180	4500	180
440	3	400	90	55: 11,000 55A: 12,000	7000 8000	500
- - -	- - -	60 400 DC	120 Kw 150 Kw 10 Kw	8000 in- cluding antenna	-	
440	3	400	65	9000	6000	500
440	3	60	13	3,320	8907	-

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Number in Use or Tentative Available Date	Supplier	Source of Information	MODEL
6	Stavid	BuShips, Code 821	AN/BPQ-1
4 developmental 1957 12 production 1958	Stavid	BuShips, Code 821	AN/BPQ-2
252 (includes equipment in storage)	Western Electric and Hoffman Labs	BuOrd, Code ReS4-c	AN/SPG-34
45	Western Electric	BuOrd, Code ReS4-c	AN/SPG-48
1-(XN-1) 1-(XN-2) Production June 1957	Sperry Gyroscope	BuOrd, Code ReS4-b	AN/SPG-49
49	Western Electric	BuOrd, Code ReS4-c	AN/SPG-50
1 prototype 17 in 1958	Raytheon	BuOrd, Code ReS4-a	AN/SPG-51 (XN-1)
58: 1957 20: 1958	Stavid	BuOrd, Code ReS4-c	AN/SPG-52
14	Western Electric	BuOrd, Code ReS4-c	AN/SPG-53
55: April 1959 55A: April 1960	Sperry Gyroscope	BuOrd, Code ReS4-a	AN/SPG-55 55A
July 1960 (Prototype)	Sperry Gyroscope	BuOrd, Code ReS4-b	AN/SPG-56
April 1960	Sperry Gyroscope	BuOrd, Code ReS4-a	AN/SPG-57
4	Fairchild Engine and Airplane Corp.	BuShips, Code 823	AN/SPQ-2

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SHIPBOARD WEAPON  
CONTROL RADARS

MODEL	Function	General Facts	Sec. Class.
AN/SPQ-5	Missile Control	Furnishes acquisition, track, capture, and guidance for Terrier beam rider missile.	C
AN/SPR-6 (XN-1)	Missile Guidance	Radar receiver, used in conjunction with AN/SPW-1 (XN-2). For Talos missile.	C
AN/SPW-1 (XN-2)	Guidance Transmitter	Transmitter for missile guidance, used with R.S. AN/SPG-49.	C
AN/SPW-2	Missile Guidance	Guidance transmitter and beacon receiver for Talos missile. Klystron chain transmitter.	C
Mk 8 Mod 2	Main Battery Fire Control	Surface only. Not presently manufactured but still in fleet use.	U
Mk 8 Mod 3	Main Battery Fire Control	Mk 8 Mod 2 converted to X-band. Surface only. Not presently manufactured but still in fleet use.	U
Mk 13	Main Battery Fire Control	Surface only. Not presently manufactured but still in fleet use.	C
Mk 25 Mod 3	Surface and AA Auto Track Fire Control	Used with GFCS Mk 37. Replaces Mk 25 Mod 2.	C
Mk 25 Mod 5	Surface and AA Auto Track Fire Control	Adaptation of Mk 25 Mod 3 for GFCS Mk 67.	C
Mk 25 Mod 7	Missile Guidance and AA Gun Fire Control	Special-purpose missile guidance radar for Terrier; provides guidance and capture beams both triple coded for use with missile receiver.	C
Mk 25 Mod 8	Missile Guidance and AA Gun Fire Control	Special-purpose missile guidance radar for Terrier; provides guidance and capture beams both triple coded for use with missile receiver.	C
Mk 34 Mod 2, 6, 16	AA Fire Control	Mod 2 controls 40 mm guns; Mod 6 controls 3-in./50 guns. No longer manufactured for USN use.	U

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Frequency (Mc)	Peak Power (kw)	Pulse Length ( $\mu$ sec)
5650 $\pm$ 250	250	Track: 0.3 or 2.0 Acq: 0.3 or 2.0 Capt. & Guid: 0.23
5635	-	-
5635 $\pm$ 10	20	0.23
5400-5900	25	0.3
3050 $\pm$ 50	20-30	0.4
8815 $\pm$ 75	35-45	0.3
8815 $\pm$ 75	25-35	0.3
8500-9600	250	0.25
8500-9600	250	0.25
8500-9600 (FM 5%)	250	Trk: 0.25 Guid. & Capt: 0.23
8500-9600 (FM 5%)	250	Trk: 0.25 Guid. & Capt: 0.23
8740-8890	25-35	0.3

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CONTROL RADARS

Pulse Rate (pps)	Smallest Ship	Display
500 or 900 500 or 900 900	DLG	5 in. track, 5 in. R-scope 5 in. acquisition (3D), 10 in. PPI
-	-	A-scope (modified Tektronix 315D)
900 Frequency Modulated	-	-
900 $\pm 5\%$ Frequency Modulated	CL	-
1500 $\pm 10\%$	CL	5 in. B-scope 3 in. B-scope
1500 $\pm 5\%$	-	5 in. B-scope 3 in. B-scope
1800 $\pm 10\%$	CL	6-3 in. B-scopes
1320 $\pm 10\%$	DD	5 in. B or E-scope 3 in. A-scope 5 in. E or $\Delta E$ -scope
1320 $\pm 10\%$	DD	5 in. B or E-scope 3 in. A-scope 5 in. E or $\Delta E$ -scope 5 in. A or R-scope
1350 $\pm 1\%$	CL	5 in. B or E-scope 3 in. A-scope 5 in. E or $\Delta E$ -scope
1350 $\pm 1\%$	DDG	5 in. B or E-scope 3 in. A-scope 5 in. E or $\Delta E$ -scope
1800 $\pm 10\%$	DE	5 in. A-scope 2- 2 in. F-scope 3 in. EE-scope

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CONTROL RADARS

Reflector		Beamwidth (degrees)		Transmission Line
Type	Size (ft)	Hor.	Vert.	
Capture: Paraboloid Others: Lens	26 in. x 26 in. 112 in. x 112 in.	6 1.6	6 1.6	RG-49/U
R.S. AN/SPW-1 (XN-2)	-	-	-	RG-49/U
Paraboloid	2	6.8	6.8	Waveguide
Paraboloid	42 in.	3.8 +0.2 -0.5	3.8 +0.2 -0.5	RG-49/U
Polyrod Array	10.17HX 2.83V	2	6	RG-48/U
Elliptical Paraboloid	8HX 2V	0.9	3.6	RG-51/U
Elliptical Paraboloid	8 x 2	0.9	3.6	RG-51/U
Paraboloid	5	1.6	1.6	RG-51/U
Paraboloid	5	1.6	1.6	RG-51/U
"Plate" lens	7.5	1	1	RG-51/U
Paraboloid	6	1	1	RG-51/U
Paraboloid	2.5	3	3	RG-51/U

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CONTROL RADARS

Associated Control or Director System	Acquisition Scan			
	Type	Rate (cps)	Coverage (Degrees)	
			Hor.	Vert.
Terrier Missile	"5 ft. x 5 ft. angle"	-	-	-
Talos Weapon System	-	-	-	-
Talos Weapon System	-	-	-	-
Talos Weapon System	-	-	-	-
Mk 34, Mk 38	Linear Horizontal	10	29	-
Mk 34, Mk 38	Sinusoidal Horizontal	5	11.5	-
Mk 34, Mk 38 Mk 54	Sinusoidal Horizontal	5	11.5	-
Mk 37	Spiral	30-cps nuta- tion at 2- cps spiral	12	12
GFCS Mk 67	Spiral	30-cps nuta- tion at 2- cps spiral	12	12
Mk 37 for Terrier	Spiral	30-cps nuta- tion at 2.4- cps spiral	7	7
Mk 37 for 5 in./38 and Terrier	Spiral	30-cps nuta- tion at 2.4- cps spiral	7	7
GFCS Mk 63, Mod 6 10, 11, 12, 13.	Conical and Antenna Nod	30-cps nuta- tion at 0.67- cps nod	4.5	34.5

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SHIPBOARD WEAPON  
CONTROL RADARS

Tracking Scan		Maximum Tracking Range	
Type	Coverage (Degrees)	DD (yd)	F6F (yd)
Monopulse	1.6	-	60,000
-	-	-	-
-	-	-	-
Conical	-	-	140,000 on beacon (Instrumented)
Linear Horizontal	29	35,000	-
Sinusoidal Horizontal	11.5	40,000	-
Sinusoidal Horizontal	11.5	40,000	-
Conical	2.6	Horizon	50,000
Conical	2.6	Horizon	50,000
Conical	1.7	-	35,000
Conical	1.7	-	35,000
Conical	4.5	-	17,000

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SHIPBOARD WEAPON  
CONTROL RADARS

Resolution		Tracking Accuracy		
Range (yd)	Bearing (Degrees)	Range (yd)	Bearing (mil)	Elevation (mil)
50	-	±15 ±0.025% R	±0.2 rms	±0.2 rms
-	-	±15 ±0.025% R	-	-
-	-	-	-	-
-	-	67 on ΔR at 10,000	-	-
120	1.0	±15 +0.1% R	±2	-
100	0.5	±15 +0.1% R	±3.62 reset ±1.5	-
100	15 mils	±15 +0.1% R	±3.62 reset ±1.5	-
80	1.3	±15 ±0.025% R	0.5 (rms)	0.5 rms above 1°
80	1.3	-	-	-
80	1	±15 ±0.1% Range	±0.5 (rms)	±0.5 (rms)
80	1	±15 ±0.1% Range	±0.5 (rms)	±0.5 (rms)
200	3.0	±15 +0.1% R	±2 reset	±2 reset

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SHIPBOARD WEAPON  
CONTROL RADARS

Bearing		Maximum Range (miles instrumented)	Minimum Range (yd)
Track Rate (deg/sec.)	Slew Rate (deg/sec.)		
-	36	100	500
5000 yards per sec.		57.5	2000
-	-	-	-
5	30	70	4000
-	-	30	250
-	-	30	200
-	-	40	350
16	30	50	300
-	-	50	300
16	25	50	300
16	25	50	500
Manual	Manual	18	350

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SHIPBOARD WEAPON  
CONTROL RADARS

Power Requirements				Weight (lb)		
Volts	Phase	Freq. (cps)	KVA	Topside	Lower Deck	Antenna
115	3	60	30	35,000 total		
440	3	60	60			
115	3	60	1.2			
115	DC	-	2 kw			
26.5	DC	-	0.3 kw			
440	3	400	2			
115	1	60	600 VA	-	-	-
115	1	60	500 VA			
440	3	60	4 Amps	1060	2500	-
208	3	60	2 Amps			
115	3	60	15 Amps			
115	1	60	25 Amps			
115	1	400	5 Amps			
115	-	DC	3 Amps			
440	60	3	5 Amps	2800	-	-
115	60	3	70 Amps			
115	3	400	2 Amps			
115	1	400	7 Amps			
115	-	DC	4 Amps			
28	-	DC	2 Amps			
115	1	60	2.2	3209	1229	2750
440	3	60	2.5			
440	1	60	2.4	1780	1229	1300
440	3	60	0.9			
115	1	60	3	1795	3070	1300
440	3	60	0.9			
115	1	60	3.5	2000	5000	625 (in- cludes part of ant. mount)
115	3	60	0.2			
115	1	60	3.5	1000	5500	175 (plus mount)
115	3	60	0.2			
115	1	60	18	8000	11,000	5500 (in- cluding mount)
440	3	60	5			
115	1	60	18	4000	6000	1500
440	3	60	5			
115	1	60	1.5	115	2200	115
440	3	60	1.7			

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SHIPBOARD WEAPON  
CONTROL RADARS

Number in Use or Tentative Available Date	Supplier	Source of Information	MODEL
4 in use. 20 to 27 starting May 1957.	Sperry Gyroscope	BuOrd, Code ReS4-a	AN/SPQ-5
1	Sperry Gyroscope	BuOrd, Code ReS4-b	AN/SPR-6 (XN-1)
1	Sperry Gyroscope	BuOrd, Code ReS4-b	AN/SPW-1 (XN-2)
XN-1: August 1956 Prod: April 1957	Sperry Gyroscope	BuOrd, Code ReS4-b	AN/SPW-2
19	Western Electric	BuOrd, Code ReS4-c	Mk 8 Mod 2
82	Western Electric	BuOrd, Code ReS4-c	Mk 8 Mod 3
107	Western Electric	BuOrd, Code ReS4-c	Mk 13
564	Western Electric	BuOrd, Code ReS4-c	Mk 25 Mod 3
5	Western Electric and Stavid Eng.	BuOrd, Code ReS4-c	Mk 25 Mod 5
5	Western Electric and Reeves Instr. Co.	BuOrd, Code ReS4-a	Mk 25 Mod 7
1	Western Electric and Reeves Instr. Co.	BuOrd, Code ReS4-a	Mk 25 Mod 8
684 (Includes equipment in reserve fleet in storage)	Western Electric	BuOrd, Code ReS4-c	Mk 34 Mod 2, 6, 16

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## SHIPBOARD WEAPON CONTROL RADARS

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SHIPBOARD WEAPON  
CONTROL RADARS

Frequency (Mc)	Peak Power (kw)	Pulse Length ( $\mu$ sec)
8740-8890	25-35	0.3
8500-9600	50	0.1
9000-9160	25-35	0.5

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## SHIPBOARD WEAPON CONTROL RADARS

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## SHIPBOARD WEAPON CONTROL RADARS

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## SHIPBOARD WEAPON CONTROL RADARS

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## SHIPBOARD WEAPON CONTROL RADARS

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## SHIPBOARD WEAPON CONTROL RADARS

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## **Section 5**

### **Landbased Control Radars**

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LANDBASED  
CONTROL  
RADARS

