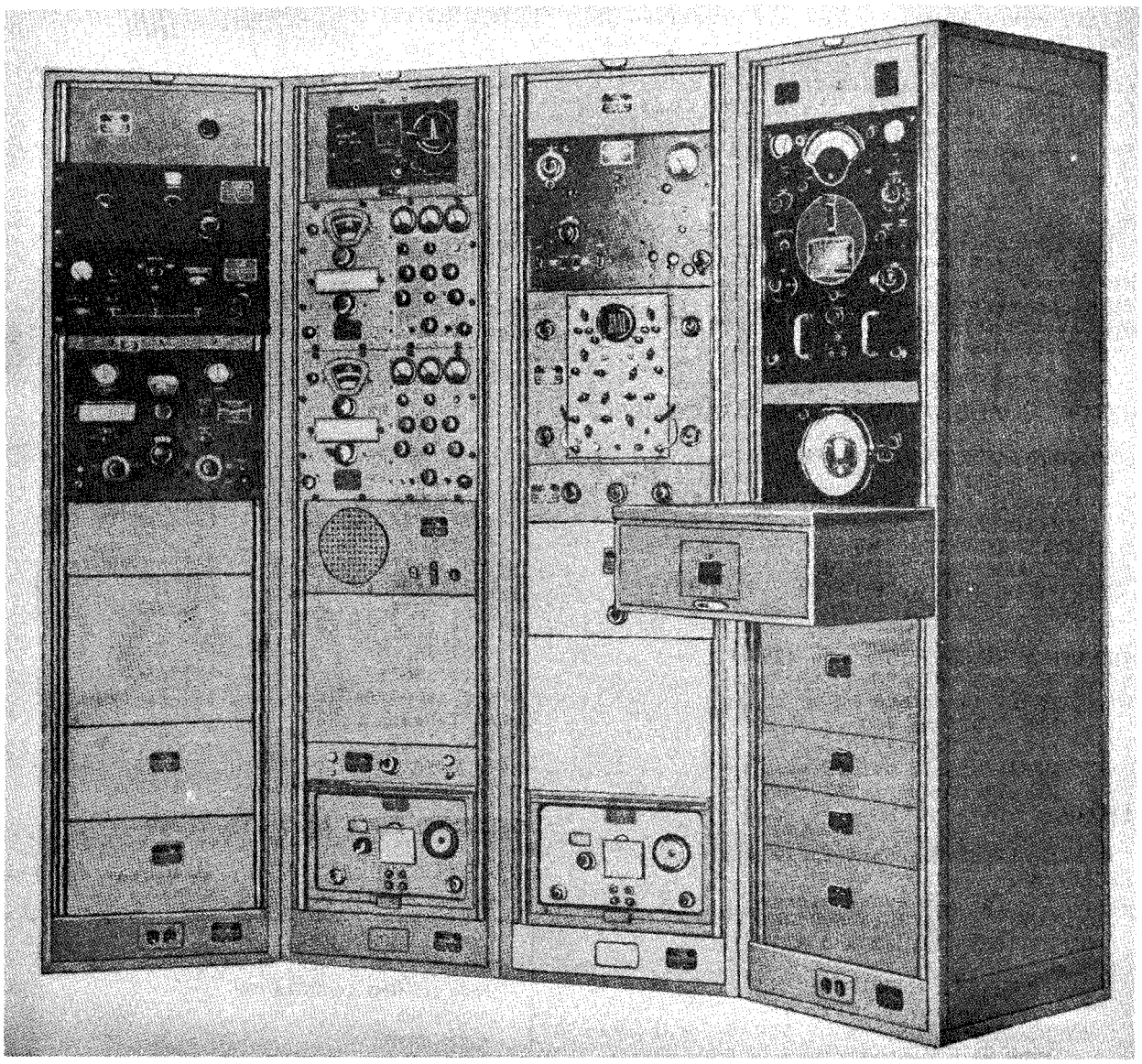
FREQUENCY CALIBRATOR SET AN/FRM-3



Frequency Calibrator Set AN/FRM-3

FUNCTIONAL DESCRIPTION

The AN/FRM-3 is designed to make precision measurements of any frequency between 15 kc and 420 mc. The frequency of the RF Oscillator O-76/U, upon which all subsequent action is based, is maintained constant to better than one part in 10 million. The same percentage of accuracy is maintained throughout the equipment. This standard's calibration may be checked against the WWV transmissions or by comparison with Navy time signals. Actual measurement of an unknown frequency is accomplished by comparison with harmonics of 9, 10, or 11 kc. The latter signals are derived by converter circuits driven by the output of the O-76/U. The comparison of the unknown and the harmonic is made by applying both signals to a receiver and then measuring, by means of an oscilloscope and a standard audio oscillator, the audio beat note produced by heterodyning the two signal frequencies. The frequency of the unknown signal is established by adding (or subtracting) the audio difference frequency to (from) the known harmonic frequency.

Test-Frequency Measuring

AN/FRM-3 FREQUENCY CALIBRATOR SET

All units of the system are contained in four Navy type CY-597/G cabinets, and includes units that are government furnished items that have been modified to some extent for proper operation in the AN/FRM-3 system.

Data on this sheet reflects the following field changes: No. 1 (27 March 1958).

RELATION TO OTHER EQUIPMENT

Equipment Required but not Supplied: Horizontal L antenna 200 ft long, 35 to 40 ft high; vertical antenna 40 to 50 ft high; one each horizontal doublets 165, 100, 50 and 25 ft long; VHF-UHF Antennas.

ELECTRICAL AND MECHANICAL CHARACTERISTICS

GOVERNMENT FURNISHED EQUIPMENTS
- RADIO RECEIVING EQUIP: RBA, RBB and RBC.
- PANORAMIC RADIO ADAPTER: RBV-1.
- OSCILLOSCOPE: OBT.
- FREQUENCY METER: LR.
- SYNCHROMETER: TD-26/U.
- INTERPOLATION OSCILLATOR: NT-35131.
- RADIO FREQUENCY TUNER: RF-36/U and RF-37/U.

FREQUENCY RANGE: 15 kc to 420 mc.
- TUNING BAND RANGES
  - RBA: 15 to 600 kc.
  - RBB: 0.5 to 4.0 mc.
  - RBC: 4.0 to 27.0 mc.
  - RF-36/U: 15 to 125 mc.
  - RF-37/U: 100 to 420 mc.

FREQUENCY DATA
- CONTROL: Xtal.
- STABILITY: One part in 10 million.

RECEIVERS.
- TYPE: TRF and superheterodyne.
- OUTPUT: 0.5 W into 600 ohm line.
- RECEPTION: A1, A2 and A3.

GENERAL
- POWER SOURCE REQUIRED: 115 v, 50 to 60 cps, single ph, 0.90 pf.
- INPUT POWER: Stand by 900 W, operating 1600 W.

HEAT DISSIPATION: 1600 W.

MANUFACTURER'S OR CONTRACTOR'S DATA

Reeves-Hoffman Corp, Carlisle, Pa.
Contract NObsr-42472 dated 9 Mar 1951.

TUBE AND/OR CRYSTAL COMPLEMENT

(5) OA2WA	(2) 12AU7
(1) 3GP1	(8) 6AB7
(12) 6B4G	(4) 6J4WA
(2) 6J7GT	(6) 6SJ7
(1) 6SQ7GT	(1) 75
(3) 884	(3) OB2WA
(3) 12AX7	(10) 5U4G
(19) 6AC7WA	(2) 6C4WA
(1) 6J5	(4) 6K6GT
(19) 6SK7WA	(3) 6V6GTY
(9) 76	(1) 9002
(9) OC3W	(2) 2X2A
(2) 5654/6AK5W	(9) 6AG7Y
(2) 6C6	(5) 6J5GT
(5) 6SA7Y	(8) 6SN7WGTA
(2) 6X5WGT	(1) 83
(1) OD3W	(1) 3BP1
(3) 5726/6AL5W	(5) 6AH6
(6) 6H6	(2) 6J6WA
(1) 6SG7Y	(1) 6SQ7
(3) 6005/6AQ5W	(1) 84-6Z4

Total Tubes: (188)
(1) 1N69
Total Crystals: (1)

REFERENCE DATA AND LITERATURE

NAVSHIPS 91320(A), Technical Manual for Frequency Calibrator Set AN/FRM-3.

TYPE CLASSIFICATION	
DESIGN COGNIZANCE	BUSHIPS
PROCUREMENT COGNIZANCE	
STOCK NO.	
R.D.B. IDENT. NO.	

SHIPPING DATA

NUMBER OF BOXES	CONTENTS AND IDENTIFICATION	VOLUME (Cu.Ft.)	OVERALL DIMENSIONS (inches)	WEIGHT PACKED (lbs.)
1	Cabinet, Modified for use as Bay No. 1. Front panels for CV-122/FRM-3, C-694/FRM-3, 2-PP-555/FRM-3, cable clamps, Sola mount, AC strip.	48	24 X 36 X 96	410
1	Cabinet, Modified for use as Bay No. 2. Dust cover for O-76/U mounting platform, cable clamps, AC strip	48	24 X 36 X 96	410

FREQUENCY CALIBRATOR SET AN/FRM-3

SHIPPING DATA

NUMBER OF BOXES	CONTENTS AND IDENTIFICATION	VOLUME (Cu.Ft.)	OVERALL DIMENSIONS (inches)	WEIGHT PACKED (lbs.)
1	Cabinet, Modified for use as Bay No. 3. Front panels for CV-120/FRM-3, CV-119/FRM-3, CV-118/FRM-3, mounting platforms for OBT oscilloscope and O-76/U Oscillator, dust cover for O-76/U, cable clamps, AC strip	48	24 X 36 X 96	410
1	Cabinet, Modified for use as Bay No. 4. SA-223 switch panel, J-361/FRM-3 Distribution Panel, Panels for CV-117/FRM-3, AM-406/FRM-3 and PP-555/FRM-3, mounting platform for LR, mounting plate for J-375/FRM-3, cable clamps, AC strip.	48	24 X 36 X 96	410
1	2 RF Amplifiers AM-407/FRM-3 1 Switch Panel SA-218/FRM-3 1 Frequency Converter CV-122/FRM-3 1 Frequency Converter CV-119/FRM-3 1 Frequency Converter CV-118/FRM-3 1 RF Amplifier AM-406/FRM-3 2 Doors for O-76/U (miscellaneous hardware) 1 Frequency Converter CV-117 /FRM-3 1 Frequency Converter CV-120 /FRM-3 2 Pair lid mounting plates for O-76/U 1 Switch Assembly 1 Amplifier Speaker AM-408/FRM-3 3 Power Supplies PP-555/FRM-3 1 Distribution Panel J-375/FRM -3 1 Set Chrome Trims (miscellaneous hardware) 4 Rear Dust Panels (miscellaneous hardware) 1 T2301 Voltage Regulating Transformer Top dust covers 1 Box miscellaneous hardware	35	24 X 29 X 84	795
1	Cable Harness for AN/FRM-3 1 Mounting Switch MT-788/FRM-3 Synchrometer TD-26/U Set of Spare parts for TD-26/U Set Spare Parts for Adaptor Kit 2 Technical Manuals Set of Installation Instructions and Drawings	12.5	24 X 30 X 30	265
1	RBA-3 Receiver (Modified), RBA-3 Receiver Power Unit Spare Parts for RBA-3	15	24 X 30 X 36	340
1	RBB-4 Receiver, RBB-4 Power Unit, Spare Parts for RBB-4	15	24 X 30 X 36	340
1	RBC-4 Receiver, RBC-4 Power Unit, spare Parts for RBC-4	15	24 X 30 X 36	340
1	RBV-1 Panoramic Adaptor and Spares	6.75	18 X 18 X 36	115
1	RF Oscillator O-76/U	7.5	18 X 24 X 30	200

Test-Frequency Measuring

AN/FRM-3 FREQUENCY CALIBRATOR SET

SHIPPING DATA

NUMBER OF BOXES	CONTENTS AND IDENTIFICATION	VOLUME (Cu.Ft.)	OVERALL DIMENSIONS (inches)	WEIGHT PACKED (lbs.)
1	RF Oscillator O-76/U	7.5	18 X 24 X 30	200
1	Spares for O-76/U Oscillator	3.75	15 X 18 X 24	65
1	Spares for O-76/U Oscillator	3.75	15 X 18 X 24	65
1	Oscilloscope OBT, (modified)	5.66	18 X 18 X 30	140
1	FN-28/U Switchboard Shelf	3	12 X 18 X 24	85
1	RF-36/U and RF-37/U, RF Heads including spares for both	6	12 X 24 X 36	108
1	Interpolation Oscillator-35131	6.9	21 X 21 X 27	115
1	LR-1 Heterdyne Frequency Meter, modified	8.75	21 X 24 X 30	220
1	Spare Parts for LR-1 Frequency Meter	3.75	12 X 18 X 30	135

EQUIPMENT SUPPLIED DATA

QUANTITY PER EQUIPT	NAME AND NOMENCLATURE	OVERALL DIMENSIONS (inches)	WEIGHT (lbs.)
2	RF Amplifier AM-407/FRM-3	3 X 4-3/4 X 5-15/16	1 ea
1	Switch Panel, SA-218/FRM-3	3 X 3-1/2 X 19	4
1	Frequency Converter, CV-122/FRM-3	6-13/16 X 6-7/8 X 19	10
1	Frequency Converter, CV-119/FRM-3	5-1/4 X 7-1/8 X 19	6
1	Frequency Converter, CV-118/FRM-3	8-1/8 X 10-1/2 X 19	15
1	RF Amplifier, AM-406/FRM-3	5-1/16 X 5-1/2 X 19	5.5
1	Mounting Switch, MT-788/FRM-3	10-1/2 X 14-1/2 X 19	15
1	Frequency Converter, CV-117/FRM-3	7 X 10-1/2 X 19	14
1	Frequency Converter, CV-120/FRM-3	5-1/4 X 11-3/4 X 19	8
1	Distribution Panel, J-361/FRM-3	3-7/8 X 5-1/4 X 19	3
1	Switch Assembly, SA-217/FRM-3	4-1/4 X 15-3/4 X 19	6
1	Amplifier Speaker, AM-408/FRM-3	8-3/16 X 8-3/4 X 19	8
3	Power Supply, PP-555/FRM-3	8-3/4 X 8-7/8 X 19	50 ea
1	Distribution Panel, J-375/FRM-3	6-1/6 X 7-1/8 X 19	20
1	Switch Panel, SA-223/FRM-3	2-1/4 X 5-1/4 X 19	1.5
1*	Radio Receiving Equipment RBA	13-1/2 X 17-5/16 X 19	150
1*	Radio Receiving Equipment RBB	19 X 20-1/8 X 28-3/16	150
1*	Radio Receiving Equipment RBC	20-1/8 X 19 X 28-3/16	150
1*	Radio Frequency Head, RF-36/U	8 X 9 X 20	25
1*	Radio Frequency Head, RF-37/U	6 X 7-1/2 X 19	25
1*	Cathode Ray Oscillograph Equipment OBT	10-3/8 X 15-1/2 X 17	60
1*	Combined Heterodyne Frequency Meter and Crystal Controlled Calibration Equipment LR	17-1/2 X 18 X 23	125
1*	Clock, TD-26/U	8-3/4 X 11 X 19	
2	RF Oscillator O-76/U	10-1/2 X 19 X 19	90 ea
1*	Panoramic Radio Adapter, RBV	8-3/4 X 13-1/2 X 15	35
1*	Interpolation Oscillator, -35131	11-3/4 X 14 X 19	80
1	Control Panel, C-694/FRM-3	1-3/4 X 1-3/4 X 19	1
4	Cabinet, CY-597/G	3 X 7 X 9	325 ea
	Equipment Spares		

NOTE: *Government furnished equipment modified for use in the AN/FRM-3.

8 February 1963 — RADIO INTERFERENCE MEASURING SET AN/PRM-25(XN-1)

Cog Service: USN **FSN:** — **Functional Class: 2.1**

USA	USN	USAF

TYPE CLASS: Used by

MANUFACTURER'S NAME/CODE NUMBER: Stoddart Aircraft Radio Co., Inc., (78591).

(No Illustration Available)

FUNCTIONAL DESCRIPTION:

The AN/PRM-25(XN-1) is a portable test equipment for making quantitative measurements of broad-band electrical and/or magnetic interference appearing in the radio frequency spectrum. It operates in the 150 kilocycle to 30 megacycle frequency range.

No field changes in effect at time of preparation (6 February 1963).

TECHNICAL CHARACTERISTICS:

TYPE OF INSTALLATION: Portable.
TYPE OF INDICATION: Meter type.
TYPE OF TERMINALS PROVIDED: Recorder terminals.
TYPE OF OUTPUT PROVIDED: Intermediate frequency.
TYPE OF OUTPUT SIGNAL: Audio type & video type output.
TYPE OF SCALE: Logarithmic scale.
TYPE OF ATTENUATOR: Calibrated.
TYPE OF MEASUREMENTS: Quantitative measurements of broad-band electrical and/or magnetic interference appearing in the radio frequency spectrum.
OPERATING FREQUENCY RANGE: 150 kc to 30 mc.
OPERATING POWER RQMT: 12 v dc.

RELATION TO OTHER EQUIPMENT:

The AN/PRM-25(XN-1) is functionally similar to the AN/PRM-1 series.

EQUIPMENT REQUIRED BUT NOT SUPPLIED: None.

MAJOR COMPONENTS

QTY	ITEM	STOCK NUMBERS	DIMENSIONS (INCHES)	WEIGHT (LBS)
1	Radio Interference Measuring Set AN/PRM-25(XN-1)		10 x 11-1/2 x 22	

REFERENCE DATA AND LITERATURE:

TUBE, CRYSTAL AND/OR SEMI-CONDUCTOR DATA:

TUBES: Data not available.

AN/PRM-25(XN-1) RADIO INTERFERENCE MEASURING SET

CRYSTALS: Data not available.

SEMI-CONDUCTORS: Data not available.

SHIPPING DATA

PKGS	VOLUME (CU FT)	WEIGHT (LBS)

PROCUREMENT DATA

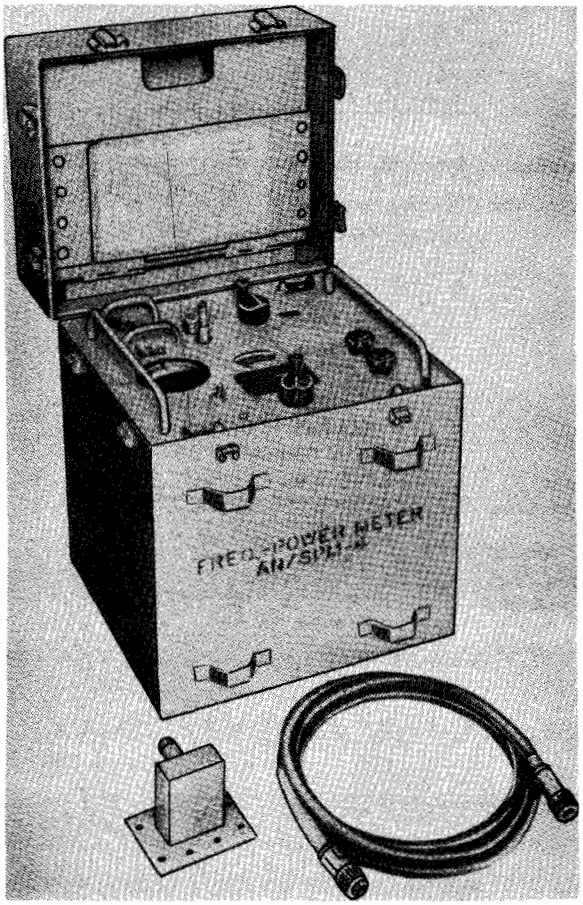
PROCURING SERVICE: USN
DESIGN COG: USN, BuShips
SPEC &/OR DWG: SHIPS-E-2602A, Amend 1

CONTRACTOR	LOCATION	CONTRACT OR ORDER NO.	APPROX. UNIT COST
Stoddart Aircraft Radio Co., Inc.	Hollywood, California	NObsr-81133, 15 January 1960	

April 1959

Test-Frequency Measuring

FREQUENCY POWER METER AN/SPM-4



Frequency-Power Meter AN/SPM-4

FUNCTIONAL DESCRIPTION

The AN/SPM-4 is designed as a portable unit, designed to make frequency and power checks of radar systems over a frequency range from 5400 to 5900 megacycles (mc) and a power range from +1 to +30 decibels referred to one milliwatt (DBM).

No field changes in effect at time of preparation (3 October 1958).

RELATION TO OTHER EQUIPMENT

The AN/SPM-4 is designed to be used with but not a part of the AN/SPG-49 and AN/SPQ-5 systems.

EQUIPMENT REQUIRED BUT NOT SUPPLIED

Three (3) 1-1/2 v cells for normal operation, use JAN Type BA-30 cells.

ELECTRICAL AND MECHANICAL CHARACTERISTICS

FREQUENCY MEASUREMENT CHARACTERISTICS
- RANGE: 5.4 to 5.9 mc.
- ACCURACY AT 25° C: ±1 mc.
- ACCURACY: From -40° C to ±55° C, ±4 mc.
- ACCURACY WITH CORRECTION CURVES: ±2.5 mc

POWER MEASUREMENT CHARACTERISTICS
- RANGE: +1 to +30 dbm at input connector.
- OPERATING TEMPERATURES: -20° C to +55° C.
- ACCURACY: ±1.5 db.
- ACCURACY WITH CORRECTION CHARTS: ±1.0 db.

POWER SUPPLY: 4-1/2 volts, battery internally contained.

MANUFACTURER'S OR CONTRACTOR'S DATA

Sperry Gyroscope Co., Great Neck, Long Island, N.Y.
Contract NOrd-11904, dated 26 June 1951.
Contract NObsr-42273.

TUBE AND/OR CRYSTAL COMPLEMENT

No Electron Tubes or Crystals used.

REFERENCE DATA AND LITERATURE

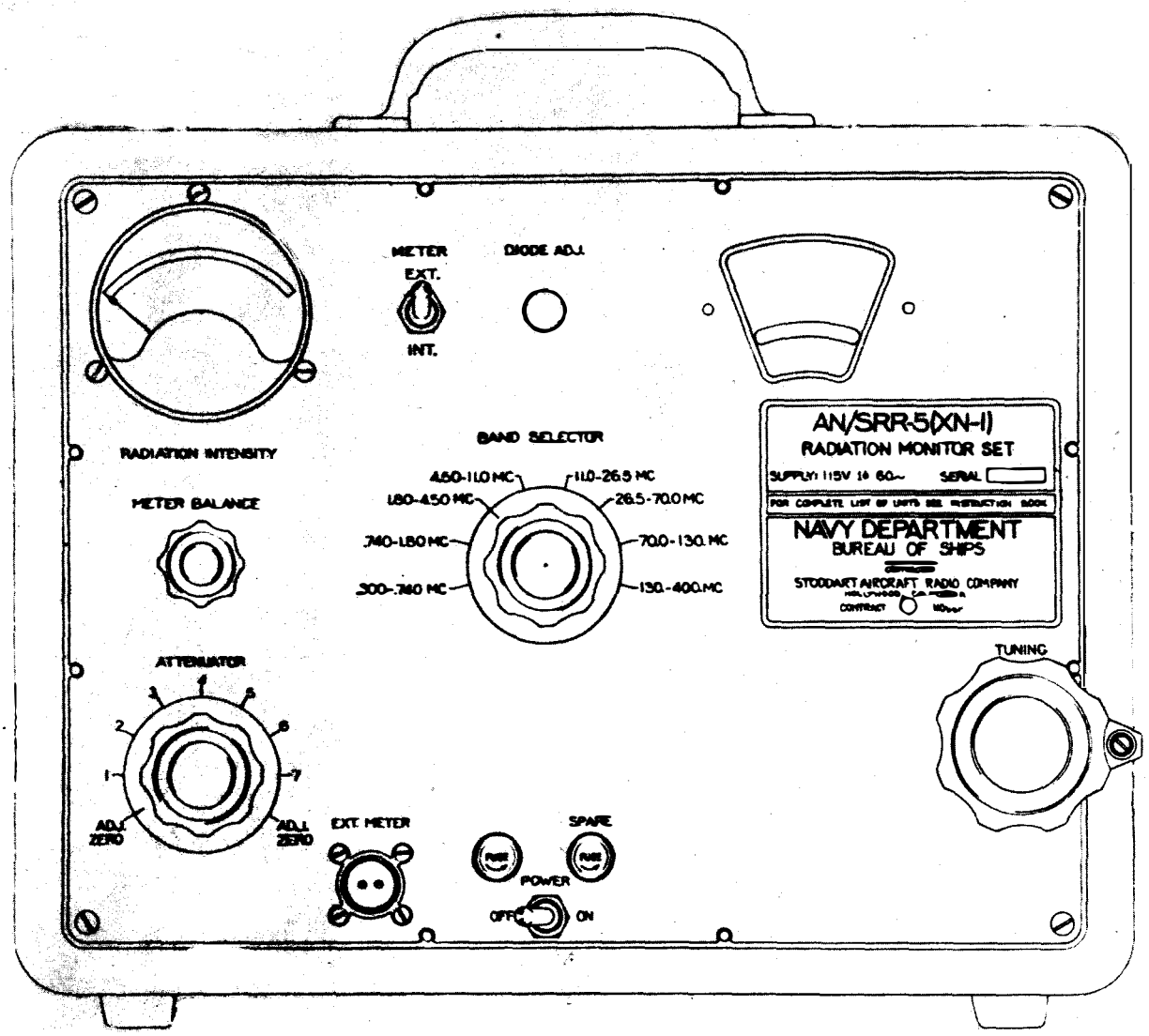
Technical Manual OP2157 for the Frequency-Power Meter AN/SPM-4.

TYPE CLASSIFICATION	
DESIGN COGNIZANCE	BUORD
PROCUREMENT COGNIZANCE	
STOCK NO.	

EQUIPMENT SUPPLIED DATA

QUANTITY PER EQUIPT	NAME AND NOMENCLATURE	OVERALL DIMENSIONS (inches)	WEIGHT (lbs.)
1	Frequency-Power Meter AN/SPM-4 Including:	10-7/8 X 12 X 16	20
1	Calibrated Coaxial Cable Ass'y	96 lg	
1	Waveguide Adapter		
1	Technical Manual OP2157	1/4 X 8-1/4 X 10-5/8	

RADIATION MONITOR SET AN/SRR-5(XN-1)



Radiation Monitor Set AN/SRR-5(XN-1)

FUNCTIONAL DESCRIPTION

The AN/SRR-5(XN-1) is designed to provide a means of visual indication of actual radiated RF energy on the fundamental transmitter frequency.

No field changes in effect at time of preparation (10 April 1957).

ELECTRICAL AND MECHANICAL CHARACTERISTICS

FREQUENCY RANGE: 300 kc to 400 mc, 8 ranges.
VOLTAGE RANGE: 40,000 uv to 8 v.
SELECTIVITY: 1 to 4% of the signal frequency at 6 db down.
OPERATING POWER: 115 v, single ph, 60 cps.

MANUFACTURER'S OR CONTRACTOR'S DATA

Stoddart Aircraft Radio Co., Hollywood, California.
Contract NObsr 39215.
Approximate Cost: $600.00 with equipment spares.

Test-Frequency Measuring

October 1957

AN/SRR-5(XN-1) RADIATION MONITOR SET

TUBE AND/OR CRYSTAL COMPLEMENT

(2) 9005 (2) 12AU7
(1) 6X4 (1) OB2
Total Tubes: (6)

TYPE CLASSIFICATION
DESIGN COGNIZANCE BUSHIPS
PROCUREMENT COGNIZANCE
STOCK NO.
R.D.B. IDENT. NO.

REFERENCE DATA AND LITERATURE

Technical Manual for RADIATION MONITOR SET AN/SRR-5(XN-1).

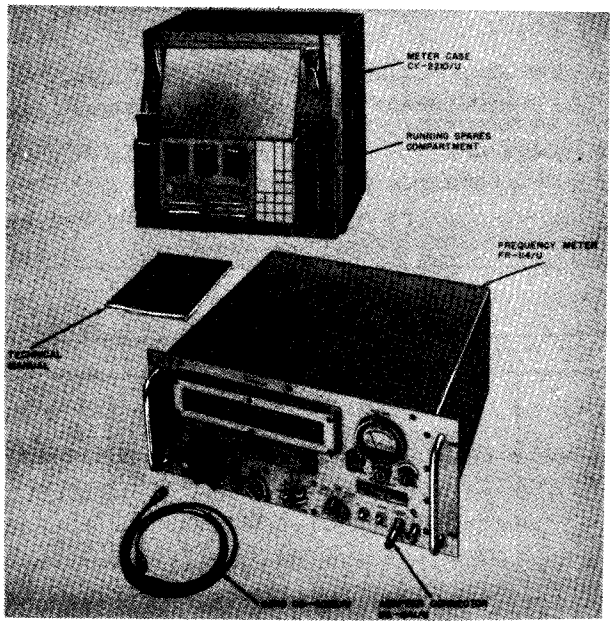
EQUIPMENT SUPPLIED DATA

QUANTITY PER EQUIPT	NAME AND NOMENCLATURE	OVERALL DIMENSIONS (inches)	WEIGHT (lbs.)
1	Radiation Monitor Set AN/SRR-5(XN-1)	9-1/8 X 13-1/2 X 14-7/8	16.5
1	Power Cable	72 lg	0.3
2	Technical Manual		0.3

February 1960

Test-Frequency Measuring

FREQUENCY METER AN/TSM-16



Frequency Meter AN/TSM-16

FUNCTIONAL DESCRIPTION

Frequency Meter AN/TSM-16 is a precision instrument used to count events within the 20 cps to 1 mc range. It is a portable, self-contained unit used in checking audio frequencies and in the maintenance of carrier telephone, telegraph, and teletypewriter equipment, to test and measure their generated frequencies.

No field changes in effect at time of preparation (17 November 1959).

ELECTRICAL AND MECHANICAL CHARACTERISTICS

FREQUENCY RANGE: 20 to 1,000,000 cps.
COUNTING INTERVAL: 0.0001, 0.001, 0.01, 0.1, 1, or 10 sec.
COUNT CAPACITY: 999,999.
DISPLAY TIME: Continuously variable from less than 1 second to more than 5 seconds.
OPERATING TEMPERATURE: -20° C to +52° C (-4° F to +125° F).
OPERATING ELEVATION: Up to 10,000 ft above sea level.
RELATIVE HUMIDITY: Continuous operation in humidities up to 97%; capable of operation in 100% humidity to 4 hours.
SELF-CHECKING CAPABILITY: An internally generated 100 kc signal can be used to check frequency meter accuracy without using other test instruments.
CYCLE OPERATION: Either manual or automatic cycling.
POWER REQUIREMENTS: 115 or 230 v ±10%, 50 to 1,000 cy, 200 W.
INPUT REQUIREMENTS
FREQUENCY COUNTING OPERATION: A periodic sine wave with a high signal-to-noise ratio and an amplitude of 0.2 to 50 v rms.
TIME INTERVAL MEASUREMENTS: Two successive negative pulses, 3 to 8 v in amplitude and 0.2 to 10 usec in duration.
ACCURACY
CLOCK PULSE TIME BASE: Better than 10 ppm (after warm up).
COUNTING: ±1, or ±10 ppm, which ever tolerance is greater.

TUBE AND/OR CRYSTAL COMPLEMENT

(1) 5670	(2) 5687WA	(1) 5725/6AS6W
(1) 5727/2D21	(9) 5814A	(3) 5726/6AL5W
(2) 6AU6WA	(1) 6080WA	(11) 12AT7WA
(1) 863-07010-1		(3) 6844A
(1) 863-07010-2		

Total Tubes: (36)

(1) CR-42/U (100 kc)

Total Crystals: (1)

REFERENCE DATA AND LITERATURE

TM11-6625-218-12: Technical Manual for FREQUENCY METER AN/TSM-16.

TYPE CLASSIFICATION	(NAVY)
DESIGN COGNIZANCE	USA, SIG C
PROCUREMENT COGNIZANCE	
STOCK NO.	
R.D.B. IDENT. NO.	

SHIPPING DATA

NUMBER OF BOXES	CONTENTS AND IDENTIFICATION	VOLUME (Cu.Ft.)	OVERALL DIMENSIONS (inches)	WEIGHT PACKED (lbs.)
1	Frequency Meter AN/TSM-16	5.6	15-1/2 X 24-1/2 X 26	160

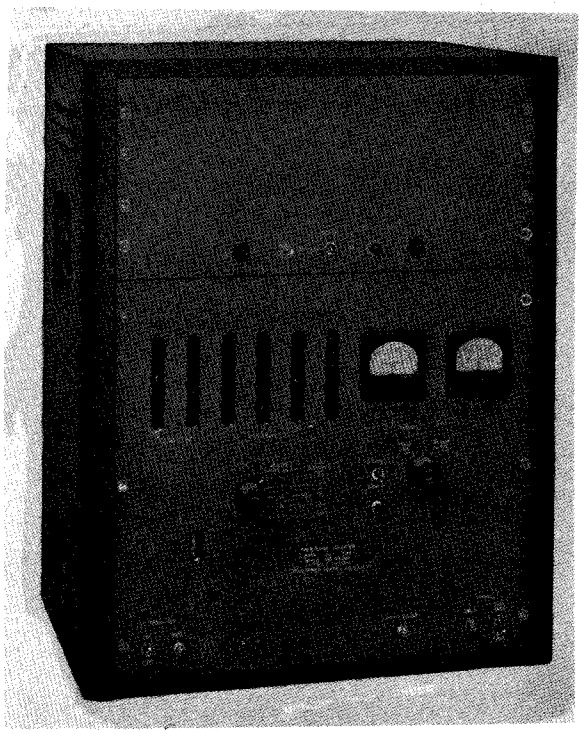
AN/TSM-16 FREQUENCY METER

EQUIPMENT SUPPLIED DATA

QUANTITY PER EQUIPT	NAME AND NOMENCLATURE	OVERALL DIMENSIONS (inches)	WEIGHT (lbs.)
1	Frequency Meter AN/TSM-16 consists of:		120
1	Frequency Meter FR-114/U	8-3/4 X 14-1/4 X 19	55
1	Meter Case CY-2210/U	12-9/32 X 21-5/16 X 22-5/16	50
1	Cord CG-409E/U	72 lg	0.4
1	Adapter Connector UG-641/U		0.2
2	Technical Manual TM11-6625-218-12		
1	Set Running Spares		

April 1958

FREQUENCY METER AN/TSM-9



Frequency Meter AN/TSM-9

FUNCTIONAL DESCRIPTION

The AN/TSM-9 (Hewlett-Packard Model 524A) is a precision instrument that automatically counts frequencies, and automatically displays the counted values on a direct-reading display system. The equipment can be used in any type of frequency measuring application, such as measuring transmitter frequencies, calibrating test oscillators, establishing frequencies for filter characteristic determination or monitoring frequency drift. It is particularly useful in Quartz Crystal grinding work.

In addition to its uses in frequency measurement, the unit can serve as a 100 kc frequency standard. Counting and display periods are equal and automatically cycled, with the count displayed repetitively or "held" for any desired length of time by manual operation. The frequency-counting range can be extended to 100 megacycles when the unit is used in conjunction with the Hewlett Packard Model 512-A frequency Converter.

No field changes in effect at time of preparation (30 January 1958).

ELECTRICAL AND MECHANICAL CHARACTERISTICS

FREQUENCY RANGE: 0.01 cps to 10 mc.

ACCURACY: Direct frequency measurement ±1 count, ± tolerance of standard, and an error due to 1/10 microsecond inaccuracy in the gate. Internal 100 kc crystal oscillator tolerance is 2 parts per million per week. External laboratory standards can be used to obtain higher oscillator accuracy.

PERIOD MEASUREMENT: Within 0.03% up to 300 cps; within 1 usec between 300 cps and 10 kc.

PRESENTATION: Total indication, 8 places, first 6 places on neon lamp banks, last two places on two meters.

MAX COUNTING RATE: 10 million cps.

PERIOD OF COUNT: 0.001, 0.01, 0.1, 1 and 10 seconds, selected by panel control. Counting and display periods are equal and are automatically cycles. Panel push button allows counting for a single period with continuous display of count until push button is again depressed.

LOW FREQUENCIES: Below 300 cps the instrument can be switched so that low frequencies will operate as time bases. Period of low frequencies is displayed in microseconds.

100 KC TIMING CIRCUIT: To use external 100 kc source required 1 volt across 1 megohm shunted by 30 uuf.

INPUT TO COUNTING CIRCUIT: 2-v peak (min).

INPUT IMPEDANCE: Approx 100000 ohms, 30 uuf shunt.

POWER SOURCE REQUIRED: 115 or 230 v, 50 to 60 cps 400 W.

OUTPUT: 100 kc peaked wave from internal standard; approx 15 v peak across 1200 ohms impedance.

MANUFACTURER'S OR CONTRACTOR'S DATA

Hewlett-Packard Co, Palo Alto, Calif.
Contract NObsr-63250, dated 10 Mar 1953.
Approximate Cost: $2042.40 with equipment spares.

TUBE AND/OR CRYSTAL COMPLEMENT

(2) OC3W	(1) 5687WA
(4) 5915	(1) 6AX5GT
(1) 5R4WGB	(2) 5725/6AS6W
(5) 5963	(1) 6BH6
(1) 5Y3WGTB	(3) 5726/6AL5W
(1) 6AH6	(3) 6CB6

Test-Frequency Measuring

AN/TSM-9 FREQUENCY METER

April 1958

(2) 5654/6AK5W
(2) 6AS7G
(1) 5727/2D21W
(1) 6SJ7

Total Tubes: (31)
No Crystals.

lett-Packard Model 524A frequency Counter (AN/TSM-9).

TYPE CLASSIFICATION
DESIGN COGNIZANCE BUSHIPS
PROCUREMENT COGNIZANCE
STOCK NO.

REFERENCE DATA AND LITERATURE

NAVSHIPS 92020, Technical Manual for Hew-

SHIPPING DATA

NUMBER OF BOXES	CONTENTS AND IDENTIFICATION	VOLUME (Cu.Ft.)	OVERALL DIMENSIONS (inches)	WEIGHT PACKED (lbs.)
1	Frequency Meter AN/TSM-9	20	28-1/2 x 31-1/2 x 39	255
1	Crystal Oven and Filter Cleaning Fluid	2.5	12 x 13 x 19	15

EQUIPMENT SUPPLIED DATA

QUANTITY PER EQUIPT	NAME AND NOMENCLATURE	OVERALL DIMENSIONS (inches)	WEIGHT (lbs.)
1	Frequency Meter AN/TSM-9	16-1/8 x 22-3/4 x 28	118

Cog Service: USAF FSN: Functional Class: 2

USA USN USAF

TYPE CLASS:

MANUFACTURER'S NAME/CODE NUMBER: Bendix Radio Corp., (06845).

(No Illustration Available)

FUNCTIONAL DESCRIPTION:

The AN/UPM-13 is designed to provide a means of measuring continuous wave or pulsed radio frequency signals.

No field changes in effect at time of preparation (6 February 1963).

TECHNICAL CHARACTERISTICS:

FREQUENCY RANGE: 925 to 1650 mc.
OPERATING POWER RQMT: 120 v ac, 55 to 65 cps, single ph, 300 ma.

RELATION TO OTHER EQUIPMENT: None.

EQUIPMENT REQUIRED BUT NOT SUPPLIED: None.

MAJOR COMPONENTS

QTY	ITEM	STOCK NUMBERS	DIMENSIONS (INCHES)	WEIGHT (LBS)
1	Radar Test Set AN/UPM-13 consists of:		8-1/4 x 16-1/8 x 19	
1	Wavemeter FR-49/U			
1	AF-RF Amplifier AM-405/U		8-1/4 x 16-1/8 x 19	

REFERENCE DATA AND LITERATURE:

TUBE, CRYSTAL AND/OR SEMI-CONDUCTOR DATA:

TUBES: Data not available.

CRYSTALS: Data not available.

SEMI-CONDUCTORS: Data not available.

SHIPPING DATA

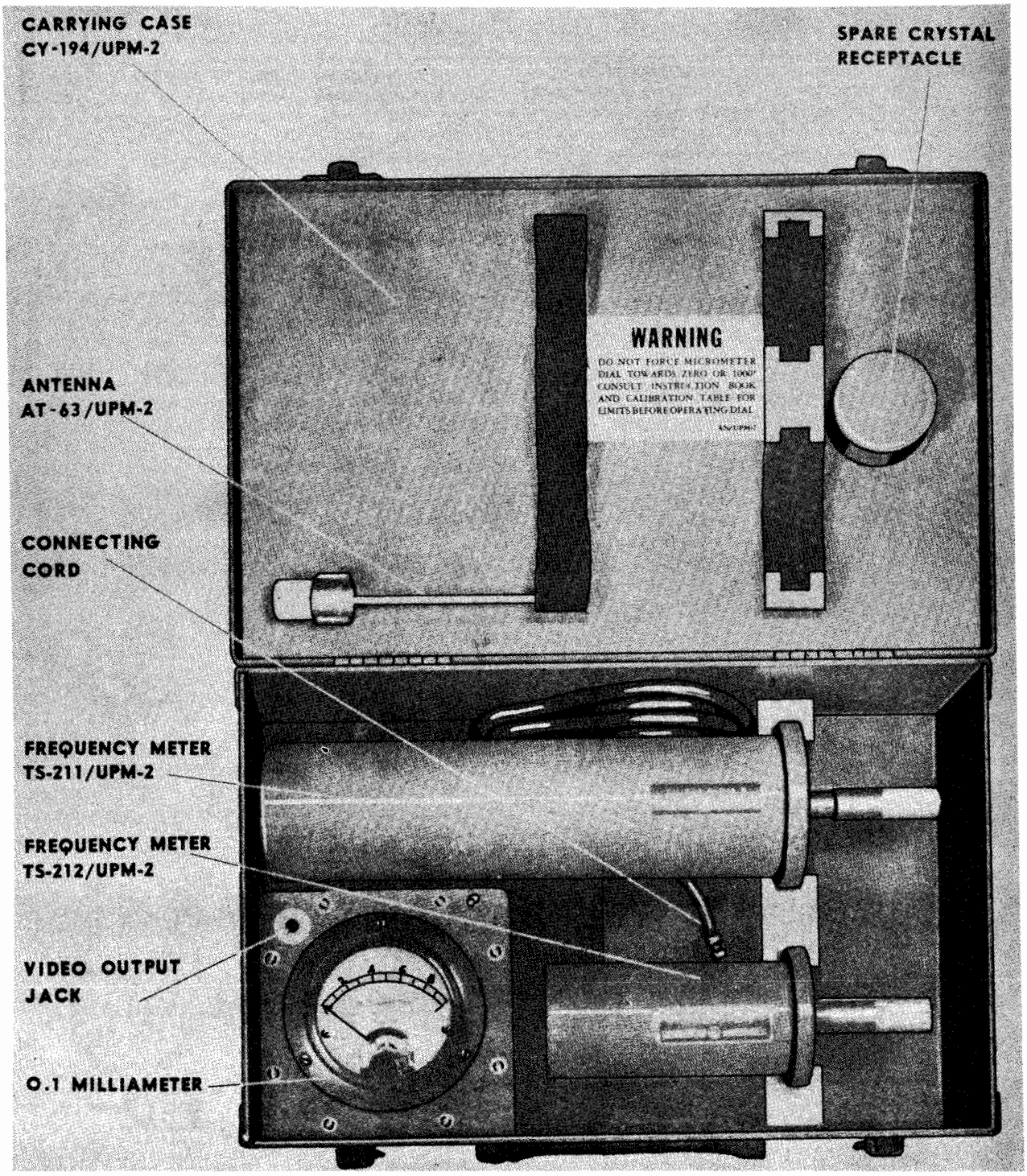
PKGS	VOLUME (CU FT)	WEIGHT (LBS)

PROCUREMENT DATA

PROCURING SERVICE: USAF
DESIGN COG: USAF
SPEC &/OR DWG:

CONTRACTOR	LOCATION	CONTRACT OR ORDER NO.	APPROX. UNIT COST
Bendix Radio Corp.	Chicago, Illinois	W33-038ac-21187	

WAVEMETER TEST SET AN/UPM-2



Wavemeter Test Set AN/UPM-2

AN/UPM-2 WAVEMETER TEST SET

FUNCTIONAL DESCRIPTION

The AN/UPM-2 consists of absorption type wavemeters covering the frequency ranges of 80 to 360 megacycles and 330 to 1220 megacycles. It uses quarter wave resonant lines capacitively tuned by micrometer adjustment. Resonance indication is on a 0 to 1 milliammeter housed in a carrying case and connected to the wavemeter by flexible interconnecting cable. Direct Current for the milliammeter is furnished by a 1N21 crystal rectifier. The two wavemeter units are housed in the carrying case when not in use.

This equipment was originally designed for CW frequency measurements of jamming transmitters or radar countermeasures systems.

No field changes in effect at time of preparation (31 March 1958).

RELATION TO OTHER EQUIPMENT

The AN/UPM-2 can be used with a Cathode Ray-Tube Oscilloscope for visual determination of resonance.

ELECTRICAL AND MECHANICAL CHARACTERISTICS

FREQUENCY RANGE: 80 to 1220 mc in two bands.
INDIVIDUAL WAVEMETER FREQUENCY DATA
TS-211/UPM-2: 80 to 360 mc
TS-212/UPM-2: 330 to 1220 mc.
ACCURACY: ±1 mc.
SENSITIVITY: 5 mw.
PRESENTATION AND CONTROLS: Each frequency meter is tuned by means of a micrometer having 1000 divisions, and the frequency determined from calibration charts. Correct Tuning is indicated by a pronounced "dip" on a meter. Alternatively, a cathode ray oscilloscope will indicate a minimum deflection at the correct tuning.
FITTINGS AND ACCESSORIES: The AN type coaxial male plug on the meter cable mates an AN type coaxial female jack on either frequency meter. The antenna plugs into the top of either unit and is clamped in position with a knurled threaded collar which is part of the antenna. The video jack is a telephone type jack.
CONSTRUCTION: The complete set is self-contained in a metal carrying case, with hinged cover, locks and handle. The 0 to 1 milliammeter and video cable are attached to, and part of, the case. All delicate components-rod antenna, frequency meters, spare crystals-have convenient spring grip or felt padded housings inside the case.

MANUFACTURER'S OR CONTRACTOR'S DATA

G. Kalart Co, Stamford, Conn.
Contract NXsa-64107, dated 1944.
Contract NXsr-53379, dated 25 October 1944.

TUBE AND/OR CRYSTAL COMPLEMENT

No Electron Tubes.

(2) 1N25
Total Crystals: (2)

REFERENCE DATA AND LITERATURE

Technical Manual for Wavemeter Test Set AN/UPM-2.

TYPE CLASSIFICATION
DESIGN COGNIZANCE BUSHIPS
PROCUREMENT COGNIZANCE
STOCK NO.
R.D.B. IDENT. NO.

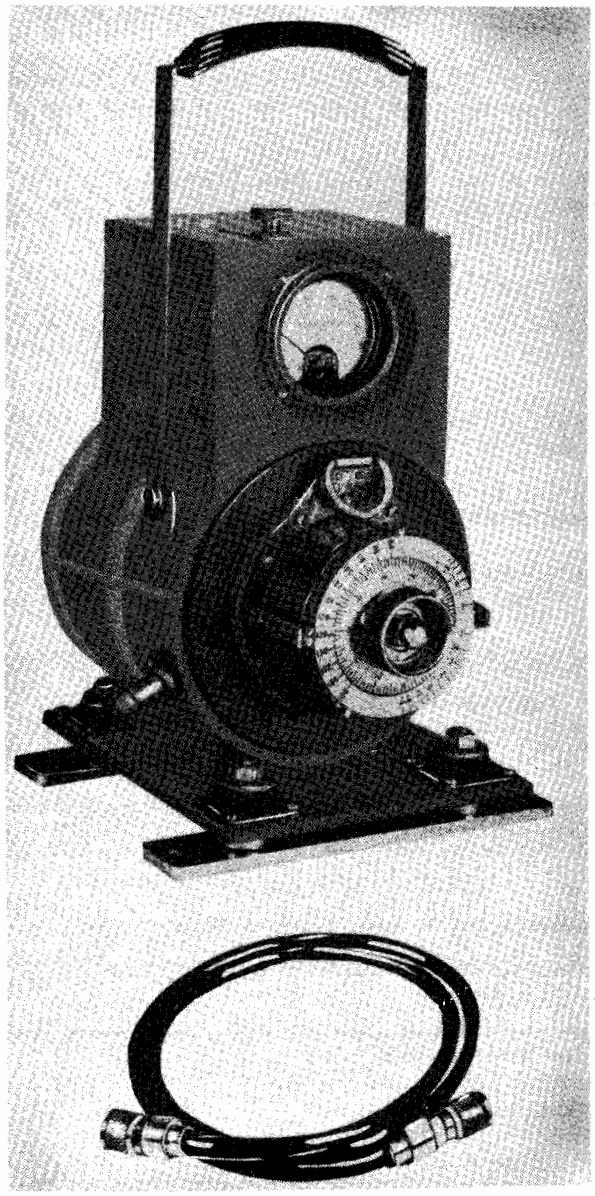
EQUIPMENT SUPPLIED DATA

QUANTITY PER EQUIPT	NAME AND NOMENCLATURE	OVERALL DIMENSIONS (inches)	WEIGHT (lbs.)
1	Wavemeter TS-211/UPM-2	3 x 4-3/4 x 12-5/16	3.75
1	Wavemeter TS-212/UPM-2	2-1/2 x 4-1/2 x 7-9/16	2.5
1	Carrying Case CY-194/UPM-2	5-5/8 x 8-3/4 x 13-1/16	11.1
1	Antenna AT-63/UPM-2	11/16 dia x 5-5/16	.1
5	Crystal Rectifier 1N25 (Instrument Spares)		

April 1959

Test-Frequency Measuring

TEST SET, RADAR AN/UPM-30



Test Set Radar AN/UPM-30

FUNCTIONAL DESCRIPTION

Radar Test Set AN/UPM-30 is a portable, hand-tuned microwave coaxial-type echo box or resonant cavity used in checking the overall performance of radar systems.

No field changes in effect at time of preparation (18 March 1959).

RELATION TO OTHER EQUIPMENT

Same as TS-545/UP except for inclusion of storage and transport case CY-1139/UPM-30.

ELECTRICAL AND MECHANICAL CHARACTERISTICS

FREQUENCY RANGE: 1,150 to 1,350 mc ±5 mc.
TYPE OF RECEPTION: Pulse.
TYPE OF EMISSION: Pulse.
DECAY: 3.5 db/usec.
SENSITIVITY: 1-db power loss for 50 yd ring time.
FREQUENCY CONTROL: Hand tuned.
INPUT IMPEDANCE: 50 ohms.
POWER INPUT: 1 W.
TEMPERATURE COEFFICIENT: 0.105% ring time/deg F at 68° F.
TEMPERATURE RANGE: -65.2° F to +140° F.

MANUFACTURER'S OR CONTRACTOR'S DATA

Johnson Service Co., Milwaukee, Wisconsin.
Contract NObsr-43457, dated 28 June 1949.
Contract NObsr-49254, dated 30 June 1950.

TUBE AND/OR CRYSTAL COMPLEMENT

No Tubes used.
(3) 1N21B
Total Tubes: (3)

REFERENCE DATA AND LITERATURE

NAVSHIPS 91213: Technical Manual for ECHO BOX TS-545/UP.
Nomenclature Card for TEST SET, RADAR AN/UPM-30.

TYPE CLASSIFICATION
DESIGN COGNIZANCE BUSHIPS
PROCUREMENT COGNIZANCE BUSHIPS SPEC CS1241A
STOCK NO. AND SHIPS-R-81
R.D.B. IDENT. NO. 2.2.2.2

Test-Frequency Measuring

AN/UPM-30 TEST SET, RADAR

SHIPPING DATA

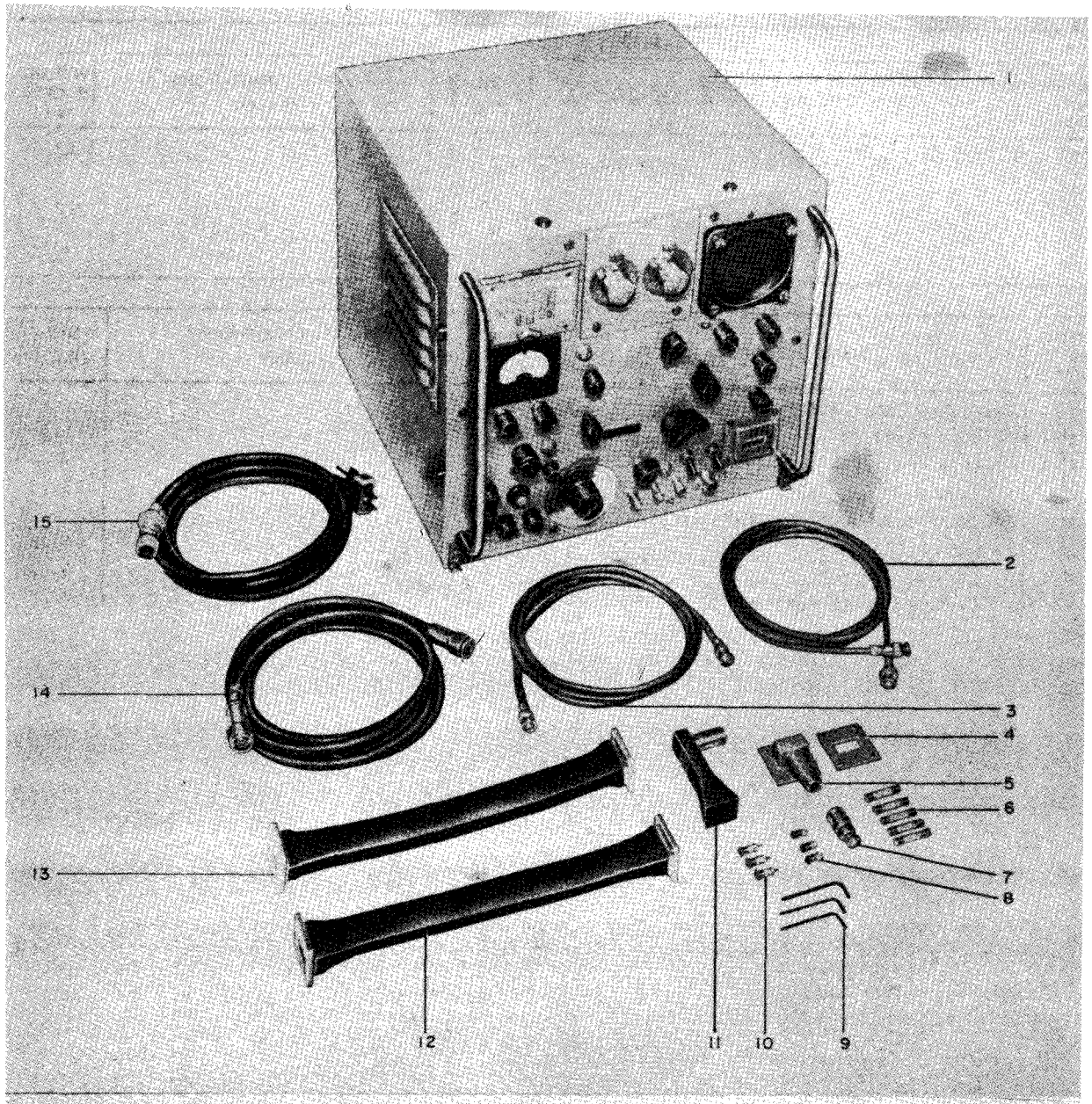
NUMBER OF BOXES	CONTENTS AND IDENTIFICATION	VOLUME (Cu.Ft.)	OVERALL DIMENSIONS (inches)	WEIGHT PACKED (lbs.)
1	Test Set, Radar AN/UPM-30	4.4	18 X 19 X 22	122

EQUIPMENT SUPPLIED DATA

QUANTITY PER EQUIPT	NAME AND NOMENCLATURE	OVERALL DIMENSIONS (inches)	WEIGHT (lbs.)
1	Test Set, Radar AN/UPM-30 Including:		
1	Cord CG-92B/U	120 lg	1.5
1	Case CY-1139/UPM-30	14-1/4 X 14-5/8 X 17	
1	Echo Box TS-545/UP	8-1/16 X 9-5/8 X 11-9/16	25.25
2	Technical Manual NAVSHIPS 91213		
1	Wrench, Socket		0.25
1	Wrench, Spanner		0.01
1	Carrying Strap Harness		

RADAR TEST SET

AN/UPM-32



1 Radar Test Set TS-757/UPM-32
2 Video Cable Assembly CG-1433/U
3 Video Cable Assembly CG-1433/U
4 Gaskets
5 Adapter Connector UG-446/U
6 Fuse
7 Adapter (UHF to BNC) UG-225/U
8 Incandescent lamp
9 Wrench
10 Crystal rectifier
11 Test Antenna AT-68/UP
12 Flexible Waveguide UG-179A/U
13 Flexible Waveguide UG-179A/I
14 R-F Cable Assembly CG-92A/U
15 Power Cable Assembly CX-3277/U

Radar Test Set AN/UPM-32, Equipment Supplied

Test-Frequency Measuring

AN/UPM-32 RADAR TEST SET

FUNCTIONAL DESCRIPTION

The AN/UPM-32 is designed as a portable test set, primarily designed for use with radar systems operating in the frequency range of 8500 to 10,500 megacycles (mc). It combines, in one test set, all the functions of a power meter, a frequency meter, a spectrum analyzer, a signal generator, and a general-purpose synchroscope.

No field changes in effect at time of preparation (25 July 1958).

ELECTRICAL AND MECHANICAL CHARACTERISTICS

POWER METER
- FREQUENCY RANGE: 8500 to 10,500 mc.
- POWER INPUT
  - RANGE: +5 to +30 dbm at input connector.
  - ACCURACY: ±1.5 db from dial at 25° C (77° F), ±1.0 db from correction chart at 25° C (77° F), ±2.0 db from dial over range -20° C to +51.7° C (-4° F to +125° F), ±1.5 db from correction chart over range -20° C to +51.7° C (-4° F to 125°F).

FREQUENCY METER
- FREQUENCY RANGE: 8500 to 10,500 mc.

SPECTRUM ANALYZER
- TEST SET CHARACTERISTICS
  - TUNING RANGE: 8500 to 10,500 mc.
  - SWEEP FREQUENCY: 3 to 30 cps.
  - RADIO FREQUENCY ATTENUATOR RANGE: 100 db.
  - RADIO FREQUENCY SENSITIVITY: -55 dbm for a one-inch deflection on the cathode-ray tube.
  - SWEEP SYNCHRONIZATION: Submultiples of line frequency.
  - INTERMEDIATE FREQUENCY BANDWIDTH: 60 kc max.
  - GATE WIDTH: 0.25 to 10 microseconds.
  - GATE DELA: 1.0 to 4000 microseconds.
  - JITTER: 1/32 inch at max sensitivity.
  - POWER INPUT: 50 to 1000 W (peak).
  - PULSE WIDTH: 0.20 to 3 microseconds
  - REPETITION RATE: 100 to 4000 pps.
  - MINIMUM PULSE SEPARATION: 0.25 microseconds.
  - MAXIMUM PULSE SEPARATION: 4000 microseconds.
  - GATING TRIGGER REQUIREMENTS: ±10 to ±50 v, 0.2 to 10 microseconds during, repetition rate of 100 to 4000 pps.

SYNCHROSCOPE
- TEST SET CHARACTERISTICS
  - DEFLECTION SENSITIVITY: 0.5 v per inch.
  - SWEEP LENGTHS: 5, 20, 50, 250 and 4000 microseconds.
  - VIDEO AMPLIFIER GAIN: 45 db.
  - VIDEO AMPLIFIER BANDWIDTH: 6 mc.
  - INPUT IMPEDANCE: 50,000 ohms at signal connector.
- INPUT RADIO FREQUENCY PULSES
  - FREQUENCY RANGE: 8500 to 10,500 mc.
  - PULSE LENGTH: 0.20 to 10 microseconds.
  - REPETITION RATE: 100 to 4000 pps.
  - POWER LEVEL: 50 to 1000 W (peak).
- INPUT VIDEO PULSES
  - PULSE LENGTH: 0.1 to 1000 microseconds.
  - REPETITION RATE: 100 to 4000 pps.
  - AMPLITUDE: 0.10 to 50 v.
- TRIGGER REQUIREMENT
  - RADIO FREQUENCY TRIGGER: 8500 to 10500 mc, 50 to 1000 W peak, 0.20 to 10 microseconds duration, repetition rate of 100 to 4000 pps.
  - VIDEO TRIGGER: ±10 to ±50 v, 0.20 to 10 microseconds duration, repetition rate of 100 to 4000 pps.

SIGNAL GENERATOR
- TEST SET CHARACTERISTICS
  - RANGE: -5 to -100 dbm.
- FREQUENCY MODULATION
  - FREQUENCY EXCURSION: 0 to 5 mc per microsecond.
  - SIGNAL DELAY: 3 to 50 microseconds.
  - REPETITION RATE: 100 to 4000 pps.
- PULSE MODULATION
  - PULSE WIDTH: 0.25 to 10 microseconds.
  - PULSE WIDTH ACCURACY: ±10% or ±0.1 microseconds.
  - RISE TIME: 0.05 microseconds max.
  - DELAY TIME: 1.0 to 4000 microseconds.
- EXTERNAL MODULATION: Any signal whose peak amplitude is less than 200 v.
- TRIGGER REQUIREMENT
  - RADIO FREQUENCY TRIGGER: 8500 to 10500 mc, 50 to 100 W peak, 0.20 to 10 microseconds duration, repetition rate of 100 to 4000 pps.
- VIDEO TRIGGER: ±10 to ±5 v, 0.20 to 10 microseconds duration, repetition rate of 100 to 4000 pps.

OPERATING POWER REQUIREMENTS: 115 v AC, 60 cps, 1 ph.

MANUFACTURER'S OR CONTRACTOR'S DATA

Sperry Gyroscope Co., Great Neck, N.Y.
Contract N-383S-16936A.

TUBE AND/OR CRYSTAL COMPLEMENT

(1) 5R4WGA (1) 6080

RADAR TEST SET AN/UPM-32

(4) 5751
(2) 5687
(1) 1Z2
(1) 5651
(1) SRX-92
(5) 6AH6
(3) 5654
(1) 12AT7WA
(1) 5639
(3) OA2
(5) 5814A
(1) 6X4W
(1) 3KP1
(1) 6D4
(1) 6AU6WA
(1) 5725/6AS6W
(4) 6111
Total Tubes: (38)

(3) 1N23B
Total Crystals: (3)

REFERENCE DATA AND LITERATURE

NAVAER 16-30UPM32-502: Technical Manual for the AN/UPM-32 Radar Test Set.

TYPE CLASSIFICATION	
DESIGN COGNIZANCE	BUAER
PROCUREMENT COGNIZANCE	
STOCK NO.	
R.D.B. IDENT. NO.	

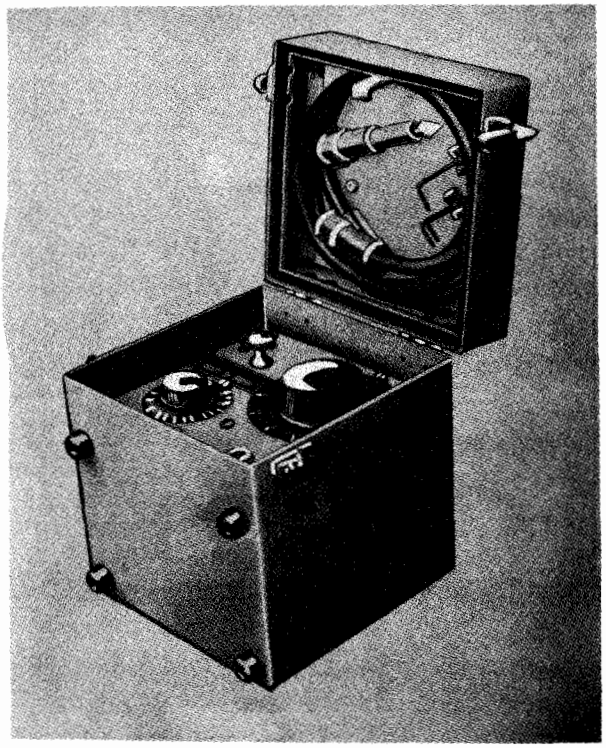
EQUIPMENT SUPPLIED DATA

QUANTITY PER EQUIPT	NAME AND NOMENCLATURE	OVERALL DIMENSIONS (inches)	WEIGHT (lbs.)
1	Test Set Radar AN/UPM-32 Including:	15-9/16 X 15-11/16 X 16-7/16	
	(1) Test Set Radar TS-757/UPM-32		
	(1) Adapter UG-225/U		
	(1) Adapter UG-466/U		
	(2) FLEXIBLE WAVEGUIDE CG-179A(1' 0")	12 lg	
	(1) Cable Ass'y Power Electrical CX-3277/U (8' 0")	96 lg	
	(1) Cable Ass'y R.F. CG-92A/U (8' 0")	96 lg	
	(1) Cable Ass'y Video CG-1433/U (8' 0")	96 lg	
	(1) Pickup Horn AT-68/UP		

December 1956

TEST OSCILLATOR

AN/UPM-46



Test Oscillator

FUNCTIONAL DESCRIPTION

The AN/UPM-46 is a portable battery operated source of pulse-modulated, radio frequency selector dial is directly calibrated from 3.1 to 11.0 kilomegacycles. The output power level is adjustable and provides a of 100 db of attenuation.

No field changes in effect at time of preparation (30 July 1956).

RELATION TO OTHER EQUIPMENT

Equipment Required but not Supplied: (4) Batteries BA-205/U

ELECTRICAL AND MECHANICAL CHARACTERISTICS

FREQUENCY RANGE: 3 to 11 kmc.
PULSE REPETITION RATE: 800 pps.
ACCURACY: Better than ±0.15 kmc from 3 to 7 kmc; ±2% from 7.5 to 11 kmc of true frequency.
ATTENUATOR: Waveguide beyond cut-off type.
POWER REQUIREMENTS: Four type BA-205-U batteries.

MANUFACTURER'S OR CONTRACTOR'S DATA

Seaboard Electrical Co., New York, N.Y.
Contract: N383s-17933a
Approximate Cost: $180.00 with equipment spares.

TUBE AND/OR CRYSTAL COMPLEMENT

No Electron Tubes.

REFERENCE DATA AND LITERATURE

AN 16-30UPM46-1: Technical Manual for Test Oscillator AN/UPM-46.

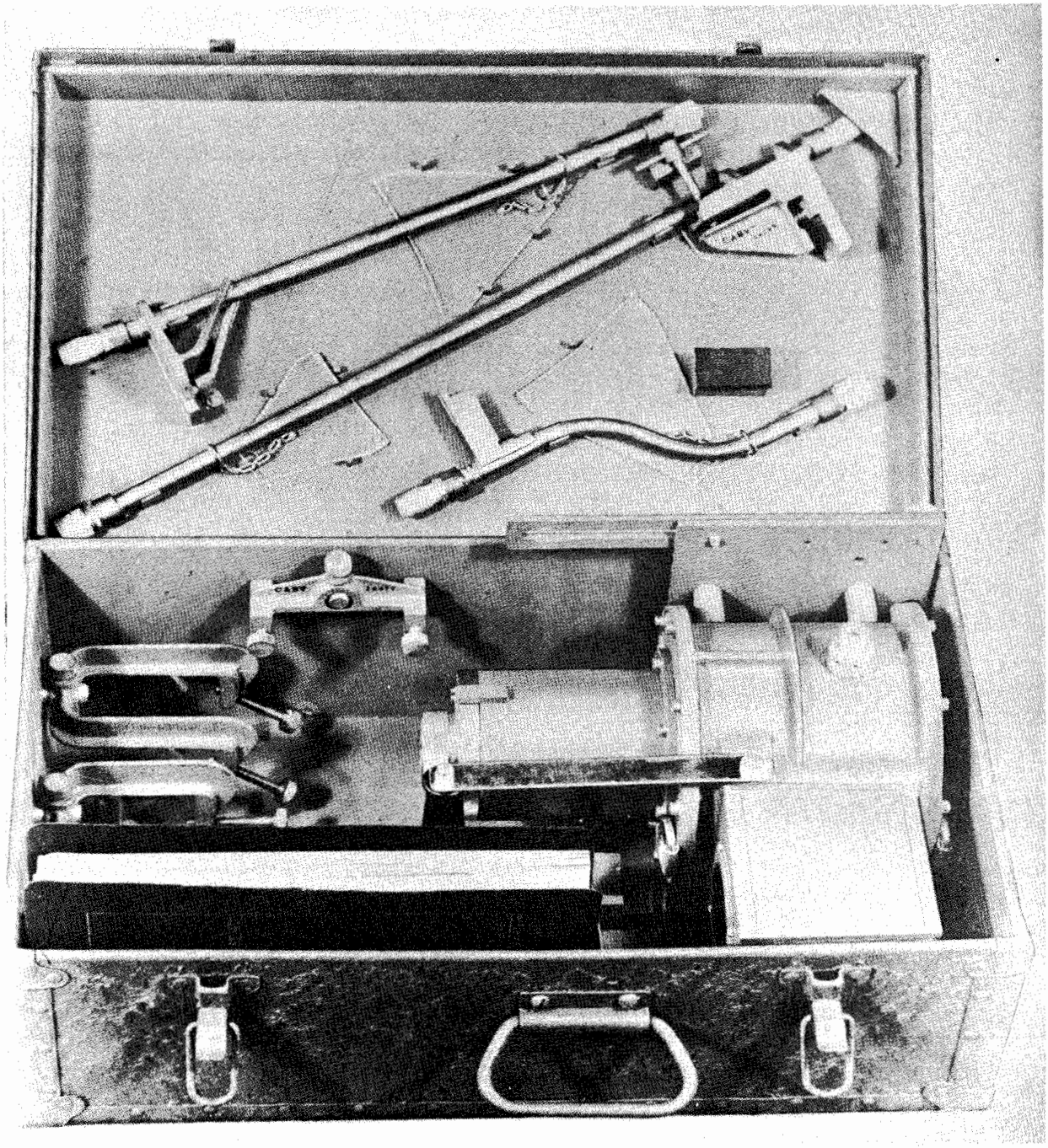
TYPE CLASSIFICATION
DESIGN COGNIZANCE
PROCUREMENT COGNIZANCE
STOCK NO.
R.D.B. IDENT. NO.

EQUIPMENT SUPPLIED DATA

QUANTITY PER EQUIPT	NAME AND NOMENCLATURE	OVERALL DIMENSIONS (inches)	WEIGHT (lbs.)
1	Test Oscillator AN/UPM-46 consisting of:	6-3/4 X 7-3/8 X 8-1/2	11
1	Test Oscillator TS-508/U	5-3/8 X 6 X 6	8-3/4
1	Antenna AT-408/UPM-46	2-5/32 X 3-11/16	1/4
1	Cover, Oscillator CW-304/UPM-46	2-27/32 X 6-5/8 X 7-3/8	1-1/4
1	Cord CG-558/U	48	3/4

Test-Frequency Measuring

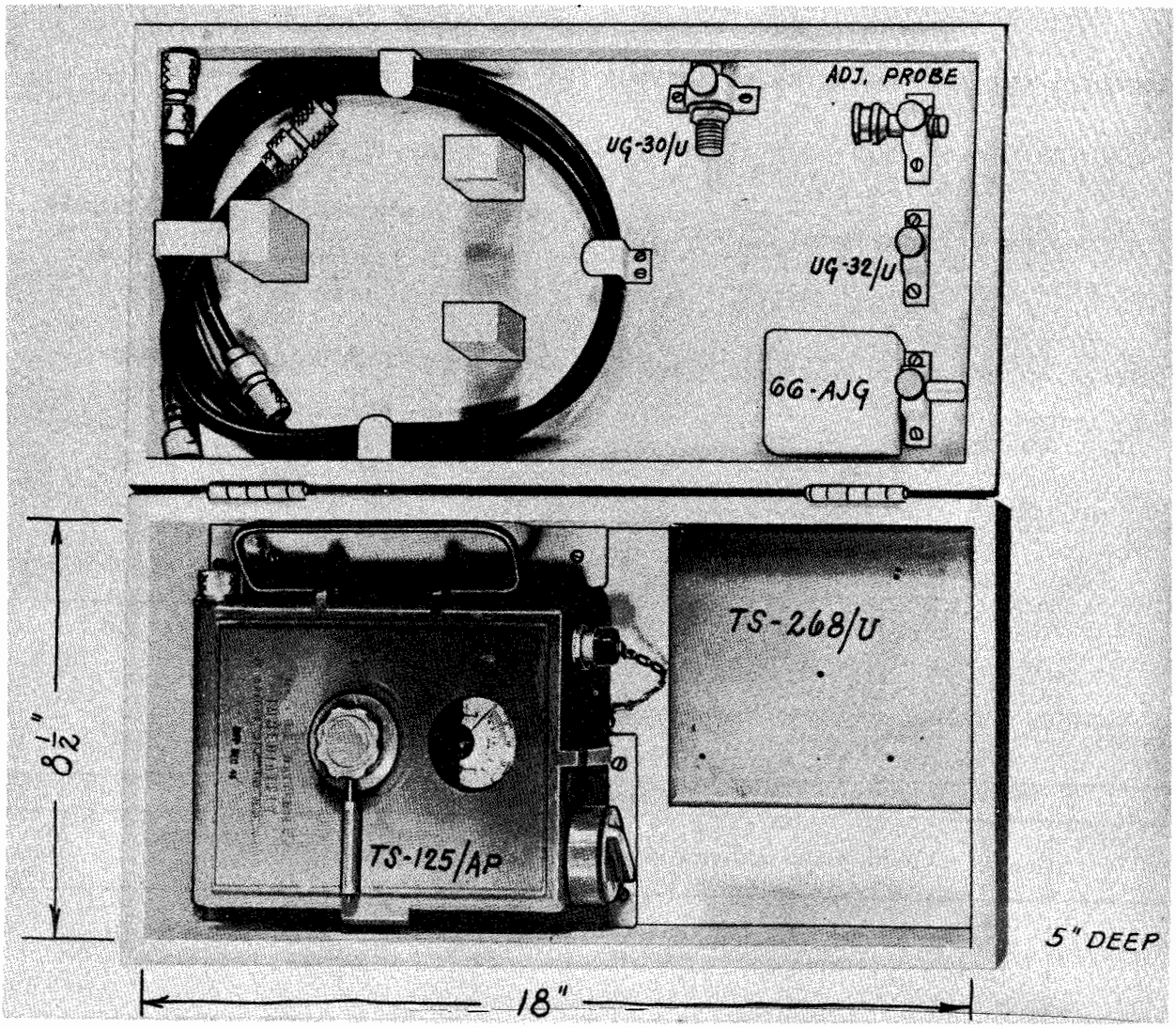
TEST KIT AN/UPM-7



AN/UPM-7 Test Kit
Case 1 of 2

Test-Frequency Measuring

AN/UPM-7 TEST KIT



AN/UPM-7 Test Kit
Case 2 of 2

FUNCTIONAL DESCRIPTION

The AN/UPM-7 is a test equipment used for periodical checks of the performance of radars operating in the 2700 to 3100 mc frequency band. The equipment consists of an echo box, a power meter and crystal checker, a pick-up dipole together with jacks, cables, plumbing and hardware for mounting antennas on specific shipboard radars.

It is well to check transmission line losses, to measure the frequency of a radar system, to measure antenna patterns and standing wave ratios, for rough spectrum analysis and for checking radar crystals.

No field changes in effect at time of preparation (31 March 1958).

RELATION TO OTHER EQUIPMENT

The AN/UPM-7 includes power Meter TS-125/AP and Crystal Rectifier Test Set TS-268/U which are described in detail elsewhere in this catalogue under their own type nomenclature. The Kit also includes Echo Box NT-14ABA-1 which is part of Radar Test Equipment OBU-4. This test set is particularly adaptable to the following radar types: SG, SG-a, SG-1, SF, SF-1, SO, SO-a, SO-b, SO-1,

Test-Frequency Measuring

TEST KIT AN/UPM-7

SO-2, SO-8, SO-9, SO-13, SL, SL-a, SL-1, SV, SJ-a, SJ-1.

ELECTRICAL AND MECHANICAL CHARACTERISTICS

ECHO BOX
- FREQUENCY RANGE: 2900 to 3100 mc, or 2830 to 3170 mc.
- SENSITIVITY: 90 yd per db.
- ACCURACY
  - PERFORMANCE MEASUREMENT: ±5 db.
  - FREQUENCY MEASUREMENT: ±6 db.
- SPURIOUS RESPONSES: Ringing due to spurious responses does not exceed 500 yd from 2830 to 3170 mc.
- METER RANGE: 0 to 100 ua.
- FREQUENCY SENSITIVITY OF RINGING: 1% per 10 mc.

POWER METER
- FREQUENCY RANGE: 2400 to 3700 mc.
- POWER RANGE: −6 to +33 db above 1 mw.
- ACCURACY: ±0.7 db.
- SIGNAL INPUT: 0 to 2 mw (with pads).
- INPUT IMPEDANCE: 50 ohm coaxial cable.
- MAXIMUM POWER FOR ATTENUATOR PADS: 27 above 1 mw.

CRYSTAL RECTIFIER TEST SET
- METER RANGE: 0 to 10,000 ohms and 0 to 1 ma.
- CRYSTALS CHECKED: Crystals 1N21 and 1N23 series.
- ACCURACY: ±2 db.

ANTENNA
- TYPE: Dipole.
- IMPEDANCE: 50 ohms.
- ACCURACY OF SPACE LOSS DATA: ±2 db or better.

POWER SOURCE REQUIRED
- POWER METER: (3) 1.5 v flashlight cells.
- CRYSTAL RECTIFIER TESTER: (1) 1.5 v flashlight cell.

MANUFACTURER'S OR CONTRACTOR'S DATA

Johnson Service Co., Milwaukee, Wis.
Contract NXsr-86351, dated 3 January 1945.

TUBE AND/OR CRYSTAL COMPLEMENT

No Electron Tubes Used.

(1) 1N21A (1) 1N21B
Total Crystals: (2)

REFERENCE DATA AND LITERATURE

SHIPS 344(A): Technical Manual for Test Kit AN/UPM-7.

TYPE CLASSIFICATION	
DESIGN COGNIZANCE	BUSHIPS
PROCUREMENT COGNIZANCE	
STOCK NO.	
R.D.B. IDENT. NO.	

SHIPPING DATA

NUMBER OF BOXES	CONTENTS AND IDENTIFICATION	VOLUME (Cu.Ft.)	OVERALL DIMENSIONS (inches)	WEIGHT PACKED (lbs.)
2	Test Kit, AN/UPM-7 complete w/two carrying cases	10.3		

EQUIPMENT SUPPLIED DATA

QUANTITY PER EQUIPT	NAME AND NOMENCLATURE	OVERALL DIMENSIONS (inches)	WEIGHT (lbs.)
1	Carrying Case Containing	8-1/2 X 12 X 20-1/2	
	(1) Echo Box	7-13/16 X 11-1/8 X 11-9/16	10
	(1) Shock Mounting	13/16 X 8 X 12	1.75
	(1) Supporting Bracket (for echo box) NT-10474		
	(1) Carrying Strap		
	(1) Wrench, Socket		
	(1) Wrench, Spanner		
	(1) Gauge, Plunger Positioning		

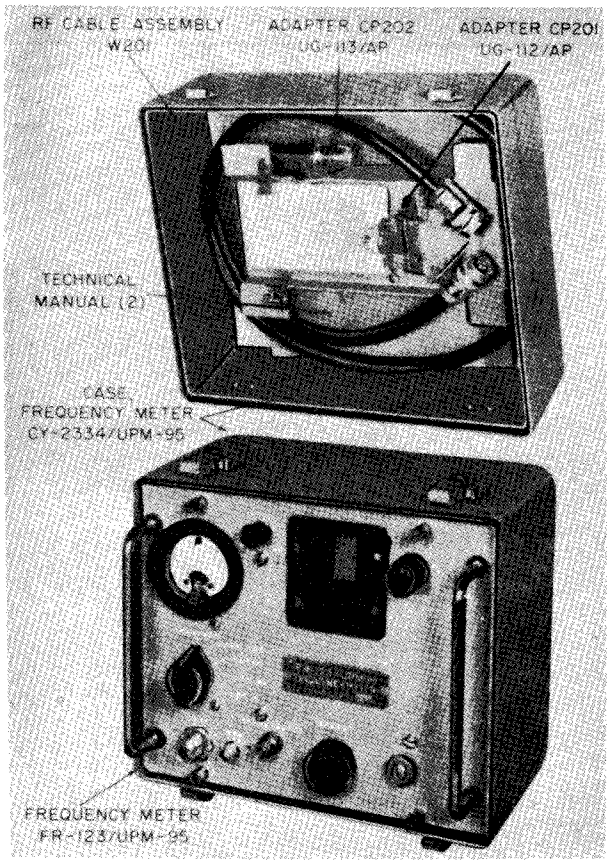
Test-Frequency Measuring

AN/UPM-7 TEST KIT

EQUIPMENT SUPPLIED DATA

QUANTITY PER EQUIPT	NAME AND NOMENCLATURE	OVERALL DIMENSIONS (inches)	WEIGHT (lbs.)
	(1) Bracket SO 1 Pendleton NT-10475		
	(1) Bracket SO 1 Wentworth or SG NT-10476		
	(1) Bracket SO NT-49798		
	(1) Bracket SL NT-49796		
	(1) Bracket SF NT-49797		
	(1) Bracket SJ NT-10477		
	Equipment Spare Box containing	5 X 8-1/2 X 18	
	(1) Connecting Cable (RG-8/U)	60 lg	
	(1) Pick-Up Dipole NT-66AJG		
	(1) Cable, Calibrated 7 db (RG-21/U) CG-171/AP	111 lg	
	(1) Calibrated 10 db Pad/TPS-51PB/10 or CN-42/UP	5	
	(1) Calibrated 16 db Pad TPS-51PB/16 or CN-43/UP	5	
	(1) Crystal Checker TS-268/U	3 X 6 X 7	3.0
	(1) Power Meter TS-125/AP	5-5/16 X 7-7/8 X 10	12.0
	(1) Standing Wave Probe NT-49977		
	(1) Adapter N Jack to N Jack UG-29/U		
	(1) Adapter UG-8/AP		

FREQUENCY METER AN/UPM-95



Frequency Meter AN/UPM-95

FUNCTIONAL DESCRIPTION

Frequency Meter AN/UPM-95 is a portable test set used in measuring the frequency range, rectified crystal current and repeller voltage in radar systems.

No field changes in effect at time of preparation (4 May 1959).

ELECTRICAL AND MECHANICAL CHARACTERISTICS

FREQUENCY RANGE: 8,500 to 9,600 mc.
TYPE OF RECEPTION: CW, MCW, pulse.
ACCURACY: Complete range ±0.025%; at 9310 mc, ±1 mc.

MANUFACTURER'S OR CONTRACTOR'S DATA

General Communication Co., Boston, Mass.

TUBE AND/OR CRYSTAL COMPLEMENT

No Tubes used.

(1) 1N23C

Total Crystals: (1)

REFERENCE DATA AND LITERATURE

NAVSHIPS 93146: Technical Manual for FREQUENCY METER AN/UPM-95.

TYPE CLASSIFICATION
DESIGN COGNIZANCE BUSHIPS
PROCUREMENT COGNIZANCE SHIPS-F-2702
STOCK NO.
R.D.B. IDENT. NO.

SHIPPING DATA

NUMBER OF BOXES	CONTENTS AND IDENTIFICATION	VOLUME (Cu.Ft.)	OVERALL DIMENSIONS (inches)	WEIGHT PACKED (lbs.)
1	Frequency Meter AN/UPM-95	0.93	10-5/8 X 11-7/8 X 12-3/4	27

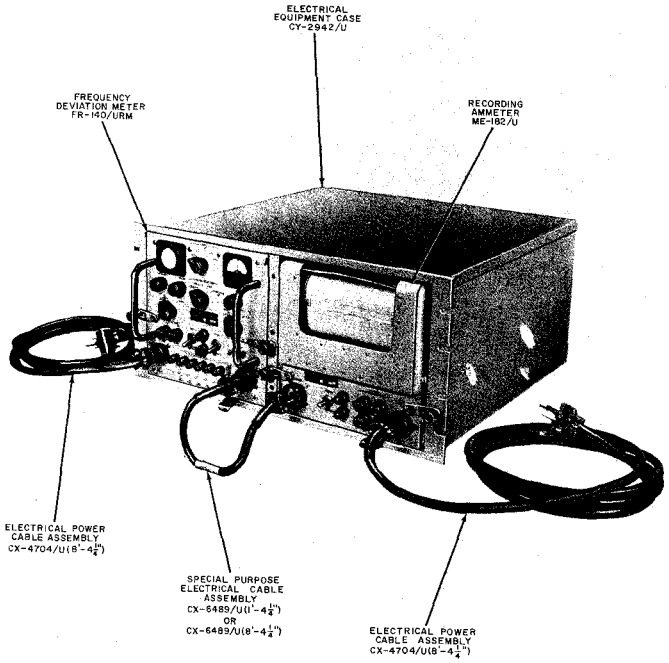
EQUIPMENT SUPPLIED DATA

QUANTITY PER EQUIPT	NAME AND NOMENCLATURE	OVERALL DIMENSIONS (inches)	WEIGHT (lbs.)
1	Frequency Meter AN/UPM-95 Including:	9-1/2 X 9-5/8 X 10-1/4	15
1	Frequency Meter FR-123/UPM-95	6-9/16 X 8-3/16 X 9-15/16	9
1	Case CY-2334/UPM-95	9-1/2 X 9-5/8 X 10-1/4	6
1	Adapter UG-112/AP		0.1
1	Adapter UG-113/AP		0.1
1	Cable Assy, RF		0.8
2	Technical Manual		

USA	USN	USAF

TYPE CLASS: Std

MANUFACTURER'S NAME/CODE NUMBER: Aircraft Radio Corp., (00781).



Frequency Deviation Meter AN/URM-115

FUNCTIONAL DESCRIPTION:

Frequency Deviation Meter AN/URM-115 is a rack-mounted, transistorized test set designed to measure and record differences in frequency between two highly accurate sine-wave frequency standards. The AN/URM-115 compares 100 kc, 1.0 mc, 2.5 mc, and 5.0 mc secondary standards to 100 kc, 1.0 mc, or 5.0 mc primary standard, and measures and records the frequency deviations of the secondary standard. The AN/URM-115 measures and records frequency deviations of from 1 part in 100000 (10^5) to 1 part in 10000000000 (10^{10}).

No field changes in effect at time of preparation (8 June 1962).

TECHNICAL CHARACTERISTICS:

POWER REQUIREMENTS: 115 porm 11.5 v, 60 cyc, single ph, 41 W (nominal) 50 W (max).
OPERATING TEMPERATURE RANGE: 0 deg C to 50 deg C (32 deg F to 122 deg F).
FREQUENCY DEVIATION METER FR-140/URM

MAXIMUM NUMBER OF SECONDARY FREQUENCY STANDARD INPUTS: 6.
INPUT FREQUENCIES: 100 kc, 1.0 mc, 2.5 mc and 5.0 mc.
INPUT IMPEDANCE: 500 ohms, nominal.
INPUT VOLTAGE: 0.5 to 10.0 v.
ISOLATION BETWEEN INPUT CIRCUITS: 100 db (min).
OPERATING VOLTAGE REQUIREMENTS: 115 porm 11.5 v, 50, 60 or 400 cyc, single ph.
OPERATING POWER REQUIREMENTS: 28 W (nominal); 37 W (max).
POWER SUPPLY REGULATION: Porm 0.1% of rated output from no load to 120% of full-rated load.
DISCRIMINATOR OVEN WARM-UP TIME: 1.0 hr.
DEVIATION METER ACCURACY: Porm 4% (M12.5 v and P125 v positions of meter selection switch), porm 2% (portable ΔF position, porm 5% (ΔF position).

RECORDING AMMETER ME-182/U
OPERATING VOLTAGE REQUIREMENTS: 115 porm 11.5 v, 60 cyc, single ph.
OPERATING POWER REQUIREMENTS: 12.6 W.
CHART SPEEDS: 12, 6, 3, 1.5, 0.75 in./hr or per minute.
CHART SIZE: 6 in. w x 100 ft lg.
CHART CALIBRATION: Rectilinear; 5 major divisions each side of 0; 5 subdivisions to each major division; each major division equals 2 error parts; each subdivision equals 0.40 error part.
FULL-SCALE PEN DEFLECTION CURRENT: Porm 0.5 ma.
FULL-SCALE RECORDING ACCURACY: Porm 1%.

RELATION TO OTHER EQUIPMENT: None.

EQUIPMENT REQUIRED BUT NOT SUPPLIED:

(1) Discriminator Test Adapter; (1) Electronic Counter CAQI-524D; (1) Multimeter AN/PSM-4C; (1) Oscilloscope AN/USM-105A; (1) RF Cable CG-409/U (0 ft 5 in.); (2) RF Oscillator 0-76/U; (1) Vacuum Tube Voltmeter CAQI-400H; (1) Signal Generator AN/URM-25D; (1) T Adapter UG-274/U.

MAJOR COMPONENTS

QTY	ITEM	STOCK NUMBERS	DIMENSIONS (INCHES)	WEIGHT (LBS)
1	Frequency Deviation Meter AN/URM-115 includes:			79.6
1	Electrical Equipment Case CY-2942/U			20.75
1	Frequency Deviation Meter FR-140/URM			26.75
1	Recording Ammeter ME-182/U			28.75
2	Cable Assy, Power, Electrical CX-4704/U		100-1/4 lg	1.75
1	Cable Assy, Special Purpose, Electrical CX-6489/U		100-1/4 lg	0.9

QTY	ITEM	STOCK NUMBERS	DIMENSIONS (INCHES)	WEIGHT (LBS)
1	Cable Assy, Special Purpose, Electrical CX-6489/U		16-1/4 lg	0.4
1	Pen-Cleaning Wire (music wire 0.004 to 0.008 in. dia)			
1	Red Ink Texas Instrument no. 84867			0.2
1	Syringe Texas Instrument no. 89241			0.1
2	Technical Manual			

REFERENCE DATA AND LITERATURE:

NAVSHIPS 94136: Technical Manual for Frequency Deviation Meter AN/URM-115.

TUBE, CRYSTAL AND/OR SEMI-CONDUCTOR DATA:

TUBES: (1) 1EP1

CRYSTALS: (2) 999.9850 kc (1) 1 mc

SEMI-CONDUCTORS: (12) 1N198 (4) 1N538 (6) 1N758A (2) 1N1731 (2) 2N43A (31) 2N274 (2) 2N333 (2) 2N384 (4) 2N539A (2) 2N1303 (4) 3N35

SHIPPING DATA

PKGS	VOLUME (CU FT)	WEIGHT (LBS)
1	11.8	162

PROCUREMENT DATA

PROCURING SERVICE: USN
DESIGN COG: USN, BuShips
SPEC &/OR DWG: SHIPS-F-3252

CONTRACTOR	LOCATION	CONTRACT OR ORDER NO.	APPROX. UNIT COST
Aircraft Radio Corp.	Boonton, N.J.	NObsr-75741, 29 April 1959	$4,516.00

6 March 1963 — RADIO INTERFERENCE MEASURING SET AN/URM-131(XN-1)

Cog Service: USN FSN: — Functional Class: 2

USA | USN | USAF

TYPE CLASS: Used by

MANUFACTURER'S NAME/CODE NUMBER: Stoddart Aircraft Radio Co., Inc., (78591).

(No Illustration Available)

FUNCTIONAL DESCRIPTION:

The AN/URM-131(XN-1) is a complete set for making quantitative measurements of broad-band electrical and/or interference appearing in the radio frequency spectrum.

The AN/URM-131(XN-1) is designed primarily for laboratory use.

No field changes in effect at time of preparation (3 January 1961).

TECHNICAL CHARACTERISTICS:

TYPE OF INSTALLATION: Portable.
TYPE OF INDICATOR: Meter.
TYPE OF OUTPUTS: Audio, video and recorder terminals.
TYPE OF USAGE: Laboratory.
TYPE OF MEASUREMENTS: Quantitative measurements of broad-band electrical and/or magnetic interference appearing in the radio frequency spectrum.
OPERATING FREQUENCY RANGE: 150 kc to 30 mc.
OPERATING POWER RQMT: 110/230 v ac, 50, 60 or 400 cps, single ph.

RELATION TO OTHER EQUIPMENT: None.

EQUIPMENT REQUIRED BUT NOT SUPPLIED: None.

MAJOR COMPONENTS

QTY	ITEM	STOCK NUMBERS	DIMENSIONS (INCHES)	WEIGHT (LBS)
1	Radio Interference Measuring Set AN/URM-131(XN-1) consists of:		7-9/16 x 9-7/16 x 19	
1	Calibrated Attenuator			
1	Internal Calibration Source			
1	Two-Decade Logarithmic Scale			

REFERENCE DATA AND LITERATURE:

NAVSHIPS 94375: Technical Manual for Radio Interference and Field Intensity Measuring Set AN/URM-131(XN-1).

TUBE, CRYSTAL AND/OR SEMI-CONDUCTOR DATA:

TUBES: (2) 0B2WA (2) 5670 (1) 5726 (3) 5814A (1) 6005 (4) 6100/6C4WA
(7) 6136/6AU6WA (1) 6688

AN/URM-131(XN-1) RADIO INTERFERENCE MEASURING SET

CRYSTALS: None used.

SEMI-CONDUCTORS: None used.

SHIPPING DATA

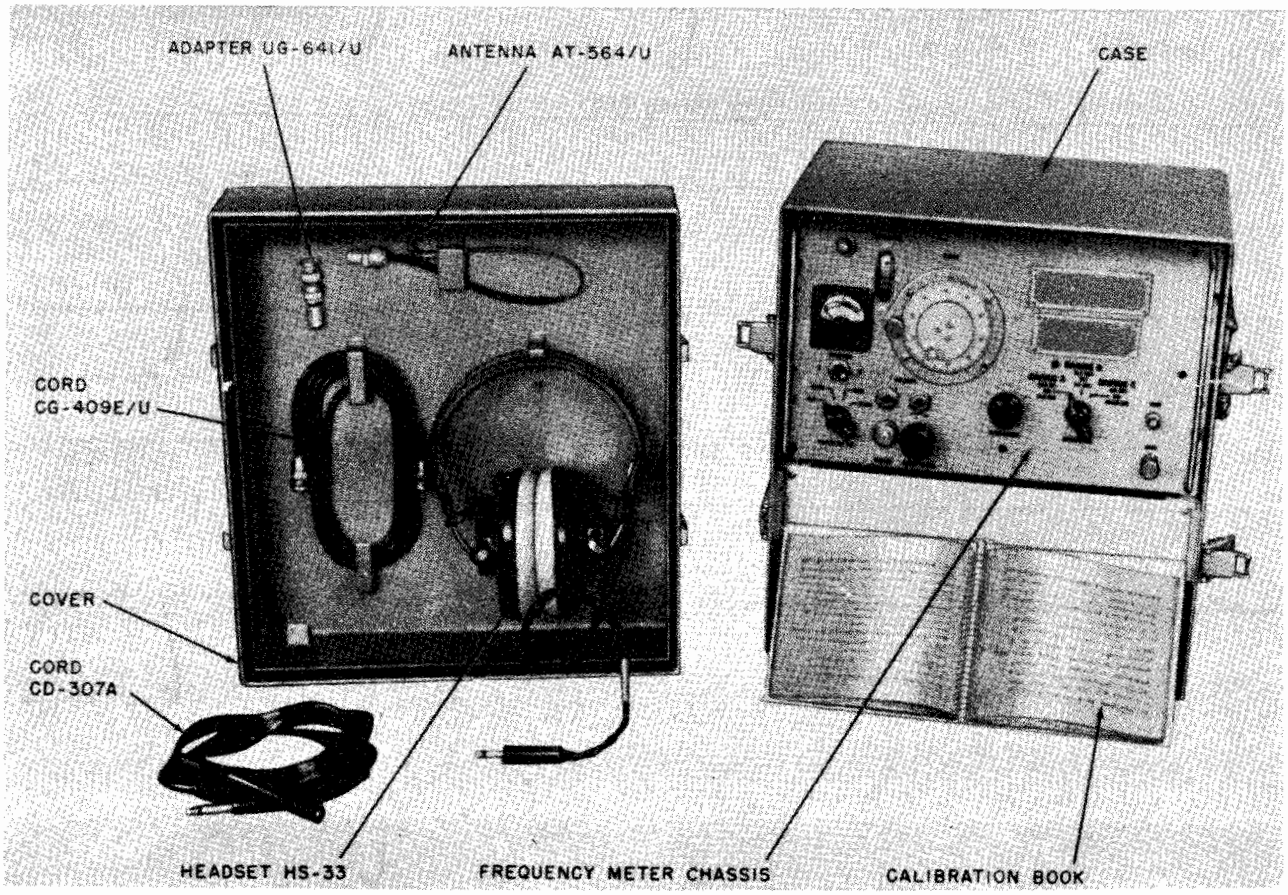
PKGS	VOLUME (CU FT)	WEIGHT (LBS)

PROCUREMENT DATA

PROCURING SERVICE: USN
DESIGN COG: USN, BuShips
SPEC &/OR DWG: SHIPS-E-3426

CONTRACTOR	LOCATION	CONTRACT OR ORDER NO.	APPROX. UNIT COST
Stoddart Aircraft Radio Co., Inc.	Hollywood, Calif.	NObsr-81077	

FREQUENCY METER AN/URM-32



Frequency Meter AN/URM-32

FUNCTIONAL DESCRIPTION

The AN/URM-32 is designed as a self-contained five-tube heterodyne meter used for measuring frequencies in the range from 125 kilocycles (kc) to 1000 megacycles (mc). It is also used as a signal generator which provides a choice of modulated or unmodulated signals for testing and calibrating radio equipment.

No field changes in effect at time of preparation (22 July 1958).

ELECTRICAL AND MECHANICAL CHARACTERISTICS

FREQUENCY RANGE

RANGE A: 125 kc to 2.5 mc.
RANGE B: 2.5 mc to 65 mc.
RANGE C: 65 mc to 1000 mc.

OUTPUT VOLTAGE RANGE

ACCURACY AND SENSITIVITY: With an RF input signal of 0.1 v, an AF output of 0.05 mw min.

RADIO FREQUENCY: 100 uv min across an external 50 ohm resistive load.

POWER INPUT: 6 v DC, 1.0 amp; 180 v DC, 25 ma.

MANUFACTURER'S OR CONTRACTOR'S DATA

Radio Frequency Labs, Inc., Boonton, N.J.
Contract 32256-PHILA-56.

Test-Frequency Measuring

April 1959

AN/URM-32 FREQUENCY METER

TUBE AND/OR CRYSTAL COMPLEMENT

(1) OB2 (2) 12AT7WA
(1) 5814A (1) 6C4W
Total Tubes: (5)

No Crystals used.

REFERENCE DATA AND LITERATURE

TM11-5120: Technical Manual for the AN/URM-32 Frequency Meter.

TYPE CLASSIFICATION	
DESIGN COGNIZANCE	TASSA
PROCUREMENT COGNIZANCE	
STOCK NO.	
R.D.B. IDENT. NO.	

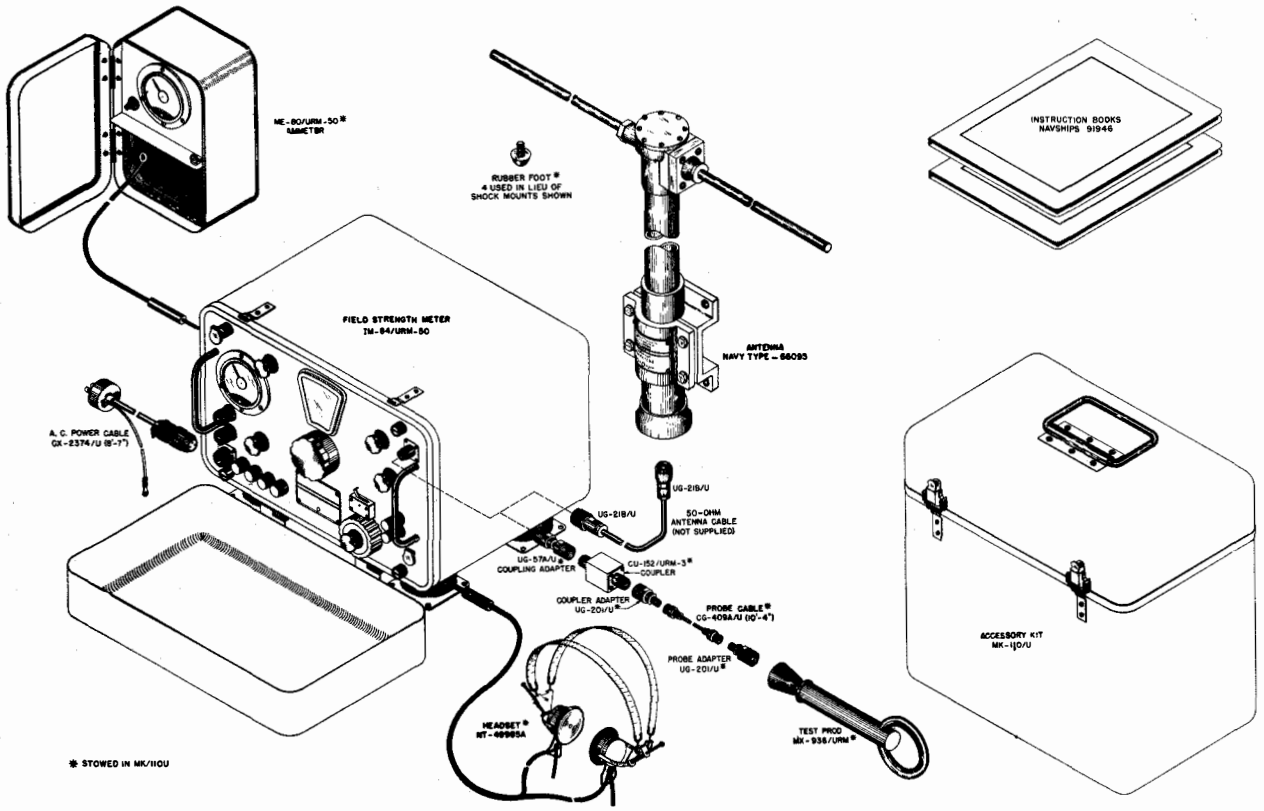
EQUIPMENT SUPPLIED DATA

QUANTITY PER EQUIPT	NAME AND NOMENCLATURE	OVERALL DIMENSIONS (inches)	WEIGHT (lbs.)
1	Frequency Meter AN/URM-32 including:	11-31/32 X 13-11/16 X 13-13/16	27
	(1) Antenna AT-564/U	12 lg	1/32
	(1) Cord CG-409E/U	12 lg	1/5
	(1) Adapter UG-641/U		1/32
	(1) Headset HS-33		1-1/32
	(1) Cord CD-307A	60 lg	1/32
	(1) Set of Equipment Spares		
	(2) Instruction Book TM11-520	5/32 X 7-7/8 X 10-1/4	

September 1956

RADIO FREQUENCY MONITOR

AN/URM-50



Radio Frequency Monitor AN/URM-50

FUNCTIONAL DESCRIPTION

The AN/URM-50 is a directly calibrated, bandswitching device. Bandswitching is accomplished by means of a rotatable turret containing all the respective R.F. coils and their associated trimmer capacitors. The monitor is supplied with its own antenna. No direct connection is made between the monitor and the transmitter being checked. The signal is tuned and adjusted to the proper level and monitoring is possible aurally by means of headphones or visually by means of the front panel mounted microammeter or the remote meter or by use of an oscilloscope.

The primary purpose of the monitor is to enable operating personnel to check shipboard transmitter performance. Its secondary use is to aid in tuning up the transmitters. It is also possible to use the monitor for checking R.F. leakage in and around the transmitting equipment.

No field changes in effect at time of preparation (22 June 1956).

ELECTRICAL AND MECHANICAL CHARACTERISTICS

FREQUENCY RANGE: 0.3 to 400 mc.

TUNING BANDS

- 0.3 to 0.65 mc
- 0.65 to 1.3 mc
- 1.3 to 2.8 mc
- 2.8 to 6.5 mc
- 6.5 to 15 mc
- 15 to 34 mc
- 34 to 75 mc
- 75 to 180 mc
- 180 to 400 mc

FIELD STRENGTH RANGE: 50 uv to 30 v.

ANTENNA IMPEDANCE: 50 ohms.

FIELD STRENGTH METER INPUT IMPEDANCE: 50 ohms.

HEADPHONE OUTPUT IMPEDANCE: 60 ohms.

POWER SUPPLY CHARACTERISTICS: 115 v, 60 to 400 cps, single ph.

MANUFACTURER'S OR CONTRACTOR'S DATA

National Co. Inc., Malden, Mass.

Contract NObsr 52582 dated 18 June 1951.

Approximate Cost $580.00 with Equipment spares

AN/URM-50 RADIO FREQUENCY MONITOR

TUBE AND/OR CRYSTAL COMPLEMENT

(1) 5Y3WGTA
(1) 5654
(2) 5814
(2) OB2WA
(3) 6AW6WA
(1) 6005
Total Tubes: (10)

REFERENCE DATA AND LITERATURE

NAVSHIPS 91946: Technical Manual Radio Frequency Monitor AN/URM-50.

TYPE CLASSIFICATION	
DESIGN COGNIZANCE	BUSHIPS
PROCUREMENT COGNIZANCE	
STOCK NO.	
R.D.B. IDENT. NO.	

SHIPPING DATA

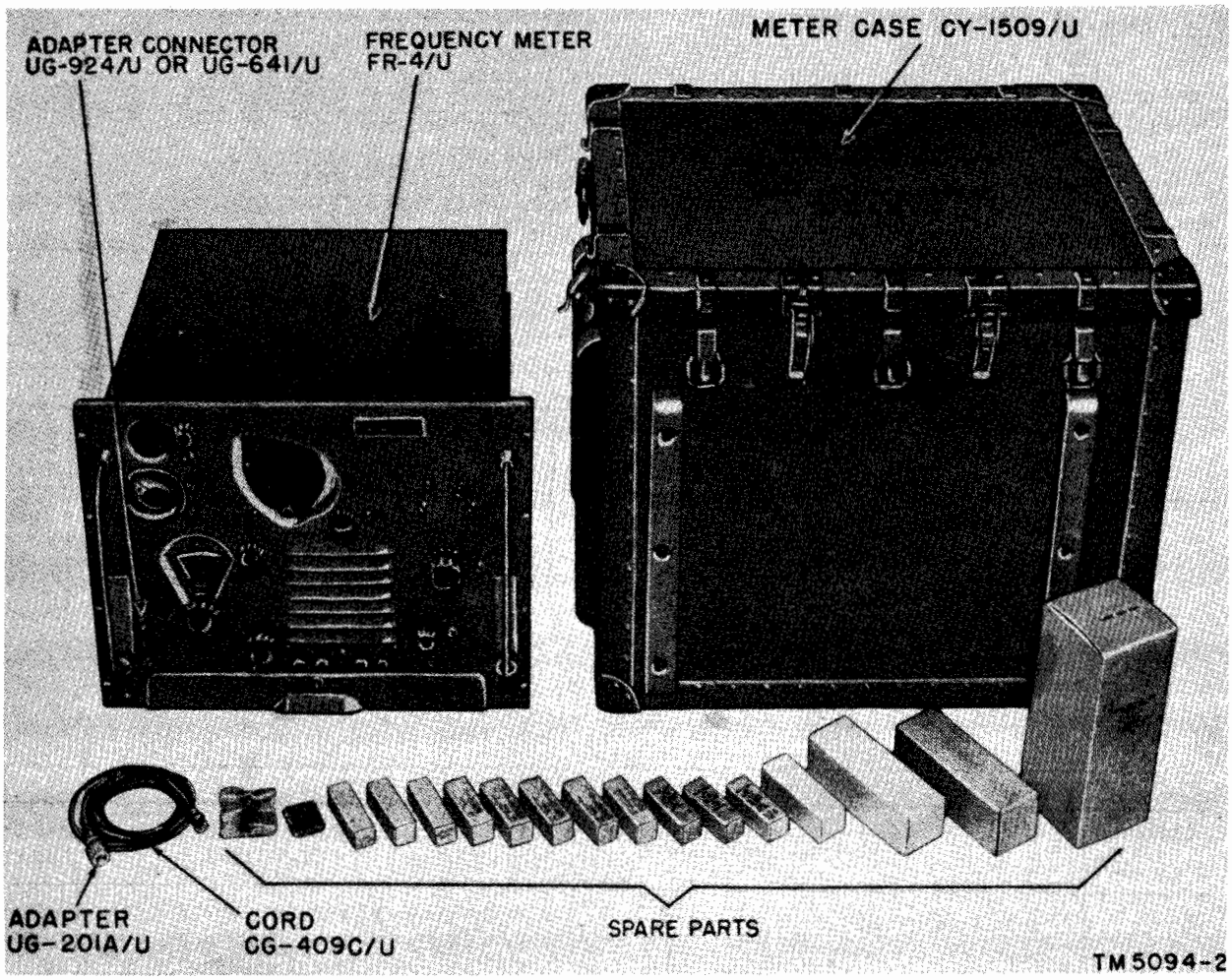
NUMBER OF BOXES	CONTENTS AND IDENTIFICATION	VOLUME (Cu.Ft.)	OVERALL DIMENSIONS (inches)	WEIGHT PACKED (lbs.)
1	Field Strength Meter IM-84/URM-50 Accessory Kit MK-110/U	6.8	19-1/2 X 19-7/8 X 30-1/2	112
1	Antenna NT-66095	3.12	6 X 27-3/4 X 32	38

EQUIPMENT SUPPLIED DATA

QUANTITY PER EQUIPT	NAME AND NOMENCLATURE	OVERALL DIMENSIONS (inches)	WEIGHT (lbs.)
1	Field Strength Meter IM-84/URM-50	11-27/32 X 15-21/32 X 15-45/64	47
1	Accessory Kit MK-110/U	11-27/32 X 15-21/32 X 15-45/64	20
1	Ammeter ME-80/URM-50	4-15/32 X 6-3/32 X 9-3/32	3-3/4
1	Headset NT-49985A		0.56
1	Coupling Adapter UG-57A/U		
1	Coupler Adapter UG-201/U		
1	Coupler CU-152/URM-3	1-1/8 X 1-1/8 X 2-3/4	
1	Probe Cable CG-409A/U	10 ft. 4 inc. (lg)	
1	Probe Adapter UG-201/U		0.06
1	Test Prod MX-936/URM	1-1/4 X 3-5/16 X 10	1.06
4	Plug Buttons		
1	Set Equipment Spares		3
1	A.C. Power Cable MX-2374/U	8 ft 7 in. (lg)	
1	Antenna NT-66095	3-15/32 X 23-3/4 X 47-1/16	18

FREQUENCY METER

AN/URM-79 AND AN/URM-82



Frequency Meter AN/URM-79

FUNCTIONAL DESCRIPTION

The AN/URM-79 and the AN/URM-82 Frequency Meters are precision instruments designed to measure frequencies in the range of 100 kilocycles (kc) to 20 megacycles (mc). It is a portable, self-contained unit used to calibrate field radio transmitters to an accuracy of 0.001 percent. The major component Frequency Meter FR-4, contains a temperature stabilized crystal oscillator operating at 1,250 kilocycles (kc). This frequency then is divided to 10 kilocycles (kc), harmonics of which are used in making measurements and checking calibration. A blinker light and earphones provide visual and aural indications of zero beat settings. An oscilloscope, built into the FR-4/U is used for interpolation.

The frequency meter also can be used as a signal generator over the range of 100 kilocycle to 20 megacycles. This instrument is useful in calibrating radio receivers.

The AN/URM-79 differ from the AN/URM-8 in that AN/URM-79 uses Meter Case CY-1509/U and the AN/URM-82 adds Frequency Meter Bracket MT-1447/URM-82 and accessories case CY-1581/U.

No field changes in effect at time of preparation (21 July 1958).

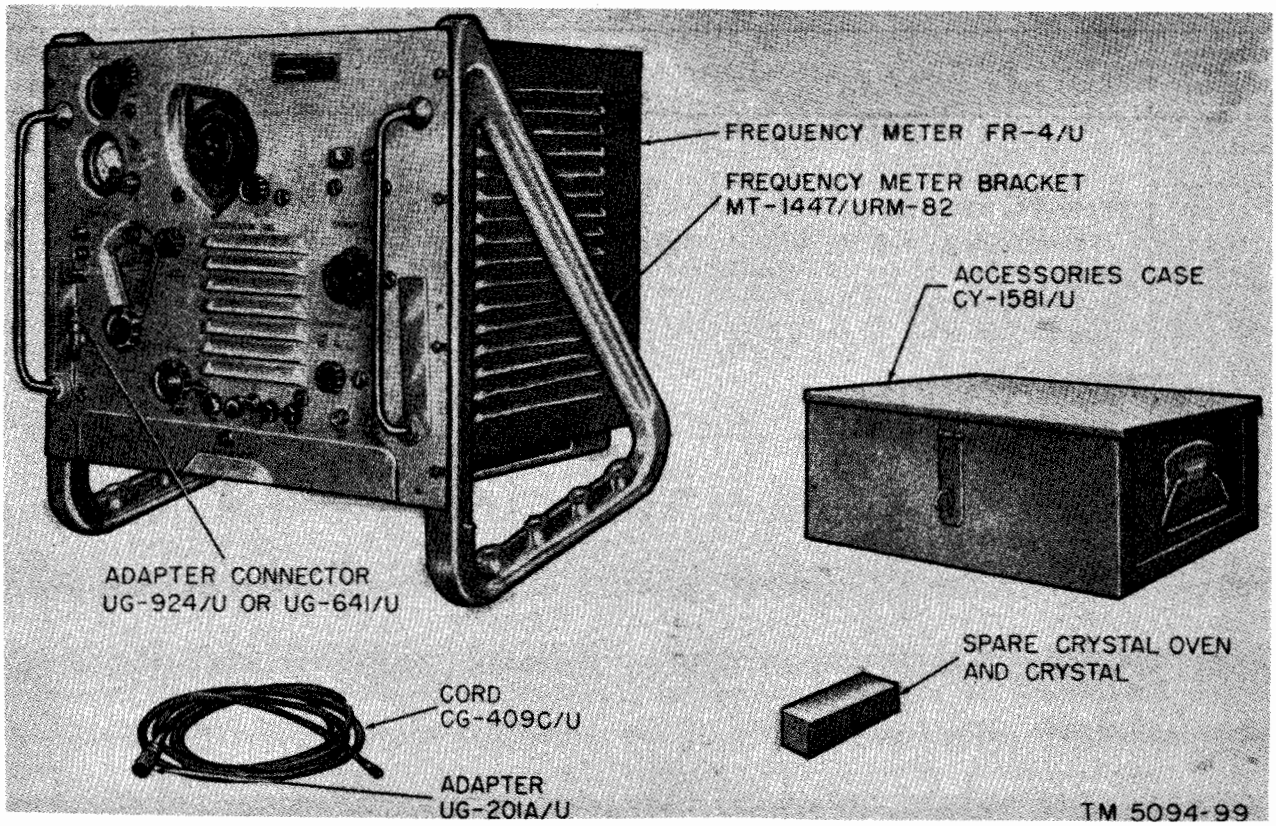
ELECTRICAL AND MECHANICAL CHARACTERISTICS

HARMONIC SELECTOR: 9th thru 26th harmonic of 10 kc.

CALIBRATION ACCURACY: 0.001%.

Test-Frequency Measuring

AN/URM-79 AND AN/URM-82 FREQUENCY METER



Frequency Meter AN/URM-82

RADIO FREQUENCY OUTPUT: 100 uv min (across 51 ohms on any harmonic).
AUDIO POWER OUTPUT: 1 mw min (across 60 ohms).
OSCILLATOR FREQUENCIES
PROXY: 100 to 250 kc.
CRYSTAL: 1250 kc.
BLOCKING: 10 kc.
INTERPOLATION: 15 to 20 kc.
FREQUENCY MULTIPLICATION: 2 to 80 times proxy oscillator frequency.
FREQUENCY RANGE
BAND ONE: 100 to 250 kc.
BAND TWO: 250 to 500 kc.
BAND THREE: 500 to 1250 kc.
BAND FOUR: 1.25 to 2.5 mc.
BAND FIVE: 2.5 to 5 mc.
BAND SIX: 5 to 10 mc.
BAND SEVEN: 10 to 20 mc.

MANUFACTURER'S OR CONTRACTOR'S DATA

The Sparks-Withington Co., Jackson, Mich.

TUBE AND/OR CRYSTAL COMPLEMENT

(1) 0A2WA	(1) 6AH6	(8) 12AT7WA
(3) 6AS6W	(1) 2BP1	(6) 6AU6WA
(2) 6AK5W	(3) 5751	(1) 5Y3WGTB
(1) 6Y6G	(3) 5670	

Total Tubes: (30)

No Crystals Used.

REFERENCE DATA AND LITERATURE

TM11-5094: Technical Manual for the AN/URM-79 and AN/URM-82 Frequency Meter.

TYPE CLASSIFICATION	
DESIGN COGNIZANCE	OC Sig O
PROCUREMENT COGNIZANCE	MIL-F-11068 (Sig C)
STOCK NO.	
R.D.B. IDENT. NO.	

FREQUENCY METER

AN/URM-79 AND AN/URM-82

EQUIPMENT SUPPLIED DATA

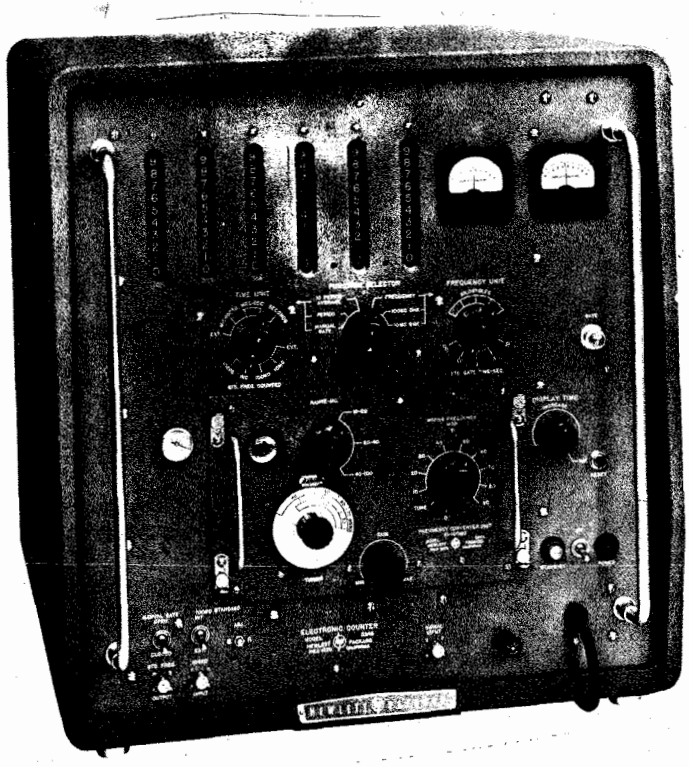
QUANTITY PER EQUIPT		NAME AND NOMENCLATURE	OVERALL DIMENSIONS (inches)	WEIGHT (lbs.)
AN/URM-				
82	79			
1	1	Frequency Meter FR-4/U		
1		Frequency Meter Bracket MT-1447/URM-82		
1		Accessories Case CY-1581/U		
1	1	Adapter Connector UG-924/U or		
1	1	Adapter Connector UG-641/U		
1	1	Cord CG-409C/U		
1	1	Adapter UG-201A/U		
	1	Meter Case CY-1509/U		
	1	Set of Equipment Spares		

10 January 1962 FREQUENCY METER AN/USM-102

Cog Service:	FSN:	Functional Class:	
	USA	USN	USAF

TYPE CLASS:

MANUFACTURER'S NAME/CODE NUMBER: Hewlett-Packard Company.



Frequency Meter AN/USM-102

FUNCTIONAL DESCRIPTION:

The Frequency Meter AN/USM-102 is designed as a general-purpose, commercial, pulse-counter type of frequency meter with a six-decade readout. Calibration is porm one count. An internal crystal is provided for checking calibration.

No field changes in effect at time of preparation (31 March 1961).

TECHNICAL CHARACTERISTICS:

TYPE OF INSTALLATION: Portable.

FREQUENCY MEASUREMENTS (WITHOUT PLUG-IN UNITS)

RANGE: 10 cps to 100 mc.

GATE TIME: 0.001, 0.01, 0.1, 1, 10 seconds or manual control.

ACCURACY: Porm 1 count porm stability.

READS IN: Kilocycles; decimal point automatically positioned.

AN/USM-102 FREQUENCY METER

PERIOD MEASUREMENT (WITHOUT PLUG-IN UNITS)
- RANGE: 0 cps to 10 kc.
- GATE TIME: 1 or 10 cycles of unknown.
- ACCURACY
  - ONE PERIOD: Porm 0.3%.
  - TEN PERIOD AVERAGE: Porm 0.03%.
- STANDARD FREQUENCY COUNTED: 10 cps; 1 or 100 kc; 10 mc, or externally applied frequency.
- READS IN: Seconds, milliseconds or microseconds, decimal point automatically positioned.

GENERAL
- REGISTRATION: 8 digital display tubes, 8 numbered columns; 99,999,999 maximum count.
- STABILITY: $1/10^6$ per week.

DISPLAY TIME: Variable 0.1 to 10 seconds in steps of gate time selected. Display can be held indefinitely.

OUTPUT FREQUENCIES
- RECTANGULAR: 10 cps, 1 kc.
- POSITIVE PULSE: 100 kc.
- SINE WAVE: 10 mc.

SELF CHECK: Panel control provides automatic count of internal standard 100 kc and 10 mc frequencies to assure accuracy of gate and proper operation of counter.

INPUT VOLTAGE: 1 v rms minimum 1.5 v peak, rise time 0.2 sec max.

INPUT IMPEDANCE: Approx 1 megohm, 40 uuf shunt.

EXTERNAL STANDARD: 100 kc or 1 mc signal from external primary standard can be applied to unit for highest accuracy.
- VOLTAGE REQUIRED: 2 v.
- INPUT IMPEDANCE: Nominal 470 k.
- SHUNT CAPACITANCE: 40 uuf.

OPERATING POWER RQMT: 115/230 v ac, 50 to 60 cps, single ph, 600 watts.

RELATION TO OTHER EQUIPMENT:

The AN/USM-102 is the same as Hewlett-Packard's Commercial Model 524B.

EQUIPMENT REQUIRED BUT NOT SUPPLIED: None.

MAJOR COMPONENTS

QTY	ITEM	STOCK NUMBERS	DIMENSIONS (INCHES)	WEIGHT (LBS)
1	Frequency Meter AN/USM-102 consists of:		20 x 21-1/4 x 23-1/2	161
1	Frequency Meter FR-132/U		20 x 21-1/4 x 23-1/2	
1	Converter, Frequency Electronic CV-766/U		6-3/8 x 6-3/8 x 10	

REFERENCE DATA AND LITERATURE:

NAVSHIPS 93325: Technical Manual for Electronic Counter AN/USM-102.

TUBE, CRYSTAL AND/OR SEMI-CONDUCTOR DATA:

TUBES: (4) HD2135 (1) 0B2WA (3) 12AT7WB (62) 212G11A (3) 5R4WGB (1) 5Y3WGTB (2) 5654-6AK5W (1) 5687WA (9) 5725-6AS6W (3) 5726-6AL5W (2) 5727-2D21W (1) 5844 (18) 5963 (12) 6AH6 (5) 6AU6WA (6) 6CB6 (1) 6E5 (2) 6005-6AQ5W (2) 6080WA

CRYSTALS: None used.

SEMI-CONDUCTORS: None used.

SHIPPING DATA

PKGS	VOLUME (CU FT)	WEIGHT (LBS)

PROCUREMENT DATA

PROCURING SERVICE: DESIGN COG: USN, BuShips
SPEC &/OR DWG: Commercial

CONTRACTOR	LOCATION	CONTRACT OR ORDER NO.	APPROX. UNIT COST
Hewlett-Packard Company	Palo Alto, California	NObsr-75637	$2,150.00

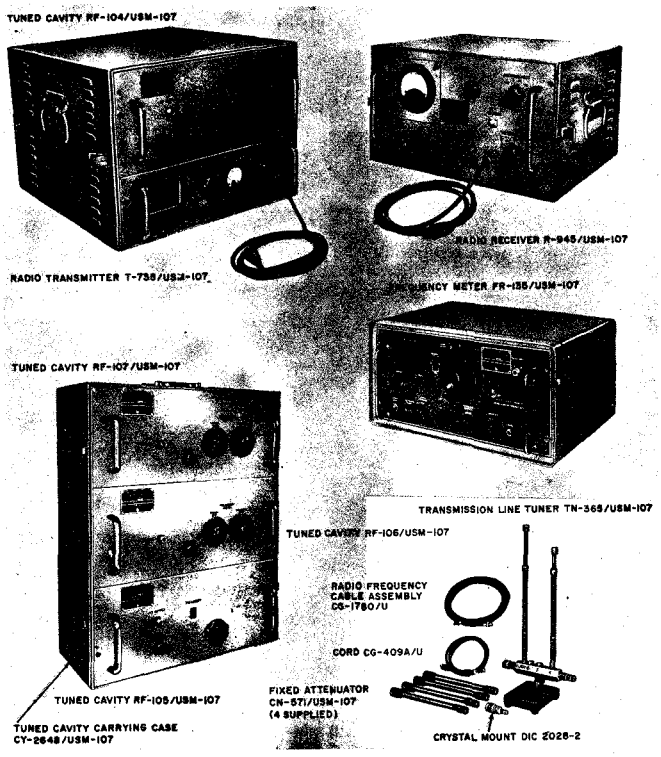
22 May 1962 **ANTENNA TEST SET AN/USM-107**

Cog Service: USN FSN: 6625-776-5953 **Functional Class: 2**

USA	USN	USAF

TYPE CLASS: Used by

MANUFACTURER'S NAME/CODE NUMBER: Airtronics Inc., (93024).



Antenna Test Set AN/USM-107

FUNCTIONAL DESCRIPTION:

Antenna Test Set AN/USM-107 supplies a signal to the antenna system under test, measures the operating frequency, and displays the relative signal strength radiated by the antenna under test. The output can be read directly on a level-indicating meter or it can be connected to any of several recorders.

No field changes in effect at time of preparation (4 December 1961).

TECHNICAL CHARACTERISTICS:

FREQUENCY RANGE: 1,000 to 10,500 mc.
TYPE OF EMISSION: A0 and A9.
TYPE OF MODULATION: 100%, 1,000 cps square wave.
MAXIMUM OUTPUT: 6, 25, 100 v.
OUTPUT IMPEDANCE: 20 ohms or higher (6 v), 340 ohms or higher (25 v), 10,000 ohms or higher (100 v).

AN/USM-107 ANTENNA TEST SET

FREQUENCY STABILITY: 1:1,000 for 15 minutes.
FREQUENCY ACCURACY: 0.1%.
POWER REQUIREMENTS: 105 to 125 v, 60 cyc, single ph, 3.4 amps.

RELATION TO OTHER EQUIPMENT: None.

EQUIPMENT REQUIRED BUT NOT SUPPLIED:

(1) Recorder; (1) Headphones.

MAJOR COMPONENTS

QTY	ITEM	STOCK NUMBERS	DIMENSIONS (INCHES)	WEIGHT (LBS)
1	Antenna Test Set AN/USM-107 includes:			
1	Radio Transmitter T-738/USM-107		11 x 19 x 19	64
1	Radio Receiver R-945/USM-107		10 x 14 x 19	52
1	Frequency Meter FR-135/USM-107		10 x 15 x 20	50
1	Tuned Cavity RF-104/USM-107		8 x 9 x 19	20
1	Tuned Cavity RF-105/USM-107		8 x 9 x 19	20
1	Tuned Cavity RF-106/USM-107		8 x 9 x 19	15
1	Tuned Cavity RF-107/USM-107		8 x 9 x 19	15
1	Radio Transmitter Cover CW-564/USM-107		4 x 15-1/2 x 20	5
1	Radio Transmitter Carrying Case		15-1/2 x 18 x 20	22
1	Radio Receiver Cover CW-563/USM-107		4 x 11-1/2 x 20	6
1	Radio Receiver Carrying Case		11-1/2 x 13 x 20	13
1	Tuned Cavity Cover CW-565/USM-107		4 x 19-1/2 x 25-1/4	7
1	Tuned Cavity Carrying Case CY-2548/USM-107		8-1/2 x 19-9/16 x 25-1/4	16
1	Transmission Line Tuner TN-365/USM-107		3-1/2 x 4-1/2 x 12-1/2	5
1	Crystal Mount DIC 2028-2		3/4 dia x 2-1/8	0.25
4	Fixed Attenuator CN-571/USM-107		3/4 dia x 8-1/4	3
1	Radio Frequency Cable Assy CG-1780/U		240 lg	1.5
1	Cord CG-409A/U		24 lg	0.5
2	Technical Manual NAVSHIPS 93746(A)			1.5

REFERENCE DATA AND LITERATURE:

NAVSHIPS 93746(A): Technical Manual for Antenna Test Set AN/USM-107.