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MODEL	Function	General Facts	Sec. Class.
AN/FPS-16 (XN-2)	Electronic Theodolite	Monopulse tracking radar for guided missile test range instrumentation. Air transportable.	C
AN/MPQ-5	Missile Guidance	Used for missile range instrumentation. Originally for control of Lark and Skylark.	C
AN/MPQ-10B	Tracking Radar	AN/MPQ-10 modified by nutating antenna and in- creased maximum range (instrumented). Radar portion of AN/MPQ-14A.	C
AN/MPQ-14A	Course Directing Central	Consists of AN/MPQ-10B radar with AN/MSQ-7 computer equipment and power supplies.	C
AN/MPQ-26	Missile Tracking and Control	Landbased duplicate of AN/SPQ-2, trailer mounted.	C
AN/MPQ-27	Bomb Scoring	AN/TPQ-10 with computer and display for bomb scoring.	C
AN/TPQ-10 ( )	Aircraft Tracking and Control	Helicopter transportable system for directing close support aircraft. Contains monopulse tracking radar, aircraft analog computer, and 400-Mc data link.	C

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LANDBASED  
CONTROL  
RADARS

Peak Power Output (kw)	Frequency Range (Mc)	Pulse Length ( $\mu$ sec)
250 or 1000	5075-5575	0.25, 0.5, 1.0
700	2700-2900	1.0
250	2740-2960	0.8
-	-	-
-	-	-
250	8500-9600	0.5
250	XN-1: 9375 XN-2: 8500 - 9600 Prod: 8500 - 9600	0.5

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CONTROL  
RADARS

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Pulse Rate (pps)	Maximum Range (Miles)		Instrumented Range	
	Aircraft (20 m <sup>2</sup> )	Aircraft (1 m <sup>2</sup> )	Min. (yd)	Max. (mi)
320-1707	320	150	40	200
350-850 570	Horizon	50	50	300
1000	-	20	500	40
-	-	-	-	-
-	-	-	-	-
1300	-	-	1000	-
1300	-	-	1000	55

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LANDBASED  
CONTROL  
RADARS

Presentation	Reflector		Beamwidth (Degrees)	
	Type	Size	Hor.	Vert.
1 J-scope 1 A-scope 1 PPI	Circular Paraboloid	12 ft	1.25	1.25
A-scope PPI	Paraboloid	8 ft	3	3
7-in. B-scope	Circular Parabola	68.75-in.	5	5
-	-	-	-	-
-	-	-	-	-
-	-	-	-	-
-	Cylindrical Parabola	4 x 6 ft	Surv: 1.1 Trk: 1.1	4.8 1.6

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LANDBASED  
CONTROL  
RADARS

Track Scan				Power Source			
Type	Range Accuracy (yd)	Bearing Accuracy (mils)	Elev. Accuracy (mils)	Volts	Phase	Freq.	KVA
Monopulse	± 5 yd	± .01 mil closing -	± .01 mil closing -	120/ 208	3	60	-
Conical	± 15	0.1° at 10°/sec.	0.1° at 10°/sec.	110	3	60	7
Nutating	± 25	± 1.5	± 1.5	115	3	60	6
-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-
Monopulse	-	-	-	-	-	-	-
Monopulse	-	-	-	120/ 208	3	400	10

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LANDBASED  
CONTROL  
RADARS

System Weight (lb)	No. in Use or Tent. Available Date	Supplier	Source of Information	MODEL
-	2 in use, 25 more by March 1958	RCA	NRL, Code 5343	AN/FPS-16 (XN-2)
64,000 (with vans)	4	Fairchild	NRL, Code 5364	AN/MPQ-5
-	14	Sperry Gyro, Mod. by Ultrasonic Corp.	BuAer, Code AV-3101	AN/MPQ-10B
-	-	-	BuAer, Code AV-3101	AN/MPQ-14A
-	-	Fairchild	BuShips, Code 828	AN/MPQ-26
-	1 under construction	GE	BuShips, Code 825	AN/MPQ-27
3600	20-50 in FY 1959	GE	BuShips, Code 828	AN/TPQ-10 ( )

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## Section 6

### Indicators

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## INDICATORS

MODEL	Function	General Facts
AN/APA-88		See AN/APS-37
AN/APA-91		See AN/APS-33B
AN/APA-125	AEW-ASW Indicator	General purpose indicator for display and plotting.
AN/MSQ-3	Ground AEW Terminal	Contains two AN/UPA-25, one AN/UPN-7, one AN/SSR-4.
AN/SPA-4	Range-Azimuth Repeater	Lightweight, spraytight PPI repeater. For use in CIC, Captain's Pilot, and Open Bridge.
AN/SPA-4A	Range-Azimuth Repeater	Lightweight, spraytight PPI repeater. For use in CIC, Captain's Pilot, and Open Bridge. Differs from AN/SPA-4 in ranges.
AN/SPA-7	Range-Height Indicator	RHI for height data from stacked-beam and pencil-beam systems.
AN/SPA-8	Azimuth-Range Repeater	For use with wide variety of radars and with AN/SPA-9 in AEW system.
AN/SPA-8A -8B	Azimuth-Range Indicator	General purpose remote indicator. Off-center cursor. Ship-centered AEW presentation. AN/SPA-8B has changes only in minor construction details.
AN/SPA-9	Azimuth-Range Repeater	For use with a wide variety of radars and with AN/SPA-8 in AEW system.
AN/SPA-18	Remote PPI	Indicator for locations where weight and space are problems.
AN/SPA-22	Intercept Tracking Control	Aided tracker for intercept control aboard ship. Eight-channel control system. VL-1 plus 2 AN/SPA-8A displays.
AN/SPA-23	Large Direct View Plotting PPI Repeater	For use as surface or air summary plot.
AN/SPA-24	Large Projected PPI	Projected plot for air or surface summary, using Schmidt optics. Modification of a Dutch system.
AN/SPA-25	Remote PPI	Transistorized, lightweight.

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<b>Security Classification</b>	<b>Presentation</b>	<b>Pulse Rate (pps)</b>
-	-	-
-	-	-
C	10-in. PPI	300-1000
C	-	-
U	10-in. PPI	57-3000
U	10-in. PPI	57-3000
U	10-in. RHI	57-3000
U	10-in. PPI (10KP7)	60-2000
U	10-in. PPI	60-3000
U	10-in. PPI (10KP7)	60-2000
U	7-in. flatface PPI	60-300
C	VL-1 and 2 AN/SPA-8A	60-3000
U	22-in. flatface PPI	60-3000
C	2-in. CRT projected to 20-in. PPI	60-500
C	10-in. PPI	57-3000

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INDICATORS

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Range (miles)	Elevation Scan (Degrees)	Max. Height (feet)
-	-	-
-	-	-
10, 20, 50, 150, 250	No	None
-	-	-
1-5, 4-20, 10-50, and 40-200 "Rubber"	No	None
1-300, continuously variable	No	None
20-300, continuously variable	-	90,000
4-250, continuously variable	No	None
4-300, continuously variable	No	None
4-250, continuously variable	No	None
2-300, continuously variable	No	None
20-200, continuously variable 4-300, continuously variable	-2 to 88	100,000
4, 10, 20, 40, 80, 200, 300	No	None
60, 90, 120, 180	No	None
4-300, continuously variable	No	None

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INDICATORS

Input Data	Output Data
-	-
-	-
1 speed bearing, standard video and trigger, remote strobe.	None
-	-
1 and 36 speed synchro, standard video and trigger.	1 and 36 speed bearing. 2,000, 72,000, and 1,296,000 yd range
1 and 36 speed synchro, standard video and trigger.	1 and 36 speed bearing. 2,000, 72,000, and 1,296,000 yd range
Pencil beam: bearing synchro sin-cos reference, video trigger. Stacked beam: bearing synchro sector from PPI, height video, video, trigger.	Height data transmission from 1G synchro at 90,000 ft per revolution
1 speed bearing, AEW synchro, DRA synchro. Standard video and trigger.	1 speed synchro bearing, 72,000 and 1,296,000 yd range.
1 speed bearing, AEW synchro, DRA synchro. Standard video and trigger.	1 speed synchro bearing, 72,000, and 1,296,000 yd range, AEW synchro
1 speed bearing, standard video and trigger.	1 speed synchro bearing, 72,000 and 1,296,000 yd range, AEW synchro
1 speed bearing from radar; standard video and trigger.	None
Raw radar plus designation from AN/SPA-26.	Analog outputs for conversion to digital data link and strobes for operator
1 speed bearing plus standard video and trigger.	None
1 speed bearing and 1 speed range from standard Navy shipboard radars.	None
1 speed bearing, standard video and trigger.	None

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INDICATORS

Power Source				Size (H x W x D, inches)	Total System Weight (lb)
Volts	Phase	Freq.	KVA		
-	-	-	-	-	-
-	-	-	-	-	-
28 115 115	DC 1 3	DC 400 400	0.3 0.15 1.0	19 x 12.5 x 24.5 15 x 11.8 x 24 (power)	150
-	3	60	20	-	-
115	1	60	1.2	38 x 18 x 19.75	330
115	1	60	1.2	38 x 18 x 19.75	360
115	1	60	-	38 x 22 x 20	350
115	1	60	1.95	38 x 25.5 x 24	846
115	1	60	1.95	38 x 21 x 20	888
115	1	60	1.95	38 x 25.5 x 24	846
115	1	60	0.65	Indicator: 14.75 x 13.13 x 37.75 Other: 30.75 x 19.25 x 18.87	107 and 198
115	1	60	3	32 x 21 x 18 + 76 x 21 x 20	800
115	1	60	1.2	50.25 x 37.5 x 33.5	787
115	1	60	0.7	28 x 32 x 51.5 18 x 24 x 24.75 (Power)	397
115	1	60	-	17 x 19 x 27	150

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INDICATORS

Supplier	Number in Use or Tentative Available Date	Information Source	MODEL
-	-	-	AN/APA-88
-	-	-	AN/APA-91
Hazeltine	XN-1: 2 Production: 10 in May 1957	BuAer, Code AV-33221	AN/APA-125
Hazeltine	-	BuShips, Code 827	AN/MSQ-3
GE	-	BuShips, Code 824	AN/SPA-4
RCA	-	BuShips, Code 824	AN/SPA-4A
GE	22	BuShips, Code 824	AN/SPA-7
Hazeltine	100 (approx.)	BuShips, Code 824	AN/SPA-8
8A: Hazeltine 8B: Crosley	1405 under construction	BuShips, Code 824	AN/SPA-8A -8B
Hazeltine	100 (approx.)	BuShips, Code 824	AN/SPA-9
Austin Co.	330	BuShips, Code 824	AN/SPA-18
Cornell Aero. Labs	More than 20 by 1959	BuShips, Code 824	AN/SPA-22
Stromberg Carlson	3 (test)	BuShips, Code 824	AN/SPA-23
Phillips Eindhoven (Indicator SGM116)	2	BuShips, Code 824	AN/SPA-24
Westinghouse	2 in 1957	BuShips, Code 824	AN/SPA-25

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## INDICATORS

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MODEL	Function	General Facts
AN/SPA-26	Data Processing	Uses several AN/SPA-8A and several VL-1 in various combinations. Input and storage facilities for position, velocity, height, size, identity, and track number of 24 targets.
AN/SPA-29	Evaluation Display	Completely synthetic display for threat evaluation computer. For use with AN/SPA-26 and AN/SPA-22.
AN/UPA-25	Azimuth Range Indicator	Repackaged AN/SPA-8A for Marine Corps. Counter-type height repeater and four video mixers added.
CXSA	-	AN/SPA-9 modified to use two-color cathode-ray tube ("Chromatron").
IP-199	Remote PPI	AN/SPA-4A modified to use electrostatic display tube ("Deflectron").
VG-2/VG-3	Projection Repeater	10- to 20-mile sector of overall range may be expanded to fill entire scope.
VH	Repeater	Lightweight, bulkhead mounted PPI for exposed installations. Used with any standard search radars.
VHa	Repeater	Remote PPI for use with search radars capable of transmitting 400-cycle PPI information.
VJ/VJa	Repeater	Electronic cursor, independent instantaneous ranging strobe. VJa is 400-cycle modification.
VK/VK-2	Repeater	Deck mounted. Provision for manual off-centering. Accepts tracking from DRA or AEW. VK-2 is mechanically redesigned VK.
VK-3	Repeater	Electronic cursor and automatic off-centering. Separate power supply.
VK-4a/VK-5	Repeater	Shore, ship, or submarine use as repeater with standard, off-center, or expanded off-center PPI. Wandering cursor and rubber range added.
VL	Remote RHI Repeater	5:1 vertical expansion.
VL-1	RHI Repeater	Repeater for any standard shipboard radar supplying range-height indication.