TUBE, CRYSTAL AND/OR SEMI-CONDUCTOR DATA:

TUBES: (5) 0A2WA (2) 0B2WA (1) 2BP1 (1) 2C53 (2) 3B24WA (1) 5R4WGB (1) 5V4G
(2) 5Y3WGTA (1) 6AF4 (4) 6AH6 (9) 6AU6WA (2) 6AQ5 (1) 6BM6 (6) 6X4W
(2) 12AT7 (1) 807 (1) 5651WA (1) 5686 (2) 5721 (1) 5726 (2) 5751WA
(1) 5778 (5) 5814WA (1) 6080WA

CRYSTALS: (1) BH6A (1) 7CU-1A

SEMI-CONDUCTORS: (1) 1N23B (1) 1N55

SHIPPING DATA

PKGS	VOLUME (CU FT)	WEIGHT (LBS)
1	6.5	150
1	4	122
1	5	118
1	3	90

PROCUREMENT DATA

PROCURING SERVICE: USN
DESIGN COG: USN, BuShips
SPEC &/OR DWG: SHIPS-S-2656, Amend 1

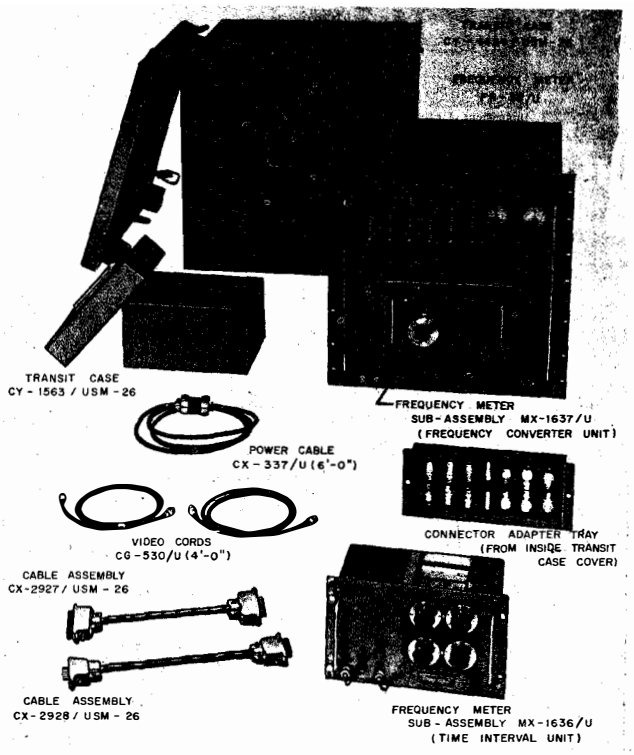
CONTRACTOR	LOCATION	CONTRACT OR ORDER NO.	APPROX. UNIT COST
Airtronics Inc.	Bethesda, Md.	NObsr-7189B	$9,871.00

1 May 1962 FREQUENCY METER AN/USM-26

Cog Service: USN FSN: 6625-542-0707 W/S Functional Class: 2.4

	USA	USN	USAF
TYPE CLASS:	Std	Used by	

MANUFACTURER'S NAME/CODE NUMBER: Hewlett-Packard Co., (28480).



Frequency Meter AN/USM-26

FUNCTIONAL DESCRIPTION:

Frequency Meter AN/USM-26 is a precision instrument that automatically measures frequencies to 100 mc and automatically displays its answers in digital form on an eight-place panel indicating system. In addition to making direct measurements of frequencies, the AN/USM-26 also measures period (time of one cycle of periodic wave), time intervals, frequency ratios and total events, and may be used to count random events such as those encountered in nuclear work. The equipment further includes a self-check feature that enables the operator to verify the proper operation of the equipment for most types of measurements.

No field changes in effect at time of preparation (23 March 1962).

TECHNICAL CHARACTERISTICS:

POWER REQUIREMENTS: 115 v, 50 to 1,000 cyc, single ph.

AN/USM-26 FREQUENCY METER

FREQUENCY MEASUREMENT
- RANGE: 10 cps to 100 mc (direct reading).
- ACCURACY: Porm 1 count porm 0.0002% (porm 0.1 cps porm 0.0002% on 10 sec gate).
- INPUT REQUIREMENT: 0.2 v rms to 10 mc; 0.02 v rms 10 mc to 100 mc, 1 v rms using Time Interval Unit.
- INPUT IMPEDANCE
  - 0 TO 10 MC: Approx. 1 meg shunted by 40 uuf.
  - 10 TO 100 MC: Approx. 50 ohms.
- GATE TIME: 0.001, 0.01, 1, or 10 sec, selected by panel control.
- DISPLAY TIME: Continuously variable from 0.3 to 5 sec by a panel control. In manual operation, display continues until reset.

PERIOD MEASUREMENT
- RANGE: 0.01 cps to 10 kc (100 usec).
- ACCURACY: Porm 0.03%.
- INPUT REQUIREMENTS: 1 v rms, min; 200 v rms, max.
- INPUT IMPEDANCE: Approx. 1 meg shunted by 40 uuf.
- GATE TIME: Counts for 1 or 10 cyc of input signal as desired.
- UNITS OF MEASUREMENT: 0.1 usec, 0.01 millisecond, 1 millisecond, or 0.1 sec.
- DISPLAY TIME: Continuously variable from 0.3 to 5 sec by a panel control. In manual operation, display continues until reset.

TIME INTERVAL MEASUREMENT
- RANGE: 1.0 usec to 10,000,000 sec.
- ACCURACY: Porm 0.1 usec porm 0.0002%.
- INPUT REQUIREMENTS: 2 v peak min; 200 v peak max.
- INPUT IMPEDANCE: Approx. 1 meg shunted by 20 to 40 uuf (each channel).
- INDEPENDENT START AND STOP CHANNELS: Triggers from either positive-going or negative-going input voltages at levels from M200 to P200 v. Separate or common direct-coupled inputs.
- DISPLAY TIME: Continuously variable from 0.3 to 5 sec by a panel control. In manual operation, display continues until reset.

RELATION TO OTHER EQUIPMENT: None.

EQUIPMENT REQUIRED BUT NOT SUPPLIED: None.

MAJOR COMPONENTS

QTY	ITEM	STOCK NUMBERS	DIMENSIONS (INCHES)	WEIGHT (LBS)
1	Frequency Meter AN/USM-26 includes:			
1	Frequency Meter FR-38/U		18-5/8 x 19 x 19-7/32	109
1	Frequency Converter Unit MX-1637/U		6-1/8 x 6-3/8 x 10	5
1	Time Interval Unit MX-1636/U		6-1/8 x 6-3/8 x 10	4
1	Transit Case CY-1424/USM-26		22-1/2 x 23-1/4 x 23-3/4	41
1	Transit Case CY-1563/USM-26		7-7/8 x 8-1/8 x 12	5
1	Power Cable CX-337/U		72 lg	0.6
2	Video Cord CG-530/U		48 lg	0.2

QTY	ITEM	STOCK NUMBERS	DIMENSIONS (INCHES)	WEIGHT (LBS)
1	Test Cable CX-2927/USM-26		13-1/2 lg	0.4
1	Test Cable CX-2928/USM-26		13-1/2 lg	0.3
2	Connector Adapter UG-201A/U		25/32 dia x 1-5/16	0.1
2	Connector Adapter UG-255/U		5/8 dia x 1-11/32	0.1
2	Connector Adapter UG-273/U		23/32 dia x 1-5/16	0.1
2	Connector Adapter UG-282/U		5/8 dia x 2-1/8	0.1
2	Connector Adapter UG-349A/U		19/32 dia x 1-9/16	0.1
2	Connector Adapter UG-914/U		7/16 dia x 1-9/32	0.003
2	Connector Adapter UG-1034/U		25/32 dia x 1-1/2	0.1

REFERENCE DATA AND LITERATURE:

AN16-30USM26-1: Handbook of Operating Instructions for Frequency Meter AN/USM-26.
AN16-30USM26-2: Handbook of Service Instructions for Frequency Meter AN/USM-26.
AN16-30USM26-3: Handbook of Overhaul Instructions for Frequency Meter AN/USM-26.
AN16-30USM26-4: Illustrated Parts Breakdown for Frequency Meter AN/USM-26.
TM11-5057: Technical Manual for Frequency Meter AN/USM-26.
TO 33A1-5-5-1: Handbook of Operating Instructions for Frequency Meter AN/USM-26.
TO 33A1-5-5-2: Handbook of Service Instructions for Frequency Meter AN/USM-26.
TO 33A1-5-5-3: Handbook of Overhaul Instructions for Frequency Meter AN/USM-26.
TO 33A1-5-5-4: Illustrated Parts Breakdown for Frequency Meter AN/USM-26.

TUBE, CRYSTAL AND/OR SEMI-CONDUCTOR DATA:

TUBES: (1) 0B2WA (1) 5Y3WGTA (3) 5R4WGA (11) 6AH6 (7) 6AU6WA (5) 6CB6 (1) 6E5
(3) 12AT7WA (6) 5654/6AK5W (1) 5687 (9) 5725/6AS6W (2) 5727/2D21W
(3) 5726/6AL5W (1) 5844 (40) 5963 (2) 6005/6AQ5W (2) 6080WA

CRYSTALS: (1) G-9

SEMI-CONDUCTORS: None used.

SHIPPING DATA

PKGS	VOLUME (CU FT)	WEIGHT (LBS)

PROCUREMENT DATA

PROCURING SERVICE: USN
DESIGN COG: USN, BuWeps
SPEC &/OR DWG: MIL-F-7847A(AER)

AN/USM-26 FREQUENCY METER

CONTRACTOR	LOCATION	CONTRACT OR ORDER NO.	APPROX. UNIT COST
Hewlett-Packard Co.	Palo Alto, Calif.	NOas-54-901-r	
Northeastern Engineering Inc.	Manchester, N. H.	N383-46506A	$1,490.00

January 1961

Test-Frequency Measuring

FREQUENCY METER AN/USM-26A

FUNCTIONAL DESCRIPTION

The AN/USM-26A is designed as a precision instrument that automatically measures frequencies to 100 megacycles (MC) and automatically displays its answers in digital form on an eight-place panel indicating system. In addition to making direct measurements of frequency, it also makes measures period (time of one cycle of periodic wave), time intervals, frequency ratios and total events, and may be used to count random events such as those encountered in nuclear work.

No field changes in effect at time of preparation (20 April 1960).

RELATION TO OTHER EQUIPMENT

The AN/USM-26A is electrically and mechanically interchangeable with AN/USM-26 but differs in equipment supplied and in improved design features.

ELECTRICAL AND MECHANICAL CHARACTERISTICS

TYPE OF TESTS: Frequency measurement; time interval measurement; period measurements; gives standard frequency outputs of 10 cps, 1 kc, 100 kc, 10 mc time and frequency ratios.

FREQUENCY DATA

FREQUENCY METER

RANGE: 10 cps to 10 mc, 1 v rms min input voltage.

FREQUENCY METER WITH FREQUENCY CONVERTER

RANGE: 10 cps to 100 mc, 0.1 v rms input voltage from 10 cps to 10 mc; 10 mv rms min input voltages from 10 mc to 100 mc.

FREQUENCY METER WITH TIMER

RANGE: 0.1 us to 107 seconds; 1 v peak min input voltage, start or stop on positive or negative trigger slope, trigger amplitude continuously adjustable from -192 v to +192 v.

OPERATING POWER RQMT: 115 to 230 v AC, 50 to 1000 cps, single ph.

MANUFACTURER'S OR CONTRACTOR'S DATA

Hewlett-Packard Co., Palo Alto, California.
Model No. 524B(N).
Contract N383-33407A.

TUBE AND/OR CRYSTAL COMPLEMENT

(1) OB2WA	(1) 5Y3WGTA
(3) 5R4WGA	(11) 6AH6
(7) 6AU6WA	(5) 6CB6
(1) 6E5	(3) 12AT7WA
(6) 5654/6AK5W	(1) 5687
(9) 5725/6AS6W	(2) 5727/2D21W
(3) 5726/6AL5W	(1) 5844
(40) 5963	(2) 6005/6AQ5W
(2) 6080WA	

Total Tubes: (98)

(63) G-11A

Total Crystals: (63)

REFERENCE DATA AND LITERATURE

AN16-30USM-26-1,-2,-3,-4: Technical Manual for Frequency Meter AN/USM-26.

Nomenclature Card for Frequency Meter AN/USM-26A.

TYPE CLASSIFICATION (NAVY)
DESIGN COGNIZANCE BUAER
PROCUREMENT COGNIZANCE MIL-F-7847A(AER)
STOCK NO.
R.D.B. IDENT. NO. 2

EQUIPMENT SUPPLIED DATA

QUANTITY PER EQUIPT	NAME AND NOMENCLATURE	OVERALL DIMENSIONS (inches)	WEIGHT (lbs.)
1	Frequency Meter FR-38A/U	18-5/8 X 19 X 19-7/32	105
1	Frequency Converter Unit MX-1637A/U	6-1/8 X 6-3/8 X 10	5
1	Time Interval Unit MX-1636A/U	6-1/8 X 6-3/8 X 10	4

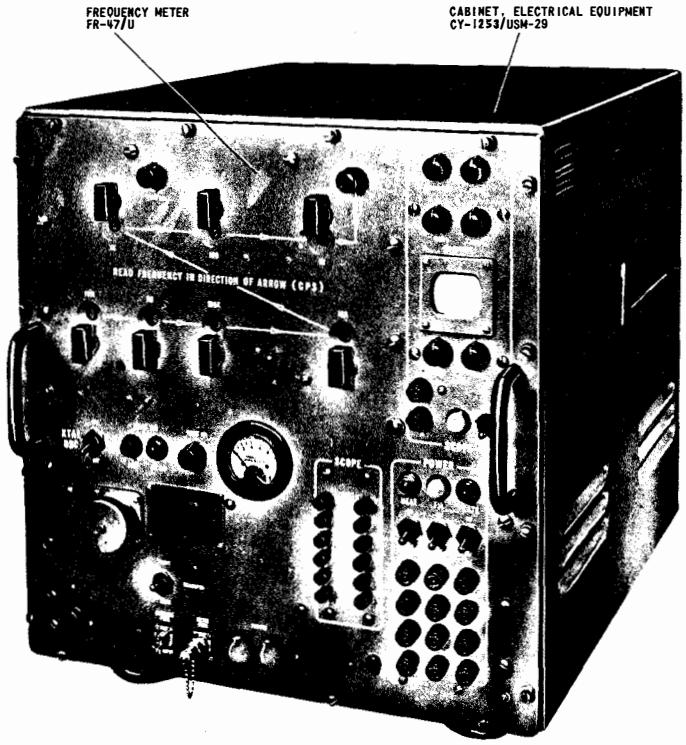
AN/USM-26A FREQUENCY METER

EQUIPMENT SUPPLIED DATA

QUANTITY PER EQUIPT	NAME AND NOMENCLATURE	OVERALL DIMENSIONS (inches)	WEIGHT (lbs.)
1	Transit Case CY-1424A/USM-26	22-1/2 X 23-1/4 X 23-3/4	41
1	Transit Case CY-1563A/USM-26	7-7/8 X 8-1/8 X 12	5
1	Power Cable CX-337A/U(6'0")	72 lg	0.6
2	Video Cord CG-530A/U(4'0")	48 lg	0.2
1	Test Cable CX-2927A/USM-26	13-1/2 lg	0.4
1	Test Cable CX-2928A/USM-26	13-1/2 lg	0.3
2	Adapter Connector UG-201A/U	25/32 dia X 1-5/16	0.1
2	Adapter Connector UG-255A/U	5/8 dia X 1-11/32	0.1
2	Adapter Connector UG-273A/U	25/32 dia X 1-5/16	0.1
2	Adapter Connector UG-282A/U	5/8 dia X 2-1/8	0.1
2	Adapter Connector UG-349A/U	19/32 dia X 1-9/16	0.1
2	Adapter Connector UG-914A/U	7/16 dia X 1-9/32	0.03
2	Adapter Connector UG-1034/U	25/32 X 1-1/2	0.1

USA	USN	USAF
TYPE CLASS:	Std	

MANUFACTURER'S NAME/CODE NUMBER: Hoffman Laboratories Inc., (82260).



Frequency Meter AN/USM-29

FUNCTIONAL DESCRIPTION:

Frequency Meter AN/USM-29 is designed for rapid measurements of unknown frequencies with a high degree of accuracy. The measuring range extends from 15 kc to 30 mc when zero-beating the unknown signal against a calibrated fundamental frequency. The range can extend up to 300 mc by the use of harmonics of the generated signal and down to 150 cycles by the observation of Lissajous patterns on the built-in oscilloscope.

No field changes in effect at time of preparation (22 March 1962).

TECHNICAL CHARACTERISTICS:

FREQUENCY RANGE

NOMINAL RANGE: 0 to 30 mc.
PRACTICAL RANGE: 15 kc to 30 mc.
USING HARMONICS: 0 to 15 kc and 30 to 300 mc.

AN/USM-29 FREQUENCY METER

TYPE OF FREQUENCY SELECTING CONTROLS: 8 direct-reading dial knobs arranged in a decade system.
TYPE OF OUTPUT: Unmodulated rf.
ACCURACY OF OUTPUT: Porm 1 cyc per mc added to porm 4 cps.
FREQUENCY STABILITY: Output will not vary more than 1 part in 10^6 porm 10 cps.
OUTPUT SIGNAL LEVEL
BELOW 6 MC: 1 v rf (min) into a 500 ohm load.
6 TO 30 MC: 1 v rf (min) into a 50 ohm load.
SUPPRESSION OF HARMONICS AND SPURIOUS SIGNALS IN OUTPUT: All harmonics or spurious frequencies are at least 30 db.
RF INPUT IMPEDANCE: 1,000 ohms (unknown frequency); 100,000 ohms (ext crystal oscillator).
OUTPUT FOR HEADPHONES: 500 to 2,000 ohms; 50 mw max.
OSCILLOSCOPE DATA
FREQUENCY RANGE: 100 cyc to 5 mc.
DEFLECTION SENSITIVITY: 2 v peak to peak per in. between 100 cyc to 3 mc.
INPUT IMPEDANCE
Y-AXIS: 1,000 ohms in parallel with 90 uuf.
X-AXIS: 500 ohms.
POWER REQUIREMENTS: 115 v, 50 to 1,000 cyc, single ph.

RELATION TO OTHER EQUIPMENT:

This equipment is identical to Frequency Meter FR-47/U, except for additional accessories.

EQUIPMENT REQUIRED BUT NOT SUPPLIED:

(1) Input Cord; (1) Headphone 49016; (1) Connector UG-88/U; (as req'd) Coaxial Cable or Wire.

MAJOR COMPONENTS

QTY	ITEM	STOCK NUMBERS	DIMENSIONS (INCHES)	WEIGHT (LBS)
1	Frequency Meter AN/USM-29 includes:			287
1	Cabinet, Electrical Equipment CY-1253/USM-29		19 x 20-7/8 x 24-9/16	40
1	Frequency Meter FR-47/U		19 x 19-1/4 x 24-3/4	162
1	Box Maintenance Repair Parts		9-3/4 x 12-1/2 x 24-1/4	85

REFERENCE DATA AND LITERATURE:

NAVAER 16-30USM29-501: Handbook of Maintenance Instructions for Frequency Meter AN/USM-29.
NAVSHIPS 91938: Technical Manual for Frequency Meter AN/USM-29.

TUBE, CRYSTAL AND/OR SEMI-CONDUCTOR DATA:

TUBES: (1) 1Z2 (1) 2BP1 (2) 5R4GY (4) 6AH6 (27) 6AK5 (8) 6AK6 (13) 6AS6
(1) 6AV6 (1) 6X4W (2) 12AT7 (6) 12AU7 (1) 12AX7 (1) 5651 (1) 6080

(1) 3-38

CRYSTALS: (1) 100 kc

SEMI-CONDUCTORS: (2) 1N38

SHIPPING DATA

PKGS	VOLUME (CU FT)	WEIGHT (LBS)
1	13.6	292
1	3.0	110

PROCUREMENT DATA

PROCURING SERVICE: USN DESIGN COG: USN, BuShips
SPEC &/OR DWG: MIL-F-15627(SHIPS), 15 August 1950

CONTRACTOR	LOCATION	CONTRACT OR ORDER NO.	APPROX. UNIT COST
Hoffman Laboratories Inc., Div. Hoffman Electronics Corp.	Los Angeles, Calif.	NObsr-52722, 30 June 1951	

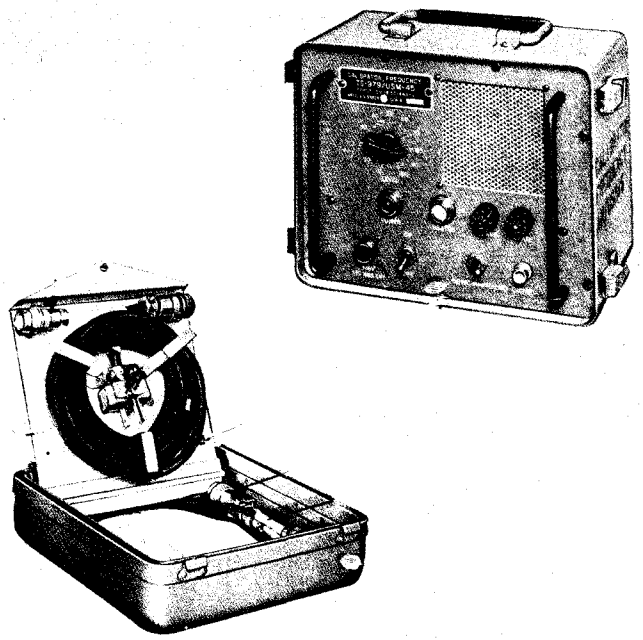
22 June 1962 FREQUENCY CALIBRATOR AN/USM-45

Cog Service: USN FSN: Functional Class: 2.1.1

USA USN USAF

TYPE CLASS: Used by

MANUFACTURER'S NAME/CODE NUMBER: Control Electronics Co. Inc., (95924).



Frequency Calibrator AN/USM-45

FUNCTIONAL DESCRIPTION:

Frequency Calibrator AN/USM-45 is used as a general piece of laboratory and field test equipment for devices operating at UHF and VHF frequencies. It can be used to provide accurate frequency calibration and a sensitivity check of radar receivers and other devices operating in this frequency range. It is designed to be used with receivers having an input impedance of approx 50 ohms and having a dc return.

No field changes in effect at time of preparation (15 March 1962).

TECHNICAL CHARACTERISTICS:

POWER REQUIREMENTS: 32 W, 103.5 to 126.5 v, 50 to 440 cyc, single ph.
CRYSTAL OSCILLATOR FREQUENCY: 50 mc.
OUTPUT SIGNAL FREQUENCIES: 50, 100, 200 mc, and harmonics up to 10,700 mc.

AN/USM-45 FREQUENCY CALIBRATOR

OUTPUT IMPEDANCE: 50 ohms into a low resistance dc load.
OUTPUT LEVEL: M10 dbm at 200 mc to M70 dbm at 10,700 mc.
OUTPUT LEVEL FOR 50 MC SIGNAL: 6 dbm greater than level of harmonics of 100 mc.
AMBIENT TEMPERATURE: M20 deg to P40 deg C (M4 deg to P104 deg F).
ACCURACY: Porm 0.005%.

RELATION TO OTHER EQUIPMENT: None.

EQUIPMENT REQUIRED BUT NOT SUPPLIED: None.

MAJOR COMPONENTS

QTY	ITEM	STOCK NUMBERS	DIMENSIONS (INCHES)	WEIGHT (LBS)
1	Calibrator Frequency AN/USM-45 includes:			
1	Calibrator Frequency TS-979/USM-45		7-1/8 x 7-3/4 x 9-7/8	9.2
1	Power Cable Assy CX-3642/U		96 lg	0.63
1	Allen Wrench, Hexagon Socket #8		5/64 x 5/64 x 1-7/8	
1	R.F. Cable Assy CG-1491/U		72 lg	0.32
1	Calibration Cover CW-418/USM-45		2 x 7-7/16 x 9-3/4	1.44
1	Crystal Unit Adapter (21-603-1 & 1N358)		3/4 x 3/4 x 2-3/16	0.12
1	Adapter UG-565/U		13/16 x 13/16 x 1-5/18	0.12

REFERENCE DATA AND LITERATURE:

NAVAER 16-30USM45-501: Operation Instructions for Frequency Calibrator AN/USM-45.
NAVAER 16-30USM45-502: Service Instructions for Frequency Calibrator AN/USM-45.
NAVAER 16-30USM45-503: Overhaul Instructions for Frequency Calibrator AN/USM-45.
NAVAER 16-30USM45-504: Illustrated Parts Breakdown for Frequency Calibrator AN/USM-45.
TM11-6625-229-10: Operator's Manual for Frequency Calibrator AN/USM-45.
TM11-6625-229-24: Organizational and Field Maintenance for Frequency Calibrator AN/USM-45.
TM11-6625-229-50: Depot Maintenance for Frequency Calibrator AN/USM 45.

TUBE, CRYSTAL AND/OR SEMI-CONDUCTOR DATA:

TUBES: (1) 6X4W (1) 12AT7WA (2) 5654/6AK5W (1) 5686

CRYSTALS: (1) CR-23/U

SEMI-CONDUCTORS: (1) 1N358

SHIPPING DATA

PKGS	VOLUME (CU FT)	WEIGHT (LBS)

PROCUREMENT DATA

PROCURING SERVICE: USN
SPEC &/OR DWG: MIL-C-17957(AER)

DESIGN COG: USN, BuWeps

CONTRACTOR	LOCATION	CONTRACT OR ORDER NO.	APPROX. UNIT COST
Control Electronics Co., Inc. Model no. FC-121	Huntingon Station, N. Y.	N600s-A-3982B	

16 May 1962 | FREQUENCY CALIBRATOR SET AN/USM-53

Cog Service:	FSN:	Functional Class:
	USA USN USAF	

TYPE CLASS:

MANUFACTURER'S NAME/CODE NUMBER: Stone and Smith Inc.

(No Illustration Available)

FUNCTIONAL DESCRIPTION:

Frequency Calibrator Set AN/USM-53 is designed for rapid measurements of fixed frequencies with a high degree of accuracy. There are 26 individually adjusted fixed frequencies. Each frequency is adjustable by capacitor adjustments on individual plug-in units.

No field changes in effect at time of preparation (26 December 1961).

TECHNICAL CHARACTERISTICS:

FREQUENCY RANGE: 20 to 20,000 cps.
NUMBER OF FIXED FREQUENCIES MEASURED: 26 individually adjusted frequencies.
FREQUENCIES AVAILABLE: 40, 50, 63, 80, 100, 125, 160, 200, 250, 315, 400, 500, 630 cps; 1.00, 1.25, 1.60, 2.00, 2.50, 3.15, 4.00, 5.00, 6.30, 8.00, 10.0, 12.5, 16.0 kc.
POWER REQUIREMENTS: 115 v, 60 cyc, single ph.

RELATION TO OTHER EQUIPMENT: None.

EQUIPMENT REQUIRED BUT NOT SUPPLIED: None.

MAJOR COMPONENTS

QTY	ITEM	STOCK NUMBERS	DIMENSIONS (INCHES)	WEIGHT (LBS)
1	Frequency Calibrator Set AN/USM-53 includes:			
1	Calibrator, Frequency FR-92/USM-53		10 x 17 x 20	
1	Cabinet, Electrical Equipment CY-1809/USM-53		10 x 17 x 20	
1	Cover, Calibrator CW-374/USM-53		3 x 17 x 20	

REFERENCE DATA AND LITERATURE: None.

TUBE, CRYSTAL AND/OR SEMI-CONDUCTOR DATA:

TUBES: (1) 0A2WA (1) 0B2WA (1) 5Y3WGTB (1) 5654/6AK5W (2) 6AK6

CRYSTALS: None used.

AN/USM-53 FREQUENCY CALIBRATOR SET

SEMI-CONDUCTORS: (3) 1N69

SHIPPING DATA

PKGS	VOLUME (CU FT)	WEIGHT (LBS)

PROCUREMENT DATA

PROCURING SERVICE: DESIGN COG: USN, BuShips

SPEC &/OR DWG: SHIPS-T-1494

CONTRACTOR	LOCATION	CONTRACT OR ORDER NO.	APPROX. UNIT COST
Stone and Smith Inc.	Los Angeles, Calif.	NObsr-64192, 12 May 1954	$1,330.30

June 1957

Test-Frequency Measuring

WAVEMETER AN/USM-64

FUNCTIONAL DESCRIPTION

The AN/USM-64 is a wavemeter designed for frequency measurement and the detection of signals in the frequency range of 900 to 12,400 mc by means of five frequency meters which are interchangeably mounted singly on the rear of the control panel. The Model 537 modified frequency meter consists of a case and panel assembly containing all controls and storage facilities for the antenna and all accessories. Five frequency meters used to cover the 900 to 12400 mc range, are interchangeable and one is mounted on the rear of the panel when the wavemeter is in use. The frequency meters not in use are not contained within the case and panel assembly.

No field changes in effect at time of preparation (17 December 1956).

ELECTRICAL AND MECHANICAL CHARACTERISTICS

FREQUENCY RANGE: 900 to 12,400 mc.
ACCURACY: ±0.1%.

MANUFACTURER'S OR CONTRACTOR'S DATA

Sperry Gryroscope Co, Great Neck, NY.
Contract NOas 54-383.

TUBE AND/OR CRYSTAL COMPLEMENT

No Electron Tubes.

REFERENCE DATA AND LITERATURE

Nomenclature Card for Wavemeter AN/USM-64.

TYPE CLASSIFICATION
DESIGN COGNIZANCE
PROCUREMENT COGNIZANCE
STOCK NO.
R.D.B. IDENT. NO.

EQUIPMENT SUPPLIED DATA

QUANTITY PER EQUIPT	NAME AND NOMENCLATURE	OVERALL DIMENSIONS (inches)	WEIGHT (lbs.)
1	Wavemeter AN/USM-64 consist of:	7-3/8 X 11-3/4 X 14-3/4	
1	Antenna		
2	Cables, Adapter, Tee		
5	Interchangeable, Panel mtg, meters		

Test-Frequency Measuring

FREQUENCY METER AN/USM-72(XN-1)

FUNCTIONAL DESCRIPTION

The AN/USM-72(XN-1) is used to accurately measure or generate any frequency within the range of 20 to 640 megacycles.

The instrument is a heterodyne frequency meter in which frequencies are measured by heterodyning two signals together in a detector and adjusting them for zero difference in frequency as indicated by the difference frequency heterodyne beat note. The instrument has a fundamental range of 20 through 40 megacycles and uses up to the 16th harmonic for complete coverage throughout the 20 to 640 megacycle range.

No field changes in effect at time of preparation (16 August 1957).

RELATION TO OTHER EQUIPMENT

Identical to Gertsch Products Inc, Los Angeles, California Model Z-2X.

ELECTRICAL AND MECHANICAL CHARACTERISTICS

FREQUENCY RANGE: 20 to 640 mc.
SENSITIVITY: 10 mv over the 20 to 640 mc range for 1 mw audio output connected across 600 ohms.
R.F. OUTPUT: 1 mv minimum over the entire band.
R.F. OUTPUT IMPEDANCE: Approx 50 ohms, above 100 mc, essentially matched.
INPUT-OUTPUT JACK SOURCE IMPEDANCE: 500 ohms in series w/100 uuf.
POWER SOURCE REQUIRED: 135 v DC and 6.3 v DC or 6.3 v, 60 cps, single ph.

MANUFACTURER'S OR CONTRACTOR'S DATA

Gertsch Products Inc, Los Angeles, Calif.
Contract NObsr-71527.
Contract NObsr-57265.

TUBE AND/OR CRYSTAL COMPLEMENT

(4) 6AU6WA (2) 5749/6BA6 (1) 12AT7WA
Total Tubes: (7)

(1) G7E (1) 1N126 (1) GP1-30 (1) IN81
(1) G7A (4) 1N126(matched)
Total Crystals: (9)

REFERENCE DATA AND LITERATURE

NAVSHIPS 92530: Technical Manual for Frequency Meter AN/USM-72(XN-1).

TYPE CLASSIFICATION	
DESIGN COGNIZANCE	BUSHIPS
PROCUREMENT COGNIZANCE	
STOCK NO.	
R.D.B. IDENT. NO.	

SHIPPING DATA

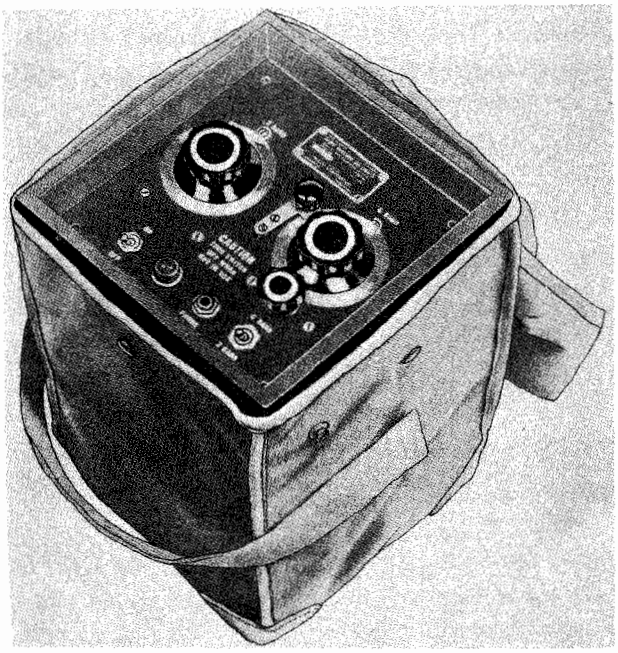
NUMBER OF BOXES	CONTENTS AND IDENTIFICATION	VOLUME (Cu.Ft.)	OVERALL DIMENSIONS (inches)	WEIGHT PACKED (lbs.)
1	Frequency Meter AN/USM-72(XN-1)	4.3	17 X 19 X 23	45

EQUIPMENT SUPPLIED DATA

QUANTITY PER EQUIPT	NAME AND NOMENCLATURE	OVERALL DIMENSIONS (inches)	WEIGHT (lbs.)
1	Frequency Meter AN/USM-72(XN-1)	7-5/8 X 8-5/8 X 10-5/8	11
1	Case	10 X 12 X 15-3/4	11-1/2
1	Antenna	1/2 X 1-1/2 X 8-1/2	
1	Instruction Book		

December 1956

RADIO RECEIVER BC-1066-A,B



Radio Receiver BC-1066-A,B

FUNCTIONAL DESCRIPTION

The BC-1066-A and BC-1066-B are calibrated radio receivers which can be used to check the frequency and to listen to the operation of other radio equipment. The receivers operate within the frequency ranges of the "I" band and "G" band. BC-1066-B covers a wider range of frequencies at the high end of the "G" band than does BC-1066-A. The power supplies for the receivers are self-contained and consist of three 45 v batteries and one 1.5 v battery.

No field changes in effect at time of preparation (19 June 1956).

RELATION TO OTHER EQUIPMENT

Equipment Required but not Supplied: (1) 1.5 v battery BA-35-A, (3) 45 v batteries type BA-53-A, (1) Headset type HS-33 or equivalent, (1) Headset Adapter type MC-385, (1) Frequency Meter BC-906C or BC-906-D, (1) Signal Generator I-196-A or I-196-B.

ELECTRICAL AND MECHANICAL CHARACTERISTICS

FREQUENCY RANGE
BC-1066-A: 150 to 225 mc.
BC-1066-B: 150 to 235 mc.
POWER SOURCE: (3) 45 v batteries and (1) 1.51 v battery.
INDICATION: Aural.
RECEPTION: Heterodyne type
BAND DATA
QUANTITY: 2.
TYPE: "I" band and "G" band.

TUBE AND/OR CRYSTAL COMPLEMENT

(2) 2J957 (1) 2J1D8GT
Total Tubes: (3)

REFERENCE DATA AND LITERATURE

AN16-40BC-1066-2: Handbook of Maintenance Instructions for Radio Receivers BC-1066-A and BC-1066-B.

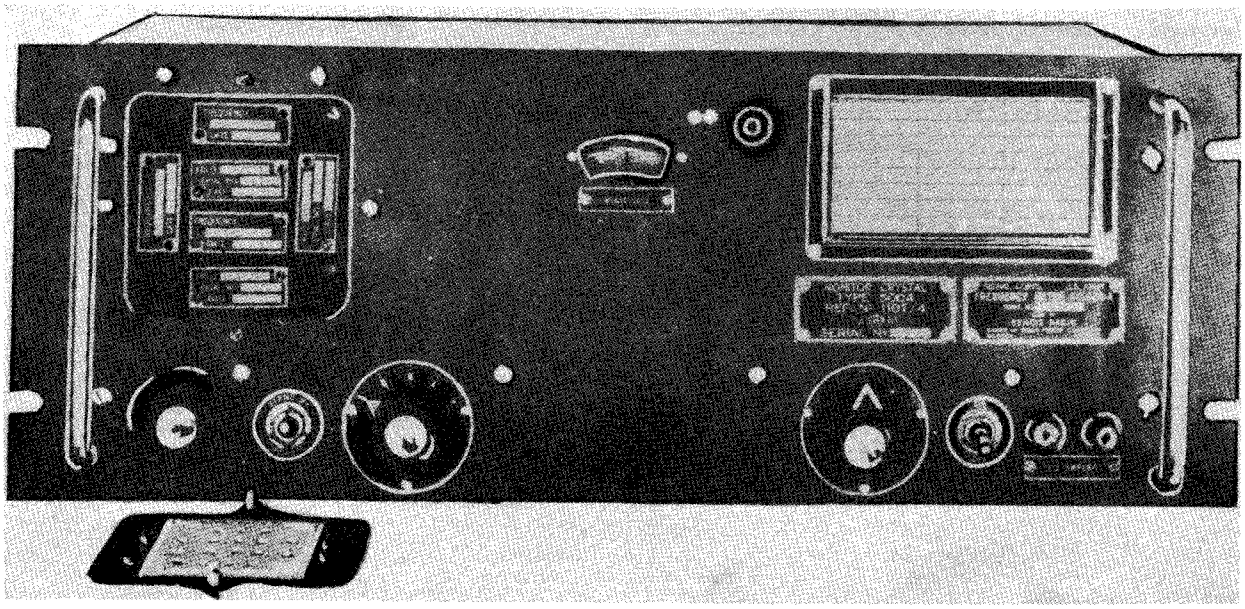
TYPE CLASSIFICATION	
DESIGN COGNIZANCE	TASSA
PROCUREMENT COGNIZANCE	
STOCK NO.	

EQUIPMENT SUPPLIED DATA

QUANTITY PER EQUIPT	NAME AND NOMENCLATURE	OVERALL DIMENSIONS (inches)	WEIGHT (lbs.)
1	Radio Receiver BC-1066-A or BC-1066-B	8 x 8 x 13-1/2	
1	Cover (canvas)	8-3/4 x 8-3/4 x 14	

Test-Frequency Measuring

FREQUENCY METER BC-638-A



Frequency Meter BC-638-A

FUNCTIONAL DESCRIPTION

The BC-638-A is a crystal-controlled signal generator used to preset, test and align radio receivers. It is generally used with Radio Receiver BC-639-().

No field changes in effect at time of preparation (30 April 1958).

RELATION TO OTHER EQUIPMENT

Equipment Required but not Supplied: Crystal Units DC-11, DC-16, or CR-1B/AR.

ELECTRICAL AND MECHANICAL CHARACTERISTICS

FREQUENCY RANGE: 100 to 156 mc.
TONE MODULATION: 30% at 1000 cps.
POWER REQUIREMENTS: 110 to 120 v or 200 to 250 v, 50 to 60 cps, single ph, 30 W; or 6 v dc used in conjunction with Dynamotor Unit PE-100-A.

MANUFACTURER'S OR CONTRACTOR'S DATA

Bendix Radio, Division of Bendix Aviation Corp, Baltimore, Md.
Approximate Cost: $1,050.00 with equipment spares.

TUBE AND/OR CRYSTAL COMPLEMENT

(1) 6SK7	(2) 9003	(1) 9002
(1) 6E5	(1) 6L5G	(1) 5V4G

Total Tubes: (7)
Crystal data not available.

REFERENCE DATA AND LITERATURE

AN16-40BC638-2: Handbook of Maintenance Instructions for Frequency Meter BC-638-A.

TYPE CLASSIFICATION	
DESIGN COGNIZANCE	TASSA
PROCUREMENT COGNIZANCE	
STOCK NO.	
R.D.B. IDENT. NO.	

EQUIPMENT SUPPLIED DATA

QUANTITY PER EQUIPT	NAME AND NOMENCLATURE	OVERALL DIMENSIONS (inches)	WEIGHT (lbs.)
1	Frequency Meter BC-638-A	7 X 11-1/2 X 19	35

Test Frequency Measuring

FREQUENCY METER

BC-906-B

FUNCTIONAL DESCRIPTION

The BC-906-B is an absorption-type meter used to determine the frequency of both radar and Al signals. An external antenna is provided to pick-up the signal to be measured.

No field changes in effect at time of preparation (28 Sept 1956).

RELATION TO OTHER EQUIPMENT

Equipment Required but not Supplied: (1) Battery (1.5 v), (1) Battery (45 v).

ELECTRICAL AND MECHANICAL CHARACTERISTICS

FREQUENCY RANGE: 160 to 220 mc.
ACCURACY: ±0.5 mc.
OPERATING POWER: 1.5 v and 45 v batteries.

TUBE AND/OR CRYSTAL COMPLEMENT

(1) 1S5
Total Tubes: (1)

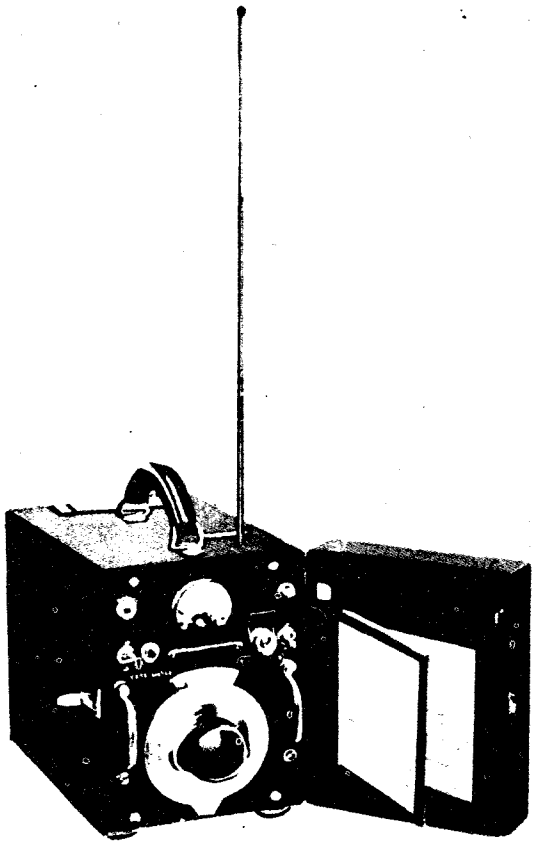
TYPE CLASSIFICATION	
DESIGN COGNIZANCE	TESSA
PROCUREMENT COGNIZANCE	
STOCK NO.	
R.D.B. IDENT. NO.	

EQUIPMENT SUPPLIED DATA

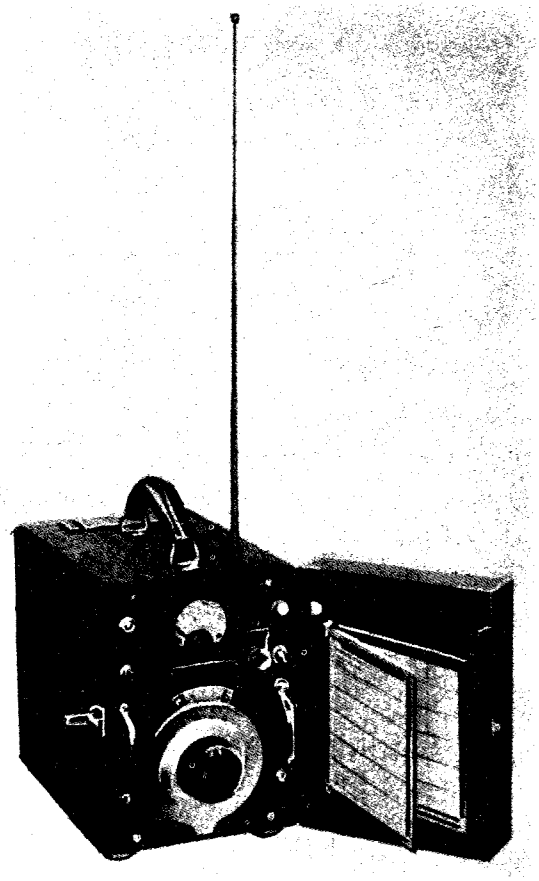
QUANTITY PER EQUIPT	NAME AND NOMENCLATURE	OVERALL DIMENSIONS (inches)	WEIGHT (lbs.)
1	Frequency Meter BC-906-B	5-3/4 x 9 x 14	
1	Antenna		
2	Cable RF		
1	Book, Calibration		

FREQUENCY METER

BC-906-C,D,E



Frequency Meter BC-906-E



Frequency Meter BC-906-C or D

FUNCTIONAL DESCRIPTION

The BC-906-C, BC-906-D and BC-906-E are absorption type frequency meters for determining the frequency of both radar and CW radio frequency signals. An external antenna is provided to pick up the signal to be measured. Frequency settings are indicated by the maximum dip in the reading of a microammeter located on the front panel of the instrument. A phone jack is provided which permits the frequency meter to be used as an audio monitor. A jack is provided on the BC-906-E only which permits the microammeter to be completely disconnected from the frequency meter circuit and employed for external measuring. The BC-906-C, BC-906-D and BC-906-E also differ in the range of frequencies covered.

No field changes in effect at time of preparation (19 June 1956).

RELATION TO OTHER EQUIPMENT

Equipment Required but not Supplied: (1) 1.5 v battery BA-35-A or subsequent production, (1) 45 v battery BA-53-A.

ELECTRICAL AND MECHANICAL CHARACTERISTICS

FREQUENCY RANGE
BC-906-D: 160 to 220 mc.
BC-906-E: 150 to 234 mc.
ACCURACY: ±0.5 mc.
POWER SOURCE: (1) 1.5 v battery and (1) 45 v battery.

TUBE AND/OR CRYSTAL COMPLEMENT

(1) 1S5
Total Tubes: (1)

BC-906-C,D,E FREQUENCY METER

September 1956

REFERENCE DATA AND LITERATURE

AN 08-40BC906-2: Handbook of Maintenance Instructions for Frequency Meters-BC-906-C, BC-906-D, BC-906-E.

TYPE CLASSIFICATION
DESIGN COGNIZANCE TASSA
PROCUREMENT COGNIZANCE
STOCK NO.
R.D.B. IDENT. NO.

SHIPPING DATA

NUMBER OF BOXES	CONTENTS AND IDENTIFICATION	VOLUME (Cu.Ft.)	OVERALL DIMENSIONS (inches)	WEIGHT PACKED (lbs.)
1	Frequency Meter BC-906-C, BC-906-D or BC-906-E	1.44	10 X 14 X 17-3/4	33

EQUIPMENT SUPPLIED DATA

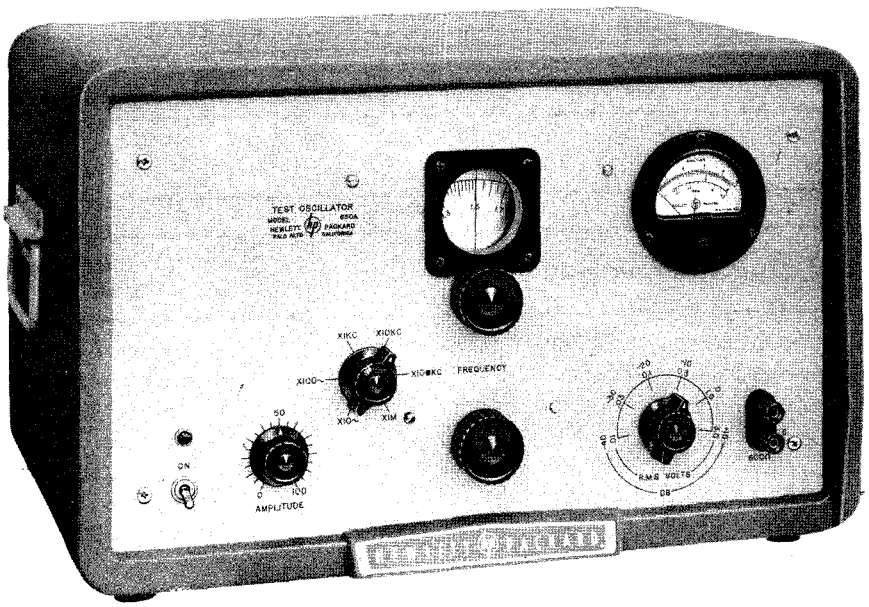
QUANTITY PER EQUIPT	NAME AND NOMENCLATURE	OVERALL DIMENSIONS (inches)	WEIGHT (lbs.)
1	Frequency Meter BC-906-C, BC-906-D or BC-906-E	6-1/2 x 9-1/4 x 12-3/8	17.8
1	Antenna (extendible type)	0.218 dia x 20	
1	Chart (calibration)	5-1/2 x 5-5/8	
1	Transportation Case	10 x 14 x 17-3/4	15.2

15 May 1962 | TEST OSCILLATOR CAQI-650A

Cog Service:	FSN:	Functional Class:
	USA	USN	USAF

TYPE CLASS:

MANUFACTURER'S NAME/CODE NUMBER: Hewlett-Packard Co.



Test Oscillator CAQI-650A

FUNCTIONAL DESCRIPTION:

The Test Oscillator CAQI-650A brings audio frequency speed, accuracy and ease of operation to higher frequency fields. Its wide frequency range, 10 cps to 10 mc, makes it ideal for a wide variety of measurements in audio, ultra-sonic, video and R.F. bands. It is a wide-band highly-stable precision instrument which provides output flat within 1 db through-out its frequency range.

No field changes in effect at time of preparation (23 June 1961).

TECHNICAL CHARACTERISTICS:

TYPE OF INSTALLATION: Portable-rack-mounted.
FREQUENCY RANGE: 10 cps to 10 mc.
NUMBER OF BANDS: Six decade bands.
CALIBRATION ACCURACY: Porm 2%, 10 cps to 100 kc, porm 3%, 100 kc to 10 mc including warmup, and porm 10% line voltage variation.

CAQI-650A TEST OSCILLATOR

OUTPUT: 15 mw or 3 v into 600 ohm resistive load. Open circuit is at least 6 v.
SOURCE IMPEDANCE: 600 ohms; 300 ohms or 6 ohms when using 65A-16D Output Divider Cable.
FREQUENCY RESPONSE: Flat within porm 1 db, 10 cps to 10 mc into 600 ohm resistive load.
DISTORTION: Less than 1% from 20 cps to 100 kc. Less than 2% from 100 kc to 1 mc. Approx 5% at 10 mc.
OUTPUT MONITOR: Vacuum tube voltmeter monitors level at input to attenuator, in volts or db at 600 ohm level. Zero db = 1 mw in 600 ohms. Accuracy porm 5% of full scale reading.
OUTPUT ATTENUATOR: Output level attenuated 50 db in 10 db steps, providing continuously variable output voltage from P12 dbm to M50 dbm, 3 volts to 3 mv, or down to 30 microvolts with voltage divider. Accuracy porm db, into resistive load of 600 ohms.
HUM VOLTAGE: Less than 0.5% of output voltage w/meter at full scale.
OPERATING POWER RQMT: 115 to 230 v ac, 50 to 1000 cps, 165 W.

RELATION TO OTHER EQUIPMENT: None.

EQUIPMENT REQUIRED BUT NOT SUPPLIED: None.

MAJOR COMPONENTS

QTY	ITEM	STOCK NUMBERS	DIMENSIONS (INCHES)	WEIGHT (LBS)
1	Test Oscillator CAQI-650A consists of:		12-1/2 x 14-3/4 x 20-1/2	46
1	Voltage Divider 65A-16D			

REFERENCE DATA AND LITERATURE:

The Hewlett-Packard Company Catalog ESO Copy #1961-F for Electronic Test Instruments Test Oscillator Model CAQI-650A.
NAVSHIPS 93400: Preliminary Data Form for Test Oscillator CAQI-650A.

TUBE, CRYSTAL AND/OR SEMI-CONDUCTOR DATA:

TUBES: Data not available.

CRYSTALS: Data not available.

SEMI-CONDUCTORS: Data not available.

SHIPPING DATA

PKGS	VOLUME (CU FT)	WEIGHT (LBS)

PROCUREMENT DATA

PROCURING SERVICE:
DESIGN COG: USN, BuShips
SPEC &/OR DWG: Commercial

TEST OSCILLATOR CAQI-650A

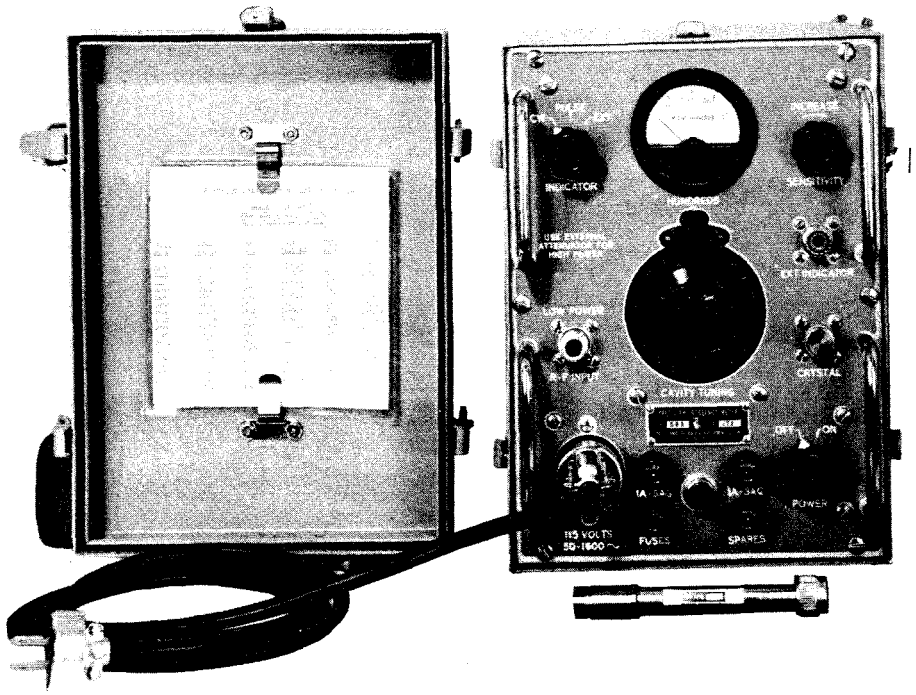
CONTRACTOR	LOCATION	CONTRACT OR ORDER NO.	APPROX. UNIT COST
Hewlett-Packard Co. Model 650A	Palo Alto, California	NObsr-81333, 3 June 1960	$490.00

Cog Service: FSN: Functional Class:

USA USN USAF

TYPE CLASS:

MANUFACTURER'S NAME/CODE NUMBER: Polytechnic Research & Development Co., Inc.



Frequency Meter CBES-560-S-1

FUNCTIONAL DESCRIPTION:

The Frequency Meter CBES-560-S-1 is a calibrated line terminating precision frequency meter designed for measurement of low power pulsed signals. Consists of a tunable coaxial cavity, a broad band crystal detector, pulse amplifying and integrating circuits, and an indicating meter. The coaxial cavity is tuned by a plunger coupled to a Cavity Tuning Dial with a counter dial and a vernier. A calibration chart converts dial and counter readings to frequency. In continuous wave (CW) operation, the amplifying and integrating circuits are switched out and the detected crystal current is indicated on the meter. Adequate meter indication is obtained for average pulse power from 0.1 mw to 1 watt.

No field changes in effect at time of preparation (27 June 1961).

TECHNICAL CHARACTERISTICS:

TYPE OF INSTALLATION: Portable, bench-mounted.

CBES-560-S-1 FREQUENCY METER

R.F. POWER INPUT RANGE (PEAK PULSE): 0.5 mw to 50 W (1 W max average power).
CONTINUOUS WAVE: 5 mw to 1 W.
PULSE INPUT: 250 to 10,000 pps.
FREQUENCY RANGE: 2.7 to 3.7 kmc.
ACCURACY IN MC/SEC: Porm 0.3 at calibration temperature, porm 0.8 from M40 deg to P50 deg C.
VERNIER LEAST COUNT (MC/SEC): 0.07.
MINIMUM DIP: 15%.
OPERATING POWER RQMT: 115 v ac, 50 to 1,600 cps, single ph, 50 W.

RELATION TO OTHER EQUIPMENT: None.

EQUIPMENT REQUIRED BUT NOT SUPPLIED: None.

MAJOR COMPONENTS

QTY	ITEM	STOCK NUMBERS	DIMENSIONS (INCHES)	WEIGHT (LBS)
1	Frequency Meter CBES-560-S-1			20

REFERENCE DATA AND LITERATURE:

Polytechnic Research & Development Company Inc. Catalog ESO Copy #0389-S for Precision Test Equipment Frequency Meter CBES-560-S-1.
NAVSHIPS 93400: Preliminary Data Form for Frequency Meter CBES-560-S-1.

TUBE, CRYSTAL AND/OR SEMI-CONDUCTOR DATA:

TUBES: (1) 6SJ7WGT (1) 6SN7WGT (1) 5726/6AL5W (1) 6J6WA (1) 6X4A

CRYSTALS: None used.

SEMI-CONDUCTORS: None used.

SHIPPING DATA

PKGS	VOLUME (CU FT)	WEIGHT (LBS)

PROCUREMENT DATA

PROCURING SERVICE: DESIGN COG: USN, BuShips
SPEC &/OR DWG: Commercial

CONTRACTOR	LOCATION	CONTRACT OR ORDER NO.	APPROX. UNIT COST
Polytechnic Research & Development Co. Inc. Type no. 560-S-1	Brooklyn, N. Y.		$1300.00

September 1956

FREQUENCY STANDARD FR-109/FQQ-1

FUNCTIONAL DESCRIPTION

The FR-109/FQQ-1 consists of a 240 cps tuning fork whose output frequency is accurate to 1 ppm/deg C over the operating range, a frequency divider which reduces the 240 cps input to 60 cps square wave output and a power amplifier. The 60 cps square wave is integrated, filtered and the remaining 60 cps sine-wave amplified to 2 W signal strength at 110 v. The frequency of this output is accurate to 1 part in 105. This apparatus supplies power to the TIMER MOTOR in the TIMER-CODER and driving voltages to the Calibrating Generator and Pilot Generator.

No field changes in effect at time of preparation (27 July 1956).

ELECTRICAL AND MECHANICAL CHARACTERISTICS

FREQUENCY: 60 cycle.

FREQUENCY ACCURACY: ±0.001%.
SIGNAL OUTPUT: 2 W at 110 v AC.
OPERATING POWER: 6.0 , AC, 410 cps, single ph; +250 v DC.

TUBE AND/OR CRYSTAL COMPLEMENT

No Electron Tubes.

REFERENCE DATA AND LITERATURE

Nomenclature Card for Frequency Standard FR-109/FQQ-1.

TYPE CLASSIFICATION	
DESIGN COGNIZANCE	
PROCUREMENT COGNIZANCE	
STOCK NO.	
R.D.B. IDENT. NO.	

EQUIPMENT SUPPLIED DATA

QUANTITY PER EQUIPT	NAME AND NOMENCLATURE	OVERALL DIMENSIONS (inches)	WEIGHT (lbs.)
1	Frequency Standard FR-109/FQQ-1 consists of:	5-1/4 x 6-7/8 x 19	
1	Amplifier		
1	Frequency Divider		
1	Oscillator, A.F.		
1	Resistor, Variable		
1	Marked Panel		
1	Connector, Receptacle		

15 May 1962 | FREQUENCY METER FR-143/U

Cog Service:	FSN:	Functional Class:
	USA USN USAF	

TYPE CLASS:

MANUFACTURER'S NAME/CODE NUMBER: Berkeley Div. of Beckman Instruments Inc.

(No Illustration Available)

FUNCTIONAL DESCRIPTION:

Frequency Meter FR-143/U is a self-contained, general purpose, 10 mc, frequency-measuring instrument, counter, and timer. The FR-143/U performs as a high-speed counter, and as a period measurement, events-per unit-time, and a time-interval meter. The FR-143/U has a broad range of applications involving frequency, frequency ratio, and time-interval measurements with 10 distinct operating functions plus self-test. The FR-143/U is of modular construction. The FR-143/U is not provided with a carrying case.

No field changes in effect at time of preparation (26 June 1961).

TECHNICAL CHARACTERISTICS:

FREQUENCY: 10 cps to 10 mc max rate (0.1 usec min. time unit).
NUMBER OF CHANNELS: 3 input.
TIME INTERVAL: 0.3 usec to 10^7 sec.
PERIOD: 0 to 3 mc.
RATIO: 1 to 10^7 (10 cps to 10 mc).
POWER REQUIREMENTS: 115 v, 50 to 60 cyc, single ph.

RELATION TO OTHER EQUIPMENT:

This equipment is used with, but is not a part of, Signal Data Recorder RO-153/U.

EQUIPMENT REQUIRED BUT NOT SUPPLIED: None.

MAJOR COMPONENTS

QTY	ITEM	STOCK NUMBERS	DIMENSIONS (INCHES)	WEIGHT (LBS)
1	Frequency Meter FR-143/U		10-1/4 x 16-1/2 x 20-3/4	

REFERENCE DATA AND LITERATURE:

NAVSHIPS 93400: Preliminary Data Sheet for Frequency Meter FR-143/U.

TUBE, CRYSTAL AND/OR SEMI-CONDUCTOR DATA:

TUBES: Data not available.

CRYSTALS: Data not available.

FR-143/U FREQUENCY METER

SEMI-CONDUCTORS: Data not available.

SHIPPING DATA

PKGS	VOLUME (CU FT)	WEIGHT (LBS)

PROCUREMENT DATA

PROCURING SERVICE: DESIGN COG: USN, BuShips
SPEC &/OR DWG:

CONTRACTOR	LOCATION	CONTRACT OR ORDER NO.	APPROX. UNIT COST
Berkeley Div. of Beckman Instruments Inc. Model no. 7370	Richmond, Calif.		

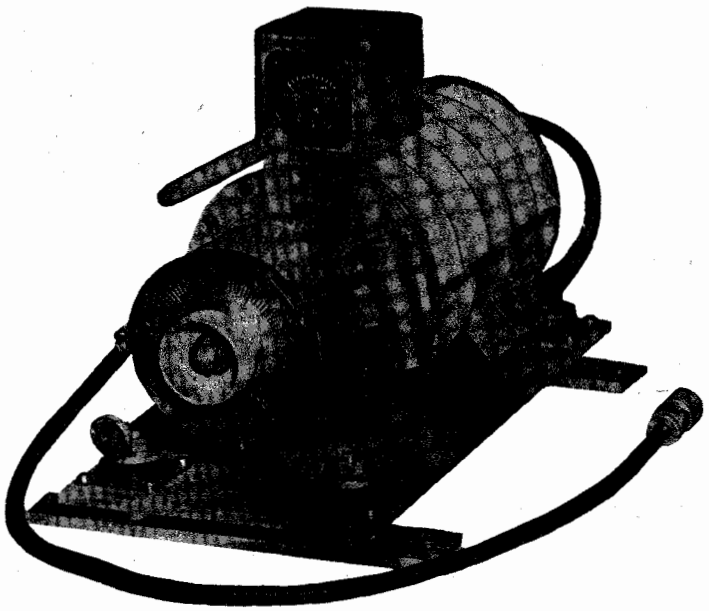
18 May 1962 ECHO BOX FR-144/U

Cog Service: FSN: 5840-448-0053 Functional Class:

USA USN USAF

TYPE CLASS:

MANUFACTURER'S NAME/CODE NUMBER: Johnson Service Co.



Echo Box FR-144/U

FUNCTIONAL DESCRIPTION:

Echo Box FR-144/U is a portable test set designed to permit convenient field testing of the performance of radars operating in the frequency range of 5440 to 5840 mc. When properly used, this echo box is helpful in recognizing and localizing troubles. It should be used daily to measure the "ringtime" of the radar, and if this measured value differs from that predicted for the particular radar under test by more than five decibels, the radar should be repaired.

No field changes in effect at time of preparation (17 May 1961).

TECHNICAL CHARACTERISTICS:

FREQUENCY RANGE: 5440 to 5840 mc.
FREQUENCY CONTROL: Hand tuned.
CONNECTING CABLE: 3 ft. 9 in. RG-21A/U cable with UG-18C/U connector.
RINGTIME: 4000 to 5000 yds.