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INDICATORS

Security Classification	Presentation	Pulse Rate (pps)
C	AN/SPA-8A and VL-1	AN/SPA-8A and VL-1
C	12-in. synthetic	-
U	10-in. PPI plus counter	60-3000
U	10-in. rectangular Chromatron	60-2000
C	12-in. Deflectron	140-3000
U	Projects onto DRT	60-85 60-325 60-1050
U	5-in. PPI	57-300 57-820 57-1000
U	5-in. PPI	57-300 57-820 57-1000
U	12-in. PPI Added delay unit	57-1000
U	12-in. delayed off-center PPI	57-3000
U	10-in.	57-3000
U	10-in. flatface PPI (10KP7)	57-3000
U	12-in. delayed 0-180 mile	60-3000
U	12-in. (12DP7)	60-3000

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## INDICATORS

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Range (miles)	Elevation Scan (degrees)	Max. Height (feet)
Same as AN/SPA-8A and VL-1	-2 to +88	100,000
500	-	-
4-300, continuously variable	No	-
4-250, continuously variable	No	None
2-300, continuously variable	No	None
4, 10, 20, 80, 200	No	None
2, 4, 10, 20, 80, 200	-	-
2, 4, 10, 20, 80, 200 (fixed scales)	No	None
2, 4, 10, 20, 80, 200	No	None
4, 10, 20, 40, 80, 200	-	-
4-200, continuously variable	-	-
4-300, continuously variable	-	-
20, 40, 80, 200	-2 to +88	100,000
20-200, continuously variable	-2 to +88	100,000

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INDICATORS

Input Data	Output Data
Raw radar plus teletype data link.	See "General Facts"
Output from AN/SPA-22 and AN/SPA-26.	Data on evaluated targets
Same as AN/SPA-8A plus height.	Same as AN/SPA-8A
Two simultaneous video inputs, each similar to AN/SPA-9.	Similar to SPA-9 for only one CSXA's two inputs.
1 speed bearing, standard video and trigger.	1 speed synchro bearing 2,000 and 72,000 yd or 72,000 and 1,296,000 yd range at installer's discretion
Trigger: 5-40 V peak. Video: 3 V peak max. OSC plus radar bearing, S <sub>1</sub> , S <sub>2</sub> , S <sub>3</sub> , R <sub>1</sub> , R <sub>2</sub> .	None
Standard video and trigger, 1 speed radar bearing.	-
Standard video and trigger, 1 speed synchro bearing. Relative bearing warning light.	None
5-40V trigger; 3V peak video; 1 speed synchro bearing and relative bearing.	Range: (5G) 2000 yd and (5G) 72,000 yd, 1 speed bearing (5G)
Standard inputs on VK. VK-2 inputs same as VK-3.	1 speed true bearing and range
SP bearing, trigger, and video. IFF trigger and video. AEW DRA off-center.	Radar selector, remote range, on-target buzzer, remote bearing, range marker
Trigger, video, plus 1 and 26 speed bearing.	Range marker bearing cursor
Range and height from SX or modified SP.	Angle line elevation and angle line buzzer
Video, trigger, 1 speed bearing, sin and cos reference from radar. Range line and sector selection from PPI.	Elevation angle from synchro

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## INDICATORS

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Power Source				Size (H x W x D, Inches)	Total System Weight (lb)
Volts	Phase	Freq.	KVA		
115	1	60	Approx. 5 + indicators	-	3000 plus indicators
115	1	60	-	Similar to AN/SPA-8	-
-	-	-	-	42 x 30 x 40	800
115	1	60	1.95	28 x 25.5 x 24	-
115	1	60	Approx. 1	38 x 19.75 x 19.75	300
115	1	60	1.765 1.5	35 x 32 x 59 38 x 42 x 89	1280 2650
115	1	60	0.45	20 x 8 x 10	437
115	1	60	4.31 amps	11.5 x 8.25 x 22.5 37 x 19.5 x 14.6 13.6 x 9.75 x 8.5	457
115	1	60	0.66	32 x 20 x 21.5	815
115	1	60	VK:1.84 1.69 VK-2:0.08	VK:37.5 x 18.3 x 16.6 VK-2: 17 x 19 x 32 12 x 20 x 24	VK: 450 VK-2: 400
115	1	60	-	40 x 18 x 24	445
115	1	60	-	40 x 18 x 22	-
115	1	60	-	32 x 17 x 19	400
115	1	60	-	32 x 17 x 19	-

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INDICATORS

Supplier	Number in Use or Tentative Available Date	Information Source	MODEL
Motorola	1 in use, 20 in 1957	BuShips, Code 824	AN/SPA-26
Motorola	2 in 1958	BuShips, Code 824	AN/SPA-29
-	-	BuShips, Code 828	AN/UPA-25
Chromatic Television Labs., Inc.	1 under test	BuShips, Code 824	CXSA
Motorola	4 in 1957	BuShips, Code 824	IP-199
GE	-	BuShips, Code 824	VG-2/VG-3
Raytheon	100	BuShips, Code 824	VH
Raytheon	1	BuShips, Code 824	VHa
Raytheon	VJ: 600 VJa: 4	BuShips, Code 824	VJ/VJa
GE	150 150	BuShips, Code 824	VK/VK-2
GE	136	BuShips, Code 824	VK-3
Westinghouse	VK-4: 475 VK-5: 485	BuShips, Code 824	VK-4a/VK-5
GE	36	BuShips, Code 824	VL
GE	400 contracted	BuShips, Code 824	VL-1

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## INDICATORS

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INDICATORS

Security Classification	Presentation	Pulse Rate (pps)

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## INDICATORS

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## INDICATORS

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## INDICATORS

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INDICATORS

Supplier	Number in Use or Tentative Available Date	Information Source	MODEL

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## **Section 7**

### **Target Designation and Weapon Direction Systems**

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Section 1

Target Designation and Weapon Direction Systems

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## SECTION 7

### TARGET DESIGNATION AND WEAPON DIRECTION SYSTEMS

In order to distinguish between the many variations in target designation systems, four types have been established. These are based on the functional and operational characteristics of the systems and not on the particular technique used to attain these characteristics. Definitions of the four basic types are:

Type A - Types of systems synthesized from a variety of equipments such as standard PPI's, Target Designation Transmitters Mk 11, PD panels and dial indicators. These systems may be found in all classes of ships. The Target Designation System Mark 1 is included.

Type B - Integrated manual systems utilizing three-coordinate search radar information and manual or aided tracking of targets. Switching between designation channels and directors is provided. These systems are suitable for ships with weapon batteries not sufficiently complex to warrant the use of automatic evaluation equipment.

Type C - These systems, for use in larger ships, are essentially automatic in operation and utilize data from either two- or three-coordinate search radars. Automatic track-while-scan channels with automatic evaluation and assignment of targets to directors are employed. When the associated gun or guided missile installation warrants the complexity, automatic switching of guns (or guided missile launchers) to directors will be provided.

Type D - Integrated manual systems utilizing two-coordinate search radar information and manual or aided tracking of targets. Switching of target designation channels to directors may be provided in cases where the weapon installation warrants the resultant complexity. These systems are for use in ships where either the limited size of the weapon installation or space and weight considerations preclude the installation of more automatic equipment. Type D systems are suitable for use in modernizing various classes of existing ships in which weight and space limitations are critical.

The need for high-speed liaison and coordination between ship's target designation system and gun/missile fire control system has led to the development of Weapon Direction Systems (WDS). These systems utilize data from search radars and other sources which is processed in a "Designation Equipment" or "Weapon Direction Equipment." Director and weapon status are displayed, and assignments of directors and weapons are made after raids are evaluated and priority determined. Automatic and semi-automatic methods are used throughout the system wherever practical in order to conserve time.

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TARGET DESIGNATION  
AND WEAPON  
DIRECTION SYSTEMS

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MODEL	General Facts
TDS Mk 1	Manual tracking system using standard radar FPis or optical target designators (TDTs) to control target designations to one or more fire control systems. The fire control systems are selected by manual or automatic switches from the target designation station.
TDS Mk 3	Target is placed in system manually from radar or optical stations. Track-while-scan channels provide information for assigning targets and guns to directors in automatic or manual modes. Accurate elevation on RH indicator.
TDS Mk 4	Lightweight two-coordinate system designed for use in auxiliary and destroyer type vessels. Threat evaluation, tracking and assignment are performed manually. Search radar information is converted into a television PPI type presentation. Electronic symbols representing the X and Y position of four designation joysticks and four gun directors are included in the display information.
TDS Mk 5	Lightweight destroyer and auxiliaries TDS. Two-coordinate display utilizing time-sharing techniques for introducing designation and repeat-back symbols by electronic means.
TDS Mk 6	Manual system using two-coordinate radar information for developing target designations for transmission to as many as four separate gun fire control systems. The techniques used in this system are similar to those in TDS Mk 4. Electronic symbols display range and train information in X and Y coordinates for 8 gun directors. Arbitrary elevation is included in the designation quantities based on position angle information relayed from CIC via electronic plotter links. Optical target designations and rapid interdirector designations are made possible by the remote control of an automatic fire control switchboard from control panels in the Air Defense and Target Designation Stations.
WDS Mk 1 MOD 0	Includes Designation Equipments Mk 4 and Mk 7. DE Mk 7 in primary WCS uses 16 auto-track-while-scan-three-coordinate gun and guided missile target channels, 2 manual long-range GM target channels with PPI and RH indicators. Manual evaluation and assignment of targets to GM directors. Automatic evaluation and assignment of targets to gun directors. Designation Equipment Mk 4 is intended as an auxiliary equipment paralleling the functions of DE Mk 7 except for the automatic features.

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TARGET DESIGNATION  
AND WEAPON  
DIRECTION SYSTEMS

Type	Security Classification	Performance
A	U	Range display (max) 200 miles designation range to maximum of gun fire control system receivers.
C	C	Range display (max) 30 miles designation range (max) 60,000 yards.
D	C	Range display (max) 240 miles designation range (max) 60,000 yards.
D	C	Range display (max) 240 miles designation range (max) 60,000 yards.
D	C	Range display (max) 240 miles designation range (max) 60,000 yards.
	C	Tracking range 120,000 yards.

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TARGET DESIGNATION  
AND WEAPON  
DIRECTION SYSTEMS

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Input Data

1. Search radar video and trigger to standard PPI. 2. Antenna bearing and relative bearing. 3. Own ship course. 4. Director repeat-back synchro signals. 5. TDT bearing and elevation.

1. Search radar video and trigger. 2. Antenna bearing and relative bearing warning. 3. Sin E, cos E, blanking. 4. Own ship course. 5. Director repeat-back signals of train range and elevation and director status information. 6. Gun orders and status for evaluation and assignment of gun mounts to directors. 7. From optical stations, target bearing and elevation estimated range.

1. Search radar video and trigger. 2. Antenna bearing and relative bearing warning. 3. Optical input bearing, elevation, estimated range. 4. Own ship course. 5. Director repeat-back signals (synchro) of train, range, and director status.

1. Search radar video and trigger. 2. Antenna bearing and relative bearing warning. 3. Optical input bearing, elevation, estimated range. 4. Own ship course. 5. Director repeat-back signals (synchro) of train, range, and director status.

1. Search radar video and trigger. 2. Antenna bearing (1X synchro) ship's heading (1X synchro). 3. Optical target information train elevation estimated range. 4. Director train from four directors (1X synchro).

1. Search radar video and trigger. 2. Antenna bearing and relative bearing warning. 3. Optical input, guns only, target bearing, elevation and estimated range. 4. Elevation blanking signal. 5. Own ship course. 6. Gun and GM director repeat-back of train, range, elevation, and status. 7. Missile-in-flight indication. 8. Launcher repeat-back of train elevation and status. 9. Missile status.

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TARGET DESIGNATION  
AND WEAPON  
DIRECTION SYSTEMS

Output Data	Ship Class	Used With
Target coordinates: bearing and elevation (synchro).	DDE CV DL	Director Mk 37 GFCS Mk 56 Mk 63
Target coordinates: bearing, range, and elevation (synchro).	CLG	GFCS Mk 56 Mk 67
Target coordinates: bearing, range, and elevation (synchro). Elevation data is estimated.	CAG DD931 CVS AGC	GFCS Mk 37, Mk 56, Mk 63 Terrier Missile
Same as for Mk 4. Employs 4 joysticks, permitting 4 operators to designate to 4 directors simultaneously.	DD445 DD692 DDE764 DD937 DDR LSD AO AGC	Director Mk 37 GFCS Mk 56 Mk 63
Same as for Mk 4. Employs 4 joysticks, permitting 4 operators to designate to 4 directors simultaneously.	CA CL CAV BB BB	GFCS Mk 37 Mk 56
1. Target coordinate: bearing, range, and elevation (X, Y, E, voltages) 2. Launching and loading operation orders. 3. Warmup orders 4. Salvo numbers 5. Missile firing orders 6. Recommended course to steer	CAG	Director Mk 37 GMFCS Mk 71 GFCS Mk 56 (Terrier)

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TARGET DESIGNATION  
AND WEAPON  
DIRECTION SYSTEMS

Power Supply				Supplier	Source of Information	MODEL
Volts	Phase	Freq.	KVA			
115	3	60	3-4	Yard	BuOrd, Code ReS4-a	TDS Mk 1
440 115	3 3	400 60	28 KW 9 KW	BTL	BuOrd, Code ReS4-b	TDS Mk 3
115 115	1 3	60 60	5.6 1.8	RCA	BuOrd, Code ReS4-a	TDS Mk 4
115 115 440	1 3 3	60 60 60	1.36 2 1	Raytheon	BuOrd, Code ReS4-a	TDS Mk 5
440 115 115	3 3 1	60 60 60	1.5 2.2 9.0	RCA	BuOrd, Code ReS4-a	TDS Mk 6
440 115 115	3 3 1	400 60 60	50 10 18	RCA BTL	BuOrd, Code ReS4-a	WDS Mk 1 MOD 0

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TARGET DESIGNATION  
AND WEAPON  
DIRECTION SYSTEMS

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MODEL	General Facts
WDS Mk 2 MOD 0	Includes Designation Equipment Mk 8 Mod 0, Coordinate Converter Mk 26 Mod 2, Stabilization Computer Mk 117 Mod 0, and miscellaneous signaling and indicating devices. Designation Equipment Mk 8 utilizes the basic equipment of TDS Mk 6 with added control console equipment to suit the requirements for a designation system for Talos guided missile control equipment.
WDS Mk 3 MOD 0	Includes DE Mk 9 and optical Transmitters Mk 24. DE Mk 9 uses 6 manual rate aided channels for designation to gun and GM Directors. Manual evaluation and assignment of targets to gun and GM Directors.
WDS Mk 3 MOD 1	Same as Mark 3 Mod 0
WDS Mk 4 MOD 0	Substitutes WDE Mk 1 for DE Mk 9. Has auto-launcher assignment and firing.

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TARGET DESIGNATION  
AND WEAPON  
DIRECTION SYSTEMS

Type	Security Classification	Performance
	C	Display 240,000 yards
	C	120,000-yd display Designation to 120,000 yd
	C	120,000-yd display Designation to 120,000 yd
	C	120,000-yd display Designation to 120,000 yd

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TARGET DESIGNATION  
AND WEAPON  
DIRECTION SYSTEMS

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Input Data

1. Search radar video and trigger. 2. Antenna bearing and true bearing indication. 3. Own ship course. 4. Director repeat-back of train range, elevation, status. 5. Missile-in-flight indication.

6. Launch repeat-back train elevation, status. 7. Missile status. 8. Target height.

1. Search radar video and trigger. 2. Antenna bearing and true bearing indication. 3. Own ship course. 4. Target height. 5. Director repeat-back of train, range, elevation status. 6. Missile status. 7. Launcher repeat-back train elevation status. 8. Input from TDT range bearing elevation. 9. Supplies information for firing guns at air target.

1. Search radar video and trigger. 2. Antenna bearing and true bearing indication. 3. Own ship course. 4. Target height. 5. Director repeat-back of train, range, elevation status. 6. Missile status. 7. Launcher repeat-back train elevation status. 8. Input from TDT range bearing elevation. 9. Supplies information for firing guns at air target.