FR-144/U ECHO BOX

RELATION TO OTHER EQUIPMENT: None.

EQUIPMENT REQUIRED BUT NOT SUPPLIED:

(1) Directional Coupler.

MAJOR COMPONENTS

QTY	ITEM	STOCK NUMBERS	DIMENSIONS (INCHES)	WEIGHT (LBS)
1	Echo Box FR-144/U includes:		9 x 9 x 14	15
1	Cable			
1	T-Handle Socket Wrench			
2	Technical Manual NAVSHIPS 93858		1/4 x 8-1/2 x 11	

REFERENCE DATA AND LITERATURE:

NAVSHIPS 93858: Technical Manual for Echo Box FR-144/U.

TUBE, CRYSTAL AND/OR SEMI-CONDUCTOR DATA:

TUBES: None used.

CRYSTALS: None used.

SEMI-CONDUCTORS: (1) 1N25

SHIPPING DATA

PKGS	VOLUME (CU FT)	WEIGHT (LBS)
1	2.1	40

PROCUREMENT DATA

PROCURING SERVICE: DESIGN COG: USN, BuShips
SPEC &/OR DWG:

CONTRACTOR	LOCATION	CONTRACT OR ORDER NO.	APPROX. UNIT COST
Johnson Service Co. Model no. 86-18209	Milwaukee, Wis.	NObsr-85005, 4 August 1960	$300.00

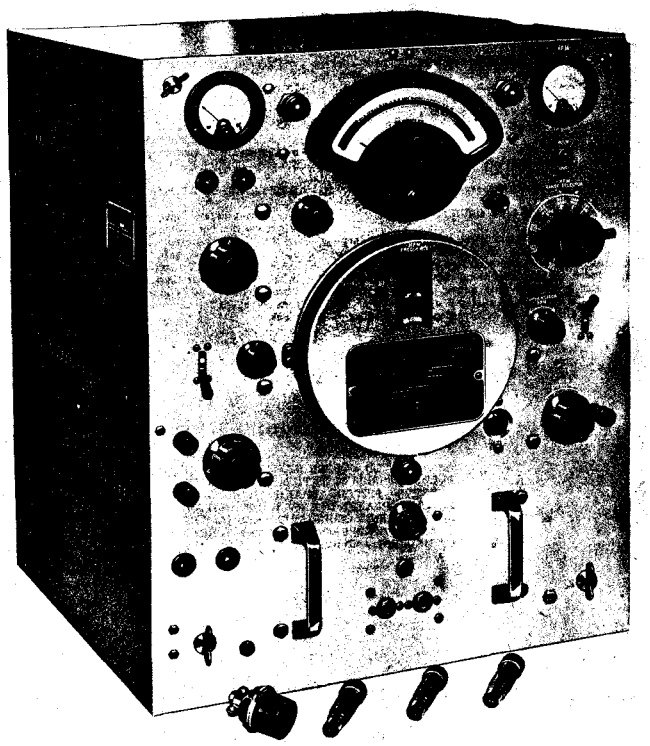
7 June 1962 **FREQUENCY METER FR-36/U**

Cog Service: USN FSN: 6625-643-3139 **Functional Class: 2.1.3**

USA	USN	USAF

TYPE CLASS: Used By

MANUFACTURER'S NAME/CODE NUMBER: General Radio Company, (24655).



Frequency Meter FR-36/U

FUNCTIONAL DESCRIPTION:

Frequency Meter FR-36/U is intended for measuring the frequencies of radio transmitters, or for setting radio receivers to designated frequencies, in the range of 160 kc to 30 mc. By harmonic extension, frequencies above 30 mc may be measured. The equipment is accurate to porm 0.003% or porm 50 cycles, whichever is greater.

No field changes in effect at time of preparation (1 February 1962).

TECHNICAL CHARACTERISTICS:

FREQUENCY RANGE: 160 kc to 30 mc; by harmonic extension, frequencies above 30 mc may be measured.

TUNING BANDS

BAND 1: 160 kc to 232 kc.
BAND 2: 232 kc to 330 kc.
BAND 3: 330 kc to 470 kc.
BAND 4: 470 kc to 660 kc.
BAND 5: 660 kc to 940 kc.
BAND 6: 940 kc to 1.33 mc.

BAND 7: 1.33 mc to 1.87 mc.
BAND 8: 1.87 mc to 2.65 mc.
BAND 9: 2.65 mc to 3.75 mc.
BAND 10: 3.75 mc to 5.30 mc.
BAND 11: 5.30 mc to 7.50 mc.
BAND 12: 7.50 mc to 10.60 mc.
BAND 13: 10.60 mc to 15.00 mc.

TYPE OF FREQUENCY CONTROL: Crystal oscillator (Calibrator), Colpitts oscillator (Frequency Meter).

TYPE OF SIGNAL MEASURED: A1, A2, A3.

A.F. AMPLIFIER OUTPUT: 6 mw into a 600 ohm load.

CRYSTAL: Quartz bar, 100 kc porm 0.0005% at 50 deg C (122 deg F).

FREQUENCY STABILITY: Five parts in a million.

OUTPUT IMPEDANCES
CALIBRATOR OUTPUT: 1,000 ohms.
AUDIO OUTPUT: 600 ohms.
R.F. OUTPUT: 600 ohms.

R.F. INPUT IMPEDANCE: 10,000 ohm potentiometer.

CHARACTERISTICS OF POWER SUPPLY:
TYPE: Self-contained, full-wave voltage regulated power supply.
VOLTAGE REQUIRED: P115 v, 50 to 1,000 cyc, single ph.
CURRENT REQUIRED
STANDBY: 0.4 amp.
OPERATION: 1.38 amps, 1.27 amps (crystal heat off).

HEAT DISSIPATION
STANDBY: 36 W.
OPERATION: 152 W.
OPERATION (CRYSTAL HEAT OFF): 142 W.

RELATION TO OTHER EQUIPMENT: None.

EQUIPMENT REQUIRED BUT NOT SUPPLIED:

(2) Telephone Receiver and Headset NT-49023.

MAJOR COMPONENTS

QTY	ITEM	STOCK NUMBERS	DIMENSIONS (INCHES)	WEIGHT (LBS)
1	Frequency Meter FR-36/U		17-1/2 x 18 x 23	146

REFERENCE DATA AND LITERATURE:

NAVSHIPS 91930: Technical Manual for Frequency Meter FR-36/U.

TUBE, CRYSTAL AND/OR SEMI-CONDUCTOR DATA:

TUBES: (2) 0C3 (1) 5R4WGY (1) 6AC7W (1) 6AU6 (1) 6AV6 (2) 6135 (1) 6SK7W (1) 6X4W (2) 884 (9) 5693

CRYSTALS: (1) 100 kc

SEMI-CONDUCTORS: (1) 1N69

SHIPPING DATA

PKGS	VOLUME (CU FT)	WEIGHT (LBS)
1	14.1	230

PROCUREMENT DATA

PROCURING SERVICE: USN
SPEC &/OR DWG: 16F1(RE)

DESIGN COG: USN, BuShips

CONTRACTOR	LOCATION	CONTRACT OR ORDER NO.	APPROX. UNIT COST
General Radio Co.	Cambridge, Mass.	NObsr-52609, 21 June 1951	

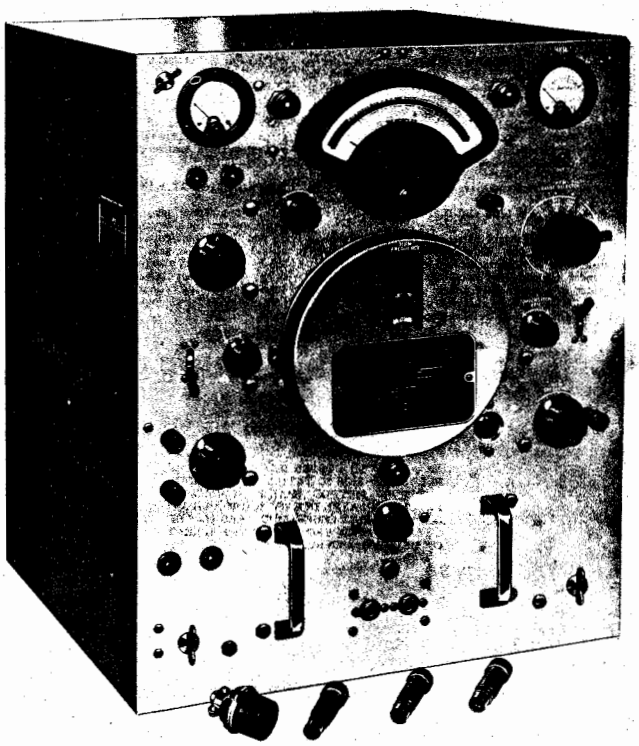
24 May 1962 FREQUENCY METER FR-36A/U

Cog Service: USN FSN: Functional Class: 2.1.3

USA USN USAF

TYPE CLASS: Used by

MANUFACTURER'S NAME/CODE NUMBER: J. W. Fecker Co., (73093).



Frequency Meter FR-36A/U

FUNCTIONAL DESCRIPTION:

Frequency Meter FR-36A/U is intended for measuring the frequencies of radio transmitters, or for setting radio receivers to designated frequencies, in the range of 160 kc to 30 mc. By harmonic extension, frequencies above 30 mc may be measured. The equipment is accurate to 0.003% or porm 50 cycles, whichever is greater.

No field changes in effect at time of preparation (3 January 1962).

TECHNICAL CHARACTERISTICS:

FREQUENCY RANGE: 160 kc to 30 mc; by harmonic extension, frequencies above 30 mc may be measured.

TUNING BANDS

BAND 1: 160 kc to 232 kc.

BAND 2: 232 kc to 330 kc.

BAND 3: 330 kc to 470 kc.
BAND 4: 470 kc to 660 kc.
BAND 5: 660 kc to 940 kc.
BAND 6: 940 kc to 1.33 mc.
BAND 7: 1.33 mc to 1.87 mc.
BAND 8: 1.87 mc to 2.65 mc.
BAND 9: 2.65 mc to 3.75 mc.
BAND 10: 3.75 mc to 5.30 mc.
BAND 11: 5.30 mc to 7.50 mc.
BAND 12: 7.50 mc to 10.60 mc.
BAND 13: 10.60 mc to 15.00 mc.

TYPE OF FREQUENCY CONTROL: Crystal oscillator (Calibrator), Colpitts oscillator (Frequency Meter).

TYPE OF SIGNAL MEASURED: A1, A2, A3.

A.F. AMPLIFIER OUTPUT: 6 mw into a 600 ohm load, through headphones.

CRYSTAL: Quartz bar, 100 kc porm 0.0005% at 50 deg C (122 deg F).

FREQUENCY STABILITY: Five parts in a million.

OUTPUT IMPEDANCES
- CALIBRATOR OUTPUT: 1,000 ohms.
- AUDIO OUTPUT: 600 ohms.
- R.F. OUTPUT: 600 ohms.

R.F. INPUT IMPEDANCE: 10,000 ohm potentiometer.

CHARACTERISTICS OF POWER SUPPLY
- TYPE: Self-contained, full-wave voltage regulated power supply.
- VOLTAGE REQUIRED: P115 v, 50 to 400 cyc, single ph.
- CURRENT REQUIRED
  - STANDBY: 0.4 amp.
  - OPERATION: 1.38 amps, 1.27 amps (crystal heat off).

HEAT DISSIPATION
- STANDBY: 36 W.
- OPERATION: 152 W.
- OPERATION (CRYSTAL HEAT OFF): 142 W.

RELATION TO OTHER EQUIPMENT: None.

EQUIPMENT REQUIRED BUT NOT SUPPLIED:

(2) Telephone Receiver and Headset NT-49023; (1) Multimeter ME-25A/U; (1) Multimeter AN/PSM-4 (optional).

MAJOR COMPONENTS

QTY	ITEM	STOCK NUMBERS	DIMENSIONS (INCHES)	WEIGHT (LBS)
1	Frequency Meter FR-36A/U		17-1/2 x 18 x 23	146

REFERENCE DATA AND LITERATURE: None.

TUBE, CRYSTAL AND/OR SEMI-CONDUCTOR DATA:

TUBES: (2) 0C3 (1) 5R4WGB (1) 6AC7W (1) 6AU6 (1) 6AV6 (2) 6C4W (1) 6SK7W (1) 6X4W (2) 884 (9) 5693

CRYSTALS: (1) 100 kc

SEMI-CONDUCTORS: (1) 1N69

SHIPPING DATA

PKGS	VOLUME (CU FT)	WEIGHT (LBS)
1	14.1	230

PROCUREMENT DATA

PROCURING SERVICE: USN DESIGN COG: USN, BuShips
SPEC &/OR DWG: MIL-F-16316A(SHIPS), Amend 1

CONTRACTOR	LOCATION	CONTRACT OR ORDER NO.	APPROX. UNIT COST
J. W. Fecker Co.	Pittsburgh, Pa.	NObsr-71839	$1,895.00
		NObsr-75082	$3,860.00
		NObsr-75526(FBM)	$6,000.00

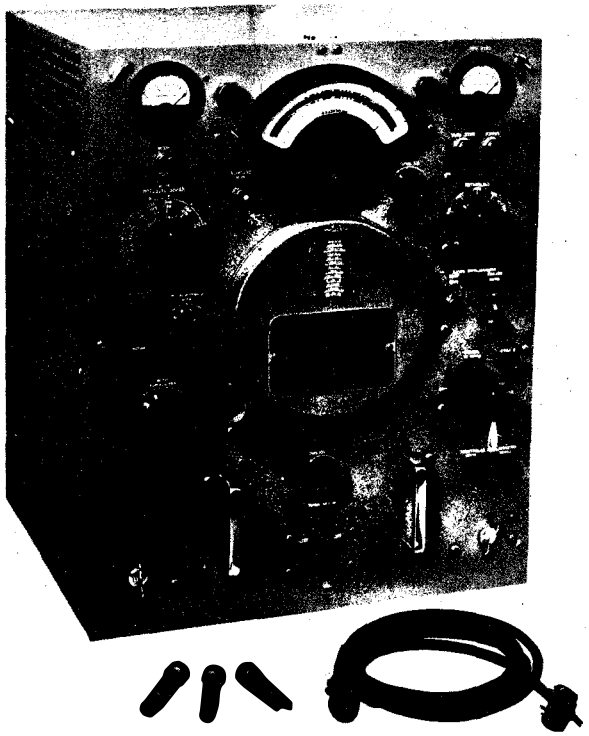
7 May 1962 FREQUENCY METER FR-36B/U

Cog Service: USN FSN: 6625-765-9847 Functional Class: 2.1.3

USA USN USAF

TYPE CLASS: Used by

MANUFACTURER'S NAME/CODE NUMBER: VOI-SHAN Electronics, (09991).



Frequency Meter FR-36B/U

FUNCTIONAL DESCRIPTION:

Frequency Meter FR-36B/U is intended for measuring the frequencies of radio transmitters, or for setting radio receivers to designated frequencies, in the range of 160 kc to 30 mc. By harmonic extension, frequencies above 30 mc may be measured. The equipment is accurate to porm 0.003% or porm 50 cycles, whichever is greater.

No field changes in effect at time of preparation (31 January 1962).

TECHNICAL CHARACTERISTICS:

FREQUENCY RANGE: 160 kc to 30 mc; by harmonic extension, frequencies above 30 mc may be measured.

TUNING BANDS

BAND 1: 160 kc to 232 kc.

BAND 2: 232 kc to 330 kc.

BAND 3: 330 kc to 470 kc.
BAND 4: 470 kc to 660 kc.
BAND 5: 660 kc to 940 kc.
BAND 6: 940 kc to 1.33 mc.
BAND 7: 1.33 mc to 1.87 mc.
BAND 8: 1.87 mc to 2.65 mc.
BAND 9: 2.65 mc to 3.75 mc.
BAND 10: 3.75 mc to 5.30 mc.
BAND 11: 5.30 mc to 7.50 mc.
BAND 12: 7.50 mc to 10.60 mc.
BAND 13: 10.60 mc to 15.00 mc.

TYPE OF FREQUENCY CONTROL: Crystal oscillator (Calibrator), Colpitts oscillator (Frequency Meter).
TYPE OF SIGNAL MEASURED: A1, A2, A3.
A.F. AMPLIFIER OUTPUT: 6 mw into a 600 ohm load, through headphones.
CRYSTAL: Quartz bar, 100 kc porm 0.0005% at 50 deg C (122 deg F).
FREQUENCY STABILITY: Five parts in a million.
OUTPUT IMPEDANCES
CALIBRATOR OUTPUT: 1,000 ohms.
AUDIO OUTPUT: 600 ohms.
R.F. OUTPUT: 600 ohms.
R.F. INPUT IMPEDANCE: 10,000 ohm potentiometer.
CHARACTERISTICS OF POWER SUPPLY
TYPE: Self-contained, full-wave voltage regulated power supply.
VOLTAGE REQUIRED: P115 v, 50 to 400 cyc, single ph.
CURRENT REQUIRED
STANDBY: 0.4 amp.
OPERATION: 1.38 amps, 1.27 amps (crystal heat off).
HEAT DISSIPATION
STANDBY: 36 W.
OPERATION: 152 W.
OPERATION (CRYSTAL HEAT OFF): 142 W.

RELATION TO OTHER EQUIPMENT: None.

EQUIPMENT REQUIRED BUT NOT SUPPLIED:

(2) Telephone Receiver and Headset NT-49023; (1) Multimeter ME-25A/U; (1) Multimeter AN/PSM-4 (optional).

MAJOR COMPONENTS

QTY	ITEM	STOCK NUMBERS	DIMENSIONS (INCHES)	WEIGHT (LBS)
1	Frequency Meter FR-36B/U includes:		17-1/2 x 18 x 23	146
1	Cable, Special Purpose		36 lg	0.62
1	Cable Ass'y, Power		96 lg	1.75
3	Connectors, Male, BNC			
1	Technical Manual NAVSHIPS 93542			

REFERENCE DATA AND LITERATURE:

NAVSHIPS 93542: Technical Manual for Frequency Meter FR-36B/U.

TUBE, CRYSTAL AND/OR SEMI-CONDUCTOR DATA:

TUBES: (2) 0C3W (1) 5R4WGB (1) 6AC7WA (1) 6AU6WA (1) 6AV6 (2) 6C4WA (1) 6SK7WA
(1) 6X4W (2) 8B4 (9) 5693

CRYSTALS: (1) 100 kc

SEMI-CONDUCTORS: (1) 1N69A

SHIPPING DATA

PKGS	VOLUME (CU FT)	WEIGHT (LBS)
1	14.1	230

PROCUREMENT DATA

PROCURING SERVICE: USN DESIGN COG: USN, BuShips
SPEC &/OR DWG: MIL-F-16316A(SHIPS), Amend 1

CONTRACTOR	LOCATION	CONTRACT OR ORDER NO.	APPROX. UNIT COST
VOI-SHAN Electronics	North Hollywood, California	NObsr-75430, 2 July 1958	$2,612.00
		NObsr-75703	$2,612.00

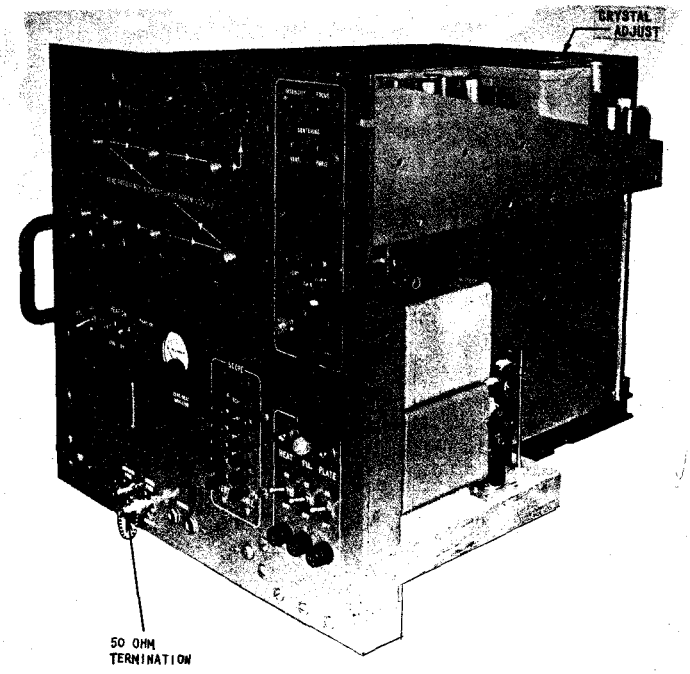
24 May 1962 FREQUENCY METER FR-47(XN-1)/U

Cog Service: USN FSN: Functional Class: 2

USA	USN	USAF

TYPE CLASS: Used by

MANUFACTURER'S NAME/CODE NUMBER: Federal Telecommunication Labs Inc., (90438).



Frequency Meter FR-47(XN-1)/U

FUNCTIONAL DESCRIPTION:

The Frequency Meter FR-47(XN-1)/U is designed for rapid and very precise frequency measurements between 15 kilocycles (KC) and 30 megacycles (MC). It consists of a signal source capable of being set to any frequency between 0 and 30 mc, two (2) beat detectors by means of which the frequency being measured is compared with the frequency of the signal source, and the necessary power supplies required for operation from a 105 to 125 volt, single phase, 50 to 1600 cycle per second (CPS) source. The output of the signal source is also available at a jack on the front panel for use as an exciter, precision frequency generator, etc.

No field changes in effect at time of preparation (11 August 1961).

TECHNICAL CHARACTERISTICS:

TYPE OF MOUNTING: Relay rack mounted.
AMBIENT TEMPERATURE RANGE: MO to 50 deg C.

FR-47(XN-1)/U FREQUENCY METER

AMBIENT HUMIDITY RANGE: MO to 95% RH.
TYPE OF FREQUENCY CONTROL: Crystal-oscillator.
NUMBER OF BANDS: 1 continuous band.
HETERODYNE BEAT DETECTOR DATA
   FREQUENCY RANGE: 15 kc to 300 mc.
   ZERO BEAT INDICATORS: 2-1/2 in. meter & jack for headphones.
   INPUT IMPEDANCE: 1000 ohms in parallel with 90 mmf.
OSCILLOSCOPE DATA
   FREQUENCY RANGE: 100 cps to 3 mc.
   DEFLECTION SENSITIVITY: Approx. 2 v rms per inch.
   INPUT IMPEDANCE: 11000 ohms in parallel with 700 mmf.
SIGNAL SOURCE DATA
   FREQUENCY RANGES AND OUTPUT: Greater than 1 volt into 50 ohms between 6 & 30 mc. Greater than 1 volt into 500 ohms between 15 kc & 6 mc. 15 cps to 15 kc at a greatly reduced amplitude.
   CALIBRATION: Direct reading in cycles per second in steps of 1/2 cps from 0 to 30 mc.
   SPURIOUS CONTENT AND NOISE AND HUM LEVEL
      NOISE AND HUM LEVEL: At least 60 db down.
      BELOW 6 MC HARMONICS: At least 10 db down.
      ABOVE 6 MC HARMONICS: At least 60 db down.
OPERATING POWER RQMT: 115 v ac, 50 to 1000 cps, single ph, 400 W.

RELATION TO OTHER EQUIPMENT: None.

EQUIPMENT REQUIRED BUT NOT SUPPLIED: None.

MAJOR COMPONENTS

QTY	ITEM	STOCK COMPONENTS	DIMENSIONS (INCHES)	WEIGHT (LBS)
1	Frequency Meter FR-47(XN-1)/U		19 x 19-1/4 x 22-1/2	169

REFERENCE DATA AND LITERATURE:

NAVSHIPS 91502: Technical Manual for Frequency Meter FR-47(XN-1)/U.

TUBE, CRYSTAL AND/OR SEMI-CONDUCTOR DATA:

TUBES: (5) 12AU7 (3) 12AT7 (28) 6AK5 (8) 6AK6 (13) 6AS6 (1) 2BP1 (1) 6X4
(1) 1Z2 (4) 6AH6 (2) 5R4GY (1) 6AS7G (1) 12AX7 (1) 5651

CRYSTALS: None used.

SEMI-CONDUCTORS: None used.

SHIPPING DATA

PKGS	VOLUME (CU FT)	WEIGHT (LBS)

PROCUREMENT DATA

PROCURING SERVICE: USN
DESIGN COG: USN, BuShips
SPEC &/OR DWG:

CONTRACTOR	LOCATION	CONTRACT OR ORDER NO.	APPROX. UNIT COST
Federal Telecommunication Labs Inc.	Nutley, N. J.	NObsr-43394, 20 June 1949	

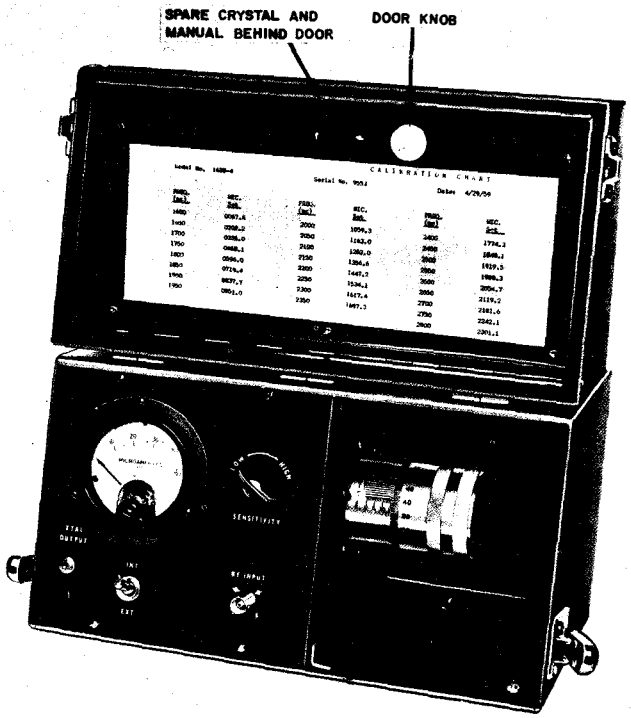
23 May 1962 WAVEMETER FR-91A/U

Cog Service: USA FSN: Functional Class: 2.2

USA	USN	USAF

TYPE CLASS: Std

MANUFACTURER'S NAME/CODE NUMBER: U. S. Army Signal Agency, (80064).



Wavemeter FR-91A/U

FUNCTIONAL DESCRIPTION:

The Wavemeter FR-91A/U is a portable, self-contained wavemeter of high accuracy, used for measuring the frequency of microwave signals within the range of 1,600 and 2,800 megacycles (MC). The signals may be continuous-wave (CW), amplitude-modulated (AM), frequency-modulated (FM), narrow-band (less than 0.02 percent deviation) or pulse-modulated (PM).

The FR-91A/U is designed to measure the frequency of microwave transmitters, microwave receiver local oscillators, and microwave signal generators. It may be used to accurately determine other characteristics of signal sources such as tuning range, generation of spurious signals (including double moding of klystrons), and modulation measurements.

No field changes in effect at time of preparation (16 August 1961).

TECHNICAL CHARACTERISTICS:

TYPE OF INSTALLATION: Portable, self-contained meter.

FR-91A/U WAVEMETER

TYPE OF SIGNAL: CW, AM, narrow-band, FM, PM.
TYPES OF INDICATION
ONE: Internal microammeter w/adjustable sensitivity.
TWO: External indicator such as "oscilloscope" or "VTVM".
CALIBRATION DATA: Individually calibrated. Calibration chart laminated between clear plastic sheets for permanent legibility.
POWER SENSITIVITY: 1 milliwatt for usable meter indication.
FREQUENCY RANGE: 1,600 to 2,800 mc.
ACCURACY OF CALIBRATION: 0.02%.
INDICATOR DATA
TYPE OF INDICATION: Visual.
TYPE OF MEASUREMENTS: DC microamps.
RANGE: 0 to 50 microamps.
TYPE OF RECTIFIER: 1N218 crystal diode.

RELATION TO OTHER EQUIPMENT:

The FR-91A/U is similar to, and interchangeable with FR-91/U, except mechanical construction and maintenance parts are different.
The FR-91A/U is designed to be used with, but not part of AN/FRC-23( ) and AN/FRC-26( ).

EQUIPMENT REQUIRED BUT NOT SUPPLIED:

(1) UG-88 Connector or equivalent; (1) RG-58C/U Cable or equivalent.

MAJOR COMPONENTS

QTY	ITEM	STOCK NUMBERS	DIMENSIONS (INCHES)	WEIGHT (LBS)
1	Wavemeter FR-91A/U		6-5/8 x 10 x 13	10.5
1	Running Spar Crystal Diode 1N21B		1/4 x 1/4 x 1/2	0.01
2	Technical Manual TM11-6625-293-12		1/4 x 7-7/8 x 10-1/4	0.25

REFERENCE DATA AND LITERATURE:

TM11-6625-293-12: Technical Manual for Wavemeter FR-91A/U.

TUBE, CRYSTAL AND/OR SEMI-CONDUCTOR DATA:

TUBES: Data not available.

CRYSTALS: (1) 1N21B

SEMI-CONDUCTORS: Data not available.

SHIPPING DATA

PKGS	VOLUME (CU FT)	WEIGHT (LBS)
1	0.9	13

PROCUREMENT DATA

PROCURING SERVICE: USA
SPEC &/OR DWG:

DESIGN COG: TASSA

CONTRACTOR	LOCATION	CONTRACT OR ORDER NO.	APPROX. UNIT COST
U. S. Army Signal Agency	Fort Monmouth, N. J.	PROC.3338-PP-59	

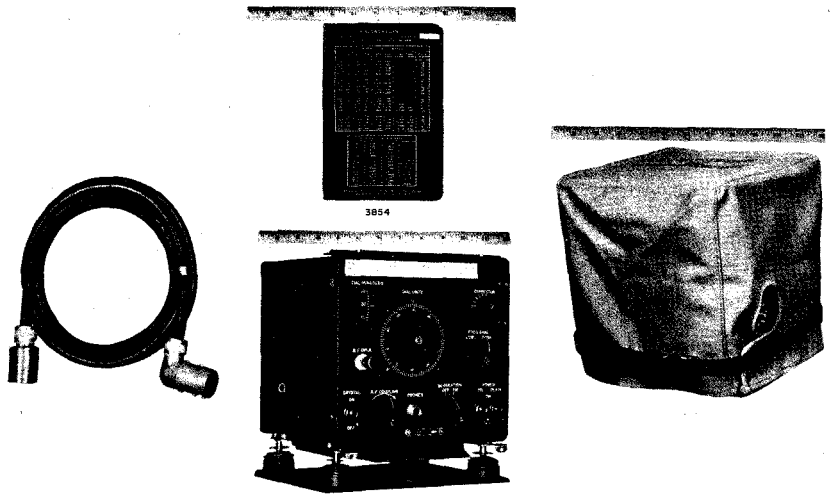
21 February 1963 **CRYSTAL CALIBRATED FREQUENCY INDICATING EQUIPMENT LM-10**

Cog Service: USN FSN: F6625-643-1533 Functional Class: 2.1.3

USA	USN	USAF

TYPE CLASS: S/Std

MANUFACTURER'S NAME/CODE NUMBER: Bendix Radio Div., Bendix Aviation Corp., (06845).



Crystal Calibrated Frequency Indicating Equipment LM-10

FUNCTIONAL DESCRIPTION:

Crystal Calibrated Frequency Indicating Equipment LM-10 is a heterodyne-type unit providing a frequency-indicating source used in setting and measuring receivers, transmitters, signal generators, and other electronic devices.

No field changes in effect at time of preparation (18 February 1963).

TECHNICAL CHARACTERISTICS:

POWER SUPPLY

SELF-CONTAINED BATTERIES: 12 to 14 v dc, 0.6 amp ((2) 6 v Battery 19020); or 24 to 28 v dc, 0.3 amp ((4) 45 v Battery 19021); 200 to 260 v dc, 10 ma; or 260 to 475 v dc, 30 ma.

FREQUENCY COVERAGE

RANGE: 125 to 20000 kc.

LM-10 CRYSTAL CALIBRATED FREQUENCY INDICATING EQUIPMENT

FUNDAMENTAL: 125 to 250 kc and 2000 to 4000 kc.
CRYSTAL OSCILLATOR: 1000 kc.
MODULATION: 500 cps.
ACCURACY: Porm 0.02% (125 to 20000 kc); porm 0.01% (2000 to 20000 kc) between M32 to P65 deg C ambient temp.
OUTPUT IMPEDANCE: 600 ohms.
MOUNTING DATA: Shockproof mounting base.

RELATION TO OTHER EQUIPMENT: None.

EQUIPMENT REQUIRED BUT NOT SUPPLIED: None.

MAJOR COMPONENTS

QTY	ITEM	STOCK NUMBERS	DIMENSIONS (INCHES)	WEIGHT (LBS)
1	Crystal Calibrated Frequency Indicating Equipment LM-10 includes:			
1	Heterodyne Frequency Meter 74028		8-1/8 x 8-1/2 x 8-5/8	11.50
1	Frequency Meter Mounting Base 10121		1-1/2 x 7 x 7-7/8	0.50
1	Shielded Power Cable		108 lg	
1	Calibration Book			
1	Instruction Book			0.25
1	Waterproof Slip Cover			

REFERENCE DATA AND LITERATURE:

NAVAER 08-5Q-35: Handbook of Maintenance Instructions for Crystal Calibrated Frequency Indicating Equipment LM-10.

TUBE, CRYSTAL AND/OR SEMI-CONDUCTOR DATA:

TUBES: (1) 76 (1) 77 (1) 6A7

CRYSTALS: (1) 40023-B

SEMI-CONDUCTORS: None used.

SHIPPING DATA

PKGS	VOLUME (CU FT)	WEIGHT (LBS)

PROCUREMENT DATA

PROCURING SERVICE: USN
SPEC &/OR DWG:

DESIGN COG: USN, BuWeps

CONTRACTOR	LOCATION	CONTRACT OR ORDER NO.	APPROX. UNIT COST
Bendix Radio Div., Bendix Aviation Corp.	Towson, Md.	NXsr-23485, 2 June 1943	$450.00

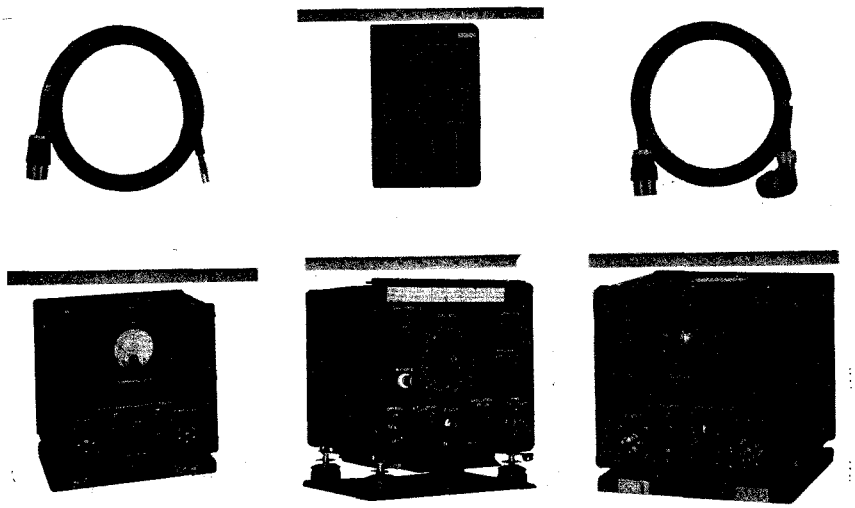
5 March 1963 F6625-643-3212 CRYSTAL CALIBRATED FREQUENCY INDICATING EQUIPMENT LM-11

Cog Service: USN FSN: F6625-643-3377 W/S Functional Class: 2.1.3

USA USN USAF

TYPE CLASS: S/Std

MANUFACTURER'S NAME/CODE NUMBER: Bendix Radio Division, Bendix Aviation Corp., (06845).



Crystal Calibrated Frequency Indicating Equipment LM-11

FUNCTIONAL DESCRIPTION:

Crystal Calibrated Frequency Indicating Equipment LM-11 is a heterodyne-type unit providing a frequency-indicating source used in setting and measuring receivers, transmitters, signal generators, and other electronic devices.

No field changes in effect at time of preparation (18 February 1963).

TECHNICAL CHARACTERISTICS:

POWER REQUIREMENTS: 27 W, 105 to 125 v ac, 50 to 60 cyc, single ph.
FREQUENCY COVERAGE
RANGE: 125 to 20,000 kc.
FUNDAMENTAL: 125 to 250 kc and 2,000 to 4,000 kc.
CRYSTAL OSCILLATOR: 1,000 kc.
MODULATION: 500 cps.

LM-11 CRYSTAL CALIBRATED FREQUENCY INDICATING EQUIPMENT

ACCURACY: Porm 0.02% (125 to 20,000 kc); porm 0.01% (2,000 to 20,000 kc) between M32 to P65 deg C ambient temp.
OUTPUT IMPEDANCE: 600 ohms.
MOUNTING DATA: Shockproof mounting base.

RELATION TO OTHER EQUIPMENT: None.

EQUIPMENT REQUIRED BUT NOT SUPPLIED: None.

MAJOR COMPONENTS

QTY	ITEM	STOCK NUMBERS	DIMENSIONS (INCHES)	WEIGHT (LBS)
1	Crystal Calibrated Frequency indicating Equipment LM-11 includes:			
1	Heterodyne Frequency Meter 74028		8-1/8 x 8-1/2 x 8-5/8	11.50
1	Frequency Meter Mounting Base 10121		1-1/2 x 7 x 7-7/8	0.50
1	Rectifier Power Unit 20104 or 20104-A		8-3/16 x 8-3/16 x 8-5/8	13.60
1	Mounting Base 10120		11/16 x 7-7/8 x 8-7/16	0.50
1	Shielded Power Cable		108 lg	1.90
1	AC Input Cable		120 lg	1.90
1	Calibration Book			
2	Technical Manual			

REFERENCE DATA AND LITERATURE:

NAVAER 08-5Q-36: Handbook of Maintenance Instructions for Crystal Calibrated Frequency Indicating Equipment LM-11.

TUBE CRYSTAL AND/OR SEMI-CONDUCTOR DATA:

TUBES: (1) 76 (1) 77 (1) 6A7 (1) 84

CRYSTALS: (1) 40023-B

SEMI-CONDUCTORS: None used.

SHIPPING DATA

PKGS	VOLUME (CU FT)	WEIGHT (LBS)

PROCUREMENT DATA

PROCURING SERVICE: USN

DESIGN COG: USN, BuWeps

SPEC &/OR DWG:

CONTRACTOR	LOCATION	CONTRACT OR ORDER NO.	APPROX. UNIT COST
Bendix Radio Division, Bendix Aviation Corporation	Towson, Md.	NOs-87546, 21 June 1941	

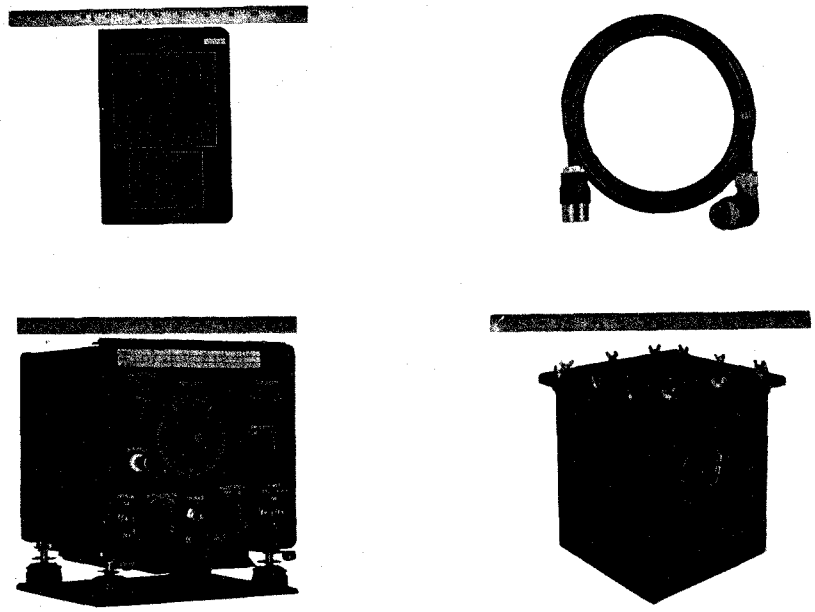
5 March 1963 F6625-643-3132 **CRYSTAL CALIBRATED FREQUENCY INDICATING EQUIPMENT LM-12**

Cog Service: USN FSN: F6625-643-3952 W/S Functional Class: 2.1.3

USA	USN	USAF

TYPE CLASS: Used by

MANUFACTURER'S NAME/CODE NUMBER: Bendix Radio Div., Bendix Aviation Corp., (06845).



Crystal Calibrated Frequency Indicating Equipment LM-12

FUNCTIONAL DESCRIPTION:

Crystal Calibrated Frequency Indicating Equipment LM-12 is a heterodyne-type unit providing a frequency-indicating source used in setting and measuring receivers, transmitters, signal generators, and other electronic devices.

No field changes in effect at time of preparation (18 February 1963).

TECHNICAL CHARACTERISTICS:

POWER SUPPLY

SELF-CONTAINED BATTERIES: 12 to 14 v dc, 0.6 amp ((2) 6 v Battery 19020); or 24 to 28 v v dc, 0.3 amp ((4) 45 v Battery 19021); 200 to 260 v dc, 10 ma; or 260 to 475 v dc, 30 ma.

FREQUENCY COVERAGE

RANGE: 125 to 20,000 kc.

LM-12 CRYSTAL CALIBRATED FREQUENCY INDICATING EQUIPMENT

FUNDAMENTAL: 125 to 250 kc and 2,000 to 4,000 kc.
CRYSTAL OSCILLATOR: 1,000 kc.
MODULATION: 500 cps.
ACCURACY: Porm 0.02% (125 to 20,000 kc); porm 0.01% (2,000 to 20,000 kc) between M32 to P65 deg C ambient temp.
OUTPUT IMPEDANCE: 600 ohms.

RELATION TO OTHER EQUIPMENT: None.

EQUIPMENT REQUIRED BUT NOT SUPPLIED: None.

MAJOR COMPONENTS

QTY	ITEM	STOCK NUMBERS	DIMENSIONS (INCHES)	WEIGHT (LBS)
1	Crystal Calibrated Frequency Indicating Equipment LM-12 includes:			
1	Heterodyne Frequency Meter 74028		8-1/8 x 8-1/2 x 8-5/8	11.50
1	Frequency Meter Mounting Base 10121		1-1/2 x 7 x 7-7/8	0.50
1	Waterproof Carrying Case 10086		9-5/16 x 10-9/16 x 11-27/32	7.50
1	Shielded Power Cable		108 lg	1.90
1	Calibration Book			
2	Technical Manual			

REFERENCE DATA AND LITERATURE:

NAVAER 08-5Q-37: Handbook of Maintenance Instructions for Crystal Calibrated Frequency Indicating Equipment LM-12.

TUBE, CRYSTAL AND/OR SEMI-CONDUCTOR DATA:

TUBES: (1) 76 (1) 77 (1) 6A7

CRYSTALS: (1) 40023-B

SEMI-CONDUCTORS: None used.

SHIPPING DATA

PKGS	VOLUME (CU FT)	WEIGHT (LBS)

PROCUREMENT DATA

PROCURING SERVICE: USN
DESIGN COG: USN, BuWeps
SPEC &/OR DWG:

CRYSTAL CALIBRATED FREQUENCY INDICATING EQUIPMENT LM-12

CONTRACTOR	LOCATION	CONTRACT OR ORDER NO.	APPROX. UNIT COST
Bendix Radio Div., Bendix Aviation Corp.	Towson, Maryland	NOs-87546, 21 June 1941	$450.00

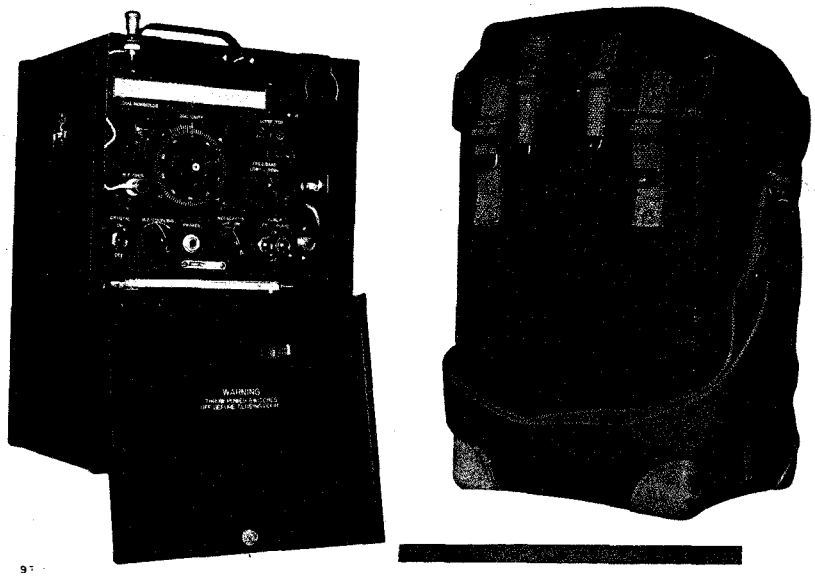
5 March 1963 F6625-643-3166 CRYSTAL CALIBRATED FREQUENCY INDICATING EQUIPMENT LM-13

Cog Service: USN FSN: F6625-643-2671 W/S Functional Class: 2.1.3

USA	USN	USAF

TYPE CLASS: Std

MANUFACTURER'S NAME/CODE NUMBER: Bendix Radio Div., Bendix Aviation Corp., (06845).



Crystal Calibrated Frequency Indicating Equipment LM-13

FUNCTIONAL DESCRIPTION:

Crystal Calibrated Frequency Indicating Equipment LM-13 is a heterodyne-type unit providing a frequency-indicating source used in setting and measuring receivers, transmitters, signal generators, and other electronic devices.

No field changes in effect at time of preparation (18 February 1963).

TECHNICAL CHARACTERISTICS:

POWER SUPPLY

SELF-CONTAINED BATTERIES: 12 to 14 v dc, 0.6 amp ((2) 6 v Battery 19020); or 24 to 28 v dc, 0.3 amp ((4) 45 v Battery 19021); 200 to 260 v dc, 10 ma; 260 to 475 v dc, 30 ma.

FREQUENCY COVERAGE

RANGE: 125 to 20,000 kc.

FUNDAMENTAL: 125 to 250 kc and 2,000 to 4,000 kc.

LM-13 CRYSTAL CALIBRATED FREQUENCY INDICATING EQUIPMENT

CRYSTAL OSCILLATOR: 1,000 kc.
MODULATION: 500 cps.
ACCURACY: Porm 0.02% (125 to 20,000 kc); porm 0.01% (2,000 to 20,000 kc) between M32 to P65 deg C ambient temp.
OUTPUT IMPEDANCE: 600 ohms.
MOUNTING DATA: Carrying case, canvas bag and strap.

RELATION TO OTHER EQUIPMENT: None.

EQUIPMENT REQUIRED BUT NOT SUPPLIED: None.

MAJOR COMPONENTS

QTY	ITEM	STOCK NUMBERS	DIMENSIONS (INCHES)	WEIGHT (LBS)
1	Crystal Calibrated Frequency Indicating Equipment LM-13 includes:			
1	Heterodyne Frequency Meter 74028		8-1/8 x 8-1/2 x 8-5/8	11.50
1	Carrying Case 10111		9-5/8 x 9-3/4 x 15-7/16	13.50
1	Canvas Bag and Strap 10110			4.00
1	Calibration Book			
2	Technical Manual			

REFERENCE DATA AND LITERATURE:

NAVAER 08-5Q-38: Handbook of Maintenance Instructions for Crystal Calibrated Frequency Indicating Equipment LM-13 and LM-13 Assy 1.

TUBE, CRYSTAL AND/OR SEMI-CONDUCTOR DATA:

TUBES: (1) 76 (1) 77 (1) 6A7

CRYSTALS: (1) 40023-B

SEMI-CONDUCTORS: None used.

SHIPPING DATA

PKGS	VOLUME (CU FT)	WEIGHT (LBS)

PROCUREMENT DATA

PROCURING SERVICE: USN
DESIGN COG: USN, BuWeps
SPEC &/OR DWG:

CRYSTAL CALIBRATED FREQUENCY INDICATING EQUIPMENT LM-13

CONTRACTOR	LOCATION	CONTRACT OR ORDER NO.	APPROX. UNIT COST
Bendix Radio Div., Bendix Aviation Corp.	Towson, Maryland	NOs-69767, 27 December 1939	$450.00

4 March 1963

CRYSTAL CALIBRATED FREQUENCY INDICATING EQUIPMENT LM-14

Cog Service: USN FSN: **Functional Class: 2.1.3**

USA	USN	USAF

TYPE CLASS: Std

MANUFACTURER'S NAME/CODE NUMBER: Hoffman Radio Corporation, (28959).

Crystal Calibrated Frequency Indicating Equipment LM-14

FUNCTIONAL DESCRIPTION:

Crystal Calibrated Frequency Indicating Equipment LM-14 is a heterodyne-type unit providing a frequency-indicating source used in setting and measuring receivers, transmitters, signal generators, and other electronic devices.

No field changes in effect at time of preparation (18 February 1963).

TECHNICAL CHARACTERISTICS:

POWER SUPPLY

SELF-CONTAINED BATTERIES: 12 to 14 v dc, 0.6 amp ((2) 6 v Battery 19020); or 24 to 28 v dc, 0.3 amp ((4) 45 v Battery 19021); 200 to 2 0 v dc, 10 ma; or 260 to 475 v dc, 30 ma.

FREQUENCY COVERAGE

RANGE: 125 to 20,000 kc.

SECT 2 OF 5 NAVSHIPS 94200.4

DIRECTORY OF ELECTRONICS TEST EQUIPMENT

(CONTINUED)

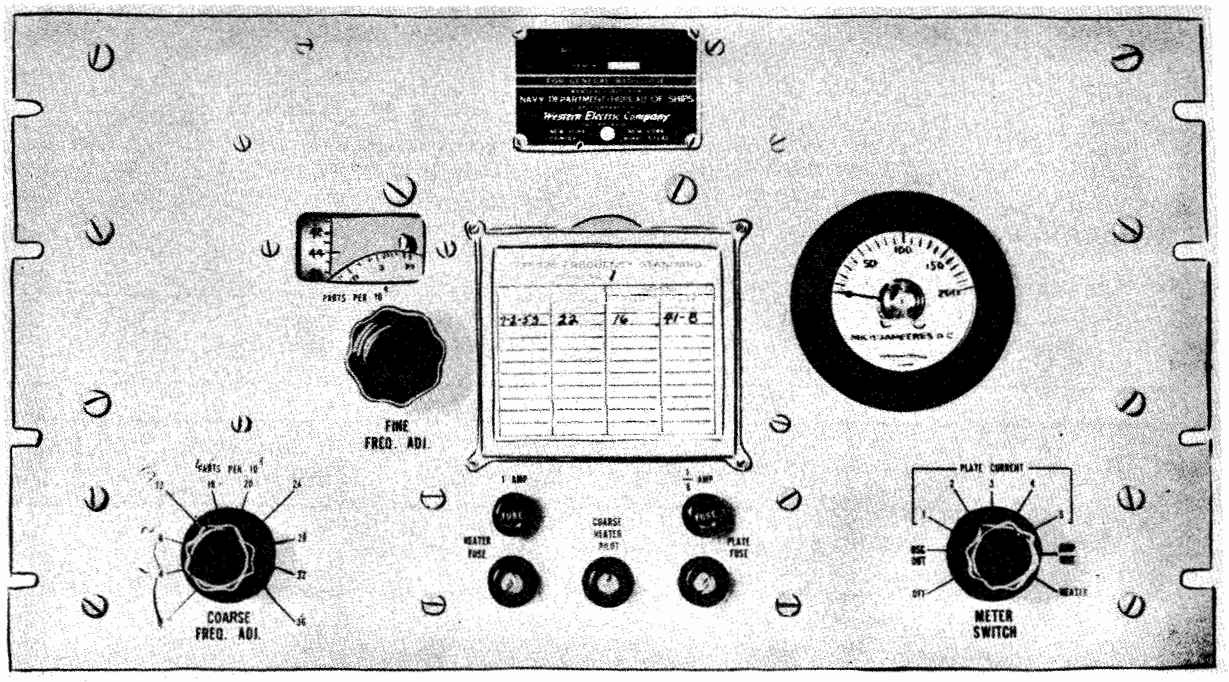
PREPARED BY
U.S. NAVY
ELECTRONICS SUPPLY OFFICE
GREAT LAKES, ILLINOIS

Test-Frequency Measuring

April 1958

RF OSCILLATOR

O-76/U, O-76A/U



RF Oscillator O-76A/U

FUNCTIONAL DESCRIPTION

The O-76/U and O-76A/U is a stable crystal oscillator designed for use as a frequency standard. The frequency can be maintained approximately constant, irrespective of moderate changes in ambient temperature, humidity, and air pressure.

The frequency may be calibrated from standard frequency transmissions of the Bureau of Standards or the time signal transmissions of the Naval Observatory.

Data on this sheet reflects the following field changes. FC1 (0-76 A/U).

RELATION TO OTHER EQUIPMENT

The O-76/U is Western Electric Co type D-175730 Frequency Standard. The O-76A/U is Western Electric Co type D-175730-L2 Frequency Standard.

Equipment Required but not Supplied: Coaxial Cable w/PL-295 plugs or equiv.

ELECTRICAL AND MECHANICAL CHARACTERISTICS

FREQUENCY: 100 kc, 1 band.
FREQUENCY CONSTANT: Approximately one part in 108 per day.
FREQUENCY CONTROL: 100 kc GT cut crystal in Meacham bridge oscillator with close temperature control.
AMBIENT TEMPERATURE
O-76/U: 60 deg F to 104 deg F.
O-76A/U: 32 deg F to 113 deg F.
CALIBRATION
COURSE FREQUENCY ADJ: 0 to 3.6 cps.
FINE FREQUENCY ADJ: 0 to 0.5 cps.
POWER SOURCE REQUIRED: 115 v ±10%, 60 cps, single ph, 1.0 amp; 6.3 v ±10%, 60 cps, single ph, 2.25 amp; or 135 v DC ±10%, 0.05 amp max.

MANUFACTURER'S OR CONTRACTOR'S DATA

Western Electric Co Inc, NY, NY.
Contract: NObsr-39395, dated 23 December 1947 (O-76/U).
Contract: NObsr-57282 (O-76A/U).

Test-Frequency Measuring

O-76/U, O-76A/U RF OSCILLATOR

April 1958

TUBE AND/OR CRYSTAL COMPLEMENT

(4) 6AC7 (1) 6V6GT/G
Total Tubes: (5)
(1) 99996.7 cps
Total Crystals: (1)

REFERENCE DATA AND LITERATURE

NAVSHIPS 91124: Technical Manual for RF Oscillator O-76/U.
NAVSHIPS 91729: Technical Manual for RF Oscillator O-76A/U.

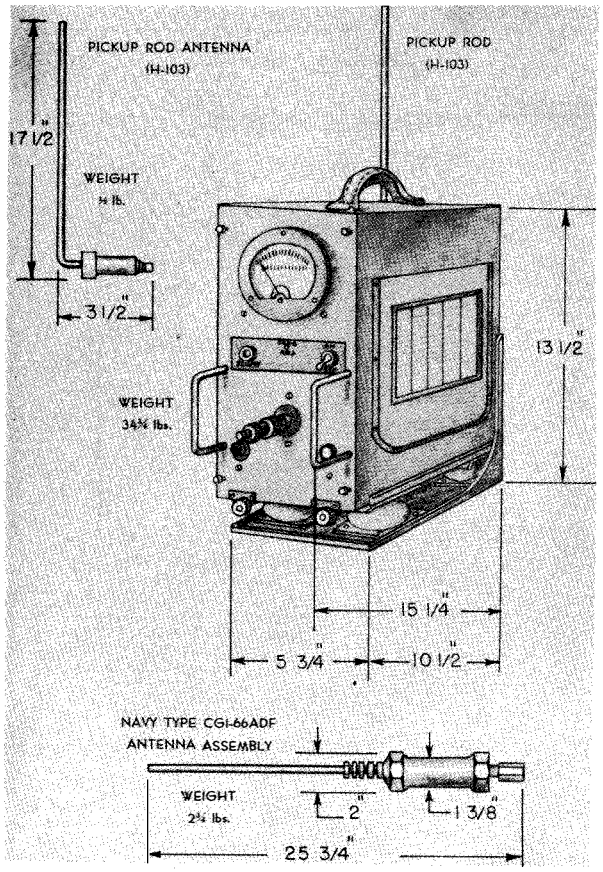
TYPE CLASSIFICATION
DESIGN COGNIZANCE BUSHIPS
PROCUREMENT COGNIZANCE
STOCK NO.
R.D.B. IDENT. NO.

EQUIPMENT SUPPLIED DATA

QUANTITY PER EQUIPT	NAME AND NOMENCLATURE	OVERALL DIMENSIONS (inches)	WEIGHT (lbs.)
1	RF Oscillator O-76/U or O-76A/U	10-15/16 x 17-3/16 x 19	90

Test-Frequency Measuring

RADAR TEST SET OAA, OAA-2



Radar Test Set OAA-2

FUNCTIONAL DESCRIPTION

The OAA and OAA-2 incorporate a tunable quarter wave resonant cavity of high Q, combined to a detector and a vacuum tube voltmeter. They are used as frequency meters or echo boxes in the band from 150 to 240 mc. They may be used to indicate the relative power output of certain transmitters or, in connection with an oscilloscope, to detect the received pulses for video presentation.

They are intended for use with SA, SC, SK Radars and similar radars operating within the frequency range.

The OAA and OAA-2 are identical in functions and characteristics, with slight differences only in presentation, layout and circuit details.

Data on this sheet reflects the following field changes: F/C 1 and 2 for OAA-2 (8 April 1958).

ELECTRICAL AND MECHANICAL CHARACTERISTICS

FREQUENCY RANGE: 150 to 240 mc.
ACCURACY: ±0.5 mc.
RANGING TIME: 50 usec, approx; equivalent to an apparent range of 5000 yds.
POWER REQUIREMENTS
OAA: 115 v, 60 cps, 1 ph, 22 W.
OAA-2: 105-125 v, 60 cps, 1 ph, 15 W.

MANUFACTURER'S OR CONTRACTOR'S DATA

RCA Manufacturing Co., Camden, N.J.
Contract NOs-96554, dated 25 May 1942 (OAA).
Gilfillan Bros, Inc., Los Angeles, Calif. (OAA-2).
Contract NXsr-10810.
Contract NXsr-45459.
Contract NXsr-33633.
Contract NXsr-60073.
Contract NXrr-41013.

TUBE AND/OR CRYSTAL COMPLEMENT

(1) 955 (1) 6SQ7 (1) 6X5WGT
Total Tubes: (3)
No Crystals Used.

REFERENCE DATA AND LITERATURE

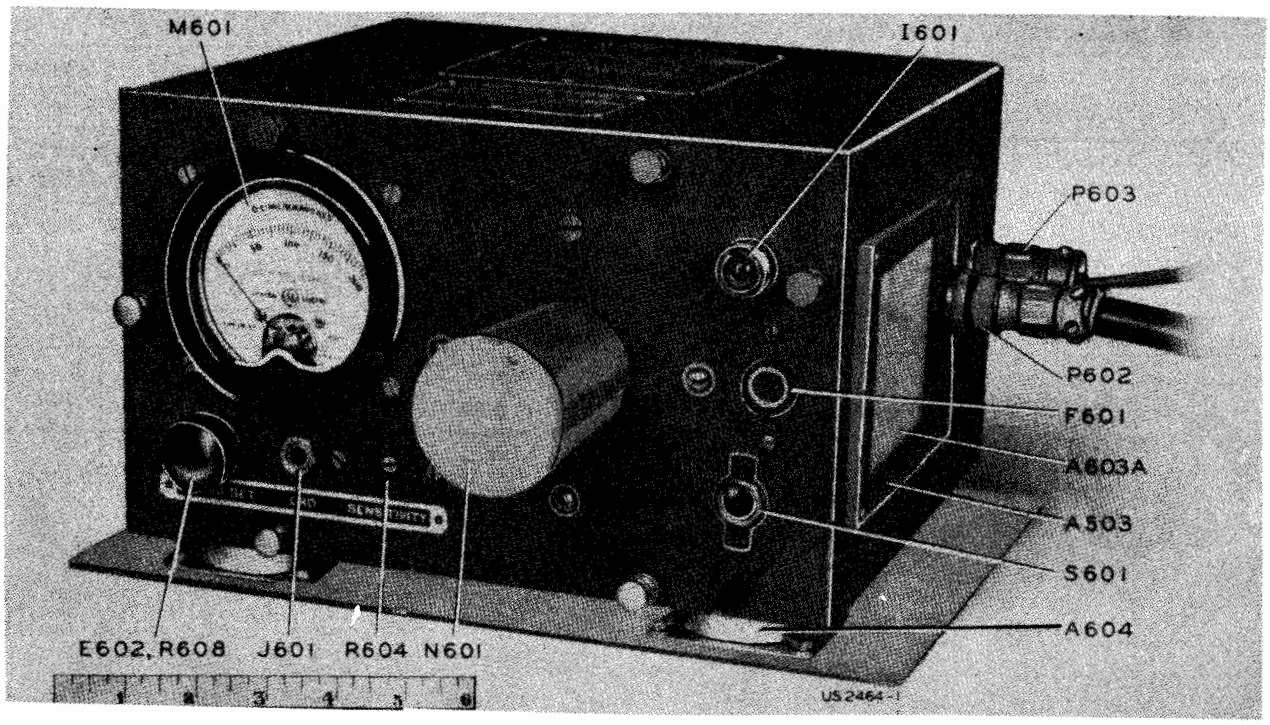
RCA-1B-38186 (ENG 184): Preliminary Instruction Book for Navy Model OAA Frequency Meter Equipment.
SHIPS 227: Instruction Book for OAA-2 Model Radar Test Equipment.

TYPE CLASSIFICATION
DESIGN COGNIZANCE BUSHIPS
PROCUREMENT COGNIZANCE
STOCK NO.
R.D.B. IDENT. NO. 2.2.2

OAA, OAA-2 RADAR TEST SET

EQUIPMENT SUPPLIED DATA

QUANTITY PER EQUIPT	NAME AND NOMENCLATURE	OVERALL DIMENSIONS (inches)	WEIGHT (lbs.)
	OAA		
1	Frequency Meter NT-60AAP	6-5/8 X 9-1/8 X 10	27
1	Antenna NT-66ABW (DECK), including cable and parts		
1	Antenna-Local NT-66ACL (stub)		
1	AC Plug		
1	Set of Equipment Spares		
	OAA-2		
1	Frequency Meter NT-60ABC	5-3/4 X 13-1/2 X 15-1/4	34.75
1	Antenna Assembly NT-66ADE including cable and parts	2 dia X 25-3/4	2.75
1	Antenna Pick-up Rod H-103, with plug	3-1/2 X 17-1/2	0.5
1	AC Plug		
1	Set of equipment spares		



CLQ-60ABA Frequency Meter

FUNCTIONAL DESCRIPTION

The OAF is essentially a frequency measuring apparatus and generator of artificial echoes. It can also be used as a relative transmitter output indicator. Its purpose is to enable checking of the transmitter frequency, relative power output, and operating adjustments of Radar Systems which operate at frequencies between 105 and 125 mc. Provision is made to permit the plugging into an auxiliary oscilloscope to view the transmitter pulses and facilitate adjustment of the transmitter keying to proper synchronism.

No field changes in effect at time of preparation (6 January 1958).

ELECTRICAL AND MECHANICAL CHARACTERISTICS

FREQUENCY RANGE: 105 to 125 mc.
ACCURACY: ±0.25 mc.
POWER SOURCE REQUIRED: 115 v, 60 cps, single ph, 11 W.

MANUFACTURER'S OR CONTRACTOR'S DATA

RCA Div of Radio Corp of America, Camden, N.J.

Contract NXss-27552, dated 19 April 1943.
Approximate Cost: $200 with equipment spares.

TUBE AND/OR CRYSTAL COMPLEMENT

(1) 6X5-GT (1) 6SQ7 (1) 955
Total Tubes: (3)

No Crystals.

REFERENCE DATA AND LITERATURE

NAVSHIPS 95158: Technical Manual for Radar Test Equipment OAF.

TYPE CLASSIFICATION	
DESIGN COGNIZANCE	
PROCUREMENT COGNIZANCE	
STOCK NO.	
R.D.B. IDENT. NO.	

Test-Frequency Measuring

OAF RADAR TEST EQUIPMENT

April 1958

SHIPPING DATA

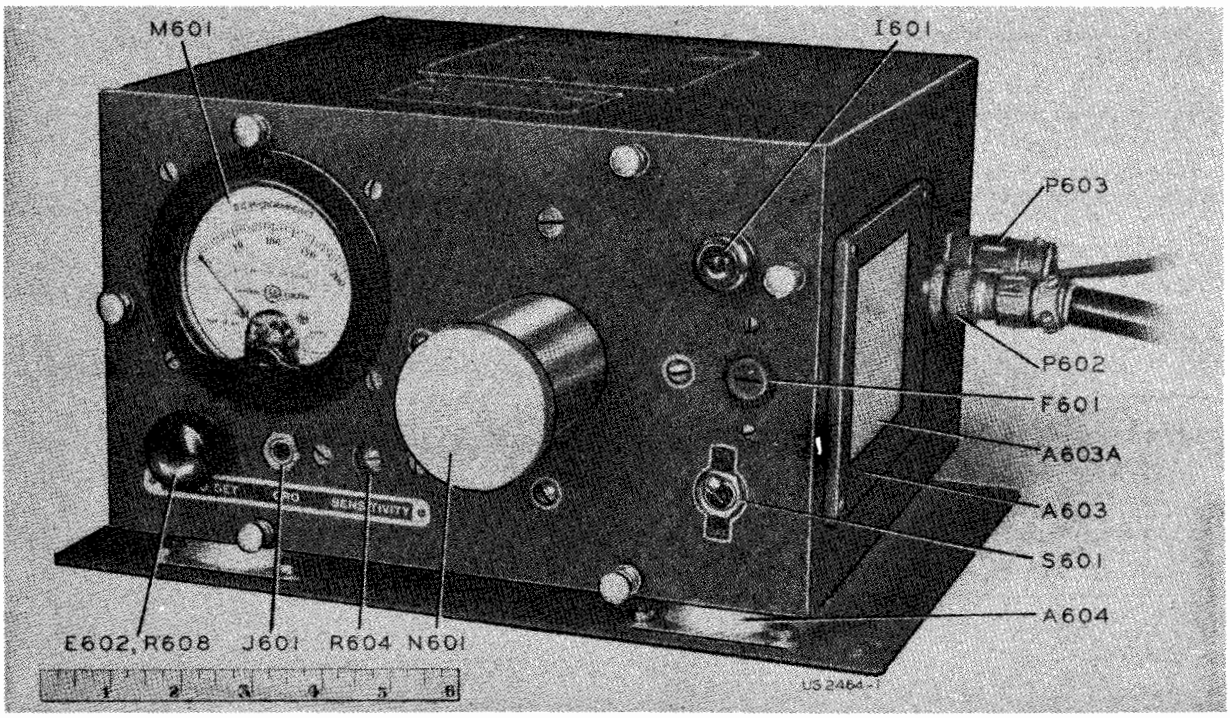
NUMBER OF BOXES	CONTENTS AND IDENTIFICATION	VOLUME (Cu.Ft.)	OVERALL DIMENSIONS (inches)	WEIGHT PACKED (lbs.)
1	Frequency Meter 60ABA	1.2	9-3/4 x 14 x 15-1/4	33
1	Antenna Assembly 66ADC	0.5	5 x 5 x 41	11

EQUIPMENT SUPPLIED DATA

QUANTITY PER EQUIPT	NAME AND NOMENCLATURE	OVERALL DIMENSIONS (inches)	WEIGHT (lbs.)
1	Frequency Meter 60ABA	6-5/8 x 12 x 12	28
1	Antenna Assembly 66ADC	1-1/2 dia x 36-1/8	2
1	Set of Accessories which include:		
1	Antenna Plug AN-3106-12-5PY		
1	Power Plug		
1	Oscilloscope Plug		
1	Ferrule	3/4 OD x 13/32 x 58	
1	Ferrule	7/16 OD x 13/32 x 9/16	

Test-Frequency Measuring

RADAR TEST EQUIPMENT OAO, OAO-1, OAO-2



Radar Test Equipment OAO,OAO-1,OAO-2

FUNCTIONAL DESCRIPTION

The Navy Models OAO, OAO-1, OAO-2 incorporate a tunable quarter wave resonant cavity of high Q combined with a detector and a vacuum tube voltmeter. They are used as frequency meters or echo boxes in the range from 105 to 125 mc. They may be used to indicate the relative power output of certain radar transmitters, or in connection with an oscilloscope, to detect the received pulses for video presentation.

No field changes in effect at time of preparation (10 April 1958).

RELATION TO OTHER EQUIPMENT

These equipments are similar to Navy Models OAA and OAF, the difference being found in the frequency coverage and in the type and quantities of accessories supplied. They are intended for use with radar equipments which operate on a 60 cycle repetition rate and a duty cycle of approximately 0.05%.

ELECTRICAL AND MECHANICAL CHARACTERISTICS

POWER SUPPLY: 115 v, 60 cps, 11 W.
FREQUENCY RANGE: 105 to 125 mc.
ACCURACY: ±0.25 mc.
RINGING TIME: 50 usec (normal), or an apparent range of 8000 yds or more.
METER RANGE: 0 to 200 ua.
PRESENTATION AND CONTROLS: The front panel controls include a micrometer drum type tuning dial, the numerical readings of which are converted to frequency by reference to a chart. A relative indication of the signal input power is given by the meter (electronic voltmeter) at resonance. A ZERO SET control and a SENSITIVITY adjusting screw are also included. A CRO output jack is provided for connection to an oscilloscope. The antenna jack and the ac power receptacle are located on the side of the instrument case.
FITTINGS AND ACCESSORIES: These equipments are intended for fixed shipboard installation. The CRO output receptacle is a Navy Type-49872 phone jack. A phone plug

Test-Frequency Measuring

OAO, OAO-1, OAO-2 RADAR TEST EQUIPMENT

NT-49006-B is supplied for use in this connection. The AC power receptacle is an AN Type connector (AN-3102-16S-4P). A mating AN Type cable connector (AN-3106-16S-4S) and cable clamp (AN-3057-8) are supplied together with a length of cable, in order to establish this connection. The antenna receptacle is an AN Type jack (AN-3102-12-5SY). Two RF plugs (AN-3106-12-5PY) and a sufficient length of RG-8/U coaxial cable are supplied, together with an RF pick-up device, to permit the installation of the equipment.

MODEL	FREQUENCY METER	ANTENNA ASSEMBLY	PICK-UP LOOP	IMPEDANCE ADAPTOR
OAO	60 ABA		47 AAH	-53146
OAO-1	60 ABA		47 AAK	
OAO-2	60 ABA-1	66 ADC	47 AAH	-53146

The type of pick-up device supplied varies with each equipment. Pick-up Loop Assembly 47 AAH is for use with transmission lines having a 3-1/4 inch diameter. An Impedance Adaptor NT-53146 is required for use between the Pick-up Loop Assembly and the antenna cable.

Pick-up Loop Assembly 47 AAK is for use with transmission lines having a 1-5/8 inch diameter, and includes its own impedance matching network. The Antenna Assembly 66 ADC is for installation in proximity to the radar antenna and is suitable for bracket mounting.

CONSTRUCTION: Each equipment is enclosed in a metal cabinet with shock mounts and a flat mounting plate for installation next to the radar receiver indicator. The Antenna Assembly is of the quarter wave rod type and has an insulated base assembly suitable for bracket mounting.

MANUFACTURER'S OR CONTRACTOR'S DATA

Radio Corporation of America, Camden, N.J.
Contract NXss-23218, dated 6 February 1943 (OAO and OAO-1).
The Liebel-Flarsheim Company, Cincinnati 2, Ohio.
Contract NXsr-53325, dated 14 March 1944 (OAO-2).

TUBE AND/OR CRYSTAL COMPLEMENT

(1) 6SQ7 (1) 6X5WGT (1) 955
Total Tubes: (3)

No Crystals used.

REFERENCE DATA AND LITERATURE

SHIPS 240: Technical Manual for Navy Model OAO Radar Test Equipment.
SHIPS 245: Technical Manual for Navy Model OAO-1 Radar Test Equipment.
SHIPS 269: Technical Manual for Radar Test Equipment Model OAO-2.

TYPE CLASSIFICATION
DESIGN COGNIZANCE BUSHIPS
PROCUREMENT COGNIZANCE
STOCK NO.
R.D.B. IDENT. NO.

SHIPPING DATA

NUMBER OF BOXES	CONTENTS AND IDENTIFICATION	VOLUME (Cu.Ft.)	OVERALL DIMENSIONS (inches)	WEIGHT PACKED (lbs.)
	OAO			
1	Radar Test Equipment OAO with Accessories	1	9-3/4 X 14 X 15-1/4	33
1	Set of Equipment Spares		10 X 15-3/4 X 18-1/2	29
	OAO-1			
1	Radar Test Equipment Model OAO-1	1	9-3/4 X 14 X 15-1/4	33
1	Equipment Spares		10 X 15-3/4 X 18-1/2	11
	OAO-2			
1	Radar Test Equipment Model OAO-2, Including Spares	5.5	14-1/8 X 16-1/2 X 41-1/4	100
1	Equipment Spares	1.3	12-1/8 X 15 X 16-1/8	36

Test-Frequency Measuring

RADAR TEST EQUIPMENT

OAO, OAO-1, OAO-2

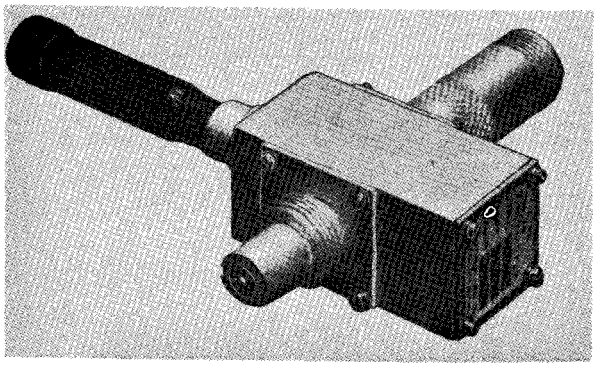
EQUIPMENT SUPPLIED DATA

QUANTITY PER EQUIPT	NAME AND NOMENCLATURE	OVERALL DIMENSIONS (inches)	WEIGHT (lbs.)
	OAO		
1	Frequency Meter NT-60ABA	6-5/8 X 12 X 12	28
1	Pick-up Loop NT-47AAK	2-1/2 X 3-1/4 X 4-9/16	0.5
1	Impedance Adaptor NT-53146	1-1/8 X 1-5/32 X 3-3/8	0.3
2	Instruction Book SHIPS 240		
1	Maintenance Repair Parts		
	OAO-1		
1	Frequency Meter NT-60ABA	6-5/8 X 12 X 12	28
1	Pick-up Loop NT-47AAK	1-5/8 X 3-1/8 X 3-15/32	0.75
2	Instruction Book SHIPS 245		
1	Equipment Spares		
	OAO-2		
1	Frequency Meter NT-60ABA-1	6-5/8 X 12 X 12	28
1	Antenna Assembly NT-66ADC	1-1/2 X 1-1/2 X 36-1/8	2
1	Pick-up Loop NT-47AAH	2-1/2 X 3-1/4 X 4-9/16	0.5
1	Impedance Adaptor NT-53146	1-1/8 X 1-5/32 X 3-3/8	0.3
2	Instruction Book SHIPS 269		
1	Maintenance Repair Parts		

April 1959

Test-Frequency Measuring

WAVEMETER EQUIPMENT OBA



Navy Model OBA Wavemeter

FUNCTIONAL DESCRIPTION

The Navy Model OBA is a peak-type resonant cavity wavemeter in which tuning is controlled by adjusting the penetration of a conductor located on the axis of the cavity. It is intended for use with Navy Model SM Radar Equipment and was designed for determining the wavelength of pulsed transmitters and continuous-wave oscillators operating in the 10 centimeter band. It includes a crystal detector and requires an auxiliary indicator, which may be a direct-current microammeter for continuous-wave signals or a pulse-prolonging, integrating vacuum tube voltmeter for pulse signals.

The relation between wavelength and microammeter reading is substantially linear over most of the range and is close to 0.009 centimeters per division.

No field changes in effect at time of preparation (15 September 1958).

EQUIPMENT REQUIRED BUT NOT SUPPLIED

(1) DC Microammeter and/or Pulse-Prolonging Integrating Vacuum Tube Voltmeter as Required.

ELECTRICAL AND MECHANICAL CHARACTERISTICS

FREQUENCY COVERAGE: 10 cm band.
ACCURACY: ±0.25 mc with cw input.
CALIBRATION CHART RANGE: Extends from 0 to 1150 mc.
CONSTRUCTION: Solid brass, silver plated body, input connector and crystal holder.

MANUFACTURER'S OR CONTRACTOR'S DATA

Raytheon Mfg Co., Waltham, Mass.
Contract NXss-24220, dated 1 June 1943.

TUBE AND/OR CRYSTAL COMPLEMENT

No Electron Tubes Used.

(1) 1N21
Total Crystals: (1)

REFERENCE DATA AND LITERATURE

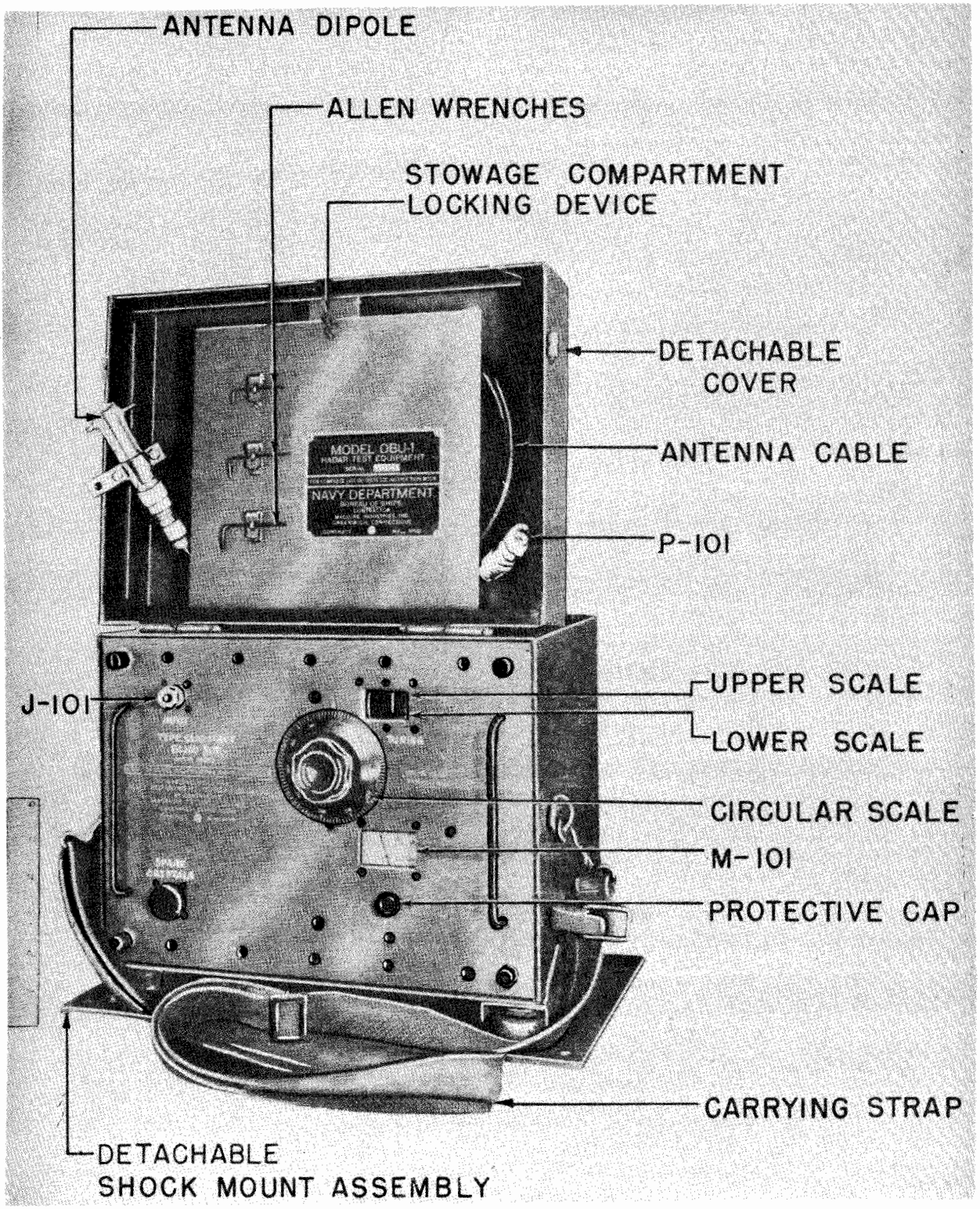
NAVSHIPS 900862: Technical Manual for UHF Wavemeter Equipment WX-4583 including Navy Model OBA Wavemeter, Type CRP-60ABF.

TYPE CLASSIFICATION
DESIGN COGNIZANCE BUSHIPS
PROCUREMENT COGNIZANCE
STOCK NO.
R.D.B. IDENT. NO.

EQUIPMENT SUPPLIED DATA

QUANTITY PER EQUIPT	NAME AND NOMENCLATURE	OVERALL DIMENSIONS (inches)	WEIGHT (lbs.)
1	Wavemeter NT-60ABF	1-1/8 X 4-1/4 X 5-1/8	0.84
1	Calibration Chart		
1	Input Cable	37-1/4 lg	0.675
1	Output Cable	36-1/2 lg	0.25
2	Crystal 1N21		

ECHO BOX RADAR TEST EQUIPMENT OBU-1,-2



Echo Box Radar Test Equipment Model OBU-1

OBU-1,-2 ECHO BOX RADAR TEST EQUIPMENT

FUNCTIONAL DESCRIPTION

The Navy Models OBU-1 and OBU-2 are portable echo box test sets designed for use in the testing and adjustment of shipboard radars operating in the 2900 to 3100 megacycle frequency range. They are designed for frequency and relative power measurements, as well as rough spectrum analysis. Coupling to the radar system can be made constant through the use of a directional coupler or a small pick-up dipole antenna.

They have similar functions and performance characteristics, differing mainly in that the directional couplers supplied make them adaptable to different types of waveguide and radar sets. The Navy Model OBU-1 is used for testing Navy Models SG-a, SG-1, SL, and SL-1 radar, while the Navy Model OBU-2 is used for testing Navy Models SL-a and SJ radars.

No field changes in effect at time of preparation (9 April 1958).

RELATION TO OTHER EQUIPMENT

Navy Models OBU-1 and OBU-2 are similar to Navy Models OBU-3 and OBU-4. They have similar functions and performance characteristics, differing in the physical construction and directional couplers supplied with each model that makes them adaptable to different types of waveguide and radar sets.

ELECTRICAL AND MECHANICAL CHARACTERISTICS

FREQUENCY RANGE: 2900 to 3100 mc.
FREQUENCY CONTROL: Hand tuned.
SENSITIVITY: 65 yds ring time per db.
LOADED Q: Approx 30000.
TEMPERATURE RANGE: -34 to +49 deg C (+410 to -160 yds correction).
TUNING CONTROL: Provides 3200 scale divisions.

MANUFACTURER'S OR CONTRACTOR'S DATA

Maguire Industries, Inc, Greenwich, Conn. Contract NXsr-51561, dated 13 March 1944.

TUBE AND/OR CRYSTAL COMPLEMENT

No Electron Tubes Used.
(1) 1N21B
Total Crystals: (1)

REFERENCE DATA AND LITERATURE

SHIPS 310-A: Technical Manual for Echo Box Radar Test Equipment Models OBU-1 and OBU-2.

TYPE CLASSIFICATION
DESIGN COGNIZANCE BUSHIPS
PROCUREMENT COGNIZANCE
STOCK NO.
R.D.B. IDENT. NO. 2.2.2.2

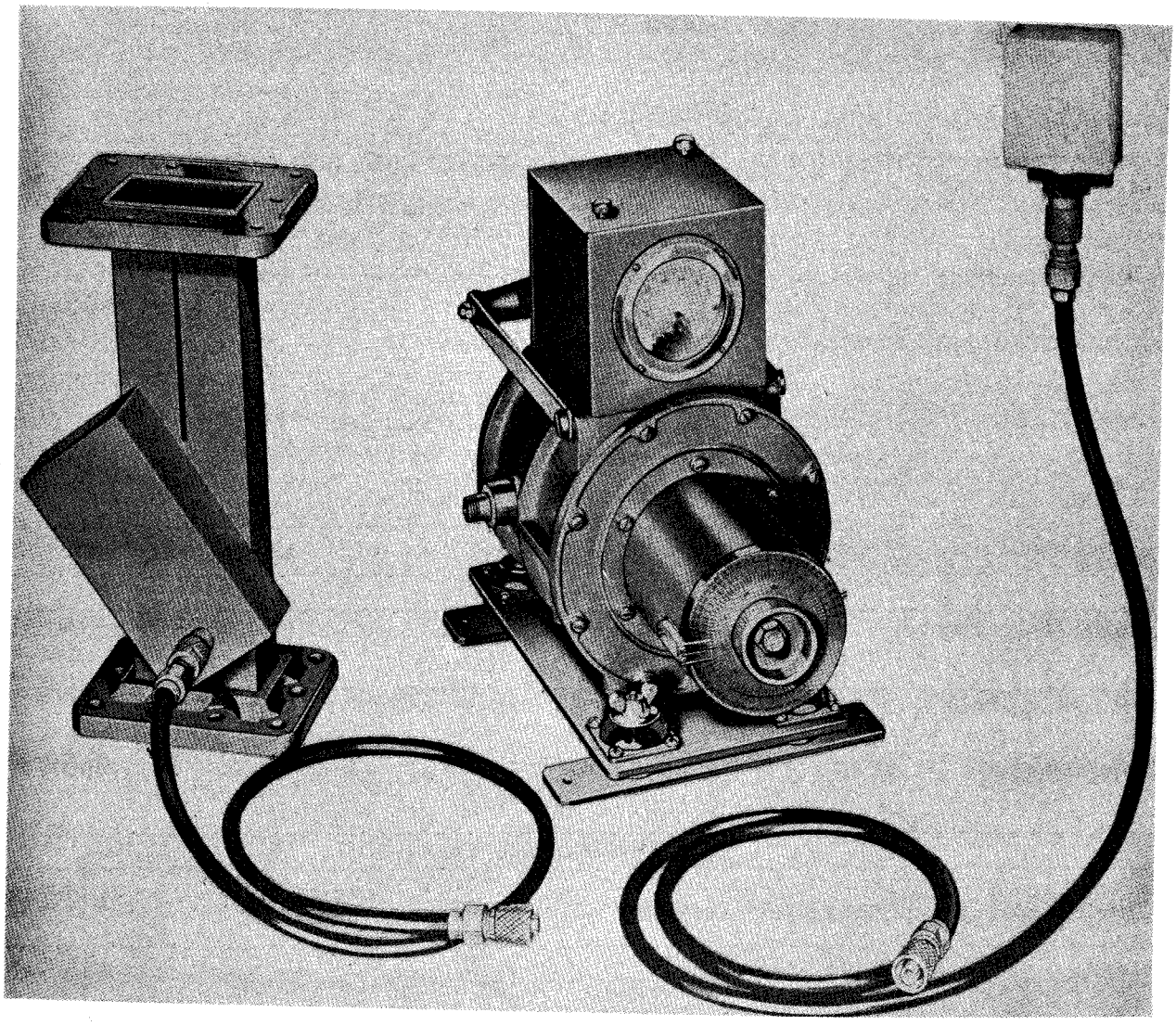
SHIPPING DATA

NUMBER OF BOXES	CONTENTS AND IDENTIFICATION	VOLUME (Cu.Ft.)	OVERALL DIMENSIONS (inches)	WEIGHT PACKED (lbs.)
1	Echo Box Radar Test Equipment Navy Model OBU-1 or	4.95	17 x 18 x 28	71
	OBU-2	4.95	17 x 18 x 28	75

EQUIPMENT SUPPLIED DATA

QUANTITY PER EQUIPT		NAME AND NOMENCLATURE	OVERALL DIMENSIONS (inches)	WEIGHT (lbs.)
OBU-				
1	2			
1	1	Test Set Assembly	10-11/16 x 12-7/8 x 14-5/8	17.75
1	1	Test Dipole Assembly NT-66AHV including: Cable	2-1/2 dia x 43	0.80
1	1	Connecting Cable Assembly	3/4 dia x 60	0.75
1		Directional Coupler NT-47AAL or	5-1/2 x 5-1/2 x 9-1/8	4.80
	1	NT-47AAM	6 x 6-1/2 x 12	8.75
1	1	Set of Equipment Spares	6-1/2 x 7-3/8 x 13-3/16	10.88
2	2	Technical Manual SHIPS 310-A	1/2 x 9 x 11-1/2	

ECHO BOX RADAR TEST EQUIPMENT OBU-3,-4



Echo Box Radar Test Equipment Navy Model OBU-3

FUNCTIONAL DESCRIPTION

The Navy Models OBU-3 and OBU-4 are portable echo box test sets designed for use in the testing and adjustment of shipboard radars operating in the 2900 to 3100 megacycle. frequency range. They are designed for frequency and relative power measurements, as well as rough spectrum analysis. Coupling to the radar system can be made constant through the use of a directional coupler or a small pick-up dipole antenna.

They have similar functions and performance characteristics, differing mainly in that the directional couplers supplied make them adaptable to different types of waveguide.

The Navy Models OBU-3 and OBU-4 are used for testing Navy Models SF, SF-1, SO, SO-1, SO-3, SO-8, SO-9, SO-13, SO-13-a, SO-13-b, SG-a, SG-1, SL, SL-a, SL-1, and SJ-1 radar.

No field changes in effect at time of preparation (10 April 1958).

RELATION TO OTHER EQUIPMENT

Navy Models OBU-3 and OBU-4 are similar to Navy Models OBU-1 and OBU-2. They have similar functions and performance characteristics, differing in the physical construc-

Test-Frequency Measuring

OBU-3,-4 ECHO BOX RADAR TEST EQUIPMENT

tion and directional couplers supplied with each model that makes them adaptable to different types of waveguide.

ELECTRICAL AND MECHANICAL CHARACTERISTICS

FREQUENCY RANGE: 2900 to 3100 mc.
FREQUENCY CONTROL: Hand tuned.
SENSITIVITY: 80 yds ring time per db.
LOADED Q: Approx 47000.
TEMPERATURE RANGE: -40 to +60 deg C (+13.7 to -6.7% change in ring time).

MANUFACTURER'S OR CONTRACTOR'S DATA

Johnson Service Company, Milwaukee, Wis.
Contract NXsr-65336, dated 15 June 1944. (OBU-3).
Contract NXsr-91972, dated 8 February 1945 (OBU-3).
Contract NXsr-83396, dated 26 November 1944 (OBU-4).

TUBE AND/OR CRYSTAL COMPLEMENT

No Electron Tubes used.
(1) 1N21B
Total Crystals: (1)

REFERENCE DATA AND LITERATURE

SHIPS 308(B): Technical Manual for Echo Box Radar Test Equipment Navy Model OBU-3.
SHIPS 345(A): Technical Manual for Echo Box Test Set Navy Model OBU-4.

TYPE CLASSIFICATION
DESIGN COGNIZANCE BUSHIPS
PROCUREMENT COGNIZANCE
STOCK NO.
R.D.B. IDENT. NO. 2.2.2.2

SHIPPING DATA

NUMBER OF BOXES	CONTENTS AND IDENTIFICATION	VOLUME (Cu.Ft.)	OVERALL DIMENSIONS (inches)	WEIGHT PACKED (lbs.)
1	Echo Box Radar Test Equipment Navy Model OBU-3 or	3.4	14-1/2 x 16-1/4 x 24-3/4	80
	OBU-4	3.4	14-1/2 x 16-1/4 x 24-3/4	77

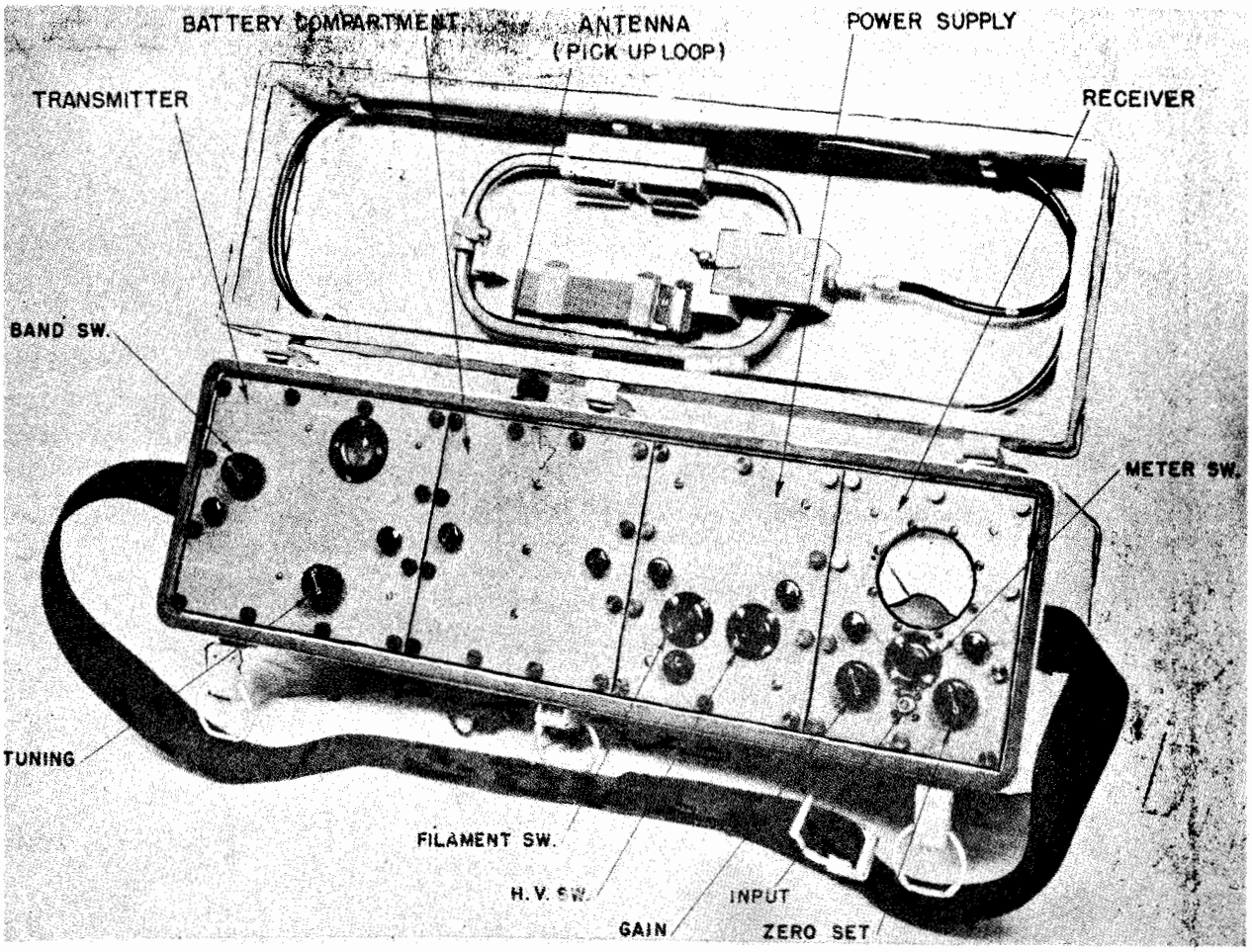
EQUIPMENT SUPPLIED DATA

QUANTITY PER EQUIPT		NAME AND NOMENCLATURE	OVERALL DIMENSIONS (inches)	WEIGHT (lbs.)
OBU-				
3	4			
1	1	Test Set Assembly NT-14ABA-1	7-5/8 x 10-3/4 x 11-1/4	18.5
1	1	Shock Mounting	2-1/8 x 8 x 10	6.0
1	1	Connecting Cable	60 lg	0.75
1	1	Connecting Cable	36 lg	0.75
1		Directional Coupler NT-47AAN or	5-1/4 x 6-1/4 x 12	8.75
		NT-47AAP	4-3/4 x 6-1/4 x 8-1/16	5.75
1	1	Dipole Antenna NT-66AJG	1-3/16 x 2-7/16 x 2-7/8	
1	1	Set of Accessories	3-1/8 x 10-1/2 x 11-1/4	9.25
1	1	Set of Equipment Spares	3 x 7-1/2 x 8-1/2	7.0
2		Technical Manual SHIPS 308(8) or		
	2	SHIPS 345(A)	1/4 x 9 x 11-1/2	

March 1957

Test Frequency Measuring

RERADIATION FREQUENCY METER OCQ



Reradiation Frequency Meter Model OCQ

FUNCTIONAL DESCRIPTION

The OCQ is a test instrument designed as an aid in installation, maintenance and service of direction-finder equipments operating in the range from 2.0 to 20 mc.

No field changes in effect at time of preparation (1 October 1956).

ELECTRICAL AND MECHANICAL CHARACTERISTICS

FREQUENCY RANGE: 2.0 to 20 mc, 4 bands.
OPERATING POWER: 6 v DC.

MANUFACTURER'S OR CONTRACTOR'S DATA

Herback and Rademan, Inc., Philadelphia, Pa.

Contract NXsr 95075, dated 4 April 1945.
Approximate Cost: $940.00 with equipment spares.

TUBE AND/OR CRYSTAL COMPLEMENT

(1) 6V6GT (1) 6H6GT
(1) 6SL7GT (3) 6AK5
Total Tubes: (6).

REFERENCE DATA AND LITERATURE

NAVSHIPS - 91134: Technical Manual for Reradiation Frequency Meter-Equipment Navy Model OCQ

TYPE CLASSIFICATION	
DESIGN COGNIZANCE	BUSHIPS
PROCUREMENT COGNIZANCE	
STOCK NO.	

Test Frequency Measuring

March 1957

OCQ RERADIATION FREQUENCY METER

SHIPPING DATA

NUMBER OF BOXES	CONTENTS AND IDENTIFICATION	VOLUME (Cu.Ft.)	OVERALL DIMENSIONS (inches)	WEIGHT PACKED (lbs.)
1	1 Frequency Indicating Meter 60166			
	1 Antenna 66165	11.25	20 X 27 X 36	127
1	Repair Parts Box			
	Battery Charger 20604	9.2	22 X 24 X 30	122

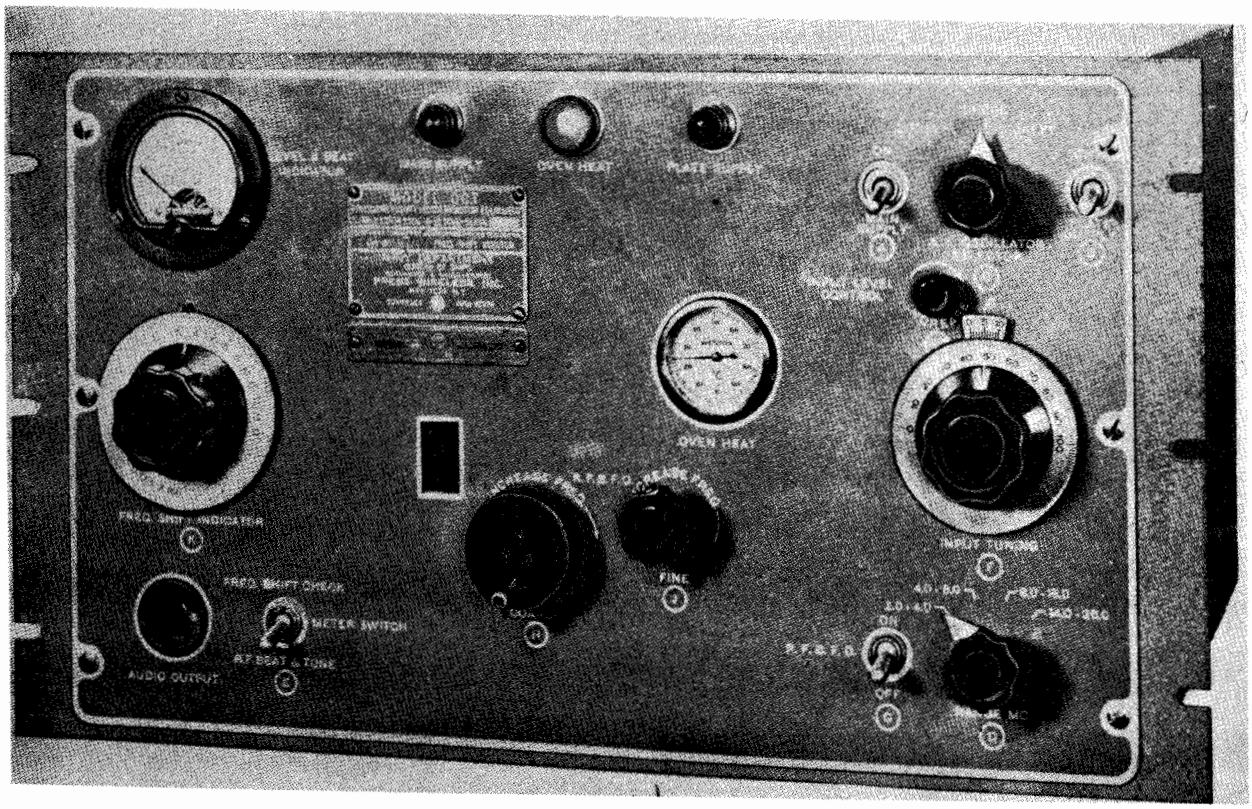
EQUIPMENT SUPPLIED DATA

QUANTITY PER EQUIPT	NAME AND NOMENCLATURE	OVERALL DIMENSIONS (inches)	WEIGHT (lbs.)
1	Frequency Indicating Meter 60166 with 1 Antenna 66165	7-1/2 X 15 X 24	62.5
1	Repair Parts Box and Battery Charger 20604	10-1/2 X 12-1/2 X 18-1/4	63

April 1958

FREQUENCY SHIFT KEYER MONITOR

OCT



Frequency Shift Keyer Monitor OCT

FUNCTIONAL DESCRIPTION

The Model OCT is designed as a rack mounted independent instrument for determining the carrier frequency-shift of any transmitter in the 2 to 26 megacycle frequency range. It will measure the total frequency shift from mark to space between the limits of plus or minus 200 and 700 cycles of the assigned frequency.

Before this monitor is used, the transmitter should be tuned to the proper operating frequency, with the frequency-shift keyer set at mark frequency.

No field changes in effect at time of preparation (6 January 1958).

ELECTRICAL AND MECHANICAL CHARACTERISTICS

FREQUENCY RANGE: 2 to 26 mc.
FREQUENCY SHIFT MEASUREMENT: ±200 cps to ±700 cps from the assigned transmitter frequency.
RF INPUT DATA
MIN: 100 mv.
MAX: 500 mv.
IMPEDANCE: 75 ohms.
AUDIO RANGE: 400 to 1400 cps.
OVEN TEMPERATURE
NORMAL: Near 50 deg C.
HIGH AMBIENT TEMPERATURES: 60 deg C.
TEMPERATURE VARIATION: ±0.5 deg C.
POWER REQUIREMENTS: 110 or 220 v, 50 to 60 cps, 100 W.

MANUFACTURER'S OR CONTRACTOR'S DATA

Press Wireless, Inc, New York, N.Y.
Contract NXsr-67976.

TUBE AND/OR CRYSTAL COMPLEMENT

(1) 0D3W	(1) 6AC7WA	(2) 6SJ7
(1) 5Y3WGTB	(1) 6K6GT	(1) 6J5
		(1) 6SL7WGT

Total Tubes: (8)

Test-Frequency Measuring

OCT FREQUENCY SHIFT KEYER MONITOR

April 1958

No Crystals.

TYPE CLASSIFICATION	
DESIGN COGNIZANCE	BUSHIPS
PROCUREMENT COGNIZANCE	
STOCK NO.	
R.D.B. IDENT. NO.	

REFERENCE DATA AND LITERATURE

Preliminary Technical Manual for Navy Model OCT Frequency Shift Keyer Monitor.

SHIPPING DATA

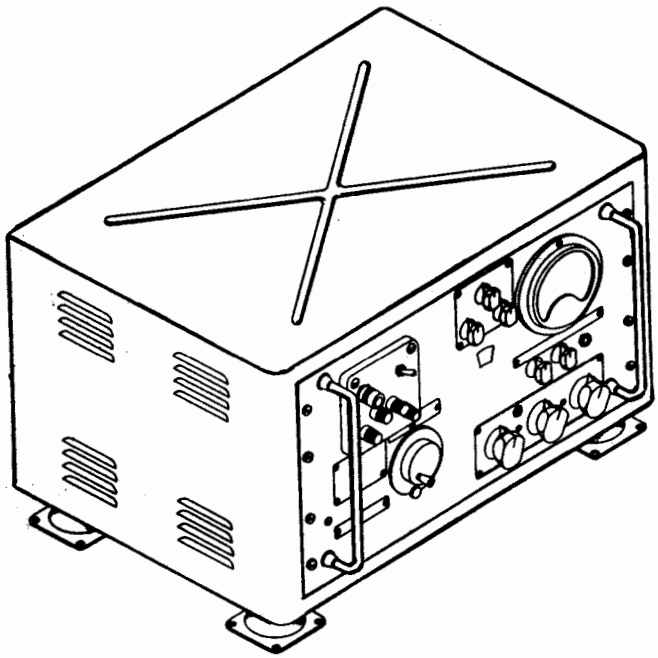
NUMBER OF BOXES	CONTENTS AND IDENTIFICATION	VOLUME (Cu.Ft.)	OVERALL DIMENSIONS (inches)	WEIGHT PACKED (lbs.)
1	Frequency Shift Monitor NT-60131	6.5	17 x 23-1/2 x 28	170
1	Set of Equipment Spares	6.5	17 x 23-1/2 x 28	122

EQUIPMENT SUPPLIED DATA

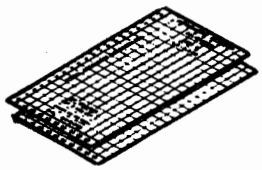
QUANTITY PER EQUIPT	NAME AND NOMENCLATURE	OVERALL DIMENSIONS (inches)	WEIGHT (lbs.)
1	Frequency Shift Monitor NT-60131	10-7/16 x 13-1/8 x 19	70
1	Set of Equipment Spares		55
2	Technical Manual	1/2 x 9 x 11	

FREQUENCY SHIFT MONITOR EQUIPMENTS

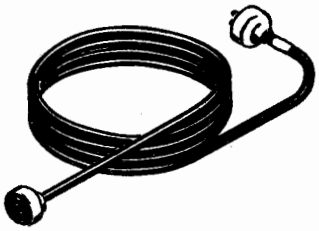
OCT-2,3



FREQUENCY SHIFT MONITOR EQUIPMENT
NAVY MODEL OCT-2



FREQUENCY CALIBRATION CHARTS
N-201 AND N-202



POWER CABLE ASSEMBLY
W-201

Frequency Shift Monitor Equipments Oct 2

FUNCTIONAL DESCRIPTION

The Navy Models OCT-2 and 3 are test equipments designed for use in measuring carrier-frequency shift of transmitters used in the frequency-shift telegraph system over the range of (1) to (26) megacycles. The equipment measures the total frequency-shift from mark to space over the limits of 0 to 1500 cps, and functions on keyed or unkeyed signals. Since it is not necessary to interrupt periods of traffic to manually measure the amount of frequency-shift being used at the transmitter by keying first to the space frequency and then to the mark frequency; the equipment may be used as a continuous frequency-shift monitor.

These two (2) equipments are identical except for differences in mounting methods and over-all dimensions. Frequency-Shift Monitor OCT-2 is intended for shipboard use and is supplied in a shock-mounted cabinet while the OCT-3 is designed for rack and panel mounting in shore type installations. The RF Monitor NT-60170 comprised of the panel and chassis is the major unit of both the Oct-2 and 3 equipments, and is completely interchangeable in either model.

No field changes in effect at time of preparation (25 July 1956).

RELATION TO OTHER EQUIPMENT

Equipment Required but not Supplied: (1) Headphone and Cable as required.

ELECTRICAL AND MECHANICAL CHARACTERISTICS

FREQUENCY RANGE: 1 to 26 mc.
BAND RANGES
- BAND 1: 1 to 2.9 mc.
- BAND 2: 2.9 to 6.7 mc.
- BAND 3: 6.7 to 14 mc.
- BAND 4: 14 to 26 mc.

TYPE OF TUNING: Manual (with frequency calibration charts).
RECEIVER TYPE: FM superheterodyne.
INTERMEDIATE FREQUENCY: 912 kc.
TYPE OF RECEPTION: Frequency shift transmissions up to 1500 cps.

FREQUENCY SHIFT MONITOR EQUIPMENTS

FREQUENCY STABILITY
FREQUENCY DRIFT: 0.5 cycles per megacycle per minute for constant ambient temperature after approximately one (1) hour warm-up period; 1 cycle per megacycle per minute for censlant ambient temperature after ten (10) minute warm-up period.
INPUT IMPEDANCE: 75 ohms approx.
ACCURACY OF MEASUREMENT: ±5% over operating range of 300 to 1400 cps.
CRYSTAL CALIBRATION ACCURACY: ±20 cps over -15°c to +50°c temperature range.
MINIMUM KEYING SPEED: 20 cps or 40 wpm.
RF SIGNAL INPUT LEVEL: 15 to 20 v.

MANUFACTURER'S OR CONTRACTOR'S DATA

Hazeltine Electronics Corporation, Little Neck, N.Y.
Contract NObsr 42028, dated 8 October 1947.

Approximate Cost: $1120.00 with equipment spares. (Oct-2)
Approximate Cost: $1200.00 with equipment spares. (Oct-3)

TUBE AND/OR CRYSTAL COMPLEMENT

(1) CC3/VR-105 (1) 12AX7 (1) 5Y3VVGTB
(1) 5750/6BE6W (1) 6AH6 (3) 6AY6
(1) 5749/6BA6W (1) 6T6WA (2) 5726/6AL5W
Total Tubes: (12)
(1) NT-40323
Total Crystals: (1)

REFERENCE DATA AND LITERATURE

NAVSHIPS 91131: Technical Manual for Frequency Shift Monitor Equipments, Navy Models OCT-2 and OCT-3.

TYPE CLASSIFICATION
DESIGN COGNIZANCE BUSHIPS
PROCUREMENT COGNIZANCE RE-13A-958A
STOCK NO.
R.D.B. IDENT. NO.

SHIPPING DATA

NUMBER OF BOXES		CONTENTS AND IDENTIFICATION	VOLUME (Cu.Ft.)	OVERALL DIMENSIONS (inches)	WEIGHT PACKED (lbs.)
OCT-2	OCT-3				
1		Frequency Shift Monitor Equipment Navy Model OCT-2	6.75	15-1/2 X 23-1/2 X 32	179
	1	Frequency Shift Monitor Equipment Navy Model OCT-3	6.75	15-1/2 X 23-1/2 X 32	151
1	1	Set of Equipment Spares	5.49	14-1/4 X 18-11/16 X 35-9/16	115

EQUIPMENT SUPPLIED DATA

QUANTITY PER EQUIPT		NAME AND NOMENCLATURE	OVERALL DIMENSIONS (inches)	WEIGHT (lbs.)
OCT-2	OCT-3			
1	1	RF Monitor NT-60170	10-1/2 X 17 X 19	71
1		Cabinet NT-10708	11-5/8 X 18-3/4 X 14	33.1
	1	Dust Cover NT-10709	6-15/16 X 14-5/8 X 17-5/16	1
1	1	Power Cord NT-62450	144 lg	1.5
2	2	Calibration Charts	4-5/16 X 8-1/8	
4		Shock Mounts	1-1/2 X 3 X 3	0.94
1	1	Set of Equipment Spares	12-1/4 X 16-11/16 X 31-9/16	75
2	2	Technical Manuals NAVSHIPS 91131		

RADAR RECEIVING EQUIPMENT

RDL

FUNCTIONAL DESCRIPTION

The RDL "Blinker" Receiver is an UHF instrument used for measuring the frequency of radar signals in the band from 300 to 600 mc. Prior to shipment the receiver has been adjusted to tune over the range from approximately 310 to 430 mc; by changing the external low pass filter to a high pass filter the range from 470 to 590 mc may be used. A small neon light mounted on the front rotating tuning dial gives a panoramic visual indication of a radar signal; in addition a jack is provided so that headphones may be used for an audio check at the same point. The tuning dial may either be operated manually or by a small induction motor which rotates the dial at about 110 rpm. This gives a stoboscopic indication of radar signals present. The dial reading is compared with a calibration chart to determine the frequency in megacycles of the detected signal.

No field changes in effect at time of peparation (10 January 1957).

ELECTRICAL AND MECHANICAL CHARACTERISTICS

FREQUENCY RANGE: 310 to 430 mc and 470 to 590 mc.
INPUT IMPEDANCE: 50 ohms.
SIGNAL INPUT: 200 uv minimum
POWER SOURCE REQUIRED: 105 to 125 V, 50 to 60 cps, 65 W.

MANUFACTURER'S OR CONTRACTOR'S DATA

Columbia Broadcasting System Inc, New York, N.Y.

TUBE AND/OR CRYSTAL COMPLEMENT

(2) 6SN7-GT	(5) 6SH7
(1) 6SL7-GT	(1) 6SQ7
(1) 5Y3-GT	(1) 9005
	(1) 9002

Total Tubes: (12)

REFERENCE DATA AND LITERATURE

Technical Manual for Navy Type RDL "Blinker" Receiver.

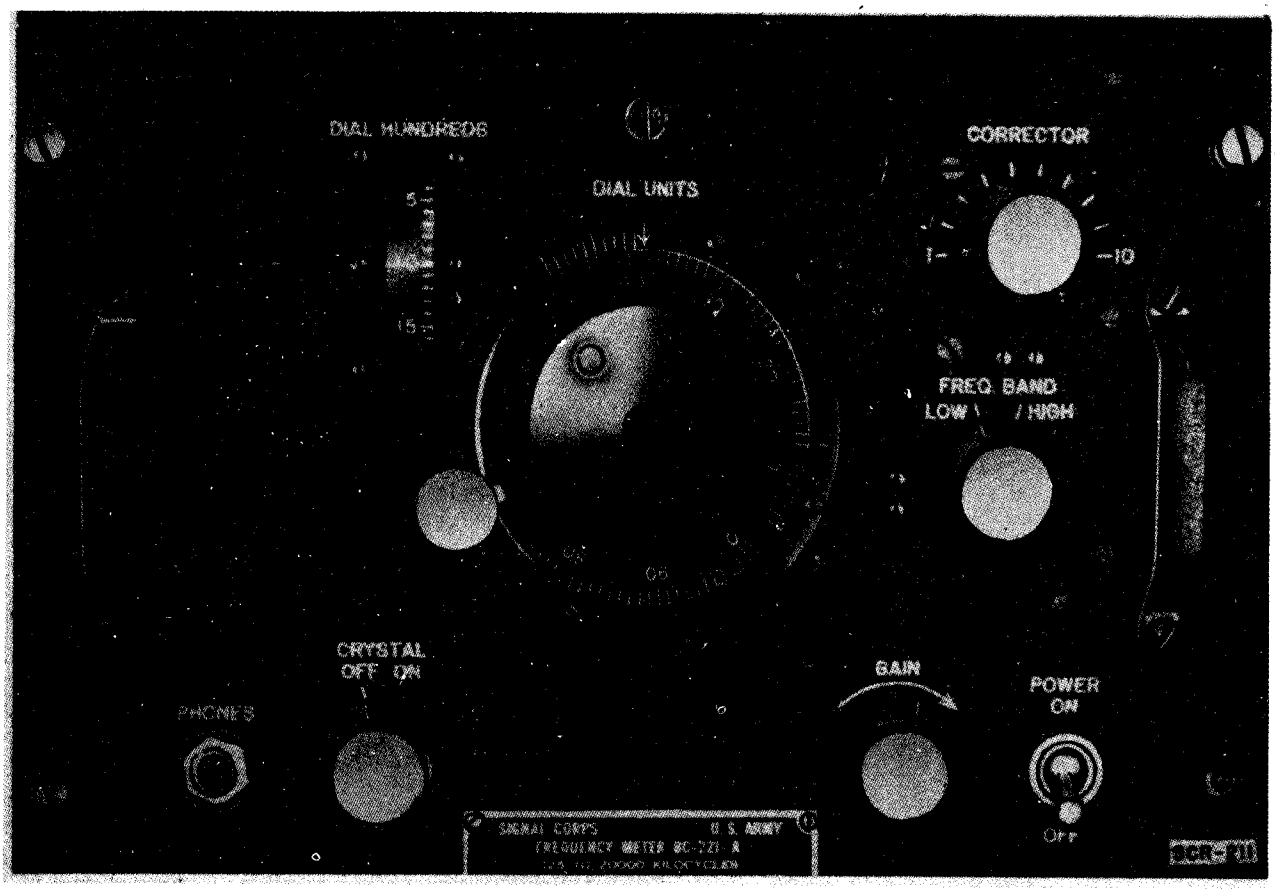
TYPE CLASSIFICATION
DESIGN COGNIZANCE BUSHIPS
PROCUREMENT COGNIZANCE
STOCK NO.
R.D.B. IDENT. NO.

EQUIPMENT SUPPLIED DATA

QUANTITY PER EQUIPT	NAME AND NOMENCLATURE	OVERALL DIMENSIONS (inches)	WEIGHT (lbs.)
1	Radar Receiving Equipment RDL		

FREQUENCY METER

SCR-211



Frequency Meter SCR-211

FUNCTIONAL DESCRIPTION

The SCR-211 is a portable heterodyne-type frequency meter. It is used to calibrate field radio receivers and transmitters by direct comparison with the calibrated variable frequency oscillator of the frequency meter.

No field changes in effect at time of preparation (21 September 1956).

RELATION TO OTHER EQUIPMENT

Equipment Required but not Supplied: (6) Batteries BA-2, (4) Batteries BA-23.

ELECTRICAL AND MECHANICAL CHARACTERISTICS

FREQUENCY RANGE: 125 to 20,000 kc.
ACCURACY: 0.01%.

OPERATING POWER: 6 v and 135 v DC.

TUBE AND/OR CRYSTAL COMPLEMENT

No Electron Tubes.

REFERENCE DATA AND LITERATURE

TM-11-48H: Technical Manual for Test Equipment.

TYPE CLASSIFICATION	
DESIGN COGNIZANCE	TASSA
PROCUREMENT COGNIZANCE	
STOCK NO.	
R.D.B. IDENT. NO.	

SCR-211 FREQUENCY METER

June 1957

EQUIPMENT SUPPLIED DATA

QUANTITY PER EQUIPT	NAME AND NOMENCLATURE	OVERALL DIMENSIONS (inches)	WEIGHT (lbs.)
1	Frequency Meter	10 X 11 X 15	39.5
1	Bag		
1	Calibration Book		
1	Crystal Unit		
2	Set Spare Tube		
1	Strap		
2	Technicals Manuals		

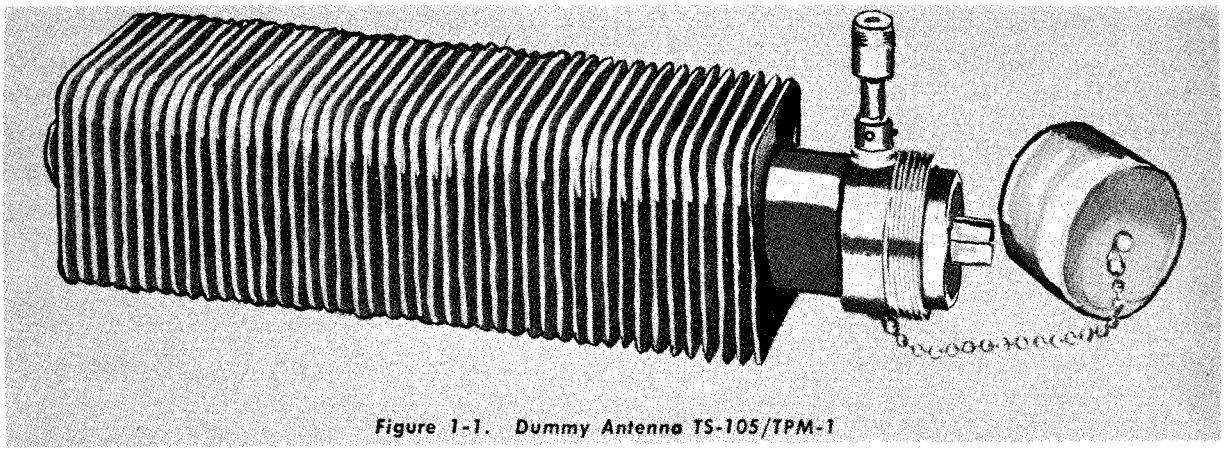


Figure 1-1. Dummy Antenna TS-105/TPM-1

Dummy Antenna TS-105/TPM-1

FUNCTIONAL DESCRIPTION

The TS-105/TPM-1 is designed to provide a power absorbing termination for radio transmission line of "L" band radars into which the transmitter can work without radiation into space.

It also includes a probe for coupling test equipment to transmission line in order that test signals may be transmitted and received through a known loss.

No field changes in effect at time of preparation (13 July 1956).

ELECTRICAL AND MECHANICAL CHARACTERISTICS

FREQUENCY RANGE: 1000 to 1500 mc.
IMPEDANCE: 50 ohms.
POWER DISSIPATION: 5 kw peak, 200 W nominal.

MANUFACTURER'S OR CONTRACTOR'S DATA

Western Electric Company, Inc., New York, N.Y.
Contract NOrd 3456.

TUBE AND/OR CRYSTAL COMPLEMENT

No Electron Tubes.

REFERENCE DATA AND LITERATURE

NAVSHIPS 900,536: Technical Manual for Dummy Antennas TS-105/TPM-1.

TYPE CLASSIFICATION
DESIGN COGNIZANCE BUORD
PROCUREMENT COGNIZANCE
STOCK NO.
R.D.B. IDENT. NO.

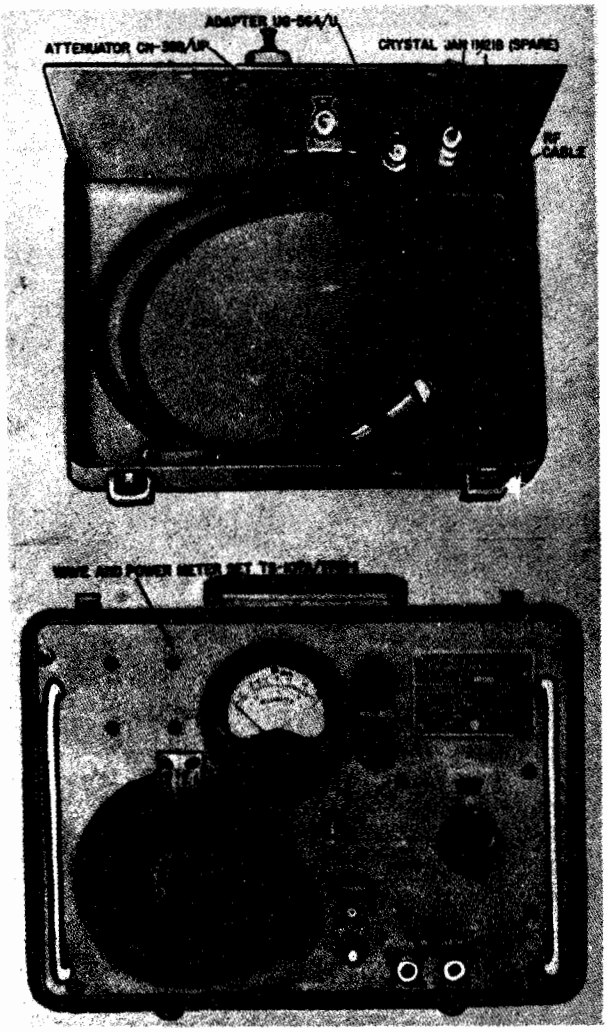
EQUIPMENT SUPPLIED DATA

QUANTITY PER EQUIPT	NAME AND NOMENCLATURE	OVERALL DIMENSIONS (inches)	WEIGHT (lbs.)
1	Dummy Antenna TS-105/TPM-1	3 X 4-1/2 X 14-9/16	7 lbs 12 oz

October 1957

Test-Frequency Measuring

WAVE AND POWER METER SET TS-107A/TPM-1



Wave and Power Meter Set, TS-107A/TPM-1

FUNCTIONAL DESCRIPTION

The TS-107A/TPM-1 is a portable, self contained equipment intended for the measurement of frequency and average power in the range of 500 to 1500 mc. This set may be used under field and laboratory conditions and is battery operated. It is used in testing any radar in the 500 to 1500 mc frequency range presenting at least 0.5 mw (-3 dbm) and no more than 2 w (+33 dbm) of average power at the RF test point or directional coupler.

No field changes in effect at time of preparation (22 March 1957).

ELECTRICAL AND MECHANICAL CHARACTERISTICS

FREQUENCY RANGE: 500 to 1500 mc.
FREQUENCY CONTROL: direct reading dial.
POWER MEASURING RANGE: 0.5 to 250 mw (-3 to +24 dbm) to 2 w (+33 dbm) with accessory attenuator.
FREQUENCY MEASUREMENT ACCURACY: ±3 mc absolute at 50% humidity.
POWER MEASURING ACCURACY: ±1 db.
INPUT IMPEDANCE: 50 ohms.
AMBIENT TEMPERATURE
OPERATING: -40 deg C to +55 deg C.
NON-OPERATING: -65 deg C to +85 deg C.
OPERATING POWER: 2 batteries BA-210/U; 12 v, 28 ma.

MANUFACTURER'S OR CONTRACTOR'S DATA

The Narda Mfg Corp, Mineola, N.Y.
Contract NObsr-64273.
Contract NObsr-59991.

TUBE AND/OR CRYSTAL COMPLEMENT

(1) 1N21B
Total Crystals: (1)

REFERENCE DATA AND LITERATURE

NAVSHIPS 92789: Technical Manual for Wave and Power Meter Set TS-107A/TPM-1.

TYPE CLASSIFICATION	
DESIGN COGNIZANCE	BUSHIPS
PROCUREMENT COGNIZANCE	
STOCK NO.	
R.D.B. IDENT. NO.	

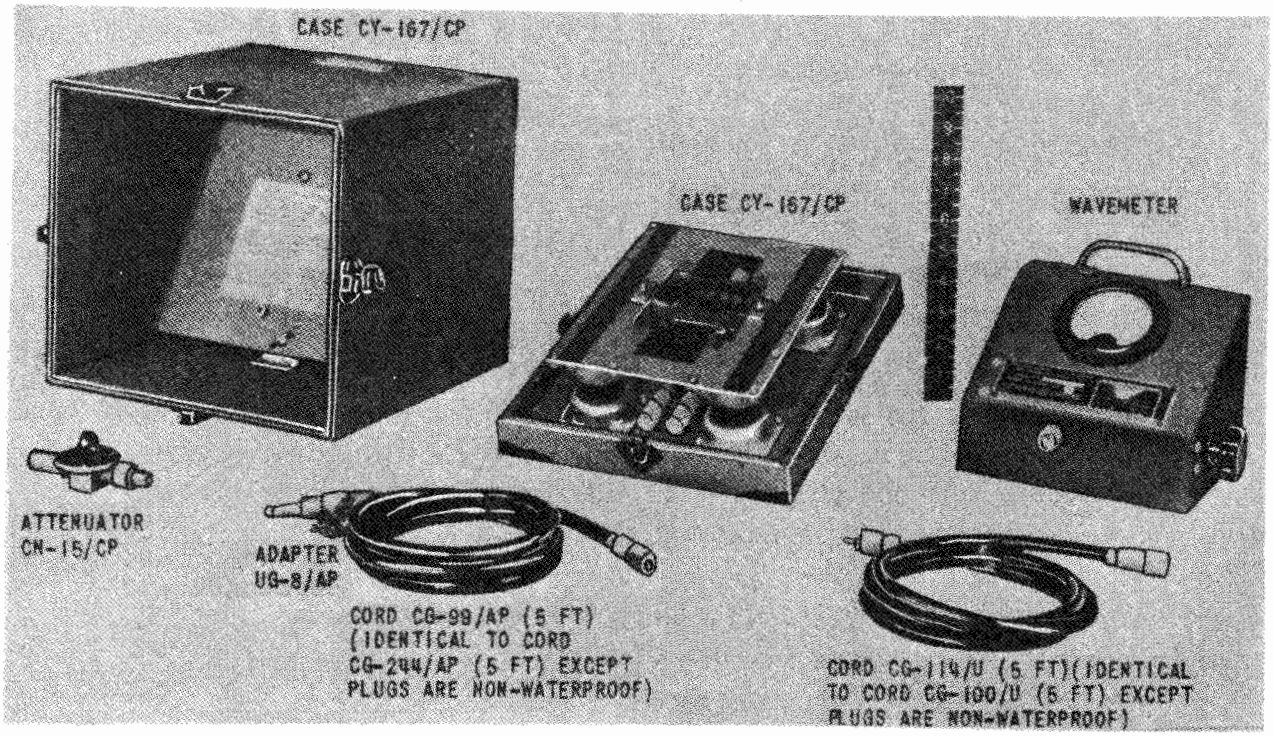
EQUIPMENT SUPPLIED DATA

QUANTITY PER EQUIPT	NAME AND NOMENCLATURE	OVERALL DIMENSIONS (inches)	WEIGHT (lbs.)
1	Wave and Power Meter Set TS-107A/TPM-1	8 X 10-1/2 X 13-1/2	26
2	Technical Manuals		
1	Adapter UG-564/U		
1	Crystal 1N21B		
1	Attenuator CN-388/UP		
1	RF Cable		

August 1957

Test-Frequency Measuring

WAVEMETER TS-111/CP



FUNCTIONAL DESCRIPTION

The TS-111/CP is a portable, precision microwave wavemeter which provides a means of measuring radio frequencies between 3000 and 3600 megacycles.