1. Search radar video and trigger. 2. Antenna bearing and true bearing indication. 3. Own ship course. 4. Target height. 5. Director repeat-back of train, range, elevation status. 6. Missile status. 7. Launcher repeat-back train elevation status. 8. Input from TDT range bearing elevation. 9. Supplies information for firing guns at air target.

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TARGET DESIGNATION  
AND WEAPON  
DIRECTION SYSTEMS

Output Data	Ship Class	Used With
1. Target coordinates: bearing, range, and elevation (synchro) 2. Launcher orders 3. Recommended course to steer	CLG 93	(Talos)
1. Bearing and range in X, Y coordinates, elevation in synchro signals 2. Launcher load and warmup orders 3. Firing order 4. Recommended course to steer	DLG	(Terrier) GMFCS Mk 73 Mod 0
1. Bearing and range in X, Y coordinates, elevation in synchro signals 2. Launcher load and warmup orders 3. Firing order 4. Recommended course to steer	CLG	(Terrier) GMFCS Mk 73 Mod 1
1. Bearing and range in X, Y coordinates, elevation in synchro signals 2. Director assignment 3. Launcher assignment 4. Launcher load orders 5. Firing order 6. Recommended course to steer	DDG 952	Gun and guided missile FCS  Mk 74 (Tartar)

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TARGET DESIGNATION  
AND WEAPON  
DIRECTION SYSTEMS

Power Supply				Supplier	Source of Information	MODEL
Volts	Phase	Freq.	KVA			
440	3	60	1.5	RCA	BuOrd, Code ReS4-b	WDS Mk 2 MOD 0
115	3	60	2.0			
115	1	60	9.0			
115	1	400	1.4	BTL	BuOrd, Code ReS4-a	WDS Mk 3 MOD 0
28	1	AC	0.6			
28		DC	1.5			
440	3	400	20	BTL	BuOrd, Code ReS4-a	WDS Mk 3 MOD 1
115	3	60	5			
115	1	400	3			
115	1	60	3	BTL	BuOrd, Code ReS4-a	WDS Mk 4 MOD 0
440	3	400	20			
115	3	60	5			
115	1	60	3	BTL	BuOrd, Code ReS4-a	WDS Mk 4 MOD 0
115	1	400	3			
440	3	400	20			
115	3	60	5	BTL	BuOrd, Code ReS4-a	WDS Mk 4 MOD 0
115	1	60	3			
115	1	400	3			

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TARGET DESIGNATION  
AND WEAPON  
DIRECTION SYSTEMS

Type	Security Classification	Performance

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TARGET DESIGNATION  
AND WEAPON  
DIRECTION SYSTEMS

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Input Data

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## TARGET DESIGNATION AND WEAPON DIRECTION SYSTEMS

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## TARGET DESIGNATION AND WEAPON DIRECTION SYSTEMS

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## **Section 8**

### **Altimeters**

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## ALTIMETERS

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ALTIMETERS

Range (ft)	Frequency (Mc)	Power Output (watts)
0-400 400-4000	420-460	0.1
0-10,000 over land 0-20,000 over water	4200-4400	1.0
-	-	-

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## ALTIMETERS

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## ALTIMETERS

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TRAINERS

MODEL	General Facts
15-A-42	Trainer to instruct aircraft tail finet gunner in radar tracking and firing mechanism.
15-B-32	Trainer for control team and CIC crew to detect air targets.
15-AM-1-a	Height-finding attachment to 15-1-1-c to allow operation with APS-42 (incomplete system without 15-1-1-c).
15-C-8	Simulates the precision phase of GCA.
15-1-1-c Type I/II	Multi-target generator presents targets on PPI (no aircraft).
15-1-1-c Type V	Permits field modification to include aircraft target signals (incomplete without 15-1-1-c).
15-1-1-c Type VI	Permits field modification to include aircraft target signals (incomplete without 15-1-1-c).
15-1-1-d	Moving radar target generator for CIC and limited search radar trainer. Not currently listed by NTDC.
15-1-1-e	Simulates surface and aircraft target signals fed to shipboard radar.
15-1-1-f	Simulates targets for AEW aircraft radar equipment (uses 15-1-1-c system).
15-1-1-m	Simulates targets for AEW aircraft radar equipment (uses 15-1-1-c system).
15-1-1-i	Generates and displays radar targets on self-contained scope.
15-1-1-k	Generates radar targets for standard PPI and elevation scanning search radar.
15-V-8	All-weather airborne intercept radar trainer.
15-W-15	Activates all indicators in the GCA room.

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## TRAINERS

MODEL	General Facts
3A-49	Trainer to instruct aircraft tail turret gunner in radar tracking and firing techniques.
3D-32	Trains fire control team and CIC crew to detect air targets.
15-AM-1-a	Height-finding attachment to 15-J-1-c to allow operation with APS-45 (incomplete system without 15-J-1-c).
X15-G-8	Simulates the precision phase of GCA.
15-J-1-c Type I,II,III	Multi-target generator presents targets on PPI (no aircraft).
15-J-1-c Type V	Permits field modification to include aircraft target signals (incomplete without 15-J-1-c).
15-J-1-c Type VI	Permits field modification to include aircraft target signals (incomplete without 15-J-1-c).
15-J-1-d	Moving radar targets generator for CIC and limited search radar trainer. Not currently listed by NTDC.
15-J-1-e	Simulates surface and aircraft target signals fed to shipboard radars.
15-J-1-l	Simulates targets for AEW aircraft radar equipment (uses 15-J-1-c system).
15-J-1-m	Simulates targets for AEW aircraft radar equipment (uses 15-J-1-c system).
15-J-1-t	Generates and displays radar targets on self-contained scope.
15-J-4-k	Generates radar targets for standard PPI and elevation scanning search radars.
15-V-6	All-weather airborne intercept radar trainer.
15-W-15	Activates all indicators in the CCA room.

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## TRAINERS

Function	Sec. Classification	Number of Operators That are Trained
Aero 21 B Operator Aircraft Turret System Trainer	C	1
Anti-Aircraft Gunnery Team Trainer	C	CIC and fire control teams
Height Finder Simulator for AEW/CIC Crew Team Trainer	C	AEW Crew CIC Crew
Primary Ground Control Trainer	U	6
Search Radar Trainer	U	Unlimited
Height-Finder Attachment to 15-J-1-c	U	Unlimited
Height-Finder Attachment to 15-J-1-c	U	Unlimited
Shipboard Radar Targets Generator	U	-
Mobile AEW Trainer	U	CIC Crew
Trailerized AEW Crew Trainer	U	CIC Crew
Radar Trainer	U	Unlimited
Multi-Target Radar Simulator	U	Unlimited
All-Weather Fighter Radar Simulator for OFT's	C	1
CCA Controller Trainer	C	CCA Crew

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## TRAINERS

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Maneuvering Simulator				
Target		Own Ship		Max. Vert. Speed (ft/min)
Turn Rate (deg/sec)	Speed (knots)	Turn Rate (deg/sec)	Speed (knots)	
0-30	400-800	-	300-600	0-60,000 climb and dive
Same as 15-J-1-c		None		0-66,000 climb and dive
-		-		Manual
0-12	0-250	-		0-1000
0-0.5 0-10 0-20	5-30 100-600 200-1200	0-0.5 0-10 0-20	5-30 100-600 200-1200	None
-		-		100-50,000
-		-		100-50,000
0-10	0-1200	0-10	0-1200	500
Same as 15-J-1-c		Same as 15-J-1-c		None
Same as 15-J-1-c		Same as 15-J-1-c		None
Manual or 15-J-1-c type course generator		-		None
Manual or 15-J-1-c type course generator		-		Manual
0-15	0-Mach 1.4	-		0-35,000 climb 0-90,000 dive
0-6	0-300		5-30	0-10,000

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TRAINERS

Signal Simulator			
Rep. Rate (cps)	Pulse Length (μsec)	Beamwidth (Degrees)	Types
			A. Target B. Sea Return C. Altitude Line D. Range Attenuation E. Noise F. Fading G. Jamming H. Land Mass I. IFF
2300	165	12	A, B, C, E
Search: Same as 15-J-1-c Fire Control: Same as Operational Fire Control Radar			A, B, C, D, E
-	-	-	A, C
-	-	-	A and Wind Velocity Effect
250-450 40-1400	1, 5, 4 2	1.5 4, 5-10	A, B, D, F, I
-	-	-	A, C
-	-	-	A, C
100-450	2	2-4	A, C, D
Same as 15-J-1-c			A, B, D, F, I
Same as 15-J-1-c			A, B, D, I (F planned)
350	-	-	A
500 or 1000	1.5	2-10	A
Match correspond- ing radar	0.5-5.0	-	A, E, G, I
500, 4000	1, 2.5	-	A, I, F (Blind Area) and Wind Velocity Effect

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TRAINERS

Output	Space Simulator	
	Problem Area (sq. miles)	Number of Targets
A. 30-60 Mc if B. Video C. Trigger D. 1x Sync. Ant.		
B	5 miles ±60° hor. ±60° elevation	1 (2 planned)
A. Fire Control B. Search	120 x 120 70,000 ft in altitude	-
B	Target: 0-57,000 ft. Own Aircraft: 0-30,000 ft in altitude	30
B	10 x 10 0-5000 ft in altitude	6
B	30 x 30 120 x 120 240 x 240	6
B	50,000 ft in altitude	6
B	50,000 ft in altitude	6
B	250 x 250 72,000 ft in altitude	6
B	30 x 30 120 x 120 240 x 240	6
B	30 x 30 120 x 120 240 x 240	30
B	Uncalibrated	6
B	60 x 60 120 x 120	12
B	0-100 Search 0-20 Track	1
B	50 x 50 0-100,000 ft in altitude	16

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## TRAINERS

Service Equipment		Radar	Size L-W-H (ft)
A. Trigger B. 1x Synchro Azimuth C. Voltage Prop to Azimuth and El D. LO Tuning Voltage E. 1x360° Potentiometer Ant. Az.			
A, B, C		Aero 21B	2x4x2 2x4x2
A, B Search		MK-35 MK-25 and Search radars	6x12 Room
-		Simulated APS-45 and APA- 56 console	2x6x1.5 2x6x1.5 3x4x3
-		AN/MPN-5 Indicator (Simulated)	-
A, B		All air search PPI's	1.5x1.5x2 2x1.5x1.5 2x4x1.5 1.5x1.5x2
A, B		AN/FPS-5 AN/TPS-10D	1.5x1.5x2 2x1.5x3 1x4x1 1.5x1.5x2
A, B		SPS-8	1.5x1.5x2 1x4x1 1.5x1.5x2 2x1.5x3
A, B, C		SPA-8 VL, VK repeater indicators	1x0.5x1 1x2x1 Total: 1x5x1
A, B		APS-20	4x2 Truck 1 ton capacity Model F3
A, B		APS-20 APA-56	40 ft trailer
None		Self-contained scope	3x3x1.5 1x1x1
A, C		SG-6 SPS-6 SPS-8 SX	-
-		AN/APQ-41 Aero 19A Aero 13F Aero 24A	34 ft trailer
A, B		AN/SPN-8 AN/SPS-8 AN/SPN-6 VK Indicator VL Indicator	Floor Plan Size: 24 x 15 27 x 16

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TRAINERS

Weight (lb)	Power Source			
	Volts	Phase	Freq.	KVA
680	115	1	60	0.6
5000	440	3	60	5
800	-	-	-	-
-	115	1	60	-
600	105-125	1	60	1
611	105-125	1	60	1.8
611	105-125	1	60	1.8
350	115	1	60 or 400	-
-	115	1	60	1
35, 270	208 or 220	3	60	40
130	115	1	60	-
-	115	1	60	-
19, 000	208/120	3	60	20
1800	115	3 or 1	400 or 60	1.5

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TRAINERS

Number of Equipments Produced	Available Date	Supplier	Source of Information	MODEL
1 3 under dev.	1956	NTDC	NTDC, Code 3131	3A-49
1	1956	NTDC	NTDC, Code 3133	3D-32
under development	7 as of 1957	NTDC	NTDC, Code 3111	15-AM-1-a
1 under development	1957	NTDC	NTDC, Code 3111	X15-G-8
approximately 700	1956	NTDC	NTDC, Code 3111	15-J-1-c Type I, II, III
130	1956	NTDC	NTDC, Code 3111	15-J-1-c Type V
1 Prototype	1956	NTDC	NTDC, Code 3111	15-J-1-c Type VI
			Navexos P-1307	15-J-1-d
1 Prototype	1956	NTDC	NTDC, Code 3111	15-J-1-e
1	1956	NTDC	NTDC, Code 3111	15-J-1-l
2	1956	NTDC	NTDC, Code 3111	15-J-1-m
1	1954	NTDC	NTDC, Code 3111	15-J-1-t
1	1956	NTDC	NTDC, Code 3111	15-J-4-k
2 (7 in production)	1956 1958	NTDC	NTDC, Code 3154	15-V-6
1	1956	NTDC	NTDC, Code 3111	15-W-15

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## TRAINERS

MODEL	General Facts
15-WV-2 (Cadillac Type)	Simulated CIC compartment of WV-2 aircraft and targets generator.
15-WV-2m (Mobile Type)	Trailerized version of CIC compartment of WV-2 aircraft. Targets generator and problem control center housed in second trailer.
15-Z-1	Trains radar operator in use of radar for navigation, ranging and bombing. Beams ultrasonic waves in water to map and receive echoes.
15-Z-4	High-altitude bombing trainer.
15-Z-5	High-altitude bombing trainer.
15-Z-8	Navigational and Mine-Laying Trainer.
AN/SPG-T10	Provides target acquisition training. Targets recorded on 35 mm film.
AN/SPN-T1* (XG-1)	Now installed at CIC/TTC, San Diego, California.
AN/SPS-T1	Repackaged 15-J-1-d to meet shipboard specifications.
AN/SSQ-T2 (XG-1)	Now installed at CIC/TTC San Diego, California.
AN/UPS-T4	Repackaged 15-J-1-c. Being replaced by AN/SPS-T1. Shipboard use on interim basis.
RS-12	Activates operational equipment in four CIC mockups. Simulates motion of air and surface targets.
RS-14	Activates operational equipment in four CIC mockups. Simulates motion of air and surface targets.