It requires a minimum RF input of 0.25 milliwatt to give reliable indications. The permissible ambient temperature range is from minus 55 to plus 50 degrees centigrade.

It is shockproof mounted for field use in aircraft or other mobile equipment.

No field changes in effect at time of preparation (27 December 1956).

RELATION TO OTHER EQUIPMENT

Electrically identical to Wavemeter TS-111 (XA)/CP, but differs in Mechanical detail.

ELECTRICAL AND MECHANICAL CHARACTERISTICS

FREQUENCY RANGE: 3000 to 3600 mc.
ACCURACY: Within ± 0.1%, ± 3 mc at 3000 mc over the entire range, and only ± 1 mc at 3 specified frequencies.
TEMPERATURE COEFFICIENT
WAVELENGTH: Approx -0.000075 cm per deg C, or -0.00004 cm per deg F.
FREQUENCY: Approx ± 0.025 mc per deg C (-0.014 mc per deg F) at 3300 mc.
TEMPERATURE RANGE (AMBIENT): -55 to +50 deg C (-67 to +122 deg F).
PRECISION: 0.6 mc over entire range.
RF INPUT: 0.25 mw min.
SENSITIVITY: Approx 6 mw for full-scale deflection at 3300 mc.
INPUT IMPEDANCE: 50 ohm surge.
ATTENUATOR: Approx 0 to 25 db.

MANUFACTURER'S OR CONTRACTOR'S DATA

General Electric Company, Schenectady, N.Y.
Approximate Cost: $200.00 with equipment spares.

TUBE AND/OR CRYSTAL COMPLEMENT

(1) 1N21B
Total Crystals: (1)

Test-Frequency Measuring

TS-111/CP

WAVEMETER

August 1957

REFERENCE DATA AND LITERATURE

CO-AN16-35TS111-2-M: Technical Manual for Wavemeters TS-111/CP and TS-111(XA)/CP.

TYPE CLASSIFICATION	
DESIGN COGNIZANCE	USAF
PROCUREMENT COGNIZANCE	
STOCK NO.	
R.D.B. IDENT. NO.	

SHIPPING DATA

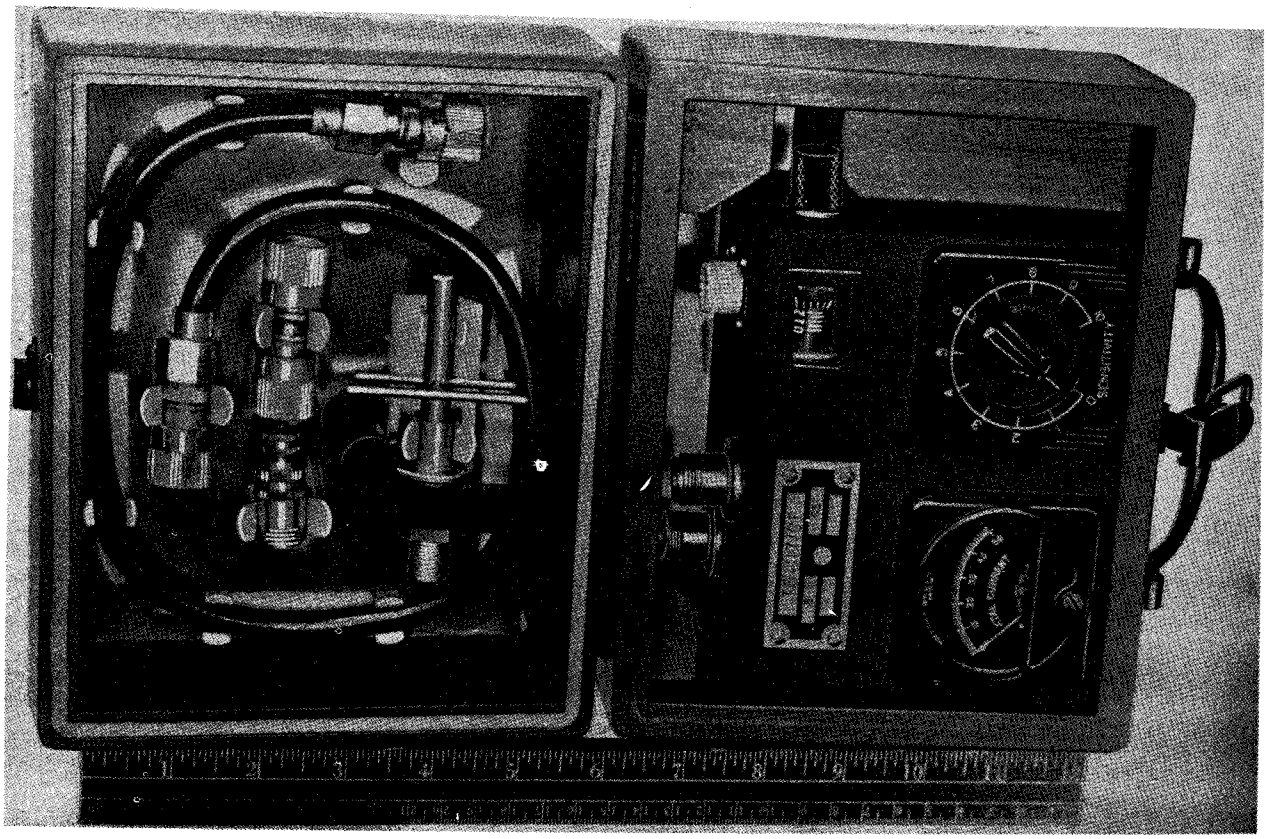
NUMBER OF BOXES	CONTENTS AND IDENTIFICATION	VOLUME (Cu.Ft.)	OVERALL DIMENSIONS (inches)	WEIGHT PACKED (lbs.)
1	Wavemeter TS-111/CP	0.73	9-1/2 X 11 X 12	19.4

EQUIPMENT SUPPLIED DATA

QUANTITY PER EQUIPT	NAME AND NOMENCLATURE	OVERALL DIMENSIONS (inches)	WEIGHT (lbs.)
1	Wavemeter TS-111/CP	6 X 7 X 9	7.5
1	Attenuator CN-15/CP	1-1/2 X 1-3/4 X 4	0.44
1	Cord CG-99/AP or CG-244/AP	3/4 dia X 60	0.75
1	Cord CG-114/U or CT-100/U	3/4 dia X 60	0.63
1	Case CY-167/CP	9-1/2 X 11 X 12	9.63
1	Adapter UG-8/AP	5/8 dia X 2-1/16	0.09
3	Radio Frequency Plug UG-21/U or UG-12/U	3/4 dia X 1-5/8	0.19
1	Plug PL-259	3/4 dia X 1-1/2	0.06
4	Crystal 1N22 or 1N21B	5/16 dia X 7/8	0.06

Test-Frequency Measuring

WAVEMETER TEST SET TS-117/GP



Wavemeter Test Set TS-117/GP

FUNCTIONAL DESCRIPTION

The TS-117/GP is a portable absorption-type meter used in measuring relative field strength, as well as the frequency of pulsed or CW oscillators. It may also be applied in tuning klystrons and similar devices.

No field changes in effect at time of preparation (15 April 1958).

RELATION TO OTHER EQUIPMENT

This equipment supersedes Test Set TS-3/AP and Thermistor Frequency Meter 60 ABM.

ELECTRICAL AND MECHANICAL CHARACTERISTICS

FREQUENCY RANGE: 2,400 to 3,400 mc.
TYPE OF RECEPTION: CW, pulse.
POWER RANGE: 100 to 1,000 uw.
SENSITIVITY: 500 uw.
IMPEDANCE: 50 ohms (input); 90 ohms (output).
"Q": 1,000 to 2,000.
TEMPERATURE RANGE: −40 deg C to +48.8 deg C.
ACCURACY: ±0.5 mc (at 3,256 mc); ±0.1% (at all other freq).

MANUFACTURER'S OR CONTRACTOR'S DATA

Lavoie Laboratories, Morganville, N.J.
Order No. 49-41-SC, dated 27 October 1948.
Order No. 49-7189, dated 11 March 1949.
Order No. 5040-45, dated 19 June 1945.
Sperry Gyroscope Co, Great Neck, N.Y.
Order No. 2338-MPD-45.
Order No. 2538-MPD-45.

Test-Frequency Measuring

April 1958

TS-117/GP WAVEMETER TEST SET

TUBE AND/OR CRYSTAL COMPLEMENT

No Electron Tubes used.
(1) 1N21B
Total Crystals: (1)

Test Set TS-117/GP.

TYPE CLASSIFICATION
DESIGN COGNIZANCE TASSA
PROCUREMENT COGNIZANCE Spec MIL-T-11559
STOCK NO.
R.D.B. IDENT. NO.

REFERENCE DATA AND LITERATURE

TM11-2538: Technical Manual for Wavemeter

SHIPPING DATA

NUMBER OF BOXES	CONTENTS AND IDENTIFICATION	VOLUME (Cu.Ft.)	OVERALL DIMENSIONS (inches)	WEIGHT PACKED (lbs.)
1	Wavemeter Test Set TS-117/GP	0.69	10 X 10 X 12	9.5

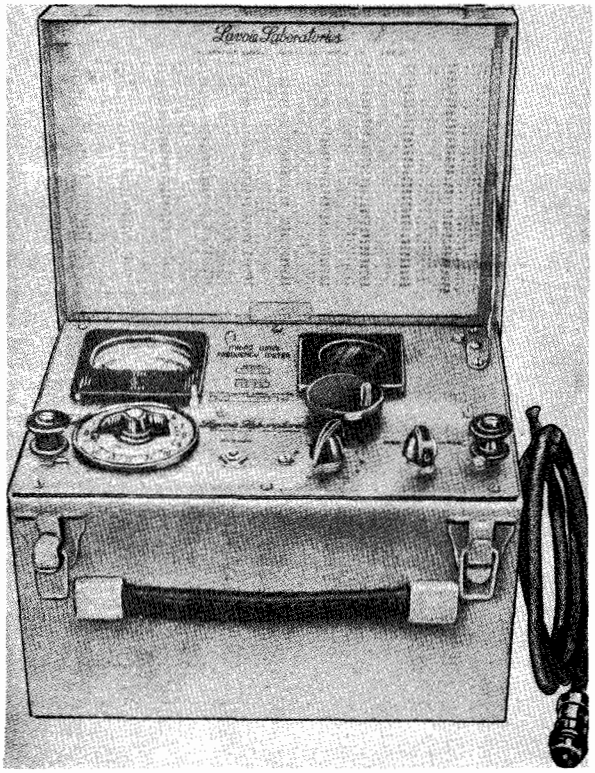
EQUIPMENT SUPPLIED DATA

QUANTITY PER EQUIPT	NAME AND NOMENCLATURE	OVERALL DIMENSIONS (inches)	WEIGHT (lbs.)
1	Wavemeter Test Set TS-117/GP including:	3-1/2 X 5-1/4 X 6-3/4	3.36
1	Carrying Case	5-3/4 X 6-1/4 X 8	3.51
1	Antenna Assy AS-23/AP	1-1/8 X 2-3/16 X 3-13/16	0.2
1	Cord CG-183A/U	26 lg	
2	Radio Frequency Plugs UG-21A/U or UG-188/U	11/16 dia X 1-1/2	
1	Connector Adapter UG-578/U	13/16 dia X 1-1/2	
1	Connector Adapter UG-131/U	5/8 dia X 1-35/64	
2	Silicon Crystal Unit 1N21B		
2	Technical Manuals TM11-2538		

April 1958

Test-Frequency Measuring

FREQUENCY METER TS-127/U



Frequency Meter TS-127/U

FUNCTIONAL DESCRIPTION

The TS-127/U is a portable instrument providing frequency readings on cw or pulsed rf transmitters and signal generators.

No field changes in effect at time of preparation (16 April 1958).

RELATION TO OTHER EQUIPMENT

This equipment is identical with Frequency Meter, Lavoie Laboratories Model 105-SM.

Equipment Required but not Supplied: (1) Battery BA-35, (1) Battery BA-59.

ELECTRICAL AND MECHANICAL CHARACTERISTICS

FREQUENCY RANGE: 375 to 725 mc ±1 mc.
CURRENT RANGE: 0 to 200 ua.
POWER REQUIREMENTS: 1.5 v, 45 v DC.

MANUFACTURER'S OR CONTRACTOR'S DATA

Lavoie Laboratories, Morganville, NJ
Contract: NXss-26732.
NXss-33777.
Approximate Cost: 200.00 with equipment spares.

TUBE AND/OR CRYSTAL COMPLEMENT

(1) 1S5 (1) 3S4 (1) 957
Total Tubes: (3)

No Crystals used.

REFERENCE DATA AND LITERATURE

AN08-35TS127-2: Handbook of Maintenance Instructions for Frequency Meter TS-127/U.

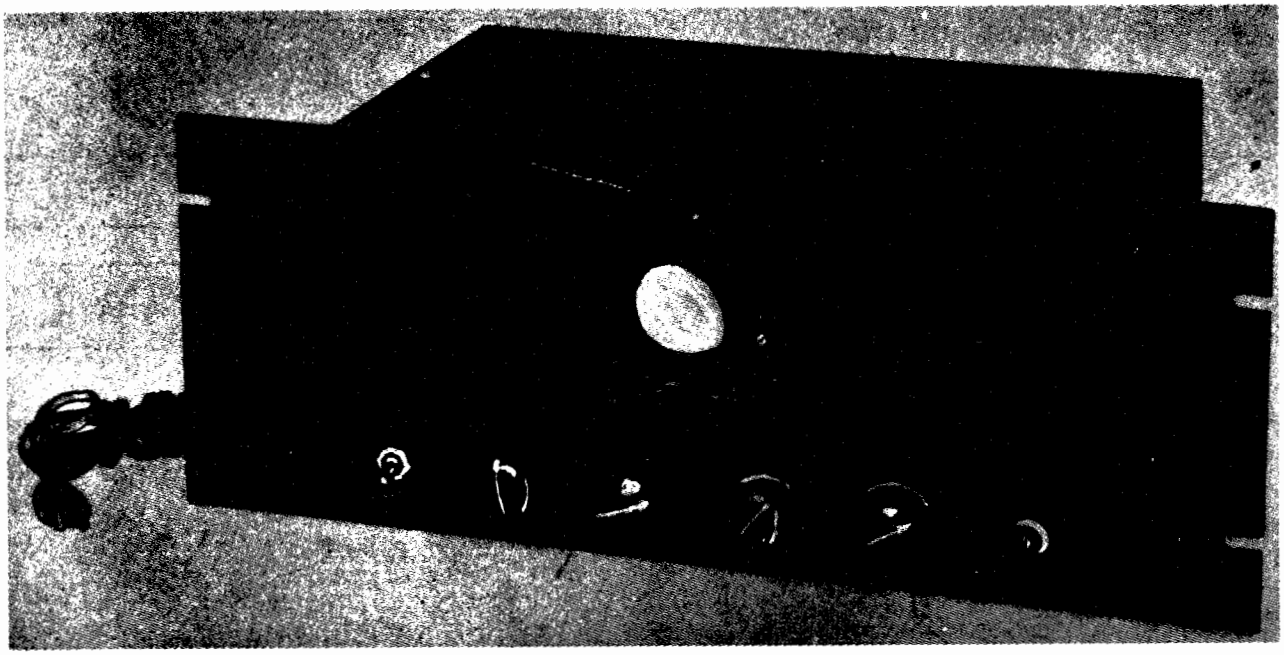
TYPE CLASSIFICATION
DESIGN COGNIZANCE BUSHIPS
PROCUREMENT COGNIZANCE BUSHIPS SPEC RE 9116A
STOCK NO.
R.D.B. IDENT. NO.

EQUIPMENT SUPPLIED DATA

QUANTITY PER EQUIPT	NAME AND NOMENCLATURE	OVERALL DIMENSIONS (inches)	WEIGHT (lbs.)
1	Frequency Meter TS-127/U including:	8-1/2 x 9-1/2 x 11-1/2	20
1	Cable Assy	48 lg	
1	Probe	4 lg	

Test-Frequency Measuring

OSCILLOSCOPE TS-152/FSM-1



Oscilloscope TS-152/FSM-1

FUNCTIONAL DESCRIPTION

The TS-152/FSM-1 is an electronic unit used for the visual comparison of two audio-frequencies. In operation with associated equipment, this oscilloscope aids in the determination of the frequency of quartz crystals.

Oscilloscope TS-152/FSM is a component of Frequency Measuring Assembly CY-93/FSM-1. It is useful in the last step of the crystal frequency measuring procedure which consists of the measurements of the audio frequency difference between the unknown crystal frequency and a known signal from a secondary frequency standard such as Frequency Standard TS-308/U. This measurement is accomplished by adjusting (and noting) the frequency of calibrated variable Audio Oscillator TS-312/FSM-1 to zero beat with the audio frequency mentioned above. Zero beat is indicated by absence of signal in headphones or speaker or by a stationary ellipse on the oscilloscope. Either indication may be used but the oscilloscope yields the sharper null point. In general, both are used simultaneously.

No field changes in effect at time of preparation (16 November 1956).

RELATION TO OTHER EQUIPMENT

Utilized as a part of Frequency Measuring Assembly CY-93/FSM-1 of which it is a major component.

Equipment Required but not Supplied: (1) Frequency Standard TS-308/U and Audio Oscillator TS-312/FSM-1.

ELECTRICAL AND MECHANICAL CHARACTERISTICS

MINIMUM INPUT FREQUENCY: 20 cps.
INPUT VOLTAGE PER INCH OF DEFLECTION
X-AXIS: 0.3 v.
Y-AXIS: 0.3 v.
MAX PERMISSIBLE INPUT: 0.3 V (Vertical or horizontal).
POWER SOURCE REQUIRED: 110 v, 60 cps, single ph.
POWER CONSUMPTION: 70 W.

TUBE AND/OR CRYSTAL COMPLEMENT

(1) 2AP1 (4) 6J5 (2) 5Y3GT/G

Total Tubes: (7)

Test-Frequency Measuring

June 1957

TS-152/FSM-1 OSCILLOSCOPE

REFERENCE DATA AND LITERATURE

TM11-2664: Technical Manual for Oscilloscope TS-152/FSM-1.

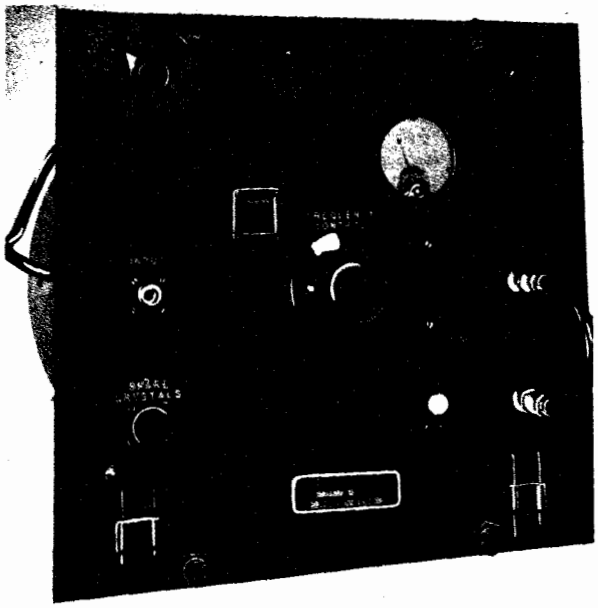
TYPE CLASSIFICATION	
DESIGN COGNIZANCE	TASSA
PROCUREMENT COGNIZANCE	
STOCK NO.	
R.D.B. IDENT. NO.	

EQUIPMENT SUPPLIED DATA

QUANTITY PER EQUIPT	NAME AND NOMENCLATURE	OVERALL DIMENSIONS (inches)	WEIGHT (lbs.)
1	Oscilloscope TS-152/FSM-1		

TEST SET

TS-172/UP



Test Set TS-172/UP

FUNCTIONAL DESCRIPTION

The TS-172/UP is a ringing cavity type testing equipment operating within a restricted range in the L band. It can be employed as a separate portable unit or permanently mounted in a radar equipment. It is designed for use with radar equipments such as Mark 20 Mod 1, AN/CPS-5 and AN/TPS-1B to perform the following tests:

(1) Over-all performance check of a radar system.
(2) Comparative measurement of the power output of a radar transmitter.
(3) Spectrum analysis of a radar transmitter.
(4) Check for improper pulsing of a radar transmitter.
(5) Check of power level of local (beat) oscillator.
(6) Check difference between transmitter and radar receiver local (beat) oscillator frequencies to within ±1 mc over the operating temperature and humidity range of the system.
(7) Check of the speed of recovery of a radar TR box and receiver.
(8) Check the adjustment of receiver components (RF amplifiers, TR box, Converter) for optimum performance.

No field changes in effect at time of preparation (3 July 1956).

RELATION TO OTHER EQUIPMENT

Equipment Required but not Supplied: (1) Test Antenna TS-122/UP, (3) 10-db Pads X-66445J.

ELECTRICAL AND MECHANICAL CHARACTERISTICS

FREQUENCY CONTROL: Hand tuned, 0 to 145 mc range in divisions of 1 mc
OUTPUT DETECTOR METER: 0 to 20 UA range utilizing a 0 to 50 UA movement.
TYPICAL RINGTIME: 10 to 12 miles.

MANUFACTURER'S OR CONTRACTOR'S DATA

Hoffman Radio Corp., Los Angeles, Calif.
Contract NXAA-76139, NXAA-65277, dated 13 November 1944.
Approximate Cost: $500.00 with equipment spares.

TUBE AND/OR CRYSTAL COMPLEMENT

No Electron Tubes

(1) IN22/IN21B
Total Crystals (1)

REFERENCE DATA AND LITERATURE

NAVSHIPS 900,460-1B: Technical Manual for Test Set TS-172/UP.

TYPE CLASSIFICATION	
DESIGN COGNIZANCE	TASSA
PROCUREMENT COGNIZANCE	
STOCK NO.	
R.D.B. IDENT. NO.	

EQUIPMENT SUPPLIED DATA

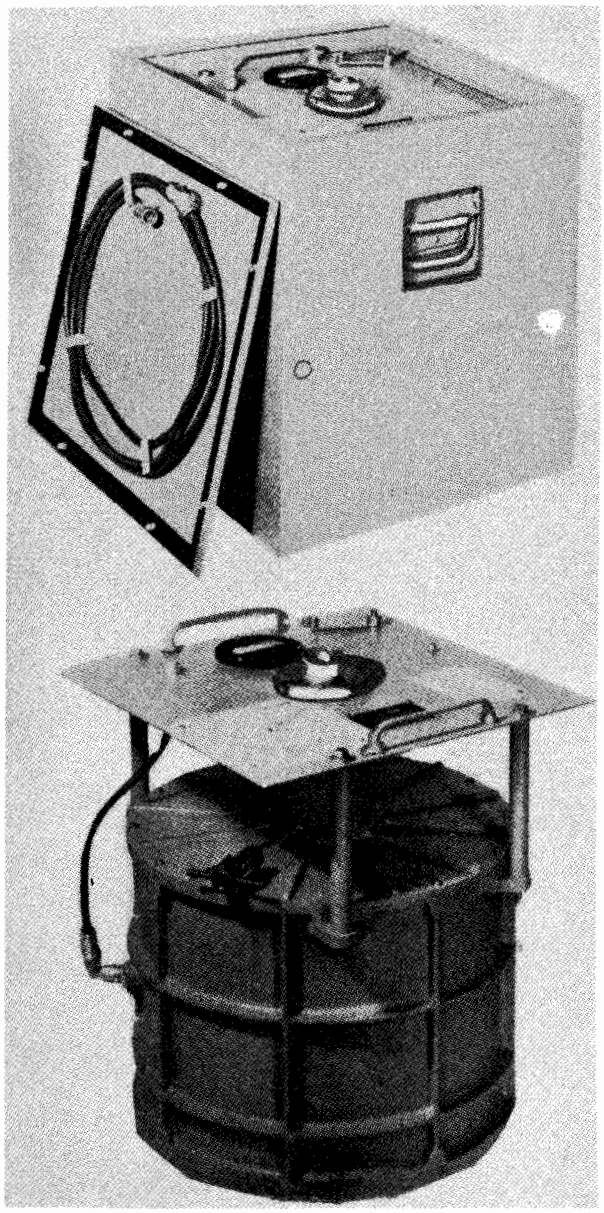
QUANTITY PER EQUIPT	NAME AND NOMENCLATURE	OVERALL DIMENSIONS (inches)	WEIGHT (lbs.)
1	Test Set TS-172/UP	15 X 15 X 18-17/32	21
1	Cable CG-99/AP	6 lg	
1*	Case, Combination, CY-132/U (green) or CY-131/U(olive drab)	17-3/8 X 17-3/8 X 19-3/4	19
2*	Coupling, Plug		
1*	Cable CG-99/AP	72 lg	
1*	Cable CG-99/AP	48 lg	
1*	Cable CG-280/UP	48 lg	

* Furnished when employed as a separate portable unit. When permanently mounted in a radar equipment the combination case not required and cables are furnished with radar.

August 1957

Test-Frequency Measuring

TUNED CAVITY TS-172B/UP



Tuned Cavity TS-172B/UP

FUNCTIONAL DESCRIPTION

The TS-172B/UP is a portable tuned cavity test set echo box designed to permit convenient field testing of the performance of radars operating in the frequency range 1215 to 1370 mc/sec. When properly used; this echo box is helpful in recognizing and localizing troubles. It is to be used for the daily measurement of the ringtime of the radar and if the measured value differs from that predicted for the particular radar under test by more than 5 decibels, the radar should be repaired.

No field changes in effect at time of preparation (31 January 1957).

RELATION TO OTHER EQUIPMENT

The TS-172B/UP is identical to the TS-172A/UP except that an air relief valve has been added to make the unit air transportable.

Equipment Required but not Supplied: A Directional Coupler, which is normally a part of modern radars is required. A pick-up dipole may be used as a substitute.

ELECTRICAL AND MECHANICAL CHARACTERISTICS

FREQUENCY RANGE: 1215 to 1370 mc.
FREQUENCY CONTROL: Hand tuned.
TYPICAL RINGTIME: Ten to 14 mi.

MANUFACTURER'S OR CONTRACTOR'S DATA

Hazeltine Electronics Corp, Little Neck, N.Y.
Contracts NObsr-64764 dated 27 May 1955
Contracts NObsr-71290 dated 30 April 1956

TUBE AND/OR CRYSTAL COMPLEMENT

(1) 1N21B

Total Crystals: (1)

REFERENCE DATA AND LITERATURE

NAVSHIPS - Technical Manual for Tuned Cavity TS-172B/UP.

TYPE CLASSIFICATION	
DESIGN COGNIZANCE	BUSHIPS
PROCUREMENT COGNIZANCE	
STOCK NO.	
R.D.B. IDENT. NO.	

Test-Frequency Measuring

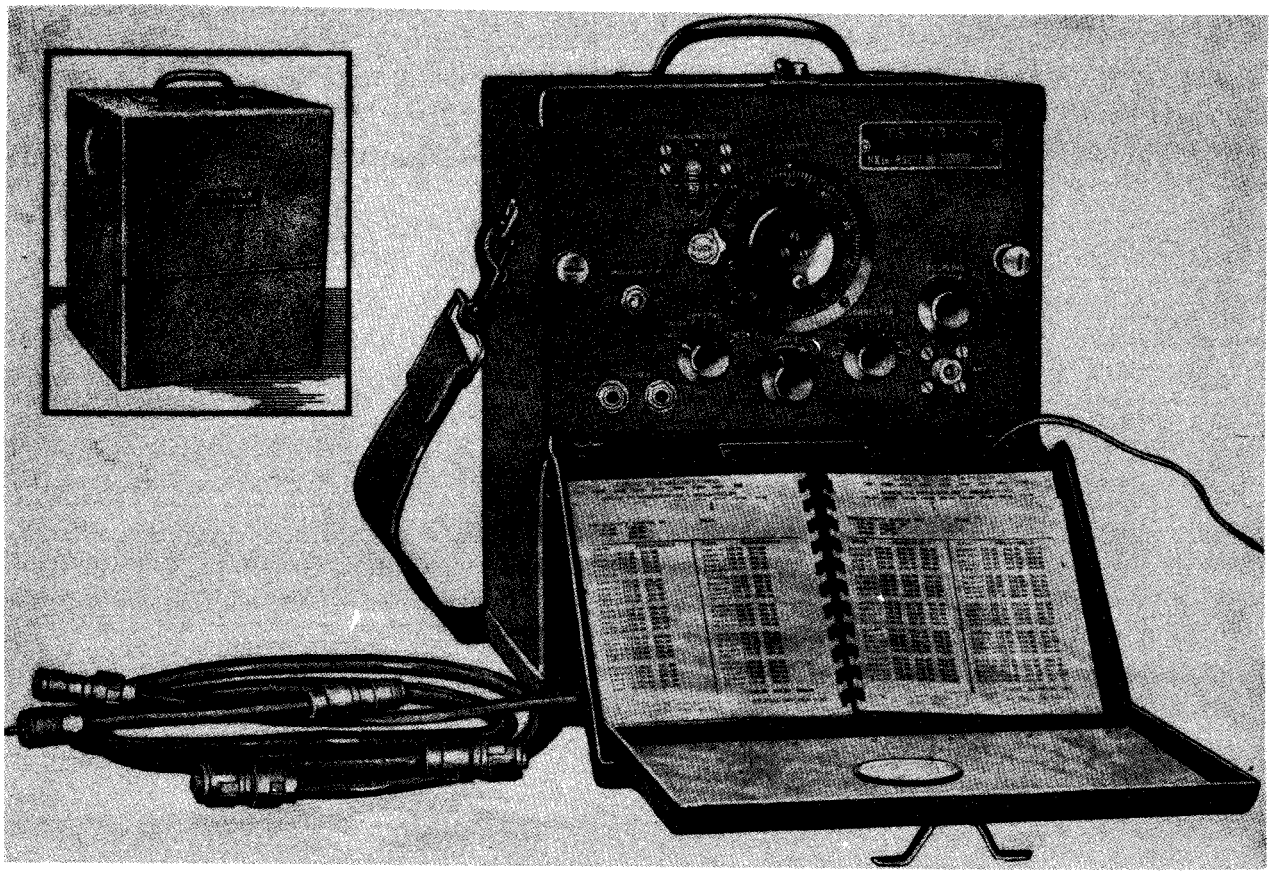
TS-172B/UP TUNED CAVITY

EQUIPMENT SUPPLIED DATA

QUANTITY PER EQUIPT	NAME AND NOMENCLATURE	OVERALL DIMENSIONS (inches)	WEIGHT (lbs.)
1	Cavity, Tuned TS-172B/UP	17-3/8 X 17-3/8 X 19-3/4	66
1	Cable (W-103)		1
1	Allen Wrench No. 6		
1	T-handle Socket Wrench		
2	Technical Manuals		

Test-Frequency Measuring

FREQUENCY METER TS-173/UR



Frequency Meter TS-173/UR and Accessories

FUNCTIONAL DESCRIPTION

The TS-173/UR is a portable instrument used in measuring and calibrating the frequency of transmitters, oscillators, signal generators, receivers with beat-frequency oscillators, and other test equipment.

No field changes in effect at time of preparation (18 April 1958).

RELATION TO OTHER EQUIPMENT

Equipment Required but not Supplied: (6) Battery BA-2, (4) Battery BA-23, (1) Headset NT-49015.

ELECTRICAL AND MECHANICAL CHARACTERISTICS

FREQUENCY RANGE: 90 to 450 mc.
CRYSTAL FREQUENCY: 5 mc.
TYPE OF EMISSION: AM, CW.
OUTPUT VOLTAGE RANGE: 465 uv to 0.1 v.
IMPEDANCE
INPUT: 50 ohm (RF).
OUTPUT: 600 ohms (AF).
MODULATION DATA: 60% at 1,000 cycles.
ACCURACY: ±0.005%.
POWER REQUIREMENTS: 20 W, 115 v, 60 cyc, 1 ph, 6 v DC, 135 v DC.

MANUFACTURER'S OR CONTRACTOR'S DATA

Allen D. Cardwell Mfg Corp, Brooklyn, N.Y.
Contract NXsr-65277, 6 June 1944.
Hoffman Radio Corp, Los Angeles, Calif.
Contract NXsa-76139.
Approximate Cost: $600.00 with equipment spares.

TUBE AND/OR CRYSTAL COMPLEMENT

(1) OD3	(1) 6X5G
(2) 9001	(3) 9002

Total Tubes: (7)

Test-Frequency Measuring

TS-173/UR

FREQUENCY METER

(1) NT-40175
Total Crystals: (1)

TYPE CLASSIFICATION
DESIGN COGNIZANCE BUSHIPS
PROCUREMENT COGNIZANCE Navy Spec RE13A930
STOCK NO.
R.D.B. IDENT. NO.

REFERENCE DATA AND LITERATURE

NAVSHIPS 900,644: Technical Manual for Frequency Meter TS-173/UR.

SHIPPING DATA

NUMBER OF BOXES	CONTENTS AND IDENTIFICATION	VOLUME (Cu.Ft.)	OVERALL DIMENSIONS (inches)	WEIGHT PACKED (lbs.)
1	Frequency Meter TS-173/UR	2.9	12 X 12 X 15	63

EQUIPMENT SUPPLIED DATA

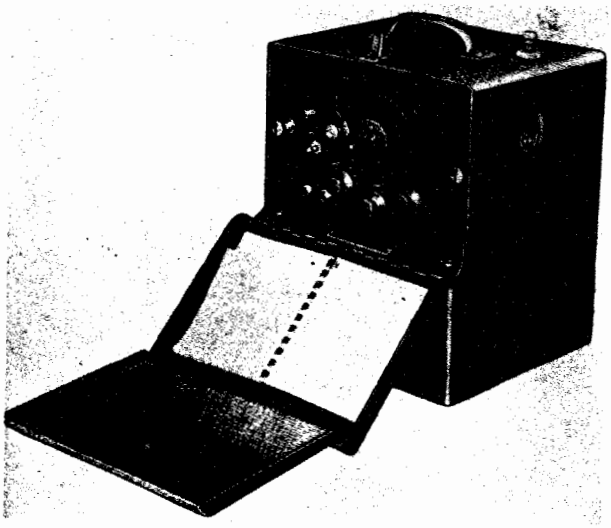
QUANTITY PER EQUIPT	NAME AND NOMENCLATURE	OVERALL DIMENSIONS (inches)	WEIGHT (lbs.)
1	Frequency Meter TS-173/UR including:	9-5/8 X 10-1/4 X 14	27
1	Antenna AT-66/U		
1	Cable, Coaxial CG-55/U	58 lg	
1	Adapter CG-56/U		
1	Case CY-133/UR		
1	Power Supply PP-79/UR		

September 1956

FREQUENCY METER

Teat-Frequency Measuring

TS-174/U



Frequency Meter TS-174/U

FUNCTIONAL DESCRIPTION

The TS-174/U is designed to measure the frequency of radio waves. It is portable and self-contained. The instrument may be used as a signal generator to calibrate radio transmitters and receivers, or to measure any frequency within the frequency range of 20 to 250 megacycles. It contains a 1000 kilocycle crystal which is used to calibrate the meter's heterodyne, oscillator at a number of points within the band. All power required for the operation of this equipment is provided by (4) batteries BA-23 and (6) batteries BA-2 included in the self-contained power pack.

No field changes in effect at time of preparation (3 July 1956).

RELATION TO OTHER EQUIPMENT

Equipment Required but not supplied: (1) Antenna, (12) Batteries (6 in use, 6 spare) Ba-2, (8) Batteries (4 in use, 4 spare) BA-23, (1) Headset HS-30.

ELECTRICAL AND MECHANICAL CHARACTERISTICS

FREQUENCY RANGE: 20 to 250 mc.
NUMBER OF BANDS: One.
CRYSTAL OSCILLATOR FREQUENCY: 1000 ks.
POWER REQUIREMENTS: (4) batteries BA-23 at 1.5 v ea and (6) batteries BA-2 at 20.25 v ea.

MANUFACTURER'S OR CONTRACTOR'S DATA

Allen D. Hardwell Mfg. Corp., Brooklyn, New York.
Order No. 1209-DAY-44.

TUBE AND/OR CRYSTAL COMPLEMENT

(1) 6K8 (1) 6SJ7 (1) 6SJ7-Y
Total Tubes: (3)

(1) DC-9
Total Crystals: (1)

REFERENCE DATA AND LITERATURE

AN08-35TS174-2: Technical Manual for Frequency Meter TS-174/U.

TYPE CLASSIFICATION	
DESIGN COGNIZANCE	TASSA
PROCUREMENT COGNIZANCE	
STOCK NO.	
R.D.B. IDENT. NO.	

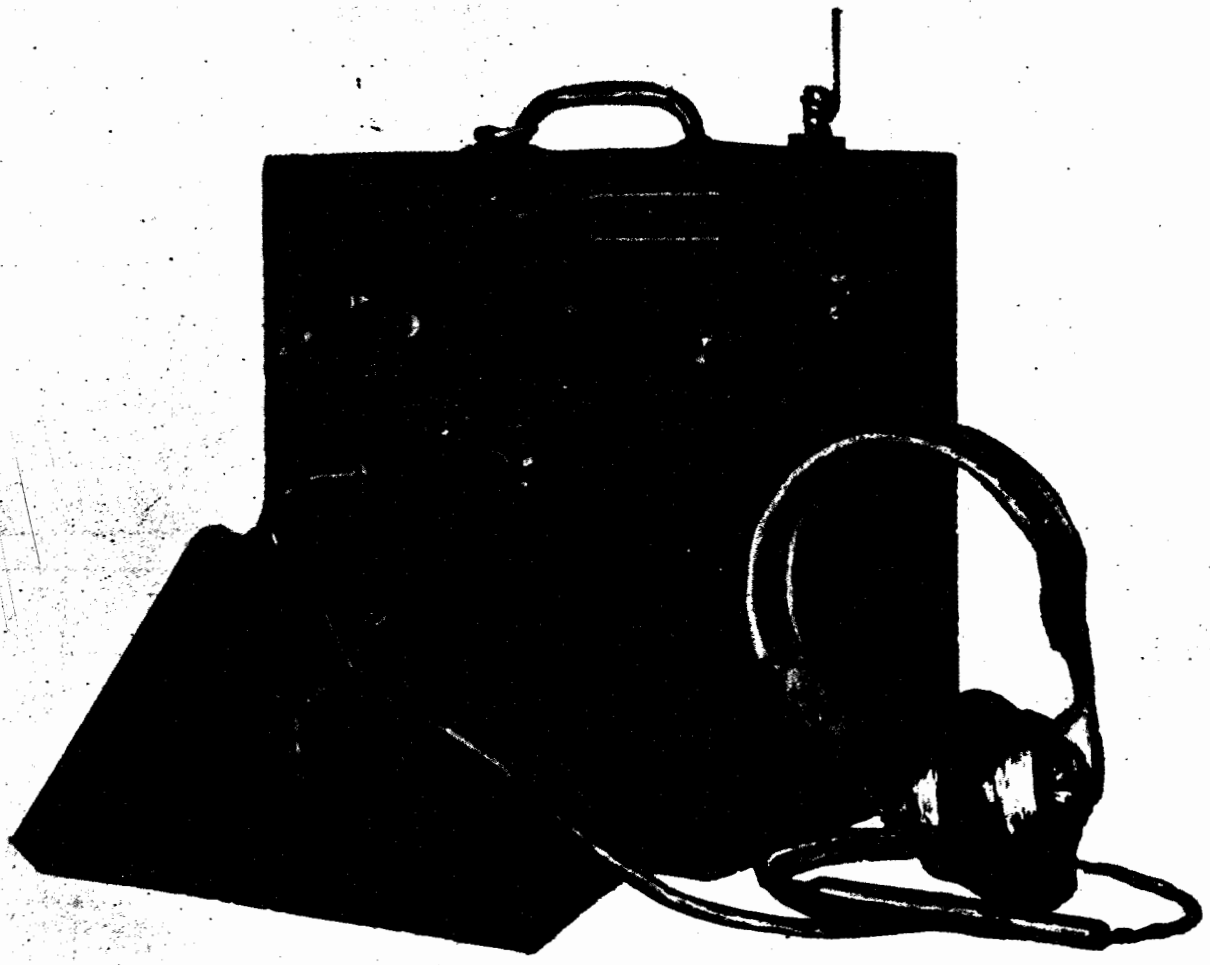
EQUIPMENT SUPPLIED DATA

QUANTITY PER EQUIPT	NAME AND NOMENCLATURE	OVERALL DIMENSIONS (inches)	WEIGHT (lbs.)
1	Frequency Meter TS-174/U	9-3/4 X 10-3/16 X 14	17.5
1	Calibration book		
1	Battery tray		
1	Wrench for Bristo No. 6 setscrew		
2	Tubes 6K8 (one in use, one spare)		0.1
2	Tubes 6SJ7 (one in use, one spare)		0.1
2	Tubes 6SJ7-Y (one in use, one spare)		0.1

June 1957

Test-Frequency Measuring

FREQUENCY METER TS-174B/U



Frequency Meter TS-174B/U

FUNCTIONAL DESCRIPTION

The TS-174B/U is a precision instrument designed to measure or radiate radio frequency energy between 20 to 250 mc. It is a portable, aelf-contained inatrument used mainly to calibrate field radio receivers and tranamitters by direct comparison to the calibrated variable-frequency oscillator of the frequency meter. The equipment contains a 1000 kc crystal-controlled oscillator circuit which is used in calibrating the instrument at a number of frequencies.

No field changes in effect at time of preparation (6 November 1956).

RELATION TO OTHER EQUIPMENT

Equipment Required but not Supplied: (1) Headset HS-30, (1) Battery BA-411/U, (1) Battery BA-420/U, (1) Antenna.

ELECTRICAL AND MECHANICAL CHARACTERISTICS

FREQUENCY RANGE: 20 to 250 mc.
OSCILLATOR
VARIABLE: 20 to 40 mc. (Fundamentala).
CRYSTAL: 1000 kc.
MODULATION: 900 cycles.
CALIBRATION ACCURACY: 0.04%.

Test-Frequency Measuring

June 1957

TS-174B/U FREQUENCY METER

TEMPERATURE RANGE: -40 deg to +55 deg C.
R F OUTPUT
FUNDAMENTAL FREQUENCY: 15,000 uv.
40 TO 250 MC: 300 uv.
AUDIO POWER OUTPUT: 0.5 mw.
POWER INPUT
6 V DC: 1 amp.
135 V DC: 0.025 amp.

TUBE AND/OR CRYSTAL COMPLEMENT

(1) 6SJ7-Y (1) 6K8 (1) 6SJ7
Total Tubes: (3)
(1) DC-9-AJ
Total Crystals: (1)

REFERENCE DATA AND LITERATURE

TM11-5044: Technical Manual for Frequency Meter TS-174B/U.

TYPE CLASSIFICATION
DESIGN COGNIZANCE TASSA
PROCUREMENT COGNIZANCE
STOCK NO.
R.D.B. IDENT. NO.

SHIPPING DATA

NUMBER OF BOXES	CONTENTS AND IDENTIFICATION	VOLUME (Cu.Ft.)	OVERALL DIMENSIONS (inches)	WEIGHT PACKED (lbs.)
1	Frequency Meter TS-174B/U	4	16 x 18 x 22	70

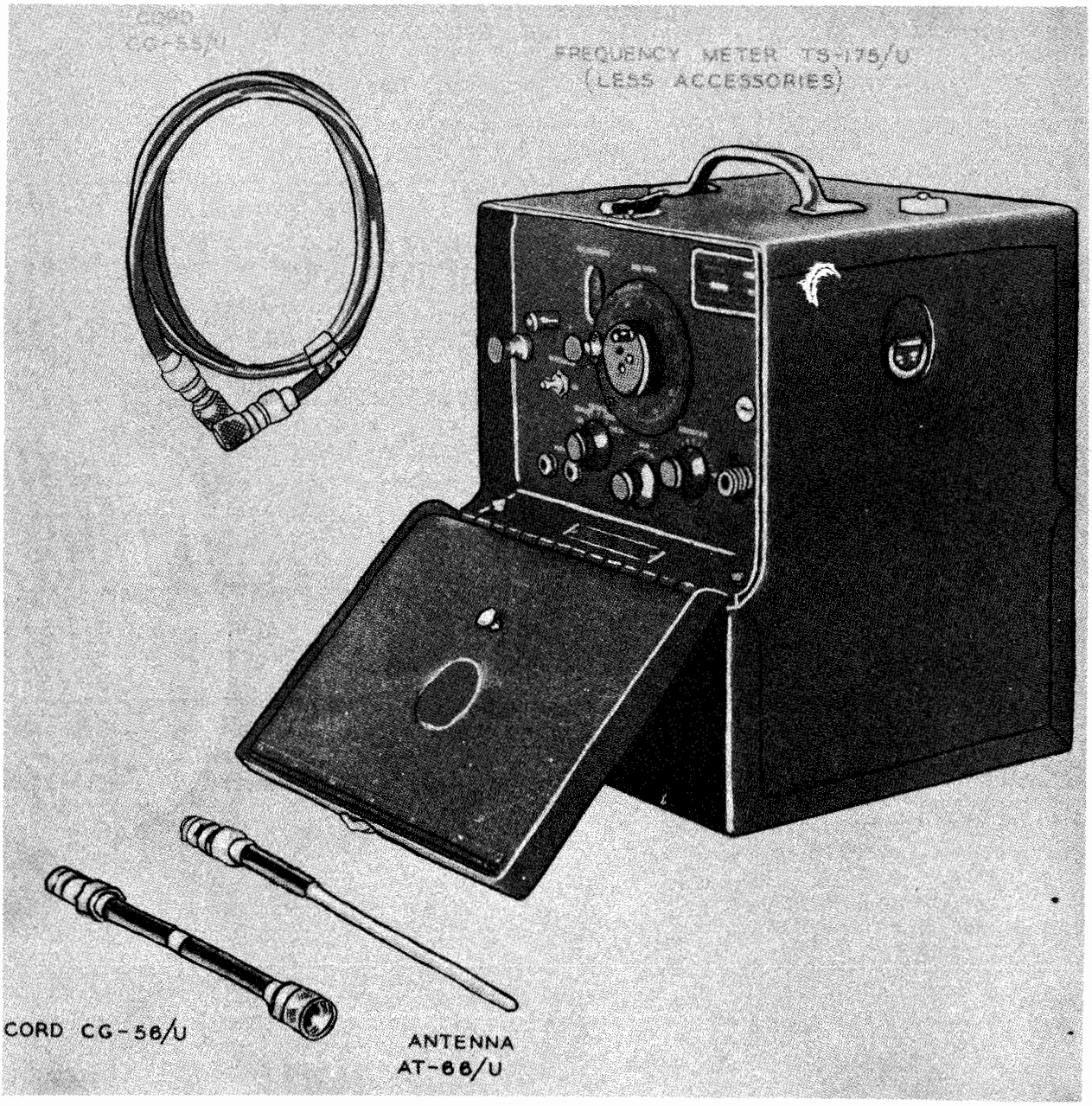
EQUIPMENT SUPPLIED DATA

QUANTITY PER EQUIPT	NAME AND NOMENCLATURE	OVERALL DIMENSIONS (inches)	WEIGHT (lbs.)
1	Frequency Meter TS-174B/U	9-11/16 x 10-1/4 x 13-13/16	25
1	Calibration Book	1/2 x 4-7/8 x 5-5/8	
1	Bristo Wrench	1/16 x 9/16 x 1-3/4	
1	Technical Manual TM11-5044	1/4 x 5-7/8 x 9-1/8	

December 1956

FREQUENCY METER

TS-175/U



Frequency Meter TS-175/U

FUNCTIONAL DESCRIPTION

The TS-175/U is a portable self-contained instrument designed to measure frequencies in the band from 85 to 1000 mc. Signals which are picked up by the antenna, beat against the output of a variable frequency heterodyne oscillator which is tuned until the beat tone heard in the headset approaches zero beat. The dial reading of the heterodyne oscillator is then converted into frequency by means of a calibration chart. A crystal controlled oscillator of fixed frequency is included to provide a calibration standard. Signals are radiated by the heterodyne oscillator and the equipment can be used as a signal gener-

TS-175/U FREQUENCY METER

ator. All power required for the operation of this equipment is supplied by the (4) batteries BA-23 and (6) batteries BA-2 contained in the self-contained power pack.

No field changes in effect at time of preparation (3 July 1956).

RELATION TO OTHER EQUIPMENT

Equipment Required but not Supplied: (6) Batteries BA-2, (4) Batteries BA-23, (1) Headset HS-33.

ELECTRICAL AND MECHANICAL CHARACTERISTICS

FREQUENCY RANGE: 85 to 1000 mc.
ACCURACY: ±0.04%.
SIGNAL INPUT: 20 mv to 2 v.
SIGNAL OUTPUT: 20 mv to 100 v, modulated at 1000 cps.
POWER SUPPLY: Batteries 22-1/2 v and 1-1/2 v.

MANUFACTURER'S OR CONTRACTOR'S DATA

Allen D. Cardwell Mfg. Corp., Brooklyn, New York.
Order No. 1210-DAY-44.

TUBE AND/OR CRYSTAL COMPLEMENT

(1) 6K8 (1) 6C8G (1) 9002
Total Tubes: (3)
(1) 1A/AR
Total Crystals: (1)

REFERENCE DATA AND LITERATURE

AN16-35TS175-2: Technical Manual for Frequency Meter TS-175/U.

TYPE CLASSIFICATION	
DESIGN COGNIZANCE	TASSA
PROCUREMENT COGNIZANCE	
STOCK NO.	
R.D.B. IDENT. NO.	

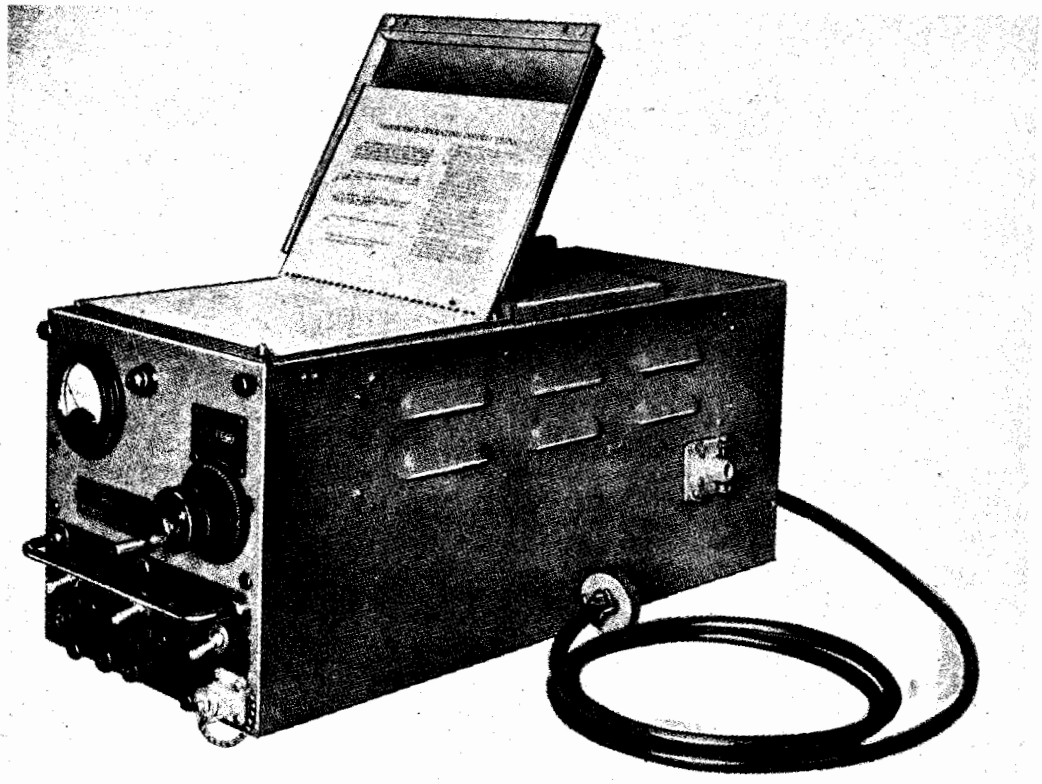
EQUIPMENT SUPPLIED DATA

QUANTITY PER EQUIPT	NAME AND NOMENCLATURE	OVERALL DIMENSIONS (inches)	WEIGHT (lbs.)
1	Frequency Meter TS-175/U	9-3/4 X 10-3/16 X 14	18
1	Calibration Book		
1	Crystal Unit CR-1A/AR		
1	Battery Tray		
1	Antenna AT-66/U		0.2
1	Cord CG-55/U		0.7
1	Cord CG-56/U		
1	Wrench for Bristo No. 6 Setscrew		
6	One Complete Set of Three Tubes and One Complete Set of Three Spare Tubes.		

March 1957

FREQUENCY METER

TS-186/UP SERIES



Frequency Meter TS-186/UP Series

FUNCTIONAL DESCRIPTION

The TS-186/UP Series is designed for making frequency measurements in the range of 100 to 10,000 mc. Harmonics of the unknown signal of the heterodyne oscillator are used for measurements outside the 500 to 1250 mc fundamental range of the heterodyne oscillator.

The equipment consists of 6 elements: Heterodyne Oscillator, Oscillator, Crystal Calibrator, Detector Mixer, Audio Amplifier, Beat Indicator and Power Supply.

No field changes in effect at time of preparation (23 August 1956).

RELATION TO OTHER EQUIPMENT

BASIC DIFFERENCES BETWEEN TS-186/UP SERIES EQUIPMENT

Equipment	Fuses	Electron Tube Differences	Power Transformer	DC Filaments
TS-186L/UP	Two line fuses located before line filter	Detector-mixer Type 12AT7	Continuous operation 115 VAC ±10%	1st Audio and detector-mixer 6.3 VDC. All others 6.3 VAC
TS-186C/UP	Two line fuses located before line filter	Detector-mixer Type 2C51	Continuous operation 115 VAC ±10%	1st Audio and detector-mixer 6.3 VDC. All others 6.3 VAC
TS-186B/UP	Two line fuses located before line filter	Detector-mixer Type 2C51	Variable tap for 105, 115, and 125 VAC	1st Audio and detector-mixer 6.3 VDC. All others 6.3 VAC
TS-186A/UP	Single line fuse located after line filter	Detector-mixer Type 2C51	Variable tap for 105, 115, and 125 VAC	Detector-mixer 6.3 VDC. All others 6.3 VAC
TS-186/UP	Single fuse located after line filter	Detector-mixer Type 955	Variable tap for 105, 115, and 125 VAC	Detector-mixer 6.3 VDC All others 6.3 VAC

Equipment Required but not Supplied: (1) Headphones H-1/AR or H-4/AR.

ELECTRICAL AND MECHANICAL CHARACTERISTICS

FREQUENCY MEASUREMENT
RANGE: 100 to 10,000
ACCURACY OVERALL: 0.01%.
ACCURACY AT CHECK POINTS: 0.002%.
HETERODYNE OSCILLATOR RANGE: 500 to 1250 mc.
CRYSTAL CALIBRATOR
OUTPUT FREQUENCY: 20 mc.
CONTROL: 5000 KG quartz crystal.
AUDIO AMPLIFIER RESPONSE: 100 to 100,000 cps.
BEAT INDICATOR RESPONSE: 100 to 100,000 cps.
TEMPERATURE RANGE: −40 to +55 deg C.
HUMIDITY RANGE: 0 to 95% relative at temperature up to 50 deg C.
PRESSURE RANGE: From atmospheric down to pressure corresponding to an altitude of 10,000 ft.
SENSITIVITY, RF INPUT: 500 uv to 1 v.
CALIBRATION CHART: 750 entires distributed over 16,500 dial divisions.

MANUFACTURER'S OR CONTRACTOR'S DATA

Washington Institute of Technology, Washington, D.C.
(TS-186/UP) Contract NXsr 83499.
(TS-186A/UP) Contract NObsr 42462, dated 30 June 1948.
Federal Manufacturing and Engineering Corp, Brooklyn, N.Y.
(TS-186B/UP) Contract NObsr 43397, dated 16 June 1949.
(TS-186C/UP) Contract NObsr 59229, dated 16 June 1950.
(TS-186D/UP) Contract NObsr 52270, dated 23 February 1951.

TUBE AND/OR CRYSTAL COMPLEMENT

TS-186/UP
(1) 2C40
(1) 955
(1) 5Y3-GT/G
(5) 6SJ7
(2) OD3/VR150
Total Tubes: (10)

TS-186A/UP, B/UP, C/UP

(1) 2C40
(1) 2C51
(1) 5Y3GT/G
(4) 6SJ7
(1) 6SN7
(2) OD3/VR-150
Total Tubes: (10)

TS-186D/UP

(1) 2C40
(1) 12AT7
(1) 5X3GT/G
(4) GSJ7
(1) 6SN7
(2) OD3/VR-150
Total Tubes: (10)

REFERENCE DATA AND LITERATURE

AN16-35TS/186-3: Technical Manual for Frequency Meter TS-186/UP.
NAVSHIPS 91205: Technical Manual for Frequency Meter TS-186A/UP.
NAVSHIPS 91335: Technical Manual for Frequency Meter TS-186B/UP.
NAVSHIPS 91376: Technical Manual for Frequency Meter TS-186C/UP.
NAVSHIPS 91592: Technical Manual for Frequency Meter TS-186D/UP.

TYPE CLASSIFICATION
DESIGN COGNIZANCE BUSHIPS
PROCUREMENT COGNIZANCE
STOCK NO.
R.D.B. IDENT. NO.

SHIPPING DATA

NUMBER OF BOXES	CONTENTS AND IDENTIFICATION	VOLUME (Cu.Ft.)	OVERALL DIMENSIONS (inches)	WEIGHT PACKED (lbs.)
1	Frequency Meter TS-186/UP	4.5	15-3/4 X 17-3/4 X 27-1/2	100
1	Frequency Meter TS-186A/UP	6.8	18-1/2 X 18-1/2 X 34-1/2	133
1	Frequency Meter TS-186B/UP	6.8	18-1/2 X 18-1/2 X 34-1/2	133
1	Frequency Meter TS-186C/UP	6.8	18-1/2 X 18-1/2 X 34-1/2	97
1	Frequency Meter TS-186D/UP	6.8	18-1/2 X 18-1/2 X 34-1/2	97

EQUIPMENT SUPPLIED DATA

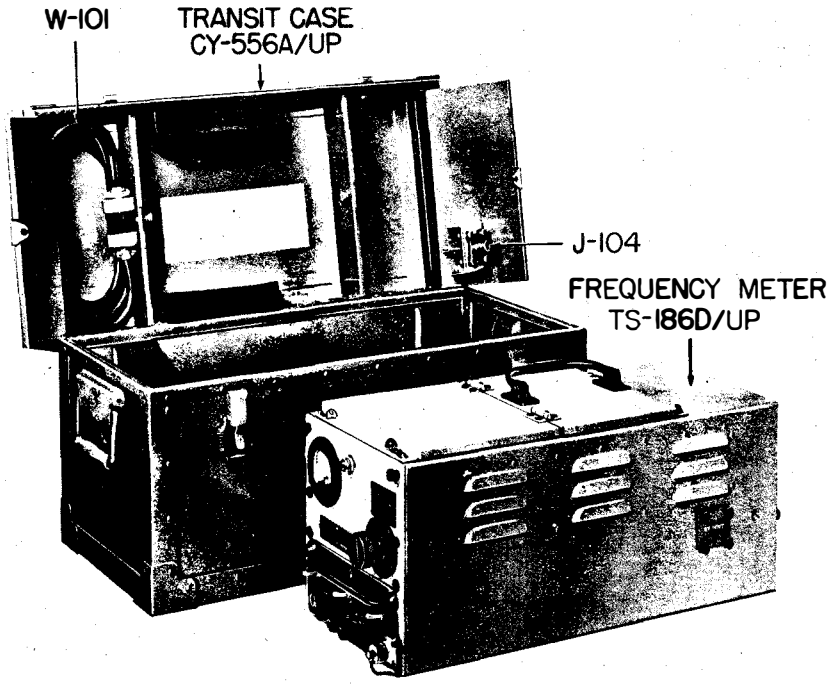
QUANTITY PER EQUIPT	NAME AND NOMENCLATURE	OVERALL DIMENSIONS (inches)	WEIGHT (lbs.)
	TS-186/UP		
1	Frequency Meter TS-186/UP	8-1/2 X 9-1/2 X 20	
	consists of:		
1	Spare 2C40 Electron Tube		
1	Spare Fuse		
2	Spanner Wrenches		
4	Allen Wrenches		
1	Coaxial J-106 Adapter		
1	Calibration Book		
1	Power Cable W-101	84 lg	0.8
2	Technical Manuals		1.0
1	Set Maintenance Repair Parts		0.9
1	Transit Case CY-556/UP	11-1/2 X 13 X 23	22.0
	TS-186A/UP		
1	Frequency Meter TS-186A/UP	8-1/2 X 9-1/2 X 20	40.0
1	Coaxial Adapter J-104	1-5/8 X 1-5/8 X 2-7/16	0.2
1	Power Cable NT-62412	84 lg	0.8
2	Technical Manuals NAVSHIPS 91205		1.5
1	Transit Case CY-55/UP	11-1/2 X 13 X 23	46
	TS-186B/UP		
1	Frequency Meter TS-1868/UP	8-1/2 X 9-1/2 X 20	42.5
1	Coaxial Adapter J-104	1-5/8 X 1-5/8 X 2-7/16	0.2
1	Power Cable NT-62412	84 lg	0.8
2	Technical Manual NAVSHIPS 91335		1.5
1	Transit Case CY-556A/UP	11-1/2 X 13 X 23	46
	TS-186C/UP		
1	Frequency Meter TS-186C/UP	8-1/2 X 9-1/2 X 20	42.5
1	Coaxial J-104 Adapter	1-5/8 X 1-5/8 X 2-7/16	0.2
1	Power Cable NT-62412	84 lg	0.8
2	Technical Manual-NAVSHIPS 91376		1.5
1	Transit Case CY-556A/UP	11-1/2 X 13 X 23	22.0
	TS-186D/UP		
1	Frequency Meter TS-186D/UP	8-1/2 X 9-1/2 X 20	42.5
1	Coaxial Adapter	1-5/8 X 1-5/8 X 2-7/16	0.2
1	Power Cable NT-62412	84 lg	0.8
2	Technical Manuals NAVSHIPS 91592		1.5
1	Transit Case CY-1449/UP	11-1/2 X 13 X 23	22

5 April 1962	6625-376-1662	FREQUENCY METER TS-186D/UP
Cog Service:	FSN: 6625-643-1881 W/S	Functional Class:

USA USN USAF

TYPE CLASS:

MANUFACTURER'S NAME/CODE NUMBER: Columbus Electronics Corp.



Frequency Meter TS-186D/UP

FUNCTIONAL DESCRIPTION:

Frequency Meter TS-186D/UP is a portable, crystal-controlled, heterodyne type meter used in measuring the frequencies of transmitters, oscillators, and signal generators.

No field changes in effect at time of preparation (5 January 1962).

TECHNICAL CHARACTERISTICS:

FREQUENCY RANGE MEASURED: 100 to 10,000 mc.

CHARACTERISTICS OF ELEMENTS

HETERODYNE OSCILLATOR: Continuous freq range 500 to 1,250 mc.

CRYSTAL CALIBRATOR: 20 mc output controlled by 5,000 kc quartz crystal.

DETECTOR-MIXER: For mixing and beating the output of the heterodyne oscillator with either the crystal calibrator or the signal being measured.

AUDIO AMPLIFIER: To amplify the resulting beat frequency detector output in the range of 100 to 100,000 cps.

BEAT INDICATOR: To provide a visual indication of the presence of a beat, the frequency of which is in the range of 100 to 100,000 cps.

POWER SUPPLY: To supply beater and 300 v dc (regulated) plate supply for the equipment. This supply operates from 115 v porm 10%, single ph, 50 to 1,000 cyc, 70 W.