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## TRAINERS

Function	Sec. Classification	Number of Operators That are Trained
AEW/CIC Crew Trainer for WV-2 Aircraft	C	AEW/CIC Crew
AEW/CIC Crew Trainer for WV-2 Aircraft	C	AEW/CIC Crew
AN/APS-T3 Radar Trainer	U	1
Radar Operator Trainer	C	1
AN/ASB-1 Advanced Operator Trainer	C	1
P6M-2 Aircraft Armament Control System Trainer	C	1
Fire Control Trainer	U	Crew for GFCS Mk 37, 56, or 63
CIC Team Training in Radar Navigation and Shore Bombardment	U	1 Complete CIC Team (6 to 14 men)
Search Radar Trainer	U	-
CIC Team Trainer	U	CIC Team
Search Radar Trainer	U	-
Fleet Air Defense Training Center Simulation Equipment	C	CIC and fire control teams
Fleet Air Defense Training Center Simulation Equipment	C	CIC and fire control teams

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TRAINERS

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Maneuvering Simulator				
Target		Own Ship		Max. Vert. Speed (ft/min)
Turn Rate (deg/sec)	Speed (knots)	Turn Rate (deg/sec)	Speed (knots)	
Same as 15-J-1-c		Same as 15-J-1-c		Manual
Same as 15-J-1-c		Same as 15-J-1-c		Manual
-	-	Manual or OFT turn rate	0-500	500-2000
-	-	0-20	1500	3000 climb 6000 dive
-	-	0-20	1500	3000 climb 6000 dive
-	-	0-20	1500	3000 climb 6000 dive
-	-	-	-	-
0-10	0-50	0-10	0-50	-
-	-	-	-	-
0-6	0-50 0-500 0-5000	0-6	0-50	-
-	-	-	-	-
-	0-40 0-1200	-	0-40 (4 Own Ships)	0-66,000 Climb & Dive
-	0-40 0-1200	-	0-40 (6 Own Ships)	0-66,000 Climb & Dive
-	-	-	-	-
-	-	-	-	-

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TRAINERS

Signal Simulator			
Rep. Rate (cps)	Pulse Length (μsec)	Beamwidth (Degrees)	Types
			A.Target B.Sea Return C.Altitude Line D.Range Attenuation E.Noise F.Fading G.Jamming H.Land Mass I.IFF
Same as 15-J-1-c			A,B,C,D,F,G,I
Same as 15-J-1-c			A,B,C,D,F,G,I
Radar Set Trigger	-	-	C,H
300 800 2400	0.75 3.0 0.25	2.5	H
300 800 2400	0.75 3.0 0.25	2.5	H
300 800 2400	0.75 3.0 0.25	2.5	H
			A
200 to 1 kc	1	2-20	A. 0.3 surface and 2 escorts, E, D, H
-	-	-	-
60-2000	0-5	0-360	A. Ship, aircraft, missile, D, E, F, I
-	-	-	-
Same as Operational Radar			A,B,C,D,E
Same as Operational Radar			A,B,C,D,E

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## TRAINERS

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Output	Space Simulator	
	Problem Area (sq. miles)	Number of Targets
A. 30-60 Mc if B. Video C. Trigger D. 1x Sync. Ant.		
B	30 x 30 120 x 120 240 x 240 0-57,000 ft in altitude	30
B	30 x 30 120 x 120 240 x 240 0-57,000 ft in altitude	30
A	50 x 100 20,000 ft in altitude	-
B	0-60 Search 60-200 Search 0-25 Track 0-50,000 ft in altitude	-
A	0-60 60-200 Search 0-25 Track 0-50,000 ft in altitude	-
A	0-60 Search 60-200 Search 0-25 Track	-
		3
A. 30 Mc B. positive C. neg. or pos. 30V, 2 $\mu$ sec. D. 1x	50	5
-	-	-
A. 11 Mc, 15 Mc, 30 Mc B. Positive C. Pos. and Neg. D. 1x, 36x	1600 (40 x 40) 160,000 (400 x 400)	3
-	-	-
A. Fire Control B. Search	240 x 240 Surface 480 x 480 Air 70,000 ft in altitude	12 Surface 18 Air
A. Fire Control B. Search	240 x 240 Surface 480 x 480 Air 70,000 ft in altitude	12 Surface 18 Air

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## TRAINERS

Service Equipment	Radar	Size L-W-H (ft)
A. Trigger B. 1x Synchro Azimuth C. Voltage Prop to Azimuth and El D. LO Tuning Voltage E. 1x360° Potentiometer Ant. Az.		
A, B	AN/APS-20E AN/APS-45 (Sim) AN/APA-81 (Ind)	Floor Plan Size: 19 x 56
A, B	AN/APS-20E (Ind) AN/APS-45 (Sim) AN/APA-56	42 ft trailer 2 of 42x12x12.5 (exp)
A	AN/APS-2,3,4 AN/APS-15 AN/APQ-13	30 x 20 Room
A, C	AN/APS-38A AN/APS-31 AN/APS-33 AN/APS-20,SG-6	35 ft trailer
A, C	AN/ASB-1A	35 ft trailer
A, C	AN/ASB-1 (modified)	40 ft trailer
	Mk 25,34,35	
A, B, D, E	SG1b radar	36x60x10 in. 22x17x48 in. 12x17x48 in. 17x48x60 in
-	-	-
A, B	SG 1b SR/SRA(radar)	See * below
-	-	-
A, B, C	SPS-8,SPS-6, SG-6, MK-35, MK-34, MK-25	40 x 40 Room
A, B, C	SPS-8,SPS-6, SG-6, MK-35, MK-34, MK-25	40 x 40 Room

\*36x24x76 in., 102x54-3/8x51 in., 23x24x56-3/8 in., 24-1/4x31x72-1/2 in.,  
24-1/4x31x72-1/2 in., 24-1/2x31x72-1/2 in., 24-1/4x31x72-1/2 in., 47-1/2x24-3/4 in.  
x70-3/4 in.

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TRAINERS

Weight (lb)	Power Source			
	Volts	Phase	Freq.	KVA
40,000	220	3	60	24
80,000	220	3	60	30
3000	220 115	3 1	60 60	1.8 1.1
22,000	208/120	3	60	15
22,000	208/120	3	60	15
22,000	208/120	3	60	20
6000	115	1	60	6
-	-	-	-	1
6500	115/230	1	60	16
-	-	-	-	-
50,000	208/120	3	60	80
50,000	208/120	3	60	80

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TRAINERS

Number of Equipments Produced	Available Date	Supplier	Source of Information	MODEL
3 under development	1957	NTDC	NTDC, Code 3111	15-WV-2 (Cadillac Type)
4 under development	1957	NTDC	NTDC, Code 3111	15-WV-2m (Mobile Type)
Approximately 100	1945	NTDC	NTDC, Code 4212	15-Z-1
Under development	1957	NTDC	NTDC, Code 3154	15-Z-4
1 under development	1956	NTDC	NTDC, Code 3154	15-Z-5
Contract within two months	1958	NTDC	NTDC, Code 3154	15-Z-8
9	-	Stavid Eng. Co.	BuOrd, Code Ma4-a	AN/SPG-T10
1	-	NEL	BuShips, Code 824	AN/SPN-T1 (XG-1)
100 on order	-	Aeromotive Equipments Corp.	BuShips, Code 824	AN/SPS-T1
1	-	Gilfillan Bros.	BuShips, Code 824	AN/SSQ-T2 (XG-1)
50	-	-	BuShips, Code 824	AN/UPS-T4
1	1956	NTDC	NTDC, Code 3133	RS-12
1	1956	NTDC	NTDC, Code 3133	RS-14

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TRAINERS

MODEL	Source of Information	General Facts	Number of Equipments Produced
15-W-2 (Cadillac Type)	WTDC, Code 3111	WTDC	3 under development
15-W-2m (Mobile Type)	WTDC, Code 3111	WTDC	4 under development
15-Z-1	WTDC, Code 3112	WTDC	Approximately 100
15-Z-4	WTDC, Code 3154	WTDC	Under development
15-Z-5	WTDC, Code 3154	WTDC	1 under development
15-Z-8	WTDC, Code 3154	WTDC	Contract within two months
AN/SPC-T10	BuOrd, Code Mat-2	Naval Eng. Co.	2
AN/SPH-T1 (XG-1)	Buships, Code 824	HEL	1
AN/SPS-T1	Buships, Code 824	Automotive Equipment Corp.	100 on order
AN/SSG-T1 (XG-1)	Buships, Code 824	Guthrie Bros.	1
AN/UPS-T4	Buships, Code 824	-	50
RS-12	WTDC, Code 3122	WTDC	1
RS-14	WTDC, Code 3122	WTDC	1

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## **Section 10**

### **Traffic Control**

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TRAFFIC CONTROL

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MODEL	Function	General Facts	Sec. Class.
AN/FPN-28	Ground Controlled Approach	Reorganized AN/MPN-5 for fixed ground installation.	U
AN/FPN-29	Harbor Control	Raytheon "Pathfinder" with special 41-ft antenna.	U
AN/FPS-8	Air Traffic Control (Surveillance)	Medium-range air traffic control, using coherent MTI.	C
AN/FPS-37	Air Traffic Control	Uses two AN/FPS-8 radars with improved MTI (cascade cancellation) and high-gain antenna. Provision for remote installation.	C
AN/GPN-2	Air Traffic and Approach Control	Ground mobile. Airport surveillance portion of GCA. Has its own PPI.	U
AN/GPN-6	Air Traffic and Approach Control	Airport surveillance portion of GCA and seaplane approach and landing. 2 PPI's, MTI. Packaged for air lift transportation.	U
AN/MPN-1B	Ground Controlled Approach	Both surveillance and final approach. 2 PPI's. Ground mobile.	U
AN/MPN-5 -5A	Ground Controlled Approach	Ground mobile for surveillance and final approach. Optional circular polarization on AN/MPN-5A.	U
AN/MPS-11A	Air Traffic Control	Mobile version of AN/FPS-8 for Marine Corps use. AN/MPS-11 is AF equipment.	C
AN/SPN-6	Air Traffic Control	SG-3 components combined with stabilized antenna system, VK-4 indicator. Only 6 equipments in use; used only as a search radar.	C
AN/SPN-8	Carrier Controlled Approach	Azimuth precision approach. 100° sector off-center PPI.	U
AN/SPN-12	Carrier Controlled Approach	Aircraft speed measurement for CCA.	C

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TRAFFIC CONTROL

Peak Power Output (kw)	Pulse Length ( $\mu$ sec)	Frequency (Mc)
Surv: 350	0.8	2740-2900
Appr: 35	0.5	9000-9180
22.5	0.2 0.6	3020-3120
1000	3	1280-1350
-	-	1280-1350
200	0.5	2860-2900
470	0.9	2700-2900
Surv: 85	0.5	2780-2820
Appr: 25		9000-9180
Surv: 350	0.8	2740-2900
Appr: 35	0.5	9000-9180
1000	3	1280-1350
650	0.3-1.3	3550-3700
35	0.25	9000-9180
0.010	FM/CW	10,000-10,250

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TRAFFIC CONTROL

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Pulse Rate (pps)	Mounting or Smallest Ship	Maximum Range (Miles)		
		2200 T DD	20 m <sup>2</sup> Aircraft	1 m <sup>2</sup> Aircraft
1200	Search: Tower	-	Surv: 31	-
2400	Precision: Trailer		Appr: 10	
800 1600	-	Horizon Limited	-	-
360	Ground	-	140 (claim)	70 (claim)
-	Ground	-	-	120 (design)
2000	Truck Mounted	-	30	-
1000	Trailer Mounted - 2 Vehicles	-	-	26
2000	Trailer Mounted - 3 Vehicles	-	Surv: 30  Appr: 10	-
1200	Semi-Trailer Mounted - 4 Vehicles	-	Surv: 31	-
2400			Appr: 10	
360	-	-	-	-
760	CVE	-	-	47
4000	CVE	-	6	-
-	CVE	-	3	-

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TRAFFIC CONTROL

Scan Coverage (Degrees)		Scan Rate (rpm)		Reflector	
Hor.	Vert.	Hor.	Vert.	Type	Size (H-W)
Surv: 360	2 to 10 local adjust	15+30	Remote Manual	Convergent Full	9 ft x 9 ft
Appr: 20 Az 7 Elev	7 Az 20 Elev	<u>2 per sec</u> Remote Manual	<u>Remote Manual</u> 2 per sec	Convergent Half	<u>37 in. x 8 ft</u> 37 in. x 11 ft
360	-	8 15	-	Parabolic Section	8 ft x 41 ft
360	30	0-10 plus sector	-	Parabola	12 ft x 20 ft
-	-	-	-	-	-
360	2 to 10	30	Manual With Servo	Truncated Parabola	8 ft x 5 ft
360	-2 to 10	15 & 30	Manual With Servo	Doubly Divergent Curved	8 ft x 12 ft
Surv: 360	2 to 10 local adjust	30	Thumb Screw	Truncated Paraboloid	4 ft x 8 ft
Appr: 20 Az 7 Elev	7 Az 20 Elev	<u>1 per sec</u> <u>+4 per sec</u> Manual	<u>Manual</u> 1 per sec <u>+4 per sec</u>	Truncated Parabolic Cylinders	<u>3.5 ft x 8.5 ft</u> 14 ft x 2 ft
Surv: 360	2 to 10 local adjust	15+30	Remote Manual	Convergent Full	9 ft x 9 ft
Appr: 20 Az 7 Elev	7 Az 20 Elev	<u>2 per sec</u> Remote Manual	<u>Remote Manual</u> 2 per sec	Convergent Half	<u>37 in. x 8 ft</u> 37 in. x 11 ft
-	-	-	-	-	-
360	14	15	-	Parabola	9 ft x 12 ft
100	0-5 Elevation	3 per sec	Manual Remote Servo	Paraboloid	1.5 ft x 5 ft
120	-15 to +30 Elevation	Steerable		Paraboloid	2.5 ft diam.

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TRAFFIC CONTROL

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Beamwidth (Degrees)		Reflector Gain		Antenna Weight (lb)
Hor.	Vert.	Major Lobe	Minor Lobe (down)	
2.5	3 csc <sup>2</sup> 29 to 10,000	33	20	515
57 min.	2.5	40	20	125
3 csc <sup>2</sup> to 15	47 min.	40	20	115
0.7	10	35	25	-
2.5	9 csc <sup>2</sup> to 30	-	-	1500
1.3	5 csc <sup>2</sup> to 58	35	25 (min)	-
5	3 csc <sup>2</sup> 10 to 5000 ft	31	15	605
2	5.7 csc <sup>2</sup> 4-29 to 10,000 ft	34	20 (min)	635
5	3 csc <sup>2</sup> 10 to 5000 ft	31	15	430
1.2	2	40	20	216
3.6	0.6	40	20	251
2.5	3 csc <sup>2</sup> 29 to 10,000	33	20	515
57 min.	2.5	40	20	125
3 csc <sup>2</sup> to 15	47 min.	40	20	115
-	-	-	-	2
2.3	14	38	26	2130
1.5	6	40	13	375
4.25	4.25	-	-	-

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TRAFFIC CONTROL

Total System Weight (lb)	Transmission Line	Power Requirements			
		Volts	Phase	Freq.	KVA
50,000 (approx)	RG-48/U	120/208	3	60	-
	RG-52/U				
10,080	RG-48/U	120/208	3	60	13
15,000	RG-69/U	120/208	3	60	15
	RG-69/U	120/208	3	60	-
28,480	RG-48/U	115	1	60	9.8
45,000	RG-75/U	120/208	3	60	Approx. 15
46,500	RG-48/U	110/220	1	60	15
	RG-52/U				
96,000	RG-48/U	120/208	3	60	30
	RG-52/U				
-	-	-	-	-	-
-	RG-48/U	115	1	60	-
3040	RG-52/U	115 115	3 1	400 60	7 0.2
1450	None	115	1	60	2

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TRAFFIC CONTROL

Supplier	No. in Use or Tent. Available Date	Source of Information	MODEL
Bendix	13	BuShips, Code 822	AN/FPN-28
Raytheon	-	BuShips, Code 821	AN/FPN-29
GE	13	BuShips, Code 822	AN/FPS-8
GE	To be contracted	BuShips, Code 822	AN/FPS-37
Bendix	10	BuShips, Code 822	AN/GPN-2
Laboratory for Electronics	10	BuShips, Code 822	AN/GPN-6
Bendix	40	BuShips, Code 822	AN/MPN-1B
Bendix	5: 24 5A: 2	BuShips, Code 822	AN/MPN-5 -5A
GE	20 U.S.M.C. and AF equipments	BuShips, Code 822	AN/MPS-11A
Raytheon	67	BuShips, Code 822	AN/SPN-6
Bendix	67	BuShips, Code 822	AN/SPN-8
Raytheon	41	BuShips, Code 822	AN/SPN-12

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TRAFFIC CONTROL

Peak Power Output (kw)	Pulse Length ( $\mu$ sec)	Frequency (Mc)
200	0.1 0.8	8500-9600

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## TRAFFIC CONTROL

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TRAFFIC CONTROL

Supplier	No. in Use or Tent. Available Date	Source of Information	MODEL
Gilfillan	1 in April 1958	BuShips, Code 828	AN/TPN-8

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## Section 11

### Additional Radar Equipments

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ADDITIONAL  
RADAR  
EQUIPMENTS

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MODEL	General Facts	Source of Information	Sec. Class.
15-F	AN/APS-T1 radar trainer for presentation of fixed targets or terrain. Obsolete, 50 produced.	NTDC, Code 4212	U
AN/APG-34 (XN-1,2,3)	X-band airborne range only. Dropped in development, no future plans.	BuAer, Code AV-33122	C
AN/APG-39	Airborne range only for gunnery applications. Obsolescent.	BuAer, Code AV-3311	C
AN/APG-43	FM/CW automatic tracking radar for search and intercept. Obsolescent.	BuAer, Code AV-3311	C
AN/APG-44	S-band air-to-air range and range rate. Obsolescent.	BuAer, Code AV-3311	C
AN/APG-45	Subminiaturized X-band airborne range only. Dropped	BuAer, Code AV-33122	C
AN/APG-46	X-band air-to-air and air-to-ground range and range rate. Monopulse on air-to-ground. Obsolescent.	BuAer, Code AV-3311	C
AN/APQ-42	X-band intercept and fire control. Production cancelled.	BuAer, Code AV-3311	C
AN/APQ-64	AN/APQ-50 with tracking loop closed through a computer. For use with Sparrow II. 20 in existence; further production cancelled.	BuAer, Code AV-33112 NRL, Code 5364	C
AN/APQ-65 65B	Improved AN/APQ-41 for French Navy use.	BuAer, Code AV-3311	C
AN/APQ-65A	American version of AN/APQ-65. Requirement cancelled.	BuAer, Code AV-3311	C
AN/APS-4	Bomb-rack mounting, forward-looking, X-band search radar for carrier based aircraft. Obsolete.	BuAer, Code AV-33222	U
AN/APS-15	X-band, 360° reconnaissance radar for heavy patrol aircraft. Obsolete.	BuAer, Code AV-33222	U
AN/APS-49	Rapid scan for sea clutter elimination in ASW. Dropped.	BuAer, Code AV-33221	C
AN/BPN-1	Submarine picket for missile navigation grid. S-band. Terminated.	BuShips, Code 822	C

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ADDITIONAL  
RADAR  
EQUIPMENTS

MODEL	General Facts	Source of Information	Sec. Class.
AN/FPN-1A	Fixed GCA with remote indicators. Height finding and final approach. Only one built.	BuShips, Code 822	U
AN/MPQ-2A	Modified SCR-584 for detection and tracking of close support aircraft. Three made, all scrapped or modified.	BuShips, Code 828	U
AN/MPQ-6 (XB-1)	X-band, high speed electronic lobing radar. Variable prf, scans, and scan rate. Research use only.	NRL, Code 5340	U
AN/MSG-1	S-band AA fire control for 90 mm guns. USMC. Obsolescent.	BuShips, Code 825	U
AN/SPA-10	Indicator using long persistence orange phosphor (British W2168). One developmental model built.	BuShips, Code 824	C
AN/SPA-12	Indicator with RHI and PPI combined in one console. One engineering model, then dropped.	BuShips, Code 824	C
AN/SPN-2	CCA air speed indicator. Replaced by AN/SPN-12.	BuShips, Code 822	U
AN/SPS-3	200 Kw, X-band hemispherical search radar. Foster antenna. One in existence, no longer being used.	BuShips, Code 823	U
AN/SPN-3	CCA X-band radar. Replaced by AN/SPN-8.	BuShips, Code 822	U
AN/SPS-11	AN/SPS-2 with smaller antenna assembly. No foreseeable future use.	BuShips, Code 821	C
AN/SPS-14	AN/SPS-6B with fault-finding features. No present plans.	BuShips, Code 821	C
AN/SPS-15	Cross-correlation modification of SU-2 for periscope detection. No further work after first experimental model.	BuShips, Code 821	C
AN/SPS-16	Lightweight 1300-Mc air search, intended as SA replacement. Not approved by OPDEVFOR.	BuShips, Code 821	U
AN/SPS-19	Rapid scan (1000 rpm) for periscope detection. SG-6 plus Dalmo Victor antenna.	BuShips, Code 821	C
AN/SPS-20	Rapid scan (1000 rpm) for periscope detection. AN/SPS-4 plus Dalmo Victor antenna.	BuShips, Code 821	C

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## ADDITIONAL RADAR EQUIPMENTS

MODEL	General Facts	Source of Information	Sec. Class.
AN/SPS-27	Nomenclature cancelled. Equipment now known as CXRX.		
AN/TPS-1B	1240 Mc, 600 Kw ground based general search radar. Obsolete.	BuShips, Code 827	U
AN/TPS-13 -13A	S-band velocity measurements for fire control. Obsolete.	BuShips, Code 825	C
AN/UPA-32	24-in. PPI for use as direct view surface or air summary plot. Cancelled.	BuShips, Code 824	U
AN/UPA-33	7-in. bulkhead mounted PPI repeater. Lightweight. Contract cancelled.	BuShips, Code 824	U
CXJG (Cindy)	24000-Mc surface search. None presently in use except as research equipment.	BuShips, Code 821	U
Mk 7 series	Experimental AA automatic tracking radar. Obsolete.	BuOrd, Code ReS4-c	U
Mk 12, Mod 1	945-Mc surface and AA fire control. Reserve fleet only.	BuOrd, Code ReS4-C	U
Mk 20, Mod 0- 1-3	L-band searchlight control. Obsolete.	BuShips, Code 825	U
Mk 22, Mod 1	X-band AA fire control radar for elevation data below 10° elevation. Reserve fleet only.	BuOrd, Code ReS4-c	U
Mk 25, Mod 2	X-band surface and AA automatic tracking fire control. Replaced by Mk 25, Mod 3.	BuOrd, Code ReS4-c	C
Mk 25, Mod 4	Mk 25, Mod 2 radar adapted to GFCS Mk 67. Replaced by Mk 25, Mod 5.	BuOrd, Code ReS4-c	C
Mk 25, Mod 6	X-band special-purpose guidance for Terrier. One equipment, now being dismantled.	BuOrd, Code ReS4-a	C
Mk 27, Mod 0, 2	S-band main battery surface fire control. Obsolete.	BuOrd, Code ReS4-c	U
Mk 28, Mod 2	S-band AA fire control for use with GFCS Mk 63. Replaced by Mk 34 radars.	BuOrd, Code ReS4-c	U



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ADDITIONAL  
RADAR  
EQUIPMENTS

MODEL	General Facts	Source of Information	Sec. Class.
Mk 29, Mod 2	X-band radar for AA fire control with GFCS Mk 57. Obsolete.	BuOrd, Code ReS4-c	U
Mk-33	X-band surface and air search. Obsolete.	BuShips, Code 828	U
Mk 34, Mod 3, 4, 7-14	X-band AA fire control. All being converted to Mk 34, Mod 16.	BuOrd, Code ReS4-c	U
Mk 44	Experimental K <sub>u</sub> -band fire control radar for submarines.	BuOrd, Code ReS4	C
Mk 47	Automatic X-band angle-tracking for AA fire control. Obsolete.	BuOrd, Code ReS4-c	C
Mk 50	X-band simultaneous lobing for gun director or missile guidance. Only one made, in use at NRL only.	NRL, Code 5343	C
OAC	Radar trainer. Out of use except in some schools.	BuShips, Code 824	U
OCJ OCJ-1	Air search trainer. Out of use except in some schools.	BuShips, Code 824	U
OCZ OCZ-1	Air search trainer. Out of use except in some schools.	BuShips, Code 824	U
SCR-584	S-band missile guidance and control (Hermes A-1 or Bumblebee). Obsolete.	BuShips, Code 825	C
SG-2S	Marine Corps 3000 Mc surface search. Obsolete.	BuShips, Code 828	U
SG-3	3600 Mc, 400 kw surface search. None in active fleet, one in reserve fleet.	BuShips, Code 821	U
SG-7	3600 Mc, high scan rate (30 rpm) for carrier air traffic control. One built as forerunner of AN/SPN-6.	BuShips, Code 821	U
SK-1	215-Mc air search. None in active fleet, three in reserve fleet.	BuShips, Code 821	U
SK-1M	200-Mc Marine Corps air search. Reserve use only. Modification known as AN/MPS-24.	BuShips, Code 827	U

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ADDITIONAL  
RADAR  
EQUIPMENTS

SECRET

MODEL	General Facts	Source of Information	Sec. Class.
SO series	Surface search radars. Obsolescent. Possibly a few SO-4 radars in use by USCG.	BuShips, Code 821	U
SO-7 M/N	3000 Mc, 80-kw Marine Corps surface search. Obsolete.	BuShips, Code 828	U
SP	S-band, 700-kw height-finder. Coming out of fleet.	BuShips, Code 823	U
SP-1M	3000 Mc, 750-kw Marine Corps height-finder. Obsolete.	BuShips, Code 828	U
SP-2	Height finder. Never approved.	BuShips, Code 823	U
SR-2	600 Mc air search. None in use by fleet.	BuShips, Code 821	U
SS-1	8800-Mc torpedo fire control for submarines. All field-changed to SS-2.	BuShips, Code 821	U
SV-1	SS radar for air search, using CXLJ antenna. S-band Out of fleet.	BuShips, Code 821	U
SV-2 SV-2A	3500-Mc height-finder for SS. SV-2A modification kit to improve vertical scan rate. Out of fleet.	BuShips, Code 821	C
SV-3	3500-Mc air search for SS. Out of fleet.	BuShips, Code 821	C
SV-4	3500-Mc missile tracking system for SS. Out of fleet.	BuShips, Code 821	C
SV-5	SV-4 plus computer and new indicators. Now part of AN/BPQ-1.	BuShips, Code 821	C
SX	Two radars with a common antenna mount for combined early warning and height finding. S-band, 700 to 1000 kw. Out of fleet and scrapped.	BuShips, Code 823	U
SX-1	Shore version of SX without stabilization. Now used mainly for training.	BuShips, Code 828	U
SX-2	Height-finder, early-warning radar system using two radars. Only one bought. No future plans.	BuShips, Code 823	U

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ADDITIONAL  
RADAR  
EQUIPMENTS

MODEL	General Facts	Source of Information	Sec. Class.
TDS/MK 2	High-speed manual track TDS with three-coordinate display and elevation in color. Only one experimental model made.	BuOrd, Code ReS4-b	C
TDS/MK 3 Mod 2	Slave bearing and range indicator. Obsolete.	BuOrd, Code ReS4-b	U
TDS/MK 11 Mod 1	Obsolete.	BuOrd, Code ReS4-b	-
TR/MK 2	Tape-recording type trainer for Mk 12 radar. Obsolete.	BuOrd, Code Ma-4c	U
TR/MK 8	AA gunnery trainer for use with Mk 28, 29, or 34 radars. Obsolete.	BuOrd, Code Ma-4c	U
VC/VC-1	7-in. remote PPI, 12-in. modification. Selector switch for choice of five radars. Obsolete.	BuShips, Code 824	U
VD to VD-2	Splash-proof 7-in. PPI repeater. Obsolete.	BuShips, Code 824	U
VE/VE-1/ VE-1A	Remote PPI repeater for use with radars having pulse rates between 60 and 1100 pulses per second. Obsolete.	BuShips, Code 824	U
VF/VFa	Precision PPI repeater and B-scope. VFa for 400 cycles only. Obsolete.	BuShips, Code 824	U
VF-1	Precision repeater. PPI and B-scope. Obsolete.	BuShips, Code 824	U
VF-2	Repeater. Increased VF range to 100 miles. Obsolete.	BuShips, Code 824	U
VG/VG-1	Repeater, projects on to 24-in. horizontal plotting unit. Obsolete.	BuShips, Code 824	-
VG-1A	Graphecon projection repeater. Obsolete.	BuShips, Code 824	U
VM	12-in. PPI repeater using two different color PPI displays optically superimposed. Three purchased, but not future plans.	BuShips, Code 824	C
VN	20-in. repeater similar to VK. Channels for use with MK 5 IFF. Three purchased, but no further plans.	BuShips, Code 824	C

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## SUMMARY OF JOINT NOMENCLATURE SYSTEM ("AN" SYSTEM FO

## TABLE OF COMPONENT INDICATORS

COMP.  
IND.