ACCURACY: 0.01% or better.

TEMPERATURE RANGE: M40 to 55 deg C (M40 to 131 deg F).

HUMIDITY RANGE: 0 to 95% relative at temperatures up to 50 deg C (122 deg F).

PRESSURE RANGE: From atmospheric down to a pressure corresponding to an altitude of 10,000 ft.

SENSITIVITY: RF signal input levels between 500 uv and 1 v.

RELATION TO OTHER EQUIPMENT: None.

EQUIPMENT REQUIRED BUT NOT SUPPLIED:

(1) Headphone H-1/AR, H-4/AR, or NT-49016.

MAJOR COMPONENTS

QTY	ITEM	STOCK NUMBERS	DIMENSIONS (INCHES)	WEIGHT (LBS)
1	Frequency Meter TS-186D/UP includes:		8-1/2 x 9-1/2 x 20	42.5
1	Coaxial Adapter		1-5/8 x 1-5/8 x 2-7/16	0.18
1	Power Cable 62412		84 lg	0.8
1	Transit Case CY-1449/UP		11-1/2 x 13 x 23	22
2	Technical Manual NAVSHIPS 91592			1.5

REFERENCE DATA AND LITERATURE:

NAVSHIPS 91592: Technical Manual for Frequency Meter TS-186D/UP and TS-186E/UP.

TUBE, CRYSTAL AND/OR SEMI-CONDUCTOR DATA:

TUBES: (2) 0D3/VR-150 (1) 2C40 (1) 5Y3GT/G (4) 6SJ7 (1) 6SN7GT (1) 12AT7WA

CRYSTALS: (1) CR-18/U

SEMI-CONDUCTORS: (1) 1N21B

SHIPPING DATA

PKGS	VOLUME (CU FT)	WEIGHT (LBS)
1	6.8	97

PROCUREMENT DATA

PROCURING SERVICE: DESIGN COG: USN, BuShips
SPEC &/OR DWG: MIL-F-15242A(SHIPS), Amend 3

CONTRACTOR	LOCATION	CONTRACT OR ORDER NO.	APPROX. UNIT COST
Columbus Electronics Corp.	Yonkers, N. Y.	NObsr-59828, 23 February 1955	$492.60
		NObsr-75303, 11 June 1958	$485.00
		NObsr-75592	$485.00
		NObsr-85549, 28 June 1961	$601.43
Hugh H. Eby Co.	Philadelphia, Pa.	NObsr-71156, 29 December 1955	$361.48
Northeastern Engineering Inc.	Manchester, N. H.	NObsr-71129, 2 December 1955	$367.00
Telerad Mfg Corp.	Flemington, N. J.	NObsr-52270, 23 February 1951	
		NObsr-57596, 30 June 1952	$921.40
		NObsr-63390	$840.00
		NObsr-81366	$600.00

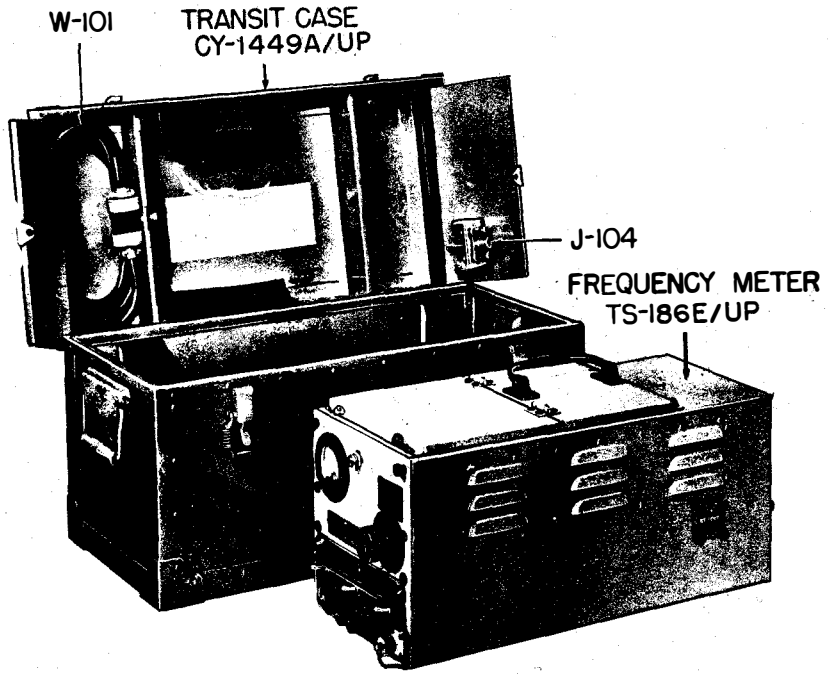
5 April 1962 FREQUENCY METER TS-186E/UP

Cog Service: FSN: 6625-556-1916 Functional Class:

USA USN USAF

TYPE CLASS:

MANUFACTURER'S NAME/CODE NUMBER: Akeley Camera and Instrument Div.



Frequency Meter TS-186E/UP

FUNCTIONAL DESCRIPTION:

Frequency Meter TS-186E/UP is a portable, crystal-controlled, heterodyne type meter used in measuring the frequencies of transmitters, oscillators, and signal generators.

No field changes in effect at time of preparation (5 January 1962).

TECHNICAL CHARACTERISTICS:

FREQUENCY RANGE MEASURED: 100 to 10000 mc.

CHARACTERISTICS OF ELEMENTS

HETERODYNE OSCILLATOR: Continuous freq range 500 to 1250 mc.

CRYSTAL CALIBRATOR: 20 mc output controlled by 5000 kc quartz crystal.

DETECTOR-MIXER: For mixing and beating the output of the heterodyne oscillator with either the crystal calibrator or the signal being measured.

AUDIO AMPLIFIER: To amplify the resulting beat frequency detector output in the range of 100 to 100000 cps.

BEAT INDICATOR: To provide a visual indication of the presence of a beat, the frequency of which is in the range of 100 to 100000 cps.

POWER SUPPLY: To supply heater and 300 v dc (regulated) plate supply for the equipment. This supply operates from 115 v porm 10%, single ph, 50 to 1000 cyc, 70 W.

ACCURACY: 0.01% or better.

TEMPERATURE RANGE: M40 to 55 deg C (M40 to 131 deg F).

HUMIDITY RANGE: 0 to 95% relative at temperatures up to 50 deg C (122 deg F).

PRESSURE RANGE: From atmosphere down to a pressure corresponding to an altitude of 10000 ft.

SENSITIVITY: RF signal input levels between 500 uv and 1 v.

RELATION TO OTHER EQUIPMENT: None.

EQUIPMENT REQUIRED BUT NOT SUPPLIED:

(1) Headphone H-1/AR, H-4/AR, or NT-49016.

MAJOR COMPONENTS

QTY	ITEM	STOCK NUMBERS	DIMENSIONS (INCHES)	WEIGHT (LBS)
1	Frequency Meter TS-186E/UP includes:		8-1/2 x 9-1/2 x 20	42.5
1	Coaxial Adapter		1-5/8 x 1-5/8 x 2-7/16	0.18
1	Power Cable 62412		84 lg	0.8
1	Transit Case CY-1449A/UP		11-1/2 x 13 x 23	22
2	Technical Manual NAVSHIPS 91592			1.5

REFERENCE DATA AND LITERATURE:

NAVSHIPS 91592: Technical Manual for Frequency Meter TS-186D/UP and TS-186E/UP.

TUBE, CRYSTAL AND/OR SEMI-CONDUCTOR DATA:

TUBES: (2) 0D3/VR-150 (1) 2C40 (1) 5Y3GT/G (4) 6SJ7 (1) 6SN7GT (1) 12AT7WA

CRYSTALS: (1) CR-18/U

SEMI-CONDUCTORS: (1) 1N21B

SHIPPING DATA

PKGS	VOLUME (CU FT)	WEIGHT (LBS)
1	6.8	97

PROCUREMENT DATA

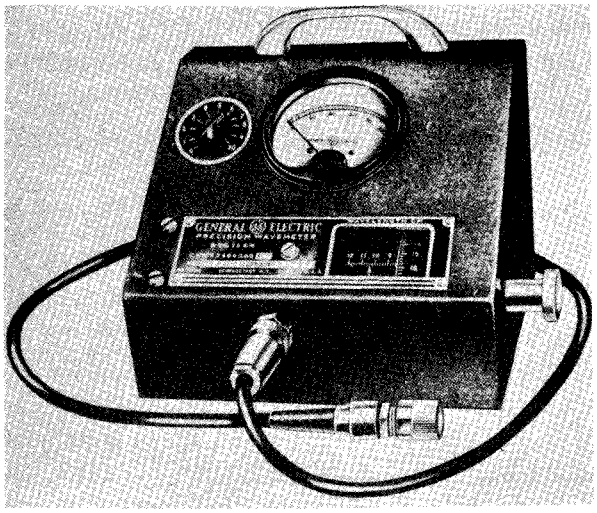
PROCURING SERVICE: DESIGN COG: USN, BuShips
SPEC &/OR DWG: MIL-F-15242A(SHIPS), Amend 3

CONTRACTOR	LOCATION	CONTRACT OR ORDER NO.	APPROX. UNIT COST
Akeley Camera and Instrument Div.	New York, N.Y.	NObsr-64788	$371.82
		NObsr-71808	$468.00

February 1960

Test-Frequency Measuring

WAVEMETER TS-192/CPM-4



Wavemeter TS-192/CPM-4

FUNCTIONAL DESCRIPTION

Wavemeter TS-192/CPM-4 is a portable RF absorption-type unit used in measuring or checking the frequency of CW, MCW, or pulsed radar transmitters, signal Generators, and local oscillators.

No field changes in effect at time of preparation (13 July 1959).

ELECTRICAL AND MECHANICAL CHARACTERISTICS

WAVELENGTH RANGE: 9.5 to 11.5 cm.
INPUT IMPEDANCE: 50 ohms.
SIGNAL INPUT: 1 mw (avg).
SENSITIVITY: 2 mw (full scale).
TEMPERATURE RANGE: -40° F to +135° F.
ACCURACY: ±3 mc.

MANUFACTURER'S OR CONTRACTOR'S DATA

General Electric Co., Schenectady, N. Y.
Contract W-3435-sc-264.

TUBE AND/OR CRYSTAL COMPLEMENT

No Electron Tubes used.

(1) 1N21B

Total Crystals: (1)

REFERENCE DATA AND LITERATURE

TM11-1544, TO 16-30CPS1-7: Technical Manual for RADIO SET AN/CPS-1.

TYPE CLASSIFICATION
DESIGN COGNIZANCE USAF, RADC
PROCUREMENT COGNIZANCE
STOCK NO.
R.D.B. IDENT. NO. 2.2.2.2

SHIPPING DATA

NUMBER OF BOXES	CONTENTS AND IDENTIFICATION	VOLUME (Cu.Ft.)	OVERALL DIMENSIONS (inches)	WEIGHT PACKED (lbs.)
1	Wavemeter TS-192/CPM-4	1.57	13 X 14 X 15	8

EQUIPMENT SUPPLIED DATA

QUANTITY PER EQUIPT	NAME AND NOMENCLATURE	OVERALL DIMENSIONS (inches)	WEIGHT (lbs.)
1	Wavemeter TS-192/CPM-4 Including:	6-1/2 X 7 X 9	7
1	Cable RG-21/U	118 lg	
2	Technical Manual TM11-1544		

April 1958

Test-Frequency Measuring

WAVEMETER

TS-211/UPM-2, TS-212/UPM-2

FUNCTIONAL DESCRIPTION

The TS-211/UPM-2 and TS-212/UPM-2 are portable self-contained units which are used to measure the frequency of transmitters in the field. They are an absorption type wavemeter in which a crystal rectifier is used to supply DC to a milliammeter for an indication of resonance. They are to be used with pulsed signals.

No field changes in effect at time of preparation (17 April 1958).

RELATION TO OTHER EQUIPMENT

The TS-211/UPM-2 and TS-212/UPM-2 are part of wavemeter Test Set AN/UPM-2.

ELECTRICAL AND MECHANICAL CHARACTERISTICS

FREQUENCY RANGE: 80 to 360 mc (TS-211/UPM-2); 330 to 1220 mc (TS-212/UPM-2).
MICROMETER DIAL DIVISIONS: 1000.
ACCURACY: ±1 mc.
POWER INPUT: 5 mw min (avg).
POWER SOURCE REQUIRED: Derived from the signal being measured.

MANUFACTURER'S OR CONTRACTOR'S DATA

The Kalart Co., Inc, Stamford, Conn.
Contract NXsr-53379, dated 23 March 1944.

TUBE AND/OR CRYSTAL COMPLEMENT

No Electron Tubes used.
(1) 1N21
Total Crystals: (1)

REFERENCE DATA AND LITERATURE

NAVSHIPS 900,452-1B: Technical Manual for Wavemeter Test Set AN/UPM-2.

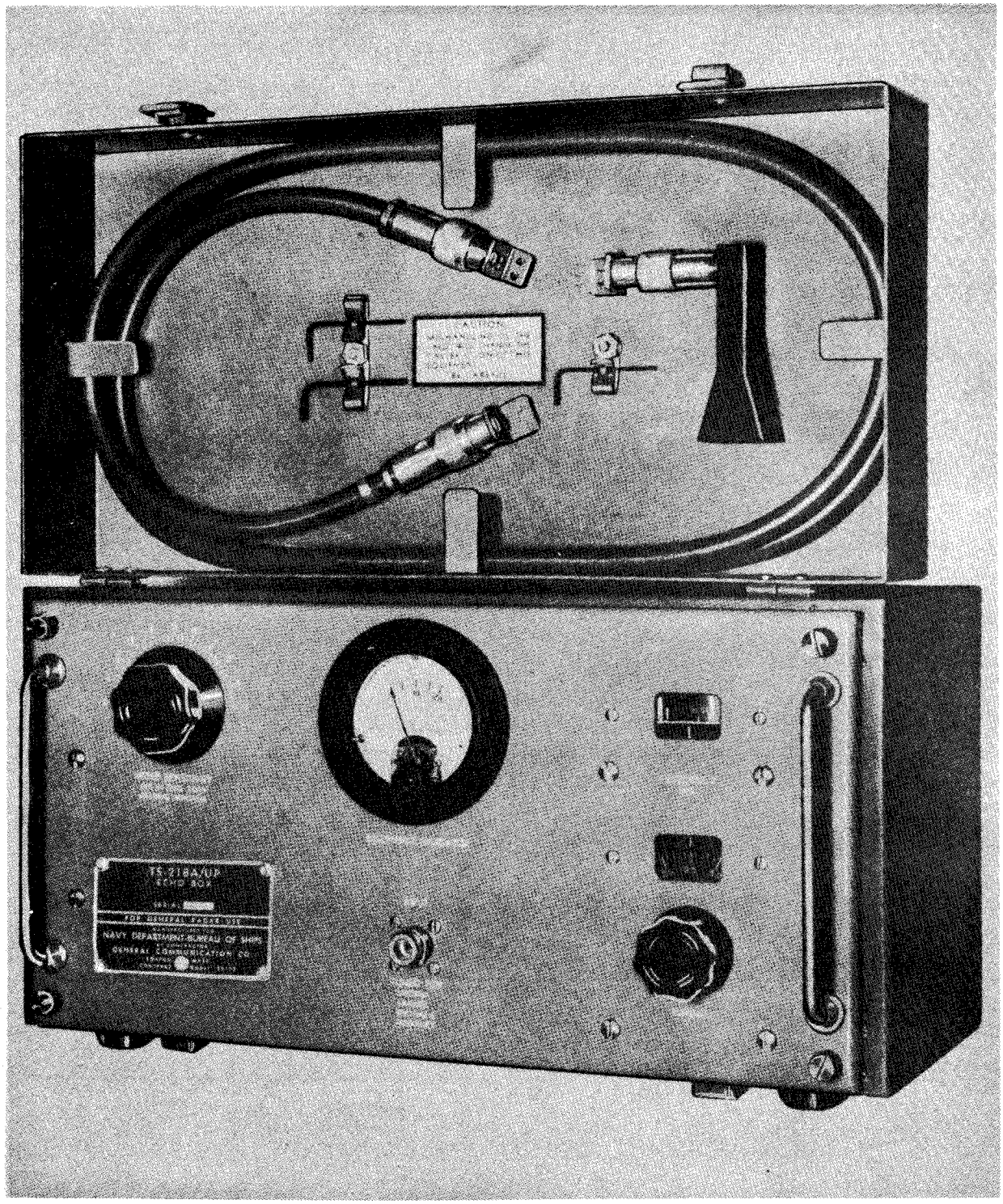
TYPE CLASSIFICATION
DESIGN COGNIZANCE BUSHIPS
PROCUREMENT COGNIZANCE
STOCK NO.
R.D.B. IDENT. NO.

EQUIPMENT SUPPLIED DATA

QUANTITY PER EQUIPT	NAME AND NOMENCLATURE	OVERALL DIMENSIONS (inches)	WEIGHT (lbs.)
1	Wavemeter TS-211/UPM-2	3 x 4-3/4 x 12-5/16	3.75
1	Wavemeter TS-212/UPM-2	2-1/2 x 4-1/4 x 7-9/16	2.5

Test-Frequency Measuring

ECHO BOX TS-218A/UP



Echo Box TS-218A/UP

Test-Frequency Measuring

TS-218A/UP ECHO BOX

FUNCTIONAL DESCRIPTION

The TS-218A/UP is a portable high-Q resonant cavity used in making rapid, rough analyses of the performance of radar systems. It is employed in determining the frequency of RF transmitters, measuring relative power output, detecting double moding of magnetrons, indicating receiver signal-to-noise ratio and making spectrum analysis of transmitters.

No field changes in effect at time of preparation (18 April 1958).

RELATION TO OTHER EQUIPMENT

The TS-218A/UP is a mechanically and electrically improved redesign of Echo Box TS-218/UP.

ELECTRICAL AND MECHANICAL CHARACTERISTICS

FREQUENCY RANGE: 8,990 to 9,170 mc ±5 mc.
TYPE OF RECEPTION: CW, MCW, pulse.
IMPEDANCE: 51 ohms (input).
DECAY: 6 db/usec.
RINGTIME: 15 to 25 usec.
TEMPERATURE RANGE: -40° F to $+120^{\circ}$ F.
ACCURACY: ±3 db (rel pwr).

MANUFACTURER'S OR CONTRACTOR'S DATA

General Communication Co., Boston, Mass.
Contract NObsr-30172, 28 June 1946.
Contract NObsr-39200, 19 May 1947.

TUBE AND/OR CRYSTAL COMPLEMENT

No Electron Tubes used.
(1) 1N23A/1N23B
Total Crystals: (1)

REFERENCE DATA AND LITERATURE

NAVSHIPS 91083: Technical Manual for Echo Box TS-218A/UP.

TYPE CLASSIFICATION
DESIGN COGNIZANCE BUSHIPS
PROCUREMENT COGNIZANCE Navy Spec R-7448
STOCK NO.
R.D.B. IDENT. NO.

SHIPPING DATA

NUMBER OF BOXES	CONTENTS AND IDENTIFICATION	VOLUME (Cu.Ft.)	OVERALL DIMENSIONS (inches)	WEIGHT PACKED (lbs.)
1	Echo Box TS-218A/UP	2.82	13 X 15 X 25	45
1	Equipment Spares	0.306	4-1/2 X 9-1/2 X 12-1/2	9

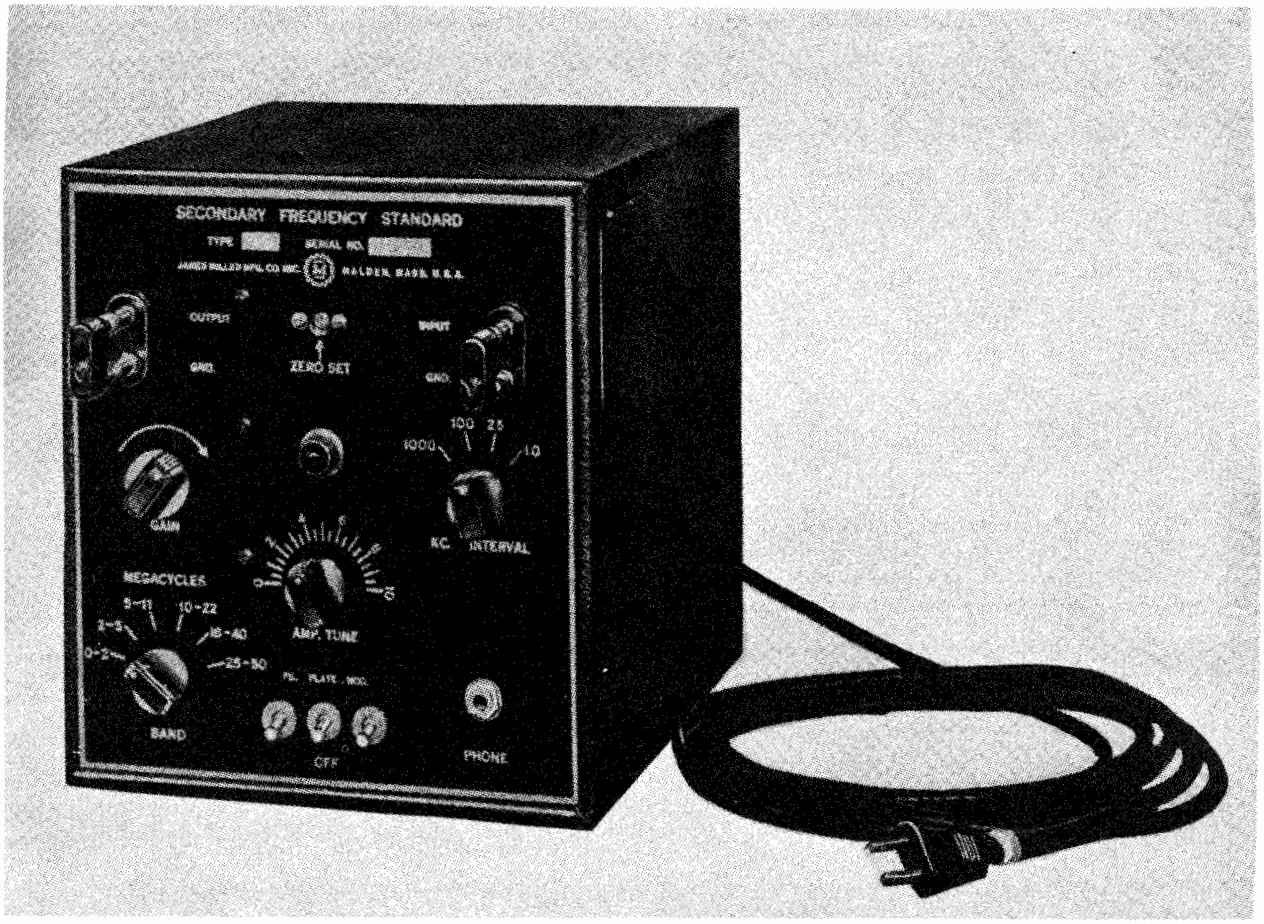
EQUIPMENT SUPPLIED DATA

QUANTITY PER EQUIPT	NAME AND NOMENCLATURE	OVERALL DIMENSIONS (inches)	WEIGHT (lbs.)
1	Echo Box TS-218A/UP	8-5/8 X 11 X 16	16.5
1	Pick-up Antenna AT-68/UP	1-1/8 X 2-1/4 X 3-3/8	0.25
1	Antenna Cable RG-9A/U	96 lg	1.25
2	Technical Manual NAVSHIPS 91083		

August 1957

Test-Frequency Measuring

FREQUENCY STANDARD TS-240/FRC



Frequency Standard TS-240/FRC

FUNCTIONAL DESCRIPTION

The TS-240/FRC is used in conjunction with audio oscillators, AF meters, oscilloscopes, and other equipment for checking the calibration of receivers and for determining the precise frequency of transmitters and signal generators. The frequency standard can be used to make precise measurements of any multiple of 10 kc, 25 kc, 100 kc, or 1000 kc from 10 kc to 50 mc.

No field changes in effect at time of preparation (28 November 1956).

RELATION TO OTHER EQUIPMENT

Same as James Millen Mfg Co., Inc., Model No. 90505.

ELECTRICAL AND MECHANICAL CHARACTERISTICS

FREQUENCY RANGE: 10 kc to 50 mc, 6 bands.
OPERATING POWER: 115 v, 60 cps, single ph.
POWER INPUT
FILAMENTS: 23 to 24 W.
ALL OTHER: 17 to 20 W.

Test-Frequency Measuring

August 1957

TS-240/FRC FREQUENCY STANDARD

MANUFACTURER'S OR CONTRACTOR'S DATA

James Millen Mfg Co., Inc., Malden Mass.

REFERENCE DATA AND LITERATURE

TM11-2625: Technical Manual for Frequency Standard TS-240/FRC.

TUBE AND/OR CRYSTAL COMPLEMENT

(1) 6K8 (2) 6SN7GT
(1) 6V6 (1) 6SJ7 (1) 5W4 or 5Y3GT/G
(1) 6J5 (1) OD3/VR-150
Total Tubes: (8)
(1) 1000KC
Total Crystals: (1)

TYPE CLASSIFICATION	
DESIGN COGNIZANCE	TASSA
PROCUREMENT COGNIZANCE	
STOCK NO.	
R.D.B. IDENT. NO.	

SHIPPING DATA

NUMBER OF BOXES	CONTENTS AND IDENTIFICATION	VOLUME (Cu.Ft.)	OVERALL DIMENSIONS (inches)	WEIGHT PACKED (lbs.)
1	Frequency Standard TS-240/FRC	4.9	17 X 21 X 23-1/2	50

EQUIPMENT SUPPLIED DATA

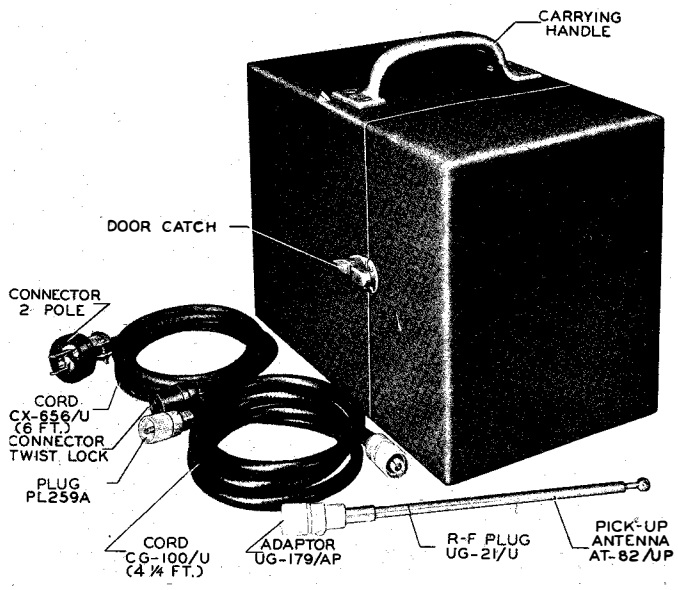
QUANTITY PER EQUIPT	NAME AND NOMENCLATURE	OVERALL DIMENSIONS (inches)	WEIGHT (lbs.)
1	Secondary Frequency Standard	8-7/8 X 9-5/16 X 11-11/16	19.6
1	Cable Assy	72 lg	0.6
1	Fuse 1-1/2 amp, 250 v		
1	Lamp 6 to 8 v, 114 amp		
2	Technical Manual TM11-2625	1/8 X 5-1/2 X 8-1/2	0.2

19 February 1963 **WAVEMETER TS-247/APM-48**

Cog Service: USAF FSN: **Functional Class: 2.2**

	USA	USN	USAF
TYPE CLASS:		Std	Std

MANUFACTURER'S NAME/CODE NUMBER: Harvey Radio Laboratories Inc., (27625).



Wavemeter TS-247/APM-48

FUNCTIONAL DESCRIPTION:

Wavemeter TS-247/APM-48 is a portable absorption type wavemeter used in measuring the rf of radar transmitters and signal generators.

No field changes in effect at time of preparation (15 June 1962).

TECHNICAL CHARACTERISTICS:

POWER REQUIREMENTS: 25 W, 115 v, 50 to 1800 cyc, single ph.
FREQUENCY RANGE: 215 to 275 mc.
TYPE OF RECEPTION: CW, pulse.
INPUT IMPEDANCE: 50 ohms.
TEMPERATURE RANGE: M67 deg to P122 deg F.
ACCURACY: Porm 0.2% (absolute).

TS-247/APM-48 WAVEMETER

RELATION TO OTHER EQUIPMENT:

This equipment is a part of Radar Test Set AN/APM-48; it is used with, but is not part of, Radar Test Set AN/APM-3.

EQUIPMENT REQUIRED BUT NOT SUPPLIED: None.

MAJOR COMPONENTS

QTY	ITEM	STOCK NUMBERS	DIMENSIONS (INCHES)	WEIGHT (LBS)
1	Wavemeter TS-247/APM-48 includes:		7-1/4 x 10-5/8 x 12-3/8	19.5
1	Antenna AT-82/UP		20-1/8 lg	0.12
1	Cord CX-656/U		72 lg	0.43
1	Cord CG-100/U		48 lg	0.62
1	Adapter UG-179/AP		7/8 dia x 2	
1	Case CY-325/APM-48		9-7/8 x 13-5/8 x 17	14

REFERENCE DATA AND LITERATURE:

TO 33A1-5-41-2: Handbook of Maintenance Instructions for Wavemeter TS-247/APM-48.
TO 33A1-5-41-4: Spare Parts List for Wavemeter TS-247/APM-48.

TUBE, CRYSTAL AND/OR SEMI-CONDUCTOR DATA:

TUBES: (1) 9002

CRYSTALS: None used.

SEMI-CONDUCTORS: None used.

SHIPPING DATA

PKGS	VOLUME (CU FT)	WEIGHT (LBS)
1	4	75

PROCUREMENT DATA

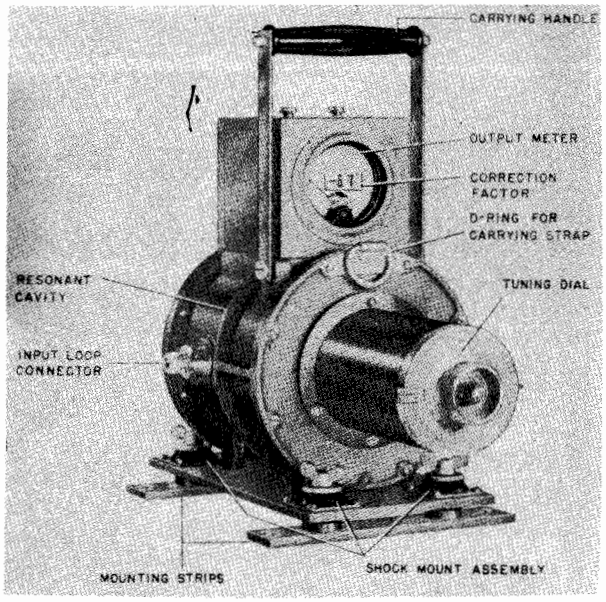
PROCURING SERVICE: USAF
DESIGN COG: USAF, WADC
SPEC &/OR DWG: USAF Spec 371-5087

CONTRACTOR	LOCATION	CONTRACT OR ORDER NO.	APPROX. UNIT COST
Harvey Radio Laboratories Incorporated	Cambridge, Massachusetts	785-DAY-45-RA, 13 November 1944 937-DAY-45-RA, 20 December 1944 2066-DAY-45, 24 February 1945	$191.00

April 1958

Test-Frequency Measuring
TS-270/UP, TS-270A/UP, TS-270B/UP

ECHO BOX



Echo Box TS-270/UP, TS-270A/UP, TS-270B/UP

FUNCTIONAL DESCRIPTION

The TS-270/UP, TS-270A/UP, and TS-270B/UP Echo Boxes are portable, hand tuned cavities designed to make a quick, routine analysis of the overall performance of radar systems.

Some of its more important uses are:

- Measurement of ringing time.
- Analysis of transmitter frequency spectrum.
- Measurement of pulse duration.
- Relative indication of transmitter power output.
- Tuning of radar equipment.
- Measurement of transmitter frequency.
- Measurement of local-oscillator frequency.
- Checking erratic transmitter operation.
- Check transmitter frequency pulling.
- Check receiver AFC action.
- Measurement of TR-box recovery time.
- Measurement of receiver recovery time.
- Check transmission line losses.
- Trouble location.

A visual indication of system performance appears on the radar screen. Resonance and relative power are indicated by the deflections of the internal microammeter. Frequency is indicated by referring the dial settings to a calibrated chart.

The Models TS-270/UP, TS-270A/UP, and TS-270B/UP differs only in the mechanical construction.

No field changes in effect at time of preparation (12 May 1958).

RELATION TO OTHER EQUIPMENT

The TS-270/UP, TS-270A/UP, and TS-270B/UP is part of Radar Set AN/MPN-1A.

Equipment Required but not Supplied: Antenna or directional coupler.

ELECTRICAL AND MECHANICAL CHARACTERISTICS

FREQUENCY RANGE
AS AN ECHO BOX: 2700 to 2900 mc.
AS AN WAVEMETER: 2630 to 2970 mc.
SENSITIVITY: 90 yards (of ringtime) per db.
TEMPERATURE RANGE: -40 deg F to +140 deg F.
LOADED Q: 47,000 approx.

MANUFACTURER'S OR CONTRACTOR'S DATA

TS-270/UP
Johnson Service Co., Milwaukee, Wis.
Contract NX-LL-77902, dated 6 November 1944.
Contract N5sr-8624, dated 26 Apr 1945.
Contract W-28-099-ac-47 dated 19 July 1948.
Order No. 2417-MPD45.
TS-270A/UP
Johnson Service Co, Milwaukee, Wis.
Order No. 5040-DAY-45-CR.
Order No. 2417-MPD-45.
TS-270B/UP
Johnson Service Co, Milwaukee, Wis.

TUBE AND/OR CRYSTAL COMPLEMENT

No Electron Tubes Used.

(1) 1N21B
Total Crystals: (1)

REFERENCE DATA AND LITERATURE

TM 11-1086: Technical Manual for Echo Boxes for TS-270/UP, TS-270A/UP and TS-270B/UP.

TYPE CLASSIFICATION	
DESIGN COGNIZANCE	TASSA
PROCUREMENT COGNIZANCE	
STOCK NO.	
R.D.B. IDENT. NO.	

Test-Frequency Measuring

April 1958

TS-270/UP,TS-270A/UP TS-270B/UP

ECHO BOX

SHIPPING DATA

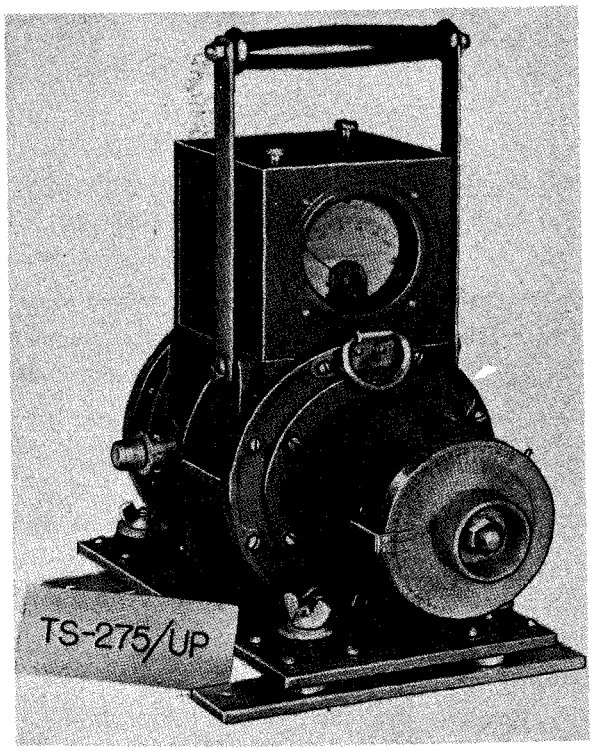
NUMBER OF BOXES	CONTENTS AND IDENTIFICATION	VOLUME (Cu.Ft.)	OVERALL DIMENSIONS (inches)	WEIGHT PACKED (lbs.)
1	Echo Box TS-270/UP with Spares and Accessories	3.4	10-1/4 X 14-1/2 X 24-3/4	73.0
1	Echo Box TS-270A/UP with Spares and Accessories	3.4	14-1/2 X 16-1/4 X 24-3/4	73.0
1	Echo Box TS-270B/UP with Spares and Accessories	4.6	15-1/4 X 21-1/2 X 24-1/8	61.0

EQUIPMENT SUPPLIED DATA

QUANTITY PER EQUIPT			NAME AND NOMENCLATURE	OVERALL DIMENSIONS (inches)	WEIGHT (lbs.)
TS-270					
/UP	A/UP	B/UP			
1			Echo Box TS-270/UP with Shock Mount	8 X 12-1/4 X 14-5/8	25.75
	1		Echo Box TS-270A/UP with Shock Mount	8 X 12-1/4 X 14-5/8	25.75
		1	Echo Box TS-270B/UP with Shock Mount	7-1/4 X 12-1/2 X 14-1/2	11.25
1	1		Accessory Case	3-3/25 X 10-1/2 X 11-1/4	9.0 full
		1	Carrying Case	10 X 15-3/4 X 19	13.0 full
1	1	1	Socket Wrench 5/8" hex	7/8 dia X 2-1/2	
1	1	1	Spanner Wrench	3/8 dia X 1	
1	1	1	Plunger Positioning Gauge		
1	1	1	Carrier Strap		
1	1		Connecting Cable RC-8A/U	120 lg	
		1	Connecting Cable Assembly CG-55B/U		
1	1	1	Technical Manuals and Charts		
3	3	3	Crystal (Spares) 1N21B		

Test-Frequency Measuring
TS-275/UP

ECHO BOX



Echo Box TS-275/UP

FUNCTIONAL DESCRIPTION

The TS-275/UP is a hand-tuned ringing cavity used in making quick, rough analyses of the over-all performance of radar systems. It checks the frequency of radar transmitters and receiver local oscillators, performs spectrum analyses, makes rough relative power measurements, and checks TR recovery time.

Data on this sheet reflects the following field changes: FC 1, 2.

MANUFACTURER'S OR CONTRACTOR'S DATA

Johnson Service Co, Milwaukee, Wis.
Contract N5sr-5934, dated 6 June 1945.
Contract NObsr-43119, dated 18 November 1948.
Contract NObsr-49123, dated 11 May 1950.
Contract NObsr-57091, dated 21 November 1951.
Contract NXsr-65336.
Approximate Cost: $319.00 with equipment spares.

ELECTRICAL AND MECHANICAL CHARACTERISTICS

FREQUENCY RANGE: 3330 to 3770 mc (wavemeter); 3400 to 3700 mc (echo box).
Q: 4700.
SENSITIVITY: 50 yd/db.
ACCURACY: ±3 mc; ±3 db.

TUBE AND/OR CRYSTAL COMPLEMENT

No Electron Tubes used.

(4) 1N21B
Total Crystals: (4)

REFERENCE DATA AND LITERATURE

NAVSHIPS 900825: Technical Manual for Echo Box TS-275/UP.

TYPE CLASSIFICATION	
DESIGN COGNIZANCE	BUSHIPS
PROCUREMENT COGNIZANCE	USN Spec RE13A1047;
STOCK NO.	MIL-E-16076(SHIPS)
R.D.B. IDENT. NO.	

SHIPPING DATA

NUMBER OF BOXES	CONTENTS AND IDENTIFICATION	VOLUME (Cu.Ft.)	OVERALL DIMENSIONS (inches)	WEIGHT PACKED (lbs.)
1	Echo Box TS-275/UP	3.12	14-1/2 X 16-1/4 X 24-1/2	75

EQUIPMENT SUPPLIED DATA

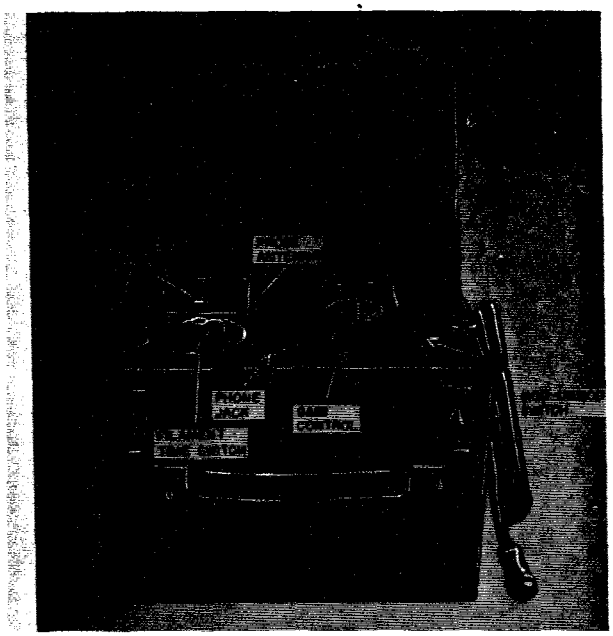
QUANTITY PER EQUIPT	NAME AND NOMENCLATURE	OVERALL DIMENSIONS (inches)	WEIGHT (lbs.)
1	Echo Box TS-275/UP including:	7 X 10-1/2 X 12-5/8	23.5
1*	RF Cable Assy	120 lg	
1**	RF Cable Assy CG-717/U	120 lg	
1	Equipment Spare Parts Case	3 X 7-1/2 X 8-1/2	7
1	Accessory Box	3-1/8 X 10-1/2 X 11-1/4	9

*Furnished on Contract NObsr-43119 and N5sr-5934.
**Furnished on Contract NObsr-49123 and NObsr-57091.

June 1957

Test-Frequency Measuring

FREQUENCY METER TS-285/GP



Frequency Meter TS-285/GP

FUNCTIONAL DESCRIPTION

The TS-285/GP is a compact, battery-powered, portable resonant-cavity type of frequency meter designed for measuring either modulated or unmodulated frequencies in the range of 90 to 210 mc. The input to the frequency meter may be obtained either through the test antenna supplied with the meter or through a test probe. The test antenna or probe is connected to an Amphenol connector which, in turn, connects to the resonant cavity. Tuning of the cylindrical resonant cavity is accomplished by moving a piston within the cylinder. The indicating circuit consists of a detector, amplifier, copper-oxide rectifier and microammeter.

No field changes in effect at time of preparation (4 December 1956).

RELATION TO OTHER EQUIPMENT

Same as Lavoie Model 150 S.

ELECTRICAL AND MECHANICAL CHARACTERISTICS

FREQUENCY RANGE: 90 to 210 mc.
ACCURACY: ±1 mc.
OPERATING POWER: 1.5 v DC and 45 v DC.

MANUFACTURER'S OR CONTRACTOR'S DATA

Lavoie Laboratories, Morgansville, N. J.

TUBE AND/OR CRYSTAL COMPLEMENT

(1) 957 (1) 1S5 (1) 3S4

Total Tubes: (3)

REFERENCE DATA AND LITERATURE

TM11-2640: Technical Manual for Frequency Meter TS-285/GP.

TYPE CLASSIFICATION
DESIGN COGNIZANCE TASSA
PROCUREMENT COGNIZANCE
STOCK NO.
R.D.B. IDENT. NO.

EQUIPMENT SUPPLIED DATA

QUANTITY PER EQUIPT	NAME AND NOMENCLATURE	OVERALL DIMENSIONS (inches)	WEIGHT (lbs.)
1	Frequency Meter TS-285/GP		
1	Cable	4 lg	
1	Probe	48 lg	

April 1959

Test-Frequency Measuring.

FREQUENCY METER

TS-29/FMQ-1 AND TS-29A/FMQ-1

FUNCTIONAL DESCRIPTION

The TS-29/FMQ-1 and the TS-29A/FMQ-1 are designed to be used in converting radiosonde receiver audio frequency (AF) output into pulsating direct current (DC) for visual reading on a direct current (DC) ammeter.

The TS-29A/FMQ-1 is the same as the TS-29/FMQ-1 except for use of war standard parts and materials. The TS-29/FMQ-1 uses a push-button type switch and the TS-29A/FMQ-1 uses a spring return toggle switch.

No field changes in effect at time of preparation (21 August 1958).

ELECTRICAL AND MECHANICAL CHARACTERISTICS

TYPE OF EMISSION: Audio sine, sawtooth, square wave.
ACCURACY: ±2%.
FREQUENCY RANGE: 0 to 200 cycle.
OPERATING POWER REQUIREMENTS: 115 v, 58 to 62 cycle, AC.

MANUFACTURER'S OR CONTRACTOR'S DATA

Julian P. Friege Co., Baltimore, Maryland.

Bendix Aviation Corp., Detroit, Michigan.
Approximate Cost: $454.00 with equipment spares.

TUBE AND/OR CRYSTAL COMPLEMENT

(1) OA3 (1) OD3 (2) 5Y3GT
(1) 6J5 (1) 6ZY5G (2) 884
Total Tubes: (8)

No Crystals Used.

REFERENCE DATA AND LITERATURE

TM11-487H-1 NAVSHIPS 93003 Volume #1 for TS-29/FMQ-1 and TS-29A/FMQ-1 Frequency Meter.

TYPE CLASSIFICATION	
DESIGN COGNIZANCE	TASSA
PROCUREMENT COGNIZANCE	MIL-R-15823
STOCK NO.	

SHIPPING DATA

NUMBER OF BOXES	CONTENTS AND IDENTIFICATION	VOLUME (Cu.Ft.)	OVERALL DIMENSIONS (inches)	WEIGHT PACKED (lbs.)
1	Frequency Meter TS-29/FMQ-1 or TS-29A/FMQ-1 Including: (1) Wrench TL-567/U (2) Technical Manual TM11-2403	1.5	10-1/4 X 13-1/2 X 20	42

EQUIPMENT SUPPLIED DATA

QUANTITY PER EQUIPT	NAME AND NOMENCLATURE	OVERALL DIMENSIONS (inches)	WEIGHT (lbs.)
1	Frequency Meter TS-29/FMQ-1 or TS-29A/FMQ-1	8-3/4 X 10 X 19	38

January 1958

Test-Frequency Measurin

RADAR TEST SET TS-311/U

FUNCTIONAL DESCRIPTION

The TS-311/UP is a portable hand tuned echo box together with crystal rectifier and microammeter. It is used to align equipments, measure over-all performance and make relative frequency measurements.

No field changes in effect at time of preparation (12 July 1957).

ELECTRICAL AND MECHANICAL CHARACTERISTICS

FREQUENCY RANGE: 8730 to 8910 mc.
OHMMETER RANGE: 0 to 20 ma.

TUBE AND/OR CRYSTAL COMPLEMENT

(1) 1N23B
Total Crystal: (1)

REFERENCE DATA AND LITERATURE

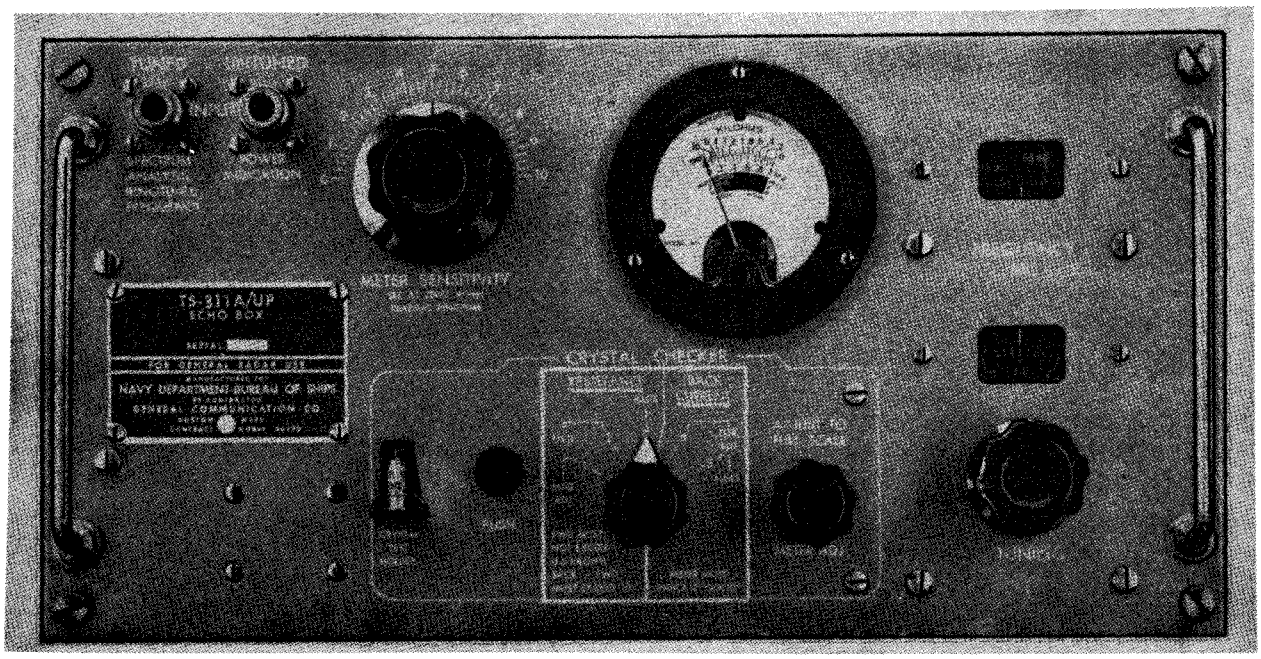
Nomenclature Card for Radar Test Set TS-311/UP.

TYPE CLASSIFICATION
DESIGN COGNIZANCE BUSHIPS
PROCUREMENT COGNIZANCE
STOCK NO.
R.D.B. IDENT. NO. 2.2.2.1

EQUIPMENT SUPPLIED DATA

QUANTITY PER EQUIPT	NAME AND NOMENCLATURE	OVERALL DIMENSIONS (inches)	WEIGHT (lbs.)
1	Radar Test Set TS-311/UP	9 X 10-1/4 X 17-7/16	

ECHO BOX TS-311A/UP



Echo Box TS-311A/UP

FUNCTIONAL DESCRIPTION

The TS-311A/UP is a sharp tuning high Q resonant cavity designed to make a quick routine analysis of the overall performance of radar systems operating at frequencies between 8730 mc and 8910 mc. The most often performed tests are:

Relative indication (from day-to-day) of transmitter power output.

Measurement of transmitter and local oscillator frequencies.

Analysis of transmitter frequency spectrum.

Checking an erratic operation, double moding and frequency pulling.

Measurement of pulse duration.

Checking of receiver AFC action, measurement of TR box and receiver recovery time.

Measurement of standing wave ratio, of transmission line losses, and other factors.

A visual indication of system performance appears on the radar screen. An untuned input receptacle permits the signal picked up by the horn antenna to by-pass the cavity and be fed directly, through an attenuator, to the crystal diode, thereby helping to detect the presence of rf energy without having to tune the echo box.

A crystal checker unit is part of the main unit and is used for checking rectifier crystals in the field, by measuring the forward and backward resistance as well as the back current.

No field changes in effect at time of preparation (12 May 1958).

RELATION TO OTHER EQUIPMENT

The TS-311A/UP is similar to Echo Box TS-311/UP except that the latter does not incorporate a crystal checker.

ELECTRICAL AND MECHANICAL CHARACTERISTICS

POWER SUPPLY (CRYSTAL CHECKER): 1.5 v, dc from dry battery.
FREQUENCY RANGE: 8730 to 8910 mc.
ACCURACY: ±5 mc.
STABILITY: 0.14 mc per deg C, max.
LOADED Q: 50,000 approx.
INPUT IMPEDANCE: 51 ohms.

Test-Frequency Measuring

TS-311A/UP ECHO BOX

MANUFACTURER'S OR CONTRACTOR'S DATA

General Communications; Boston, Mass.
Contract 30172 dated 28 June 1946.
Contract 39201 dated 19 May 1947.
Contract 42101 dated 30 January 1948.
Contract 42413 dated 21 June 1948.

TUBE AND/OR CRYSTAL COMPLEMENT

No Electron Tubes Used.
(1) 1N23A
Total Crystals: (1)

REFERENCE DATA AND LITERATURE

NAVSHIPS 91111: Technical Manual for Echo Box TS-311A/UP.

TYPE CLASSIFICATION
DESIGN COGNIZANCE BUSHIPS
PROCUREMENT COGNIZANCE
STOCK NO.
R.D.B. IDENT. NO.

SHIPPING DATA

NUMBER OF BOXES	CONTENTS AND IDENTIFICATION	VOLUME (Cu.Ft.)	OVERALL DIMENSIONS (inches)	WEIGHT PACKED (lbs.)
1	Echo Box TS-311A/UP and Maintenance Repair Parts	3		

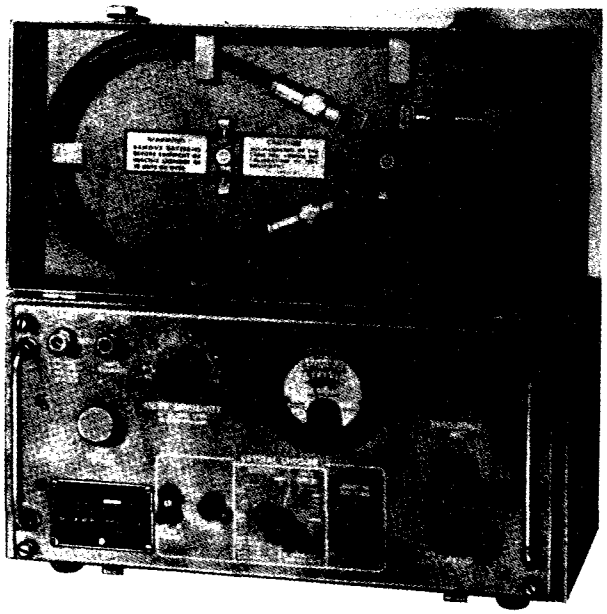
EQUIPMENT SUPPLIED DATA

QUANTITY PER EQUIPT	NAME AND NOMENCLATURE	OVERALL DIMENSIONS (inches)	WEIGHT (lbs.)
1	Echo Box TS-311A/UP, including Dry Battery	8-11/16 X 11 X 16	19.25
1	Pick-Up Antenna AT-68/UP	1-1/8 X 2-1/4 X 3-3/8	0.25
1	Antenna Cable RG-9A/U	96 lg	1.25
3	Allen Wrench		
2	Instruction Book NAVSHIPS 91111		
1	Maintenance Repair Parts Set	4-1/2 X 10-1/2 X 12-1/4	12.0

December 1956

ECHO BOX

TS-311B/UP



Echo Box TS-311B/UP

FUNCTIONAL DESCRIPTION

The TS-311B/UP is a ringing cavity designed to operate at frequencies between 8730 and 8910 mc. It is portable, self contained instrument used to check the over-all performance of a radar set. It is powered by the RF energy picked up from the radar set under test. A crystal checker unit is provided for testing rectifier crystals in the field. The TS-311B/UP can be used to make the following tests; over-all performance check of a radar; comparative measurements of the power output of a radar transmitter; spectrum analysis of a radar transmitter; check for multiple moding of a radar transmitter; check for transmitter frequency pulling; check for the speed of recovery of a radar T-R box and receiver; test for performance of rectifying crystals.

No field changes in effect at time of preparation (2 July 1956).

RELATION TO OTHER EQUIPMENT

Equipment Required but not Supplied: (1) 1-1/2 v dry cell NT-BA2030/U.

ELECTRICAL AND MECHANICAL CHARACTERISTICS

FREQUENCY RANGE: 8730 to 8910 mc.
TYPE
TUNED INPUT: Manually tuned echo box.
UNTUNED INPUT: Antenna direct to crystal.
CRYSTAL CHECKER: For testing 1N23 series crystals.
FREQUENCY CHANGE WITH TEMPERATURE: Does not exceed 0.14 mc per deg C.
INPUT IMPEDANCE: 51 ohms nom.

MANUFACTURER'S OR CONTRACTOR'S DATA

Johnson Service Co., Milwaukee, Wisc.
Contract NObsr-52618, dated 3 August 1953.
Approximate Cost: $700.00 with equipment spares.

TUBE AND/OR CRYSTAL COMPLEMENT

(1) 1N23B
Total Crystals: (1)

REFERENCE DATA AND LITERATURE

NAVSHIPS 92004: Technical Manual for Echo Box TS-311B/UP.

TYPE CLASSIFICATION	
DESIGN COGNIZANCE	BUSHIPS
PROCUREMENT COGNIZANCE	
STOCK NO.	
R.D.B. IDENT. NO.	

SHIPPING DATA

NUMBER OF BOXES	CONTENTS AND IDENTIFICATION	VOLUME (Cu.Ft.)	OVERALL DIMENSIONS (inches)	WEIGHT PACKED (lbs.)
1	Echo Box TS-311B/UP	2.6	13-1/2 X 15-1/4 X 22	36

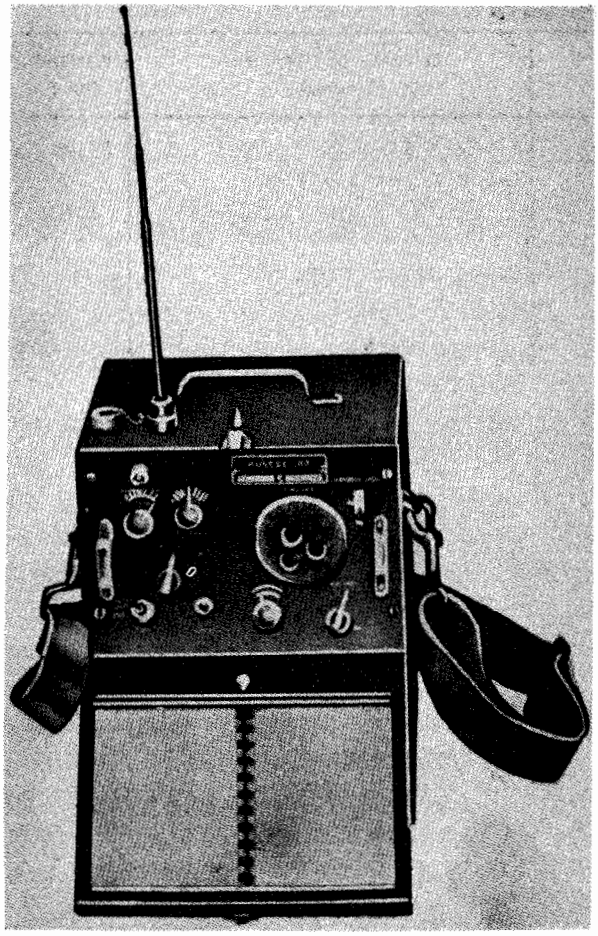
TS-311B/UP ECHO BOX

EQUIPMENT SUPPLIED DATA

QUANTITY PER EQUIPT	NAME AND NOMENCLATURE	OVERALL DIMENSIONS (inches)	WEIGHT (lbs.)
1	Echo Box TS-3118/UP	8-1/2 X 11 X 16	19.4
1	Pick-up Antenna AT-68/UP	1-1/8 X 2-1/8 X 3-3/8	.2
1	Cable (W-101) CG-928/U (8)		1.0
1	Rectifier Crystal JAN-1N238	19/64 dia X 27/32 ht.	
3	Allen Wrenches No. 6, No. 8, No. 10		
2	Technical Manuals NAVSHIPS 92004		

Test-Frequency Measuring

FREQUENCY METER TS-323/UR



Frequency Meter TS-323/UR

FUNCTIONAL DESCRIPTION

The TS-323/UR is a portable, self-contained instrument designed to provide a simple, accurate and reliable means of adjusting radio transmitters and receivers, or measuring the frequencies of RF signals.

No field changes in effect at time of preparation (1 May 1958).

RELATION TO OTHER EQUIPMENT

The TS-323/UR is recommended in place of Frequency Meter TS-174/U.

Equipment Required but not Supplied: (2) 6 v batt BA-203 (-19020), (3) 45 v batt BA-59 (-19021), (1) Headphone Set (600 ohms) -49015 or equal.

ELECTRICAL AND MECHANICAL CHARACTERISTICS

FREQUENCY RANGE: 20 to 450 mc.
TYPE OF RECEPTION OR TRANSMISSION: A1, A2.
ACCURACY: 0.005% to 0.01%.
MODULATION FREQUENCY: 1000 cps approx.
SENSITIVITY: 5000 uv signal input gives audio beat note output of 10 mw.
AMBIENT TEMPERATURE RANGE: 32 deg to 120 deg F.
POWER SOURCE REQUIRED: 12 v and 135 v DC.

MANUFACTURER'S OR CONTRACTOR'S DATA

Hoffman Radio Corp, Los Angeles, Calif.
Contract NXsa-76139, dated Aug 1945.
Approximate Cost: $525.00 with equipment spares.

TUBE AND/OR CRYSTAL COMPLEMENT

(2) 5654/6AK5W
(1) 6C4WA
(1) 9001
(1) 9002
Total Tubes: (5)
(1) Quartz (1000 KC)
Total Crystals: (1)

REFERENCE DATA AND LITERATURE

AN08-35TS323-2: Technical Manual for Model TS-323/UR Heterodyne Frequency Meter and Crystal Calibrator.

TYPE CLASSIFICATION
DESIGN COGNIZANCE BUAER
PROCUREMENT COGNIZANCE SPEC RE13A930A(NAVY)
STOCK NO.
R.D.B. IDENT. NO.

TS-323/UR FREQUENCY METER

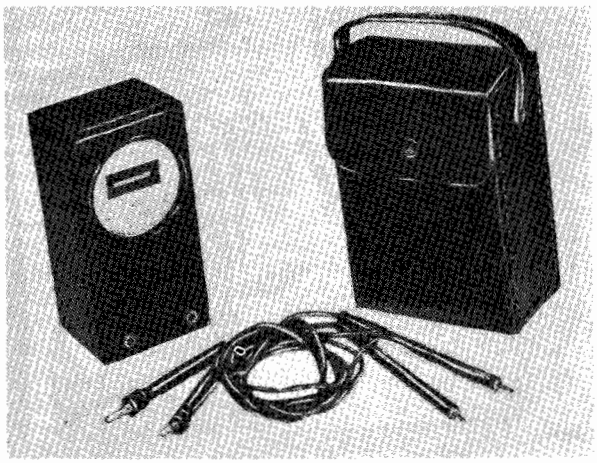
EQUIPMENT SUPPLIED DATA

QUANTITY PER EQUIPT	NAME AND NOMENCLATURE	OVERALL DIMENSIONS (inches)	WEIGHT (lbs.)
1	Frequency Meter TS-323/UR complete in carrying case (less batteries)	9-1/2 x 11-1/8 x 14-5/16	21
1	Carrying Strap	2 x 65	.75
1	Collapsible Rod Antenna	17-1/2 lg extended	
1	Output Coupling Terminal -49759	7-3/8 closed	
1	Carrying Case CY-133/UR		
1	RF Post Adapter		
1	RF Power Cord		
1	Calibration Book	5-1/8 x 5-3/4 x 9/16	
1	Technical Manual AN08-35TS323-2		
1	Allen Wrench No. 6		
1	Allen Wrench No. 8		

April 1959

Test-Frequency Measuring

FREQUENCY METER TS-328/U



Frequency Meter TS-328/U

FUNCTIONAL DESCRIPTION

Frequency Meter TS-328/U is a portable, vibrating reed-type instrument used in checking 400 cycle power sources.

No field changes in effect at time of preparation (19 March 1959).

RELATION TO OTHER EQUIPMENT

This equipment is similar to J.B.T. Instrument Co. Model 33/FP.

ELECTRICAL AND MECHANICAL CHARACTERISTICS

FREQUENCY RANGE: 380 to 420 cy.
VOLTAGE RANGE: 100 to 130 v AC.
METER RATING: 70 ohms/v at 400 cy.
TEMPERATURE COEFFICIENT: 0.000075/deg F, inverse (approx).
ACCURACY: ±0.3% at 77° F with sine wave input.

MANUFACTURER'S OR CONTRACTOR'S DATA

Western Electric Co., N.Y., N.Y.
Contract NXsr-38866.

TUBE AND/OR CRYSTAL COMPLEMENT

No Electron Tubes or Crystals used.

REFERENCE DATA AND LITERATURE

J.B.T. Instruments, Inc., Catalog No. 558-A.