FAMILY NAME

EXAMPLES OF USE

(Not to be construed as limiting the application of the component indicator)

COMP. IND.	FAMILY NAME	EXAMPLES OF USE	
AB	Supports, Antenna	Antenna mounts, mast bases, mast sections, towers, etc.	INS
AM	Amplifiers	Power, audio, interphone, radio frequency, video, electronic control, etc.	
AS	Antennae, Complex	Arrays, parabolic type, masthead, etc.	A--Air
AT	Antennae, Simple	Whip or telescopic loop, dipole, reflector, etc.	and
BA	Battery, primary type	B batteries, battery packs, etc.	ers
BB	Battery, secondary type	Storage batteries, battery packs, etc.	B--Un
BZ	Signal Devices, Audible	Buzzers, gongs, horns, etc.	sub
C	Controls	Control box, remote tuning control, etc.	C--Air
CA	Commutator Assemblies, Sonar	Peculiar to Sonar equipment.	act
CB	Capacitor Bank	Used as a power supply.	D--Pile
CG	Cable Assemblies, R.F.	R.F. cables, wave guides, transmission lines, etc., with terminals.	F--Fix
CK	Crystal Kits	A kit of crystals with holders.	G--Gr
CM	Comparators	Compares two or more input signals.	grc
CN	Compensators	Electrical and/or mechanical compensating, regulating or attenuating apparatus.	two
CP	Computers	A mechanical and/or electronic mathematical calculating device.	typ
CR	Crystals	Crystal in crystal holder.	K--Am
CU	Couplers	Impedance coupling devices, directional couplers, etc.	M--Gr
CV	Converters (electronic)	Electronic apparatus for changing the phase, frequency, or from "one" medium to "another".	sta
CW	Covers	Cover, bag, roll, cap, radome, nacelle, etc.	uni
CX	Cable Assemblies, Non-R.F.	Non-R.F. cables with terminals, test leads, also composite cables of R.F. and non-R.F. conductors.	has
CY	Cases and Cabinets	Rigid and semirigid structure for enclosing or carrying equipment.	tha
D	Dispensers	Chaff dispensers.	equ
DA	Load, Dummy	R.F. and non-R.F. test loads.	P--Pa
DT	Detecting Heads	Magnetic pick-up device, search coil, hydrophone, etc.	ma
DY	Dynamotors	Dynamotor power supply.	S--Wa
E	Hoists	Sonar Hoist assembly, etc.	T--Gr
F	Filters	Band-pass, noise, telephone, wave traps, etc.	ble
FN	Furniture	Chairs, desks, tables, etc.	U--Gru
FR	Frequency Measuring Devices	Frequency meters, tuned cavity, etc.	gen
G	Generators, Power	Electrical power generators without prime movers. (See PU & PD.)	cia
GO	Goniometers	Goniometers of all types.	gls
GP	Ground Rods	Ground Rods, stakes, etc.	cli
H	Head, Hand, and Chest Sets	Includes earphone.	sh
HC	Crystal Holder	Crystal holder less crystal.	gro
HD	Air Conditioning Apparatus	Heating, cooling, dehumidifying, pressure, vacuum devices, etc.	V--Gr
ID	Indicators, Non-Cathode-Ray Tube	Calibrated dials and meters, indicating lights, etc. (See IP.)	(ins)
IL	Insulators	Strain, stand-off, feed-through, etc.	des
IM	Intensity Measuring Devices	Includes SWR gear, field intensity and noise meters, slotted lines, etc.	oth
IP	Indicators, Cathode Ray Tube	Azimuth, elevation, panoramic, etc.	ele
J	Junction Devices	Junction, jack and terminal boxes, etc.	etc
KY	Keying Devices	Mechanical, electrical and electronic keyers, coders, interrupters, etc.	W--Wa
LC	Tools, Line Construction	Includes special apparatus such as cable plows, etc.	und
LS	Loudspeakers	Separately housed loudspeakers, intercommunication station.	
M	Microphones	Radio, telephone, throat, hand, etc.	
MA	Magazines	Magnetic tape or wire, etc.	
MD	Modulators	Device for varying amplitude, frequency or phase.	
ME	Meters	Multimeters, volt-ohm-milliammeters, vacuum tube voltmeters, power meters, etc.	
MF	Magnets or Magnetic Field Generators	Magnetic tape or wire eraser, electro-magnet, permanent magnet, etc.	
MK	Miscellaneous Kits	Maintenance, modification, etc., except tool and crystal. (See CK, TK.)	
ML	Meteorological Devices	Barometer, hygrometer, thermometer, scales, etc.	
MT	Mountings	Mountings, racks, frames, stands, etc.	
MX	Miscellaneous	Equipment not otherwise classified, includes subassemblies. Do not use if better indicator is available.	TYPE
O	Oscillators	Master frequency, blocking, multivibrators, etc. (For test oscillators, see SG.)	AN/SGC
OA	Operating Assemblies	Assembly of operating units not otherwise covered, used with or part of one set or set series.	AN/SGC
OC	Oceanographic Devices	Bathymographs, etc.	AN/SGC
OS	Oscilloscope, Test	Test Oscilloscopes for general test purposes.	AN/SGC
PD	Prime Drivers	Gasoline engines, electric motors, Diesel motors, etc.	AN/SGC
PF	Fittings, Pole	Cable hangar, clamp, protectors, etc.	AN/APC
PG	Pigeon Articles	Container, loft, vest, etc.	AN/APC
PH	Photographic Articles	Camera, projector, sensitometer, etc.	AN/APC
PP	Power Supplies	Nonrotating machine type such as vibrator pack, rectifier, thermoelectric, etc.	AN/APC
PT	Plotting Equipments	Except meteorological. Boards, maps, plotting table, etc.	AN/APC
PU	Power Equipments	Rotating power equipment except dynamotors. Motor-generator, etc.	AN/APC
R	Receivers	Receivers, all types except telephone.	AN/APC
RC	Reels	Reel, cable (See RL.)	AN/UPC
RD	Recorder-Reproducers	Sound, graphic, tape, wire, film, disc, facsimile, magnetic, mechanical, etc.	AN/UPC
RE	Relay Assemblies	Electrical, electronic, etc.	AN/UPC
RF	Radio Frequency Component	Composite component of R.F. circuits. Do not use if better indicator is available.	AN/UPC
RG	Cables, R.F., Bulk	R.F. cable, wave guides, transmission lines, etc., without terminals.	AN/UPC
RL	Reeling Machines	Mechanisms for dispensing and rewinding antenna or field wire, recording wire or tape, etc.	AN/UPC
RO	Recorders	Sound, graphic, tape, wire, film, disc, facsimile, magnetic, mechanical, etc.	T-51( )
RP	Reproducers	Sound, graphic, tape, wire, film, disc, facsimile, magnetic, mechanical, etc.	T-51A/
RR	Reflectors	Target, confusion, etc. Except antenna reflectors. (See AT.)	T-51A/
RT	Receiver and Transmitter	Radio and radar transceivers, composite transmitter and receiver, etc.	RD-31( )
S	Shelters	House, tent, protective shelter, etc.	RD-31A/
SA	Switching Devices	Manual, impact, motor driven, pressure operated, etc.	RD-31( )
SB	Switchboards	Telephone, fire control, power, panel, etc.	RD-31A/
SG	Generators, Signal	Test oscillators, noise generators, etc. (See O.)	RD-31( )
SM	Simulators	Flight, aircraft, target, signal, etc.	RD-31A/
SN	Synchronizers	Equipment to coordinate two or more functions.	RD-31A/
ST	Straps	Harness, straps, etc.	
T	Transmitters	Transmitters, all types except telephone.	
TA	Telephone Apparatus	Miscellaneous telephone equipment.	
TB	Towed Body	Towed underwater body or fish, paravane, etc.	
TC	Towed Cable	Articulated towing strut, faked cable, etc.	
TD	Timing Devices	Mechanical and electronic timing devices, range device, multiplexers, electronic gates, etc.	
TF	Transformers	Transformers when used as separate items.	
TG	Positioning Devices	Tilt and/or Train Assemblies.	
TH	Telegraph Apparatus	Miscellaneous telegraph apparatus.	
TK	Tool Kits	Miscellaneous tool assemblies.	
TL	Tools	All types except line construction. (See LC.)	
TN	Tuning Units	Receiver, transmitter, antenna, tuning units, etc.	1. ?
TR	Transducers	Magnetic heads, phono pickups, sonar transducers, vibration pickups, etc. (See H, LS, and M.)	CLAT
TS	Test Items	Test and measuring equipment not otherwise included; boreighting and alignment equipment.	EQUI
TT	Teletypewriter and Facsimile Apparatus	Miscellaneous tape, teletype, facsimile equipment, etc.	2.
TV	Tester, Tube	Electronic tube tester.	use th
TW	Tapes and Recording Wires	Recording tape and wire, splicing, electrical insulating tape, etc.	3.
U	Connectors, Audio and Power	Unions, plugs, sockets, adapters, etc.	by a t
UG	Connectors, R.F.	Unions, plugs, sockets, choke couplings, adapters, elbows, flanges, etc.	chart
V	Vehicles	Carts, dollies, trucks, trailers, etc.	4.
VS	Signaling Equipment, Visual	Flag sets, aerial panels, signal lamp equipment, etc.	set w
WD	Cables, Two Conductor	Non-R.F. wire, cable and cordage in bulk. (See RG.)	equi
WF	Cables, Four Conductor	Non-R.F. wire, cable and cordage in bulk. (See RG.)	of a
WM	Cables, Multiple Conductor	Non-R.F. wire, cable and cordage in bulk. (See RG.)	5.
WS	Cables, Single Conductor	Non-R.F. wire, cable and cordage in bulk. (See RG.)	of D
WT	Cables, Three Conductor	Non-R.F. wire, cable and cordage in bulk. (See RG.)	tion
ZM	Impedance Measuring Devices	Used for measuring Q, C, L, R or PF, etc.	(Sup

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# R COMMUNICATION - ELECTRONIC EQUIPMENT)

TABLE OF SET OR EQUIPMENT INDICATOR LETTERS

TALLATION	TYPE OF EQUIPMENT	PURPOSE
borne (installed operated in air-ft)	A--Invisible light, heat radiation	A--Auxiliary assemblies (not complete operating sets used with or part of two or more sets or sets series)
erwater mobile, marine	B--Pigeon	B--Bombing
transportable (in- vated, do not use) tless carrier.	C--Carrier	C--Communications (re- ceiving and transmit- ting)
ed	D--Radiac	D--Direction finder and/ or reconnaissance
ound, general und use (include or more ground e installations)	E--Nupac	E--Ejection and/or re- lease
phibious	F--Photographic	G--Fire control or searchlight directing
ound, mobile (in- lled as operating t in a vehicle which no function other n transporting the pment)	G--Telegraph or teletype	H--Recording and/or re- producing (graphic meteorological and sound)
ck or portable (an- l or man)	I--Interphone and pub- lic address	L--Searchlight control (inactivated, use "G")
ter surface craft ound, transporta-	J--Electro-mechanical (not otherwise cov- ered)	M--Maintenance and test assemblies (including tools)
neral utility (in- des two or more eral installation sses, airborne, ipboard, and und)	K--Telemetering	N--Navigational aids (in- cluding altimeters, beacons, compasses, racons, depth sound- ing, approach, and landing)
ound, vehicular stalled in vehicle igned for functions or than carrying tronic equipment, ., such as tanks) er surface and erwater	L--Countermeasures	P--Reproducing (inac- tivated, do not use)
	M--Meteorological	Q--Special, or combina- tion of purposes
	N--Sound in air	R--Receiving, passive detecting
	P--Radar	S--Detecting and/or range and bearing
	Q--Sonar and under- water sound	T--Transmitting
	R--Radio	W--Control
	S--Special types, mag- netic, etc., or combi- nations of types	X--Identification and recognition
	T--Telephone (wire)	
	V--Visual and visible light	
	W--Armament (peculiar to armament, not otherwise covered)	
	X Facsimile or televi- sion	

## EXAMPLES OF "AN" TYPE NUMBERS

NUMBER	INDICATES
3-3 ( )	General reference set nomenclature for water surface craft radio communication set No. 3.
3-3	Original procurement set nomenclature applied against AN/SRC-3 ( ).
3-3A	Modification set nomenclature applied against AN/SRC-3.
3-13-T1 ( )	General reference training set nomenclature for the AN/APQ-13 set.
3-13-T1	Original procurement training set nomenclature applied against AN/APQ-13-T1 ( ).
3-13-T1A	Modification training set nomenclature applied against AN/APQ-13-T1.
T-T3 ( )	General reference training set nomenclature for general utility radar transmitting training set No. 3.
T-T3	Original procurement training set nomenclature applied against AN/UPT-T3 ( ).
T-T3A	Modification training set nomenclature applied against AN/UPT-T3.
/ARQ-8	General reference component nomenclature for transmitter No. 51, part of or used with airborne radio special set No. 8.
RQ-8	Original procurement component nomenclature applied against T-51 ( )/ARQ-8.
ARQ-8	Modification component nomenclature applied against T-51/ARQ-8.
/U	General reference component nomenclature for recorder-reproducer No. 31 for general utility use, not part of a specific set.
T	Original procurement component nomenclature applied against RD-31 ( )/U.
U	Modification component nomenclature applied against RD-31/U.

## NOTES

This chart was formerly titled SUMMARY OF JOINT ARMY-NAVY NOMENCLATURE SYSTEM ("AN" SYSTEM) FOR COMMUNICATION AND ASSOCIATED

NT. "AN" does not mean that the Army, Navy and Air Force jointly that the type number was assigned in the "AN" system. Nomenclature system, nomenclature consists of a name followed by a type number will consist of indicator letters shown on this chart.

If an independent major unit not part of or used with a specific component indicator, a number, the slant and such of the set or sets as apply. Example: SB-5/PT would be the type number switchboard for independent use.

Nomenclature assignments will be submitted on the Department and prepared in accordance with the item names and descriptions by the Office of The Assistant Secretary of Defense

## MODIFICATION LETTERS

Component modification suffix letters will be assigned for each modification of a component when detail parts and sub-assemblies used therein are no longer interchangeable, but the component itself is interchangeable physically, electrically, and mechanically.

Set modification letters will be assigned for each modification not affecting interchangeability of the sets or equipment as a whole, except that in some special cases they will be assigned to indicate functional interchangeability and not necessarily complete electrical and mechanical interchangeability. Modification letters will only be assigned if the frequency coverage of the unmodified equipment is maintained.

The suffix letters X, Y, and Z will be used only to designate a set or equipment modified by changing the power input voltage, phase or frequency. X will indicate the first change, Y the second, Z the third, XX the fourth, etc., and these letters will be in addition to other modification letters applicable. (For examples see JANAP 196.)

## ADDITIONAL INDICATORS

Experimental Sets. In order to identify a set or equipment of an experimental nature with the development organization concerned, the following indicators will be used within the parentheses:

- XA --Communications-Naval Laboratory, WADC, Dayton, Ohio.
- XB --Naval Research Laboratory, Washington, D. C.
- XC --Coles Signal Laboratory, Fort Monmouth, N. J.
- XD --Cambridge Research Center, Cambridge, Mass.
- XE --Evans Signal Laboratory, Fort Monmouth, N. J.
- XF --Frankford Arsenal, Philadelphia, Pa.
- XG --U. S. N. Electronic Laboratory, San Diego, Calif.
- XH --Aerial Reconnaissance Laboratory, WADC, Dayton, Ohio.
- XI --Naval Air Development Center, Johnsville, Pa.
- XK --Flight Control Laboratory, WADC, Dayton, Ohio.
- XL --Signal Corps Electronics Research Unit, Mountain View, Calif.
- XM --Squier Signal Laboratory, Fort Monmouth, N. J.
- XN --Department of the Navy, Washington, D. C.
- XO --Redstone Arsenal, Huntsville, Ala.
- XP --Canadian Department of National Defense, Ottawa, Canada.
- XR --Engineer Research and Development Laboratory, Fort Belvoir, Va.
- XS --Electronic Components Laboratory, WADC, Dayton, Ohio.
- XU --U. S. N. Underwater Sound Laboratory, Fort Trumbull, New London, Conn.
- XW --Rome Air Development Center, Rome, N. Y.
- XY --Armament Laboratory, WADC, Dayton, Ohio.

Example: Radio Set AN/ARC-3 ( ) might be assigned for a new airborne radio communication set under development. The cognizant development organization might then assign AN/ARC-3(XA-1), AN/ARC-3(XA-2), etc., type numbers to the various sets developed for test. When the set was considered satisfactory for use, the experimental indicator would be dropped and procurement nomenclature AN/ARC-3 would be officially assigned thereto.

Training Sets. A set or equipment designed for training purposes will be assigned type numbers as follows:

1. A set to train for a specific basic set will be assigned the basic set type number followed by a dash, the letter T, and a number. Example: Radio Training Set AN/ARC-6A-T1 would be the first training set for Radio Set AN/ARC-6A.

2. A set to train for general types of sets will be assigned the usual set indicator letters followed by a dash, the letter T, and a number. Example: Radio Training Set AN/ARC-T1 would be the first training set for general airborne radio communication sets.

Parentheses Indicator. A nomenclature assignment with parentheses, ( ) following the basic type number is made to identify an article generally, when a need exists for a more general identification than that provided by nomenclature assigned to specific designs of the article. Examples: AN/ARC-5 ( ), AM-6 ( )/GRC-5, SB-8 ( )/GG. A specific design is identified by the plain basic type number, the basic type number with a suffix letter, or the basic type number with an experimental symbol in parentheses. Examples: AN/GRC-5, AN/GRC-5A, AN/GRC-5(XC-1), AM-6B/GRC-5, SB-8(XE-3)/GG.

The letter V within the parentheses is used to identify systems with varying parts list.

## NOMENCLATURE POLICY

(See JANAP 196 for Statement of Policies)

1. AN nomenclature will be assigned to:
  - A. Complete sets of equipment and major components of military design.
  - B. Groups of articles of either commercial or military design which are grouped for a military purpose.
  - C. Major articles of military design which are not part of or used with a set.
  - D. Commercial articles when nomenclature will facilitate military identification and/or procedures.
2. AN nomenclature will not be assigned to:
  - A. Articles cataloged commercially except in accordance with Paragraph 1. D.
  - B. Minor components of military design for which other adequate means of identification are available.
  - C. Small piece parts such as capacitors and resistors.
  - D. Articles having other adequate identification in joint military specifications.
3. Nomenclature assignments will remain unchanged regardless of later changes in installation and/or application.

IMPORTANT. --All personnel are cautioned against originating or changing any part of any nomenclature assignment, including modification letters, without authorization.





APPENDIX B  
Master Index

Sections

- |  |                               |        |
|--|-------------------------------|--------|
| 1. Shipboard Search Radars                   | 7. Target Designation         | Weapon |
| 2. Land based Search Radars                  | Direction System              |        |
| 3. Airborne Search and Weapon Control Radars | 8. Altimeters                 |        |
| 4. Shipboard Weapon Control Radars           | 9. Trainers                   |        |
| 5. Landbased Control Radars                  | 10. Traffic Control           |        |
| 6. Indicators                                | 11. Additional Radar Elements |        |

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15-F . . . . .	11	AN/APN-42 . . . . .	8
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Type I, II, III . . . . .	9	AN/APQ-35, 35A, 35B . . . . .	3
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15-Z-4 . . . . .	9	AN/APS-28 . . . . .	Se /APQ-35
15-Z-5 . . . . .	9	AN/APS-31, A, B, C, . . . . .	3
15-Z-8 . . . . .	9	AN/APS-33A, F . . . . .	3
AN/APA-88 . . . . .	See AN/APS-37	AN/APS-33B, APA-91 . . . . .	3
AN/APA-91 . . . . .	See AN/APS-33B	AN/APS-37, APA-88 . . . . .	3
AN/APA-125 . . . . .	6	AN/APS-38, 38A . . . . .	3
AN/APG-30 - 30A . . . . .	3	AN/APS-42, 42B . . . . .	3
AN/APG-34 (XN-1, 2, 3) . . . . .	3	AN/APS-44, 44A . . . . .	3
AN/APG-36 . . . . .	See AN/APQ-35	AN/APS-45 . . . . .	3
AN/APG-39 . . . . .	11	AN/APS-49 . . . . .	11
AN/APG-43 . . . . .	11	AN/APS-56 . . . . .	3
AN/APG-44 . . . . .	11	AN/APS-62 . . . . .	3
AN/APG-45 . . . . .	3	AN/APS-67 . . . . .	3
AN/APG-46 . . . . .	11	AN/APS-69 . . . . .	3

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Mod	Section	Model	Section
AN/APS	70A	AN/SPG-48	4
AN/BPA	1	AN/SPG-48 (XN-4)	See AN/SPG-53
AN/BPN	11	AN/SPG-49	4
AN/BPQ	4	AN/SPG-50	4
AN/BPQ	4	AN/SPG-51 (XN-1)	4
AN/BPS	1	AN/SPG-52	4
AN/BPS	1	AN/SPG-53	4
AN/BPS	1	AN/SPG-55, 55A, 55B	4
AN/BPS	1	AN/SPG-56	4
AN/BPS	1	AN/SPG-57	4
AN/FPN	11	AN/SPG-T10	9
AN/FPN	10	AN/SPN-2	11
AN/FPN	10	AN/SPN-3	11
AN/FPS	10	AN/SPN-4	1
AN/FPS	XN-2)	AN/SPN-5	1
AN/FPS	10	AN/SPN-6	10
AN/GPN	10	AN/SPN-8	10
AN/GPN	10	AN/SPN-11	1
AN/KPQ	2	AN/SPN-12	10
AN/MPN	10	AN/SPN-13	1
AN/MPN	5A	AN/SPN-18	1
AN/MPQ	11	AN/SPN-21	1
AN/MPQ	5	AN/SPN-22	1
AN/MPQ	KB-1)	AN/SPN-T1 (XG-1)	9
AN/MPQ	3	AN/SPQ-2	4
AN/MPQ	A	AN/SPQ-5	4
AN/MPQ	5	AN/SPQ-6	See AN/KPQ-1
AN/MPQ	5	AN/SPQ-49	See AN/SPQ-5
AN/MPS	2	AN/SPR-6 (XN-1)	4
AN/MPS	10	AN/SPS-2	1
AN/MPS	2	AN/SPS-3	11
AN/MPS	2	AN/SPS-4	1
AN/MSG	11	AN/SPS-5, 5B	1
AN/MSQ	6	AN/SPS-T1	9
AN/MSQ	2	AN/SPW-1 (XN-1)	4
AN/SPA	6	AN/SPW-2	4
AN/SPA	6	AN/SSQ-T2 (XG-1)	9
AN/SPA	6	AN/TPN-8	10
AN/SPA	6	AN/TPQ-10	10
AN/SPA	8B	AN/TPS-1B	11
AN/SPA	6	AN/TPS-1D, 1G	2
AN/SPA	11	AN/TPS-13, 13A	11
AN/SPA	11	AN/TPS-21	2
AN/SPA	11	AN/UPA-25	6
AN/SPA	6	AN/UPA-32	11
AN/SPA	6	AN/UPA-33	11
AN/SPA	6	AN/UPS-1 (XN-1)	2
AN/SPA	6	AN/UPS-T4	9
AN/SPA	6	Cindy	See CXJG
AN/SPA	6	CXCJ	See CXJG
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CXLJ . . . . .	See SV-1	Mk 35, Mod 2 . . . . .	4
CXRC . . . . .	See AN/SPS-13	Mk 39, Mod 3 . . . . .	4
CXRX . . . . .	1	Mk 44 . . . . .	11
CXSA . . . . .	6	Mk 47 . . . . .	11
AN/SPS-6B, 6C . . . . .	1	Mk 50 . . . . .	11
AN/SPS-7 . . . . .	1	OAC . . . . .	11
AN/SPS-8, 8C . . . . .	1	OCJ-1 . . . . .	11
AN/SPS-8A . . . . .	1	OCZ-1 . . . . .	11
AN/SPS-8B, 8D . . . . .	1	P-1X . . . . .	AN/BPQ-1
AN/SPS-10, 10X . . . . .	1	RS-12 . . . . .	9
AN/SPS-11 . . . . .	11	RS-14 . . . . .	9
AN/SPS-12 . . . . .	1	SC-5 . . . . .	1
AN/SPS-13 . . . . .	1	SCR-584 . . . . .	11
AN/SPS-14 . . . . .	11	SG-1B . . . . .	1
AN/SPS-15 . . . . .	11	SG-2S . . . . .	11
AN/SPS-16 . . . . .	11	SG-3 . . . . .	11
AN/SPS-17 . . . . .	1	SG-6, 6b . . . . .	1
AN/SPS-18 . . . . .	1	SG-7 . . . . .	11
AN/SPS-19 . . . . .	11	SK-1 . . . . .	11
AN/SPS-20 . . . . .	11	SK-1M . . . . .	11
AN/SPS-21 . . . . .	1	SK-2, 3 . . . . .	1
AN/SPS-26 . . . . .	1	SO-series . . . . .	11
AN/SPS-27 . . . . .	11	SO-7 M/N . . . . .	11
AN/SPS-28 . . . . .	1	SO-12 M/N . . . . .	2
AN/SPS-29 . . . . .	1	SP . . . . .	11
AN/SPS-30 . . . . .	1	SP-1M . . . . .	11
AN/SPS-31 (XN-1) . . . . .	1	SP-1M . . . . .	AN/MPQ-5
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Mk 7 series . . . . .	11	SR-6B . . . . .	1
Mk 8, Mod 3 . . . . .	4	SS-1 . . . . .	11
Mk 12, Mod 1 . . . . .	11	SS-2 . . . . .	1
Mk 13 . . . . .	4	SS-2A . . . . .	1
Mk 20, Mod 0, 1, 3 . . . . .	11	ST-1 . . . . .	1
Mk 22, Mod 1 . . . . .	11	SU-1 . . . . .	1
Mk 25, Mod 2 . . . . .	11	SU-2 . . . . .	1
Mk 25, Mod 3 . . . . .	4	SV-1 . . . . .	11
Mk 25, Mod 4 . . . . .	11	SV-2, 2A . . . . .	11
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Mk 27, Mod 0, 2 . . . . .	11	SX-1 . . . . .	11
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TR/Mk 8	11	VK-4a/VK-5	6
VC/VC-1	11	VL	6
VD, VD-1	11	VL-1	6
VE/VE-1	11	VM	11
VE-1A	11	VN	11
VF/VFa	11	VP	11
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VF-2	11	WDS Mk 2, Mod 0	7
VG/VG-1	11	WDS Mk 3, Mod 0	7
VG-1A	11	WDS Mk 3, Mod 1	7
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