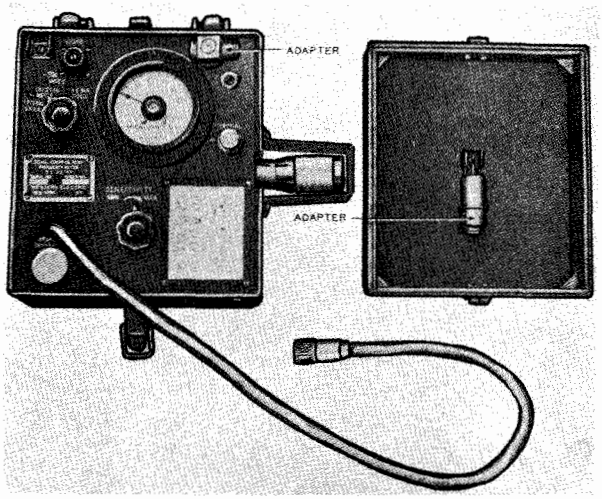
TYPE CLASSIFICATION
DESIGN COGNIZANCE TASSA
PROCUREMENT COGNIZANCE ARMY SPEC 7525, NAVY SPEC KS-9868
STOCK NO.
R.D.B. IDENT. NO. 2.5.4

EQUIPMENT SUPPLIED DATA

QUANTITY PER EQUIPT	NAME AND NOMENCLATURE	OVERALL DIMENSIONS (inches)	WEIGHT (lbs.)
1	Frequency Meter TS-328/U Including:	2-5/8 X 3-1/16 X 5-7/8	
1	Case	2-3/4 X 4-1/4 X 6-3/32	
2	Test Leads	48 lg	

Test-Frequency Measuring

FREQUENCY METER TS-33/AP



Frequency Meter TS-33/AP

FUNCTIONAL DESCRIPTION

The TS-33/AP is a portable wavemeter used in measuring or checking the frequency of CW, MCW, or pulsed X-band radar transmitters, signal generators, and beat-frequency oscillators. It may also be employed in indicating transmitter power, detecting double moding and erractic operation of magnetrons, and in measuring rectified crystal current and repeller voltage. In conjunction with an oscilloscope, shapes of transmitter pulses from TR boxes may be viewed.

No field changes in effect at time of preparation (14 April 1958).

RELATION TO OTHER EQUIPMENT

This equipment is part of Radar Test Set AN/APM-21. The TS-33/AP has been superseded by Frequency Power Meter TS-230( )/AP.

ELECTRICAL AND MECHANICAL CHARACTERISTICS

FREQUENCY RANGE: 8,700 to 9,500 mc.
TYPE OF RECEPTION: CW, MCW, pulse.
INPUT IMPEDANCE: 50 ohms.
SIGNAL INPUT RANGE
CW: 2 mw (min); 2 W (max).
PULSE: 150 mw; 1,000 W; 2,000 W.
TEMPERATURE RANGE: -40 deg F to +160 deg F.
ACCURACY OF CALIBRATION: ±3 mc.
ACCURACY: ±5 mc (rel).

MANUFACTURER'S OR CONTRACTOR'S DATA

Western Electric Co., New York, N. Y.
Contract NOas-429.
Approximate Cost: $800.00 with equipment spares.

TUBE AND/OR CRYSTAL COMPLEMENT

No Electron Tubes used.
1N21B or 1N22
Total Crystals: (1)

REFERENCE DATA AND LITERATURE

CO-AN 08-35TS33-2: Handbook of Maintenance Instructions for Frequency Meter TS-33/AP.

TYPE CLASSIFICATION
DESIGN COGNIZANCE BUSHIPS
PROCUREMENT COGNIZANCE NAVY SPEC RE13A1001
STOCK NO.
R.D.B. IDENT. NO.

SHIPPING DATA

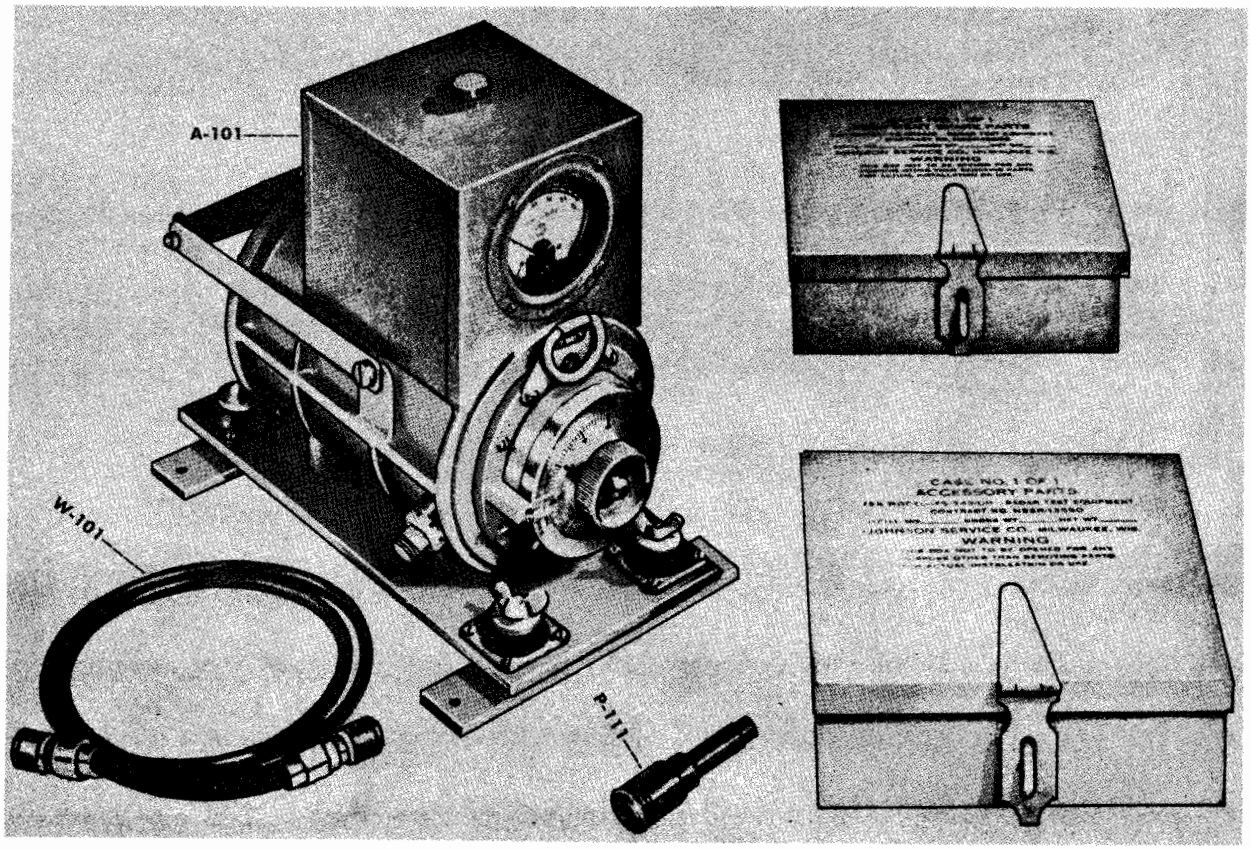
NUMBER OF BOXES	CONTENTS AND IDENTIFICATION	VOLUME (Cu.Ft.)	OVERALL DIMENSIONS (inches)	WEIGHT PACKED (lbs.)
1	Frequency Meter TS-33/AP w/accessories	3.4	11 x 15 x 37	67

EQUIPMENT SUPPLIED DATA

QUANTITY PER EQUIPT	NAME AND NOMENCLATURE	OVERALL DIMENSIONS (inches)	WEIGHT (lbs.)
1	Frequency Meter TS-33/AP including:	6 x 9 x 10	7.5
1	Technical Manual		
1	Adapter UG-112/AP	13/16 x 15/16 x 1-3/8	
1	Adapter UG-113/AP	1 dia x 2-1/4	
1	Cable Assy		
1	Wrench hex	5/64 x 39/64 x 1-7/8	

Test-Frequency Measuring

ECHO BOX TS-349/UP



Echo Box TS-349/UP

FUNCTIONAL DESCRIPTION

The TS-349/UP is a portable, hand tuned ringing cavity designed to make a quick routine analysis of the overall performance of radar systems operating at frequencies between 910 and 980 megacycles.

The most frequently made tests are:

Relative indication (from day-to-day) of transmitter power output.

Measurement of transmitter and local oscillator frequencies.

Analysis of transmitter frequency spectrum.

Checking on erratic operation, double moding and frequency pulling.

Measurement of pulse duration.

Checking of receiver AFC action, measurement of TR box and receiver recovery time.

Measurement of standing wave ratio, of transmission line losses, and other factors.

A visual indication of system performance appears on the radar screen. Resonance and relative power are indicated by the deflections of the internal microammeter. Frequency is indicated by referring the dial settings to a calibration chart.

No field changes in effect at time of preparation (30 April 1958).

RELATION TO OTHER EQUIPMENT

This equipment was designed primarily for testing Navy radar set Mark 12.

ELECTRICAL AND MECHANICAL CHARACTERISTICS

FREQUENCY RANGE: 910 to 980 mc.

SENSITIVITY: 65 yd change in ring time per db change in power.

PRESENTATION AND CONTROLS: The tuning knob actuates the plunger inside the resonant cavity and the calibrated frequency dial at the same time. An individual calibration chart indicates frequencies in relation to dial settings.

Test-Frequency Measuring

TS-349/UP ECHO BOX

A meter indicator with a 0 to 100 microamperes scale indicates the relative amount of power absorbed by the cavity at the tuned frequency and thereby the resonance. Three spare crystal rectifiers are located in a special compartment within the meter cover.

FITTINGS AND ACCESSORIES: The input terminal on the side of the echo box is an N type jack, -49795 to which is connected one end of the RF cable, terminated by an N plug, UG-18/U. The RF cable is made of RG-21/U coaxial, having a minimum length of four feet, and the other end is a similar plug, UG-18/U, for connection to either a pick-up antenna or a directional coupler. Neither of these accessories is supplied with the equipment.

An "N" to "Holmdel" adapter, UG-8/AP is supplied to match the equipment to radar systems having this latter type of coupling connector.

CONSTRUCTION: The echo box is provided with a shock mount assembly. The cavity is made of silver plated cast bronze. A carrying handle is permenantly attached to the echo box. A carrying strap is used when climbing the radar tower. No carrying case is supplied.

MANUFACTURER'S OR CONTRACTOR'S DATA

Johnson Service Co., Milwaukee, Wis.
Contract N5sr-13590, dated 17 Sep 1945.
Contract NObsr-39148, dated 21 March 1947.
Contract NObsr-39352, dated 24 June 1947.

TUBE AND/OR CRYSTAL COMPLEMENT

No Electron Tubes Used.
(1) 1N21B
Total Crystals: (1)

REFERENCE DATA AND LITERATURE

NAVSHIPS 900884: Technical Manual for Echo Box Model TS-349/UP.

TYPE CLASSIFICATION STANDARD
DESIGN COGNIZANCE BUSHIPS
PROCUREMENT COGNIZANCE SPEC RE-16B10(NAVY)
STOCK NO.
R.D.B. IDENT. NO. 2.2.2.2

SHIPPING DATA

NUMBER OF BOXES	CONTENTS AND IDENTIFICATION	VOLUME (Cu.Ft.)	OVERALL DIMENSIONS (inches)	WEIGHT PACKED (lbs.)
1	Echo Box TS-349/UP w/Accessories and Equipment Spares	3.9	16 X 18-1/4 X 24-3/4	80.0

EQUIPMENT SUPPLIED DATA

QUANTITY PER EQUIPT	NAME AND NOMENCLATURE	OVERALL DIMENSIONS (inches)	WEIGHT (lbs.)
1	Echo Box w/Shock Mount	8 X 10-1/2 X 12-7/8	24.25
1	Accessory Box	3 X 7-1/2 X 8-1/2	7 (full)
1	RF Cable Assembly	48 lg	
1	Adapter (N to Holmdel) UG-8/AP		
1	Wrench, 5/8 Hex		
1	Wrench, Spanner, 1 in.		
1	Carrying Strap		
1	Plunger Positioning Gage		
1	Case, Equipment Maintenance Repair Parts	3 X 7-1/2 X 8-1/2	7.5 (full)

April 1958

Test-Frequency Measuring

TEST SET TS-385/U

FUNCTIONAL DESCRIPTION

The TS-385/U is a portable heterodyne-type frequency meter used in preflight checking and adjusting or radio sets. It is also employed as a source at 19 mc for IF alignment.

No field changes in effect at time of preparation (1 May 1958).

RELATION TO OTHER EQUIPMENT

This equipment is part of Radio Set SCR-658. It is also similar to Fred M. Link Model No. 230-B and Frequency Meter BC-438.

ELECTRICAL AND MECHANICAL CHARACTERISTICS

FREQUENCY RANGE: 376 to 418 mc; 19 mc (IF output).
ACCURACY: ±3%.
POWER REQUIREMENTS: 45 W, 115 v, 50 to 60 cps.

MANUFACTURER'S OR CONTRACTOR'S DATA

Fred M. Link, New York, N.Y.

TUBE AND/OR CRYSTAL COMPLEMENT

(1) 6A8GT (1) 6J5GT (1) 6K7GT
(3) 6V6GT (1) 6X5GT
Total Tubes: (7)

No Crystals used.

REFERENCE DATA AND LITERATURE

NAVSHIPS 93003, VOL I: Electronic Test Equipment.

TYPE CLASSIFICATION
DESIGN COGNIZANCE TASSA
PROCUREMENT COGNIZANCE Farnsworth Dwg 97-5504
STOCK NO.
R.D.B. IDENT. NO.

EQUIPMENT SUPPLIED DATA

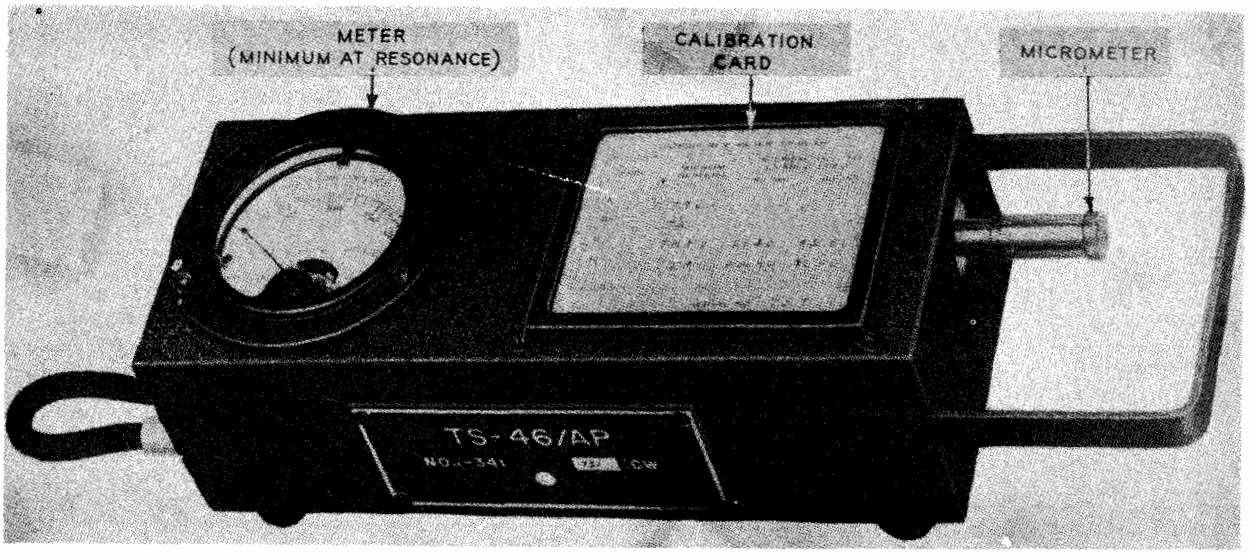
QUANTITY PER EQUIPT	NAME AND NOMENCLATURE	OVERALL DIMENSIONS (inches)	WEIGHT (lbs.)
1	Test Set TS-385/U	8 X 8-3/4 X 16	

September 1956

Test-Frequency Measuring

FREQUENCY METER

TS-46/AP



Frequency Meter TS-46/AP

FUNCTIONAL DESCRIPTION

The TS-46/AP is designed to measure frequencies, Al or pulsed, in the 3267 to 3333 mc range. It consists essentially of a tunable coaxial line coupled by an inductive loop across a crystal detector circuit. The crystal detector and DC micrommeter measure Al radio frequency waves; when determining the frequency of a pulsed signal an external CR oscillograph should be used in place of the DC meter.

No field changes in effect at time of preparation (20 June 1956).

ELECTRICAL AND MECHANICAL CHARACTERISTICS

TYPE SIGNAL MEASURED: Al or pulsed.
FREQUENCY RANGE: 3267 to 3333 mc.
MINIMUM MEASURABLE POWER: 0.1 mw.
ACCURACY: ±1 mc.
DC METER RANGE: 0 to 20 ua.
IMPEDANCE: 72 ohms.
POWER LIMITATION
MAX. Al POWER: 2 mw.
MAX. PEAK POWER: 2 W.
MIN. Al POWER: 0.1 mw
MIN. PULSE POWER: 6 mw.

MANUFACTURER'S OR CONTRACTOR'S DATA

Western Electric Co., New York, N.Y.
Contract NOas-341.

TUBE AND/OR CRYSTAL COMPLEMENT

No Electron Tubes.

REFERENCE DATA AND LITERATURE

AN-08-35TS46-2: Technical Manual Frequency Meter TS-46/AP.
NAVSHIPS 900,155-Vol II: Electronic Test Equipment Handbook.

TYPE CLASSIFICATION	
DESIGN COGNIZANCE	BUAER
PROCUREMENT COGNIZANCE	
STOCK NO.	
R.D.B. IDENT. NO.	

EQUIPMENT SUPPLIED DATA

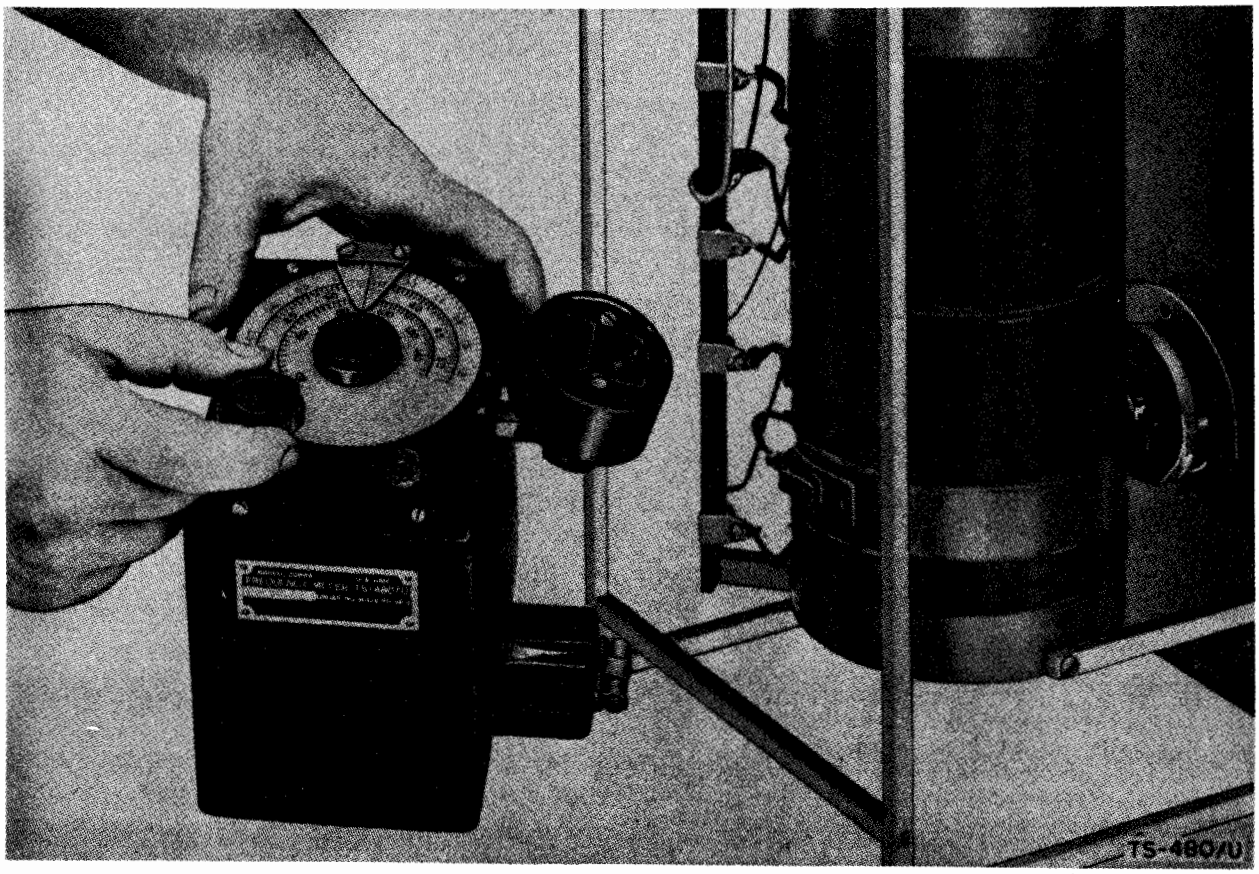
QUANTITY PER EQUIPT	NAME AND NOMENCLATURE	OVERALL DIMENSIONS (inches)	WEIGHT (lbs.)
1	Frequency Meter TS-46/AP	3-1/4 x 3-3/4 x 12	4.5
3	Cable		

August 1957

Test-Frequency Measuring

FREQUENCY METER

TS-480/U



Frequency Meter TS-480/U

FUNCTIONAL DESCRIPTION

The TS-480/U is a wide-range, general purpose absorption type frequency meter. Five plug-in inductors are utilized to cover a wide frequency range. It is used for rapid frequency checks of radio equipment in the laboratory or in the field.

No field changes in effect at time of preparation (4 February 1957).

RELATION TO OTHER EQUIPMENT

Same as General Radio Model 566A

ELECTRICAL AND MECHANICAL CHARACTERISTICS

RANGE: 0.5 to 150 mc.
ACCURACY

9.5 to 16 MC: ± 2%.
16 to 150 MC: ± 3%.

RESONANCE INDICATOR: Incandescent lamp.

TUBE AND/OR CRYSTAL COMPLEMENT

No Electron Tubes.

REFERENCE DATA AND LITERATURE

TM11-487H: Technical Manual for Test Equipment.

TYPE CLASSIFICATION
DESIGN COGNIZANCE TASSA
PROCUREMENT COGNIZANCE
STOCK NO.
R.D.B. IDENT. NO.

Test-Frequency Measuring

August 1957

TS-480/U FREQUENCY METER

SHIPPING DATA

NUMBER OF BOXES	CONTENTS AND IDENTIFICATION	VOLUME (Cu.Ft.)	OVERALL DIMENSIONS (inches)	WEIGHT PACKED (lbs.)
1	Frequency Meter TS-480/U	0.23	7 X 7 X 9	7.5

EQUIPMENT SUPPLIED DATA

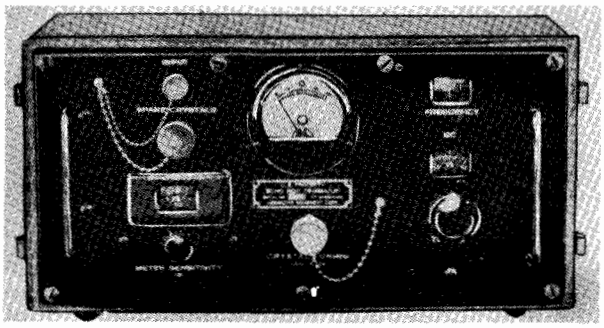
QUANTITY PER EQUIPT	NAME AND NOMENCLATURE	OVERALL DIMENSIONS (inches)	WEIGHT (lbs.)
1	Frequency Meter TS-480/U	4-3/4 X 5-3/4 X 5-7/8	3

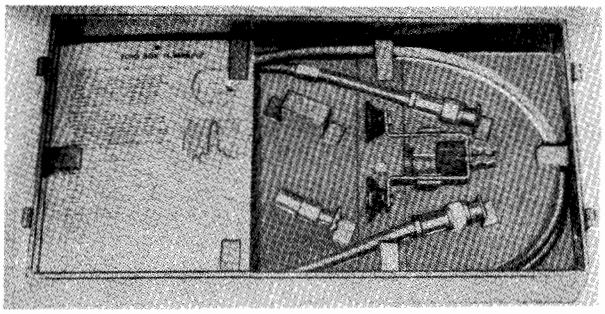
April 1959

Test-Frequency Measuring

ECHO BOX

TS-488A/UP





Echo Box TS-488A/UP

FUNCTIONAL DESCRIPTION

Echo Box TS-488A/UP is a portable unit used in determining the over-all performance of X-band radar sets. The unit also may be used in comparative measuring of the average power output of radar transmitters, detecting faults in radar systems, and determining the frequency spectrum of radar transmitters. The unit consists of a pick-up antenna dipole, a tunable resonant cavity, a coupling loop, a crystal rectifier, and a dc microammeter.

Data on this sheet reflects the following field change: FC 1.

ELECTRICAL AND MECHANICAL CHARACTERISTICS

FREQUENCY RANGE: 8,990 to 9,610 mc ±8 mc.
DECAY RATE: 3.5 db/mc.
RINGTIME: 25.4 usec.

MANUFACTURER'S OR CONTRACTOR'S DATA

Aeromotive Equipment Corp., Kansas City, Missouri.
Contract AF33(600)-21642, dated 15 October 1954.

TUBE AND/OR CRYSTAL COMPLEMENT

No Tubes used.
(1) 1N23B
Total Crystals: (1)

REFERENCE DATA AND LITERATURE

TM11-6625-220-10: Technical Manual for Echo Box TS-488A/UP.

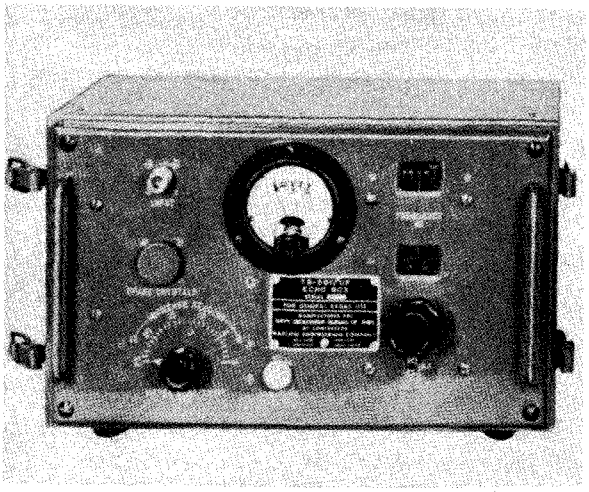
TYPE CLASSIFICATION
DESIGN COGNIZANCE USAF
PROCUREMENT COGNIZANCE USAF SPEC R-7476A
STOCK NO.
R.D.B. IDENT. NO. 2.2.2.1

EQUIPMENT SUPPLIED DATA

QUANTITY PER EQUIPT	NAME AND NOMENCLATURE	OVERALL DIMENSIONS (inches)	WEIGHT (lbs.)
1	Echo Box TS-488A/UP Including:		
1	Pick-up Antenna AT-68/U		
1	Cord CG-92A/U		
1	Antenna Bracket		
1	Trouble Shooting Chart		
2	Allen Wrench		

Test-Frequency Measuring

ECHO BOX TS-501/UP



Echo Box TS-501/UP

FUNCTIONAL DESCRIPTION

The TS-501/UP is a portable, high-Q, tunable cavity used in making quick, rough analyses of the over-all performance or radar systems. It checks the frequency of radar transmitters and receiver local oscillators, performs spectrum analyses, makes rough relative power measurements, and serves in adjusting various RF controls of radar equipments.

No field changes in effect at time of preparation (1 May 1958).

ELECTRICAL AND MECHANICAL CHARACTERISTICS

FREQUENCY RANGE: 6,250 to 6,900 mc ±5 mc.
INPUT IMPEDANCE: 51 ohms.
RING TIME: 5,000 yd ±4%.
ATTENUATION RANGE: 0 to 25 db.
SENSITIVITY: 50 yd of ring time/db change in pwr.
TEMPERATURE RANGE: −40° deg F to +150° deg F.

MANUFACTURER'S OR CONTRACTOR'S DATA

Barlow Engineering Co, New York, N.Y.
Contract NObsr-42428, 30 June 1948.
Contract NObsr-39218, 18 June 1947.
Approximate Cost: $375.00 with equipment spares.

TUBE AND/OR CRYSTAL COMPLEMENT

No Electron Tubes used.

(1) 1N23B
Total Crystals: (1)

REFERENCE DATA AND LITERATURE

NAVSHIPS 91191: Technical Manual for Echo Box TS-501/UP.

TYPE CLASSIFICATION	
DESIGN COGNIZANCE	BUSHIPS
PROCUREMENT COGNIZANCE	Navy Spec CS-675;
STOCK NO.	Spec MIL-E-15369
R.D.B. IDENT. NO.	

SHIPPING DATA

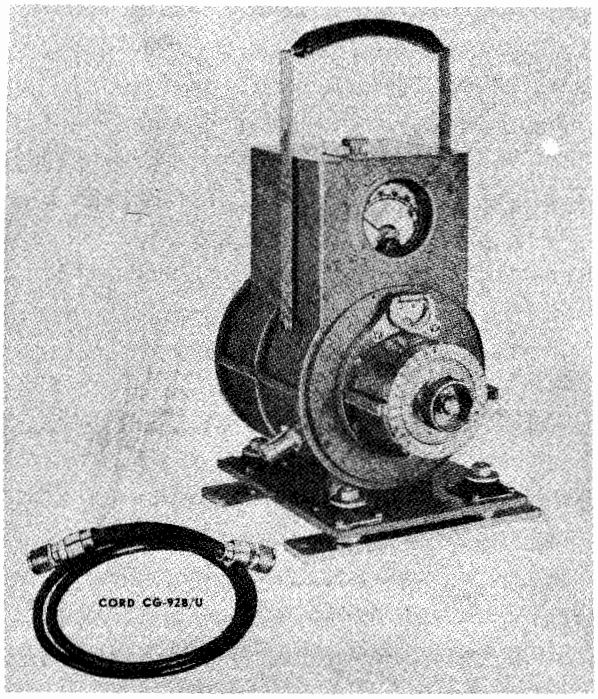
NUMBER OF BOXES	CONTENTS AND IDENTIFICATION	VOLUME (Cu.Ft.)	OVERALL DIMENSIONS (inches)	WEIGHT PACKED (lbs.)
1	Echo Box TS-501/UP	1.8	14 X 15-1/4 X 16-1/4	36

EQUIPMENT SUPPLIED DATA

QUANTITY PER EQUIPT	NAME AND NOMENCLATURE	OVERALL DIMENSIONS (inches)	WEIGHT (lbs.)
1	Echo Box TS-501/UP	8-7/8 X 10-1/4 X 15-1/16	16.75
1	RF Cable Assy CG-92A/U	120 lg	1.5
1	Equipment Spare Parts Case	3-1/8 X 12-1/2 X 12-1/2	11

Test-Frequency Measuring

ECHO BOX TS-545/UP



Echo Box TS-545/UP

FUNCTIONAL DESCRIPTION

The TS-545/UP is a portable, hand-tuned microwave coaxial-type echo box or resonant cavity used in checking the overall performance of radar systems.

Data on this sheet reflects the following field changes: FC 2, 3.

ELECTRICAL AND MECHANICAL CHARACTERISTICS

FREQUENCY RANGE: 1,150 to 1,350 mc ±5 mc.

TYPE OF RECEPTION: Pulse.
TYPE OF EMISSION: Pulse.
SENSITIVITY: 1 db power loss for 50 yd ring time.
TEMPERATURE COEFFICIENT: −0.105% ring time/deg F at 68 deg F.
INPUT IMPEDANCE: 50 ohms.

MANUFACTURER'S OR CONTRACTOR'S DATA

Johnson Service Co, Milwaukee, Wis,
Contract NObsr-39392, 30 June 1947.
Contract NObsr-42382, 24 June 1948.
Contract NObsr-43457, 28 June 1949.
Contract NObsr-49089, 6 April 1950.
Contract NObsr-49254, 30 Jan 1950.
Contract NObsr-52092, 20 Nov 1950.
Contract NObsr-52404, 4 June 1951.

TUBE AND/OR CRYSTAL COMPLEMENT

No Electron Tubes used.
*(3) 1N21B
Total Crystals: (3)
NOTE: *Not supplied on Contract NObsr-49089

REFERENCE DATA AND LITERATURE

NAVSHIPS 91213: Technical Manual for Echo Box TS-545/UP.

TYPE CLASSIFICATION
DESIGN COGNIZANCE BUSHIPS
PROCUREMENT COGNIZANCE Navy Spec CS-746 and CS-914
STOCK NO.
R.D.B. IDENT. NO.

SHIPPING DATA

NUMBER OF BOXES	CONTENTS AND IDENTIFICATION	VOLUME (Cu.Ft.)	OVERALL DIMENSIONS (inches)	WEIGHT PACKED (lbs.)
1	Echo Box TS-545/UP	4.7	17-1/2 X 18-1/2 X 25	80

Test-Frequency Measuring

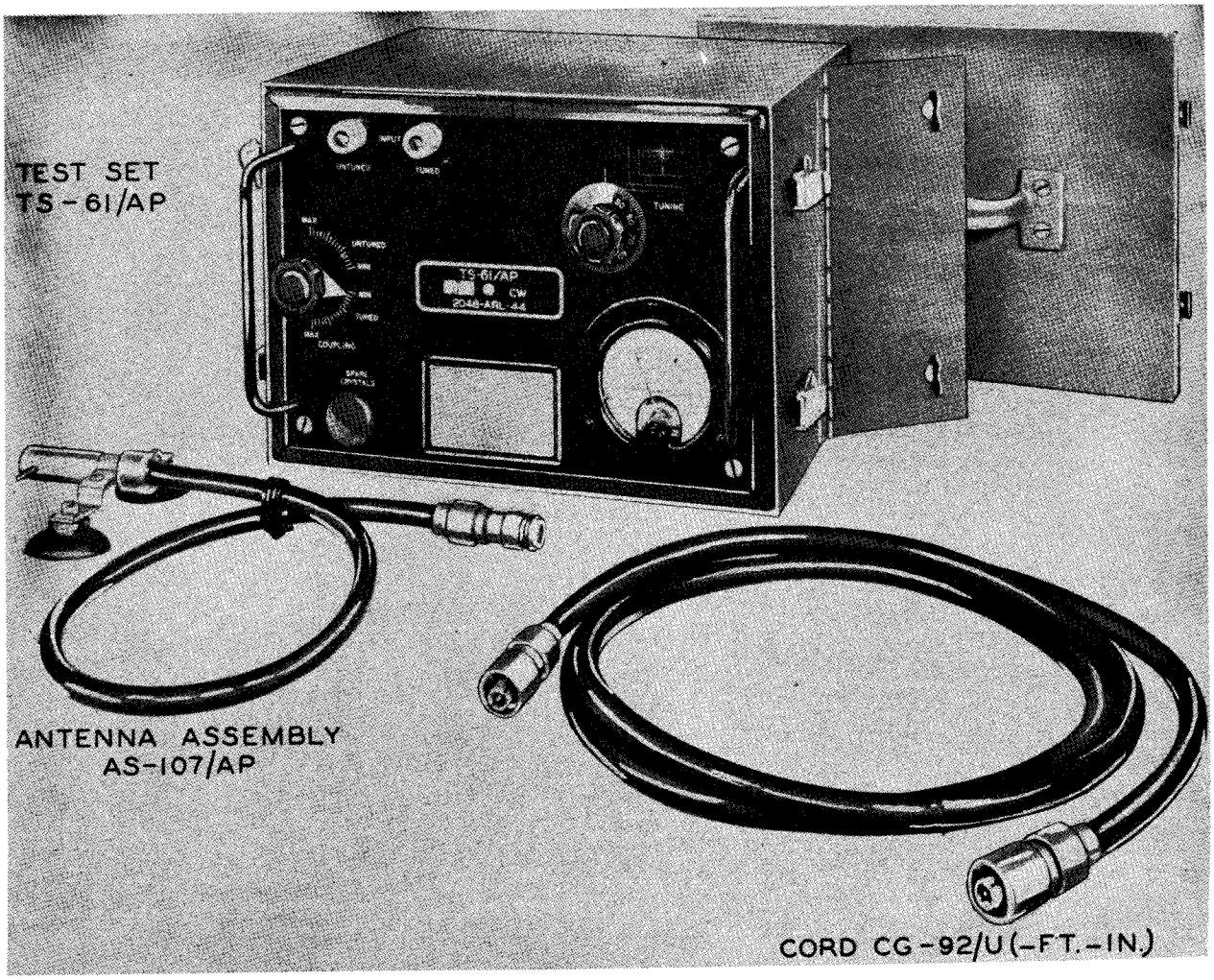
TS-545/UP ECHO BOX

EQUIPMENT SUPPLIED DATA

QUANTITY PER EQUIPT	NAME AND NOMENCLATURE	OVERALL DIMENSIONS (inches)	WEIGHT (lbs.)
1	Echo Box TS-545/UP	8-1/16 X 9-5/8 X 11-9/16	25.25
1	Separable Shock-mounted Base	2-1/4 X 8-1/4 X 8-3/4	4
2	Technical Manual NAVSHIPS 91213		
1	Cord CG-92B/U or	120 lg	
*1	Cord CG-92B/U	144 lg	
1	Wrench, dial socket		
1	Wrench, Spanner (1 in.)		
1	Strap, Carrying		

*Furnished on Contracts NObsr-43457, NObsr-49254, and NObsr-52404.

TEST SET TS-61/AP



Test Set TS-61/AP

FUNCTIONAL DESCRIPTION

The TS-61/AP is a portable, manually tuned echo box used in making rapid, rough analysis of overall performance of various radar equipment operating in the "Sa" band. It can also be employed in determining the frequency of CW, MCW, or pulsed rf transmitters, in indicating relative transmitter power output, spectrum and pulse length, in detecting double moding of magnetrons, and in checking indirectly the signal-to-noise ratio of receivers.

No field changes in effect at time of preparation (15 April 1958).

RELATION TO OTHER EQUIPMENT

This equipment is similar to Test Set TS-110/AP except for frequency range.

ELECTRICAL AND MECHANICAL CHARACTERISTICS

FREQUENCY RANGE: 3, 140 to 3,360 mc ±10 mc.
TYPE OF RECEPTION: CW, MCW, pulse.
INPUT IMPEDANCE: 50 ohms.
DECAY: 2.3 db/usec.
OPERATING "Q": 35,000.
SYSTEM PERFORMANCE: ±2 db.
TEMPERATURE RANGE: -40 deg C to +48 deg C.
ACCURACY: ±3 db (relative pwr).

Test-Frequency Measuring

April 1958

TS-61/AP TEST SET

MANUFACTURER'S OR CONTRACTOR'S DATA

Western Electric Co, NY, NY
Order No. 797-DAY-54A
Order No. 2218-DAY-45AR
Order No. 959-DAY
Order No. 1105-DAY-44
Order No. 2048-ARL-44
Order No. 797-DAY-45RA

TUBE AND/OR CRYSTAL COMPLEMENT

No Electron Tubes Used.
(1) 1N21B
Total Crystals: (1)

REFERENCE DATA AND LITERATURE

AN16-35T61-2: Handbook of Maintenance Instructions for Test Sets TS-61/AP and TS-110/AP.

TYPE CLASSIFICATION
DESIGN COGNIZANCE USAF
PROCUREMENT COGNIZANCE USAE SPEC 71-5071
STOCK NO.
R.D.B. IDENT. NO.

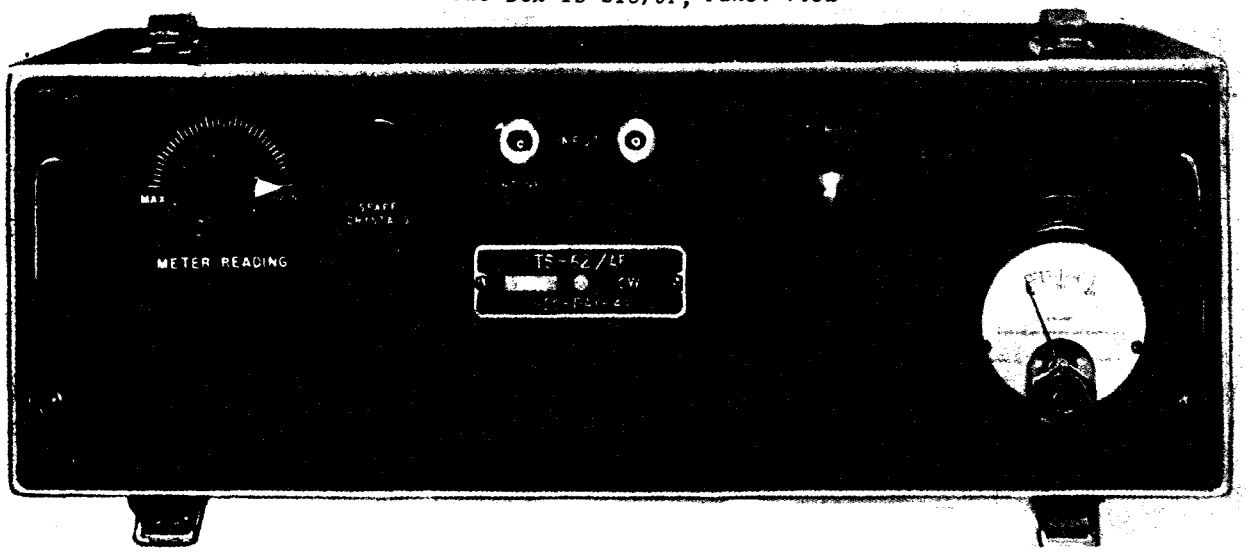
SHIPPING DATA

NUMBER OF BOXES	CONTENTS AND IDENTIFICATION	VOLUME (Cu.Ft.)	OVERALL DIMENSIONS (inches)	WEIGHT PACKED (lbs.)
1	Test Set TS-61/AP (Complete w/accessories)	4.25	15 x 18-1/2 x 26-1/2	74

EQUIPMENT SUPPLIED DATA

QUANTITY PER EQUIPT	NAME AND NOMENCLATURE	OVERALL DIMENSIONS (inches)	WEIGHT (lbs.)
1	Test Set TS-61/AP	7-1/2 x 12 x 10	9.7
1	Antenna Assembly AS-107/AP	1 x 4-1/2 x 28	0.6
1	Connecting Cord CG-92/U	96 lg	
1	Hex Wrench TL-1567/U		
1	Hex Wrench		
1	Impedance Matching Adapter UG-8/U		
1	Carrying Case		
2	Technical Manual		

Echo Box TS-218/UP, Panel View



Echo Box TS-62/AP, Panel View

FUNCTIONAL DESCRIPTION

The TS-62/AP, 218/UP are sharp tuning high Q resonant cavities designed to make a quick routine analysis of the overall performance of radar systems. They may be used to make the following tests on radar sets operating within the frequency range covered by the echo boxes: over-all performance check of a radar set; compartive measurement of the power output of a radar transmitter; spectrum analysis of a radar transmitter; check for multiple moding of a radar transmitter; check for transmitter frequency pulling; check of the speed of recovery of a radar T-R box and receiver. The principal functional difference between the TS-62/AP and 218/UP is in frequency.

No field changes in effect at time of preparation (2 July 1956).

ELECTRICAL AND MECHANICAL CHARACTERISTICS

FREQUENCY RANGE
TS-62/AP: 9320 to 9430 mc.
TS-218/UP: 8920 to 9250 mc.
INDICATOR SECTOR SCALE
TS-62/AP: Upper 7 to 12; lower 11 to 23.
TS-218/UP: Upper 0 to 18; lower 0 to 33.
"Q" OF CAVITY: 50000 to 80000.
RINGTIME: 15 to 25 usec.
SENSITIVITY: 40 yds change in ringtime per db down in power.

MANUFACTURER'S OR CONTRACTOR'S DATA

Western Electric Co. Inc., New York, N.Y.

TS-62/AP,218/UP TEST SET

September 1956

Contract NXsr 83432, dated 21 April 1945.
Approximate Cost: $336.00 with equipment spares.

REFERENCE DATA AND LITERATURE

SHIPS 366: Technical Manual for Echo Boxes TS-62/AP and TS-218/UP.

TYPE CLASSIFICATION	
DESIGN COGNIZANCE	USAF
PROCUREMENT COGNIZANCE	
STOCK NO.	
R.D.B. IDENT. NO.	

TUBE AND/OR CRYSTAL COMPLEMENT

(1) 1N23
Total Crystals: (1)

SHIPPING DATA

NUMBER OF BOXES	CONTENTS AND IDENTIFICATION	VOLUME (Cu.Ft.)	OVERALL DIMENSIONS (Inches)	WEIGHT PACKED (lbs.)
1	Test Set TS-62/AP or TS-218/UP	2.3	11-5/8 X 16-1/8 X 24-7/8	45.0

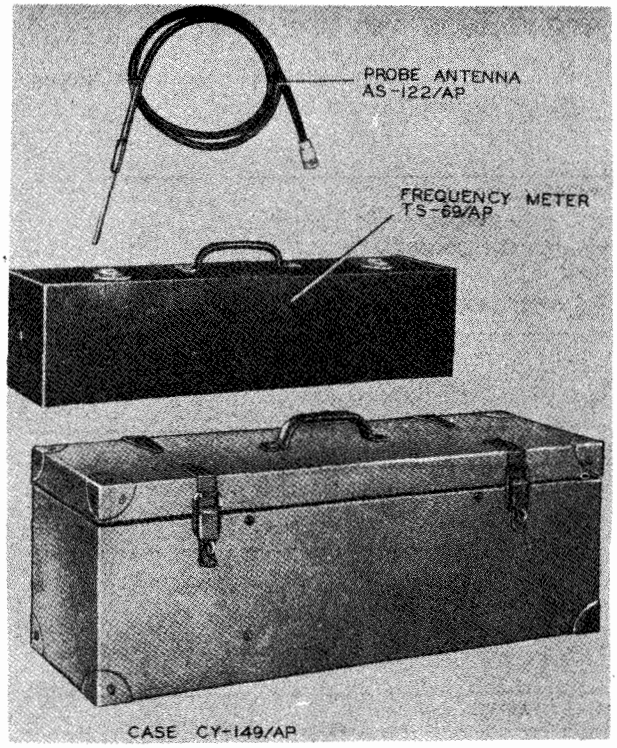
EQUIPMENT SUPPLIED DATA

QUANTITY PER EQUIPT	NAME AND NOMENCLATURE	OVERALL DIMENSIONS (inches)	WEIGHT (lbs.)
1	Test Set TS-62/AP or TS-218/UP	6-1/32 X 11-3/8 X 18-1/4	10
1	Pick-up Antenna AS-106/AP	4-1/2 dia X 27-7/8 lg	1.0
1	Cord CG-92/U	76-1/4 lg	0.9

August 1957

Test-Frequency Measuring

FREQUENCY METER TS-69/AP



Frequency Meter TS-69/AP

No field changes in effect at time of preparation (29 November 1956).

RELATION TO OTHER EQUIPMENT

Similar to TS-69A/AP
Equipment Required but not Supplied: (1) Interphone System on Audio Amplifying Equipment, (1) Headset.

ELECTRICAL AND MECHANICAL CHARACTERISTICS

FREQUENCY RANGE: 350 to 3000 mc
ACCURACY
350 MC: 0.10%
1000 MC 0.25%
BANDWIDTH
350 MC: 0.25%
1000 MC: 0.70%
OPERATING TEMPERATURE: -40 to +55 deg C.
OPERATING POWER: No battery or external power supply required.

TUBE AND/OR CRYSTAL COMPLEMENT

(4) 1N21 or 1N21A,B
Total Crystals: (4)

FUNCTIONAL DESCRIPTION

The TS-69/AP is an absorption type meter. It is designed for portable ground use in setting transmitters accurately to a given frequency and for measuring the frequency at which a transmitter is operating. It can also be used for checking by ear the type and extent of modulation at any signal within its frequency range.

REFERENCE DATA AND LITERATURE

AN 08-35TS69-2: Technical Manual for Frequency Meters TS-69/AP and TS-69A/AP.

TYPE CLASSIFICATION	
DESIGN COGNIZANCE	USAF
PROCUREMENT COGNIZANCE	
STOCK NO.	
R.D.B. IDENT. NO.	

EQUIPMENT SUPPLIED DATA

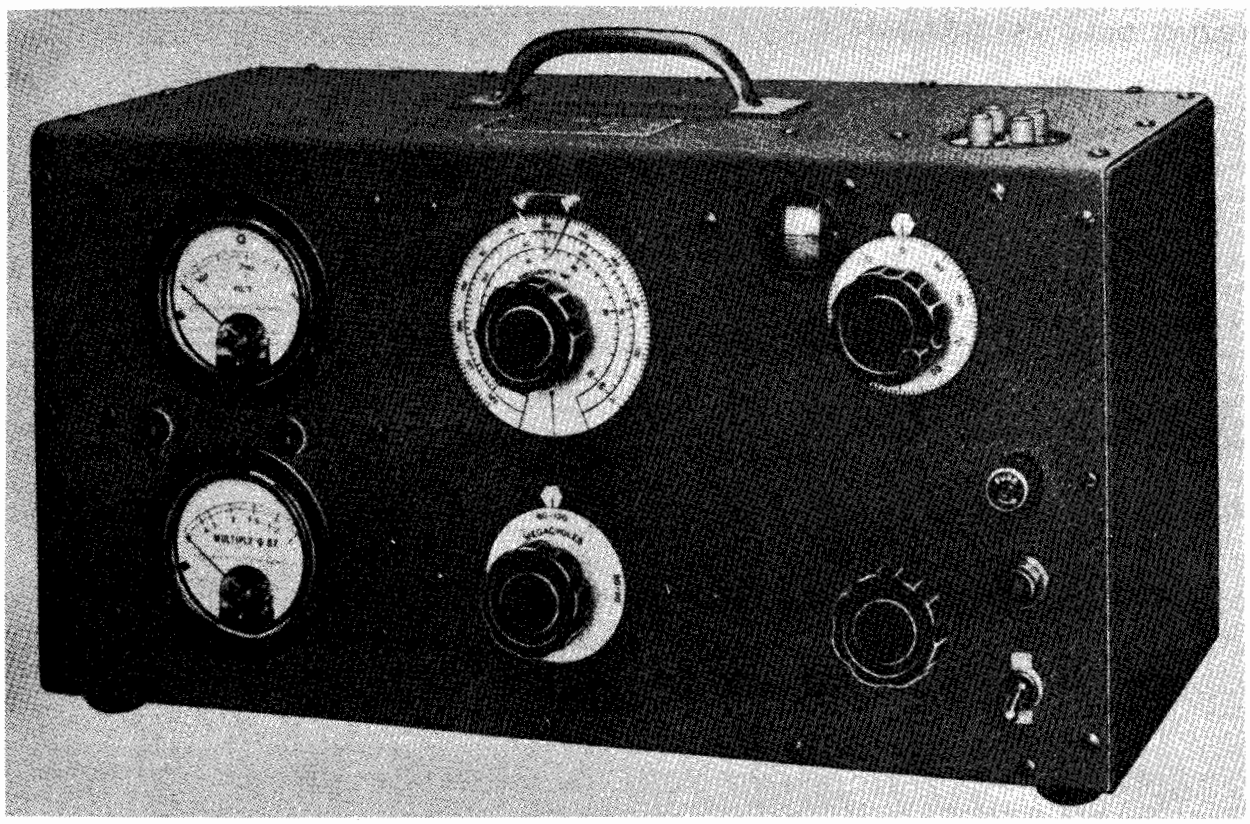
QUANTITY PER EQUIPT	NAME AND NOMENCLATURE	OVERALL DIMENSIONS (inches)	WEIGHT (lbs.)
1	Frequency Meter TS-69/AP	6 x 7 x 22	14.68
1	Case CY-149/AP	9-1/2 x 11 x 24-3/4	15
1	Probe Antenna AS-122/AP	72 lg	0.75
4	Crystal 1N21B, 1N21A or 1N21		

April 1959

Test-Frequency Measuring

Q-METER

TYPE NO. 170A



Q Meter Type 170-A

FUNCTIONAL DESCRIPTION

The Q-Meter Type No. 170-A is designed to supplement the lower-frequency Q-Meter by extending the range of the measurement up to 200 megacycles (MC).

No field changes in effect at time of preparation (26 September 1958).

RELATION TO OTHER EQUIPMENT

The Type 170-A Q-Meter retains the same general principles and characteristics as the Types 100-A and 160-A Q-Meters, but with structural modifications and design refinements as are required for accurate performance at higher frequencies.

ELECTRICAL AND MECHANICAL CHARACTERISTICS

VOLTMETER RANGE: 80 to 300 v range.

CAPACITANCE RANGE: 11 to 60 UUFD.

OSCILLATOR FREQUENCY RANGE: 30 to 200 mc.

OPERATING POWER REQUIREMENTS: 110-120 v, 50 to 60 cycles single ph; 220-240 v, 50 to 60 cycles, single ph, 50 W.

MANUFACTURER'S OR CONTRACTOR'S DATA

Boonton Radio Corp., Boonton, N.J.

TUBE AND/OR CRYSTAL COMPLEMENT

(1) 9002	(2) 955
(2) VR-150/30	(1) 5W4
(1) Mazda 47	

Total Tubes: (7)

No Crystals Used.

Test-Frequency Measuring

April 1959

TYPE NO. 170A Q-METER

REFERENCE DATA AND LITERATURE

Boonton Radio Corporation Catalog No. 00816 for the T-170-A Q-Meter.

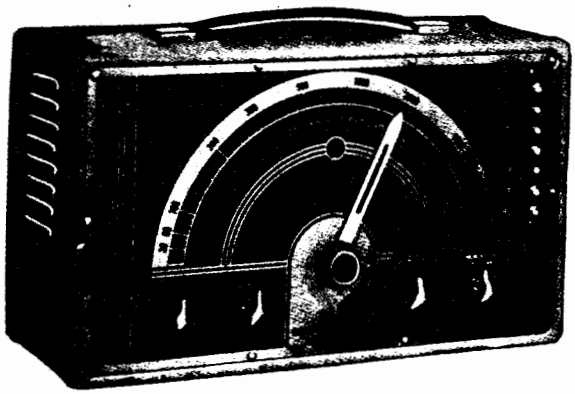
TYPE CLASSIFICATION
DESIGN COGNIZANCE
PROCUREMENT COGNIZANCE
STOCK NO.

EQUIPMENT SUPPLIED DATA

QUANTITY PER EQUIPT	NAME AND NOMENCLATURE	OVERALL DIMENSIONS (inches)	WEIGHT (lbs.)
1	Q-Meter Type No. 170-A Indcluding:	8-3/4 X 10-1/2 X 17	21
1	VT-Voltmeter		
1	Meter Multiply Q BY		

March 1957

BEAT-FREQUENCY OSCILLATOR



Beat-Frequency Oscillator 154

FUNCTIONAL DESCRIPTION

The Radio Corp of America Stock No. 154 Beat-Frequency Oscillator is a portable, self-contained instrument designed for generating voltages in the audio-frequency range of 30 to 15,000 cycles.

Provision is made for calibrating against a power-supply frequency, which method affords exceptional accuracy and utmost convenience. No calibration meter or dial is employed, a neon lamp indicator serving to register synchronization with the supply frequency.

It is especially useful in measuring the fidelity of radio receivers, the frequency response of audio amplifiers, the frequency characteristics of audio transformers and filters, and the modulation characteristics of audio transformers and filters, and the modulation characteristics of transmitters, and also may be used to advantage in determining frequencies and mechanical speeds.

No field changes in effect at time of preparation (5 September 1956).

ELECTRICAL AND MECHANICAL CHARACTERISTICS

FREQUENCY RANGE: 30 to 15000 cps.
POWER OUTPUT: 125 mw.
VOLTAGE OUTPUT

LOAD IMPEDANCE	OUTPUT VOLTAGE
Open Circuit	37.5 v
5000 ohms	25.0 v
500 ohms	7.5 v
250 ohms	5.2 v

RESPONSE (MAX VOLUME)

load impedance	30 to 10,000 cps	30 to 15,000 cps
5000 ohms	±1 db	+1 db, −2 db
500 or 250 ohms	±1 db	+1 db, −3 db

DISTORTION: 5% max rms over entire frequency range.
HUM: Approx 60 db below max output.
POWER REQUIREMENTS: 110 to 120 v, 50 to 60 cps. 35 W.

MANUFACTURER'S OR CONTRACTOR'S DATA

Radio Corp. of America, Camden, New Jersey.

TUBE AND/OR CRYSTAL COMPLEMENT

(2) 6J7	(1) 6J5
(1) 6C5	(1) 5Y3GT/G

Total Tubes: (5)

REFERENCE DATA AND LITERATURE

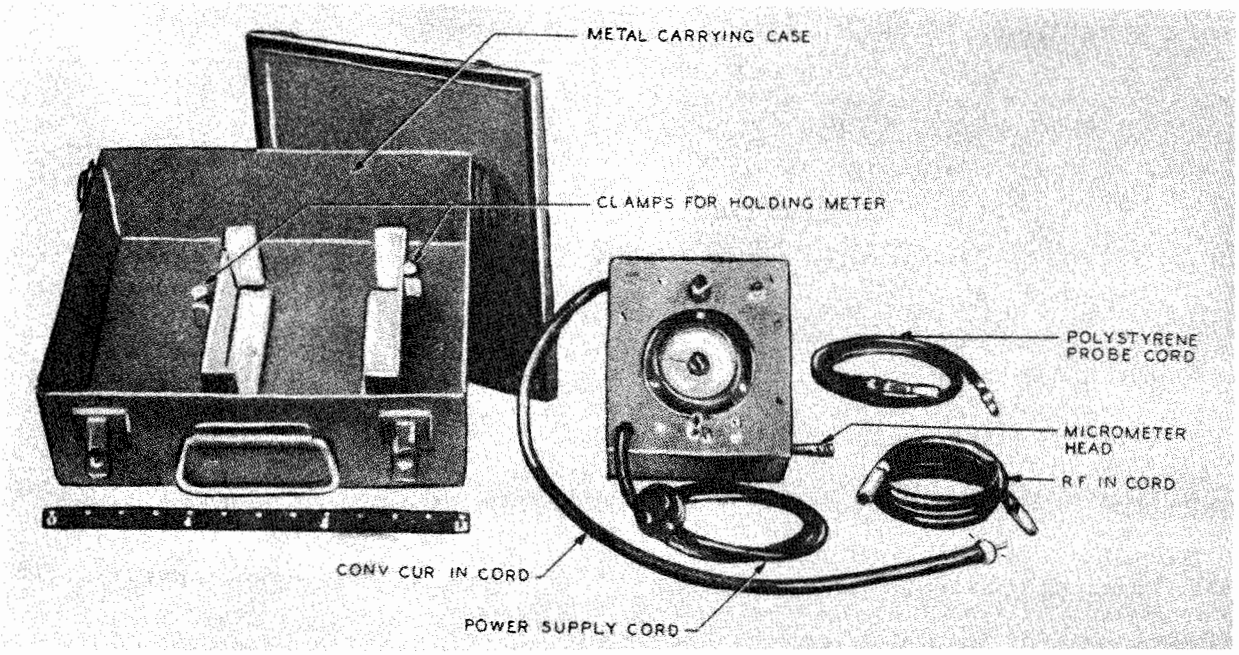
Radio Corp. of America Technical Manual for Beat-Frequency Oscillator Stock No. 154.

TYPE CLASSIFICATION
DESIGN COGNIZANCE
PROCUREMENT COGNIZANCE
STOCK NO.

Test-Frequency Measuring

April 1958

THERMISTOR FREQUENCY METER 60ABM



Thermister Frequency Meter 60ABM

FUNCTIONAL DESCRIPTION

The Navy Type 60ABM is a portable instrument designed to measure the frequency of pulsed or continuous RF voltages within the range of the S-band. It has a maximum power indication feature which can be used in tuning transmission lines for minimum standing waves and in determining the optimum tuning of S-band systems. It has a frequency measurement feature which can be used for measuring the frequency of magnetrons and beating oscillators in radar receivers.

It employs a thermal device which responds to average high-frequency power and is not subject to damage by the high peak energy of a pulsed RF supply.

No field changes in effect at time of preparation (20 November 1957).

ELECTRICAL AND MECHANICAL CHARACTERISTICS

FREQUENCY RANGE: 1650 to 5200 mc.
RF POWER INPUT: 5 to 100 mw.
ACCURACY: ±0.5 mc.
METER INDICATOR RANGE: 0 to 2.5 ma.
AMBIENT TEMPERATURE: -40 deg F min.
POWER REQUIREMENTS: 105 to 125 v, 50 to 800 cps, single ph, or 4.5 v "C" battery.

MANUFACTURER'S OR CONTRACTOR'S DATA

Western Electric Company, Inc, New York, N.Y.
Contract NXss-26585.

TUBE AND/OR CRYSTAL COMPLEMENT

No Electron Tubes or Crystals.

REFERENCE DATA AND LITERATURE

NAVSHIPS 95427: Technical Manual for 60ABM (D-150925) Thermistor Frequency Meter.

TYPE CLASSIFICATION
DESIGN COGNIZANCE BUSHIPS
PROCUREMENT COGNIZANCE
STOCK NO.
R.D.B. IDENT. NO.

Test-Frequency Measuring

60ABM THERMISTOR FREQUENCY METER

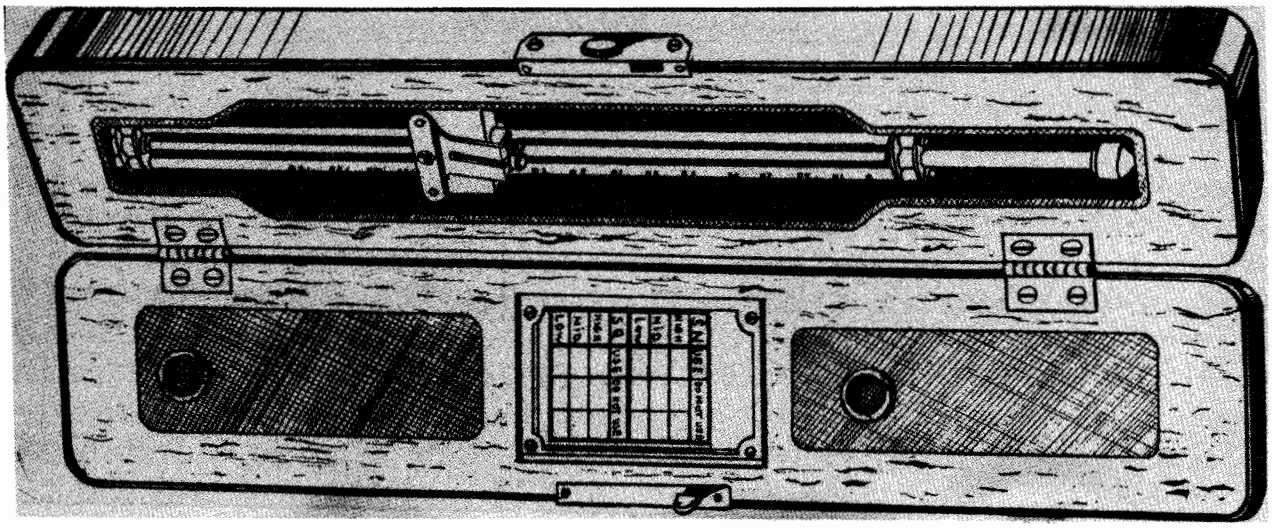
April 1958

EQUIPMENT SUPPLIED DATA

QUANTITY PER EQUIPT	NAME AND NOMENCLATURE	OVERALL DIMENSIONS (inches)	WEIGHT (lbs.)
1	Thermistor Frequency Meter Type 60ABM	4 x 6 x 6	5
1	Carrying Case	5 x 13 x 13	10
1	RF Input Cord	31 lg	
1	Polystyrene Probe Cord	34-1/4 lg	

Test-Frequency Measuring

WAVEMETER 60ABO



Wavemeter Model 60ABO

FUNCTIONAL DESCRIPTION

The Navy Type 60ABO is a portable Lecher Wire absorption wavemeter designed specifically for checking the tuning of microwave cavity oscillators similar to those in the Navy Model SN and SQ Radar Equipments.

No field changes in effect at time of preparation (6 May 1958).

ELECTRICAL AND MECHANICAL CHARACTERISTICS

FREQUENCY RANGE: 1550 to 11000 mc.
RESONANT FREQUENCY: Fixed by means of a slider varying the electrical length of the Lecher Wire.

MANUFACTURER'S OR CONTRACTOR'S DATA

General Electric Co, Bridgeport, Conn.
Contract NXss-23150, dated 5 February 1943.

Approximate Cost: $400.00 with equipment spares.

TUBE AND/OR CRYSTAL COMPLEMENT

No Electron Tubes or Crystal used.

REFERENCE DATA AND LITERATURE

NAVSHIPS 95428: Technical Manual for Navy Type CG-60ABO Wavemeter.

TYPE CLASSIFICATION
DESIGN COGNIZANCE BUSHIPS
PROCUREMENT COGNIZANCE
STOCK NO.
R.D.B. IDENT. NO. 2.2.3

EQUIPMENT SUPPLIED DATA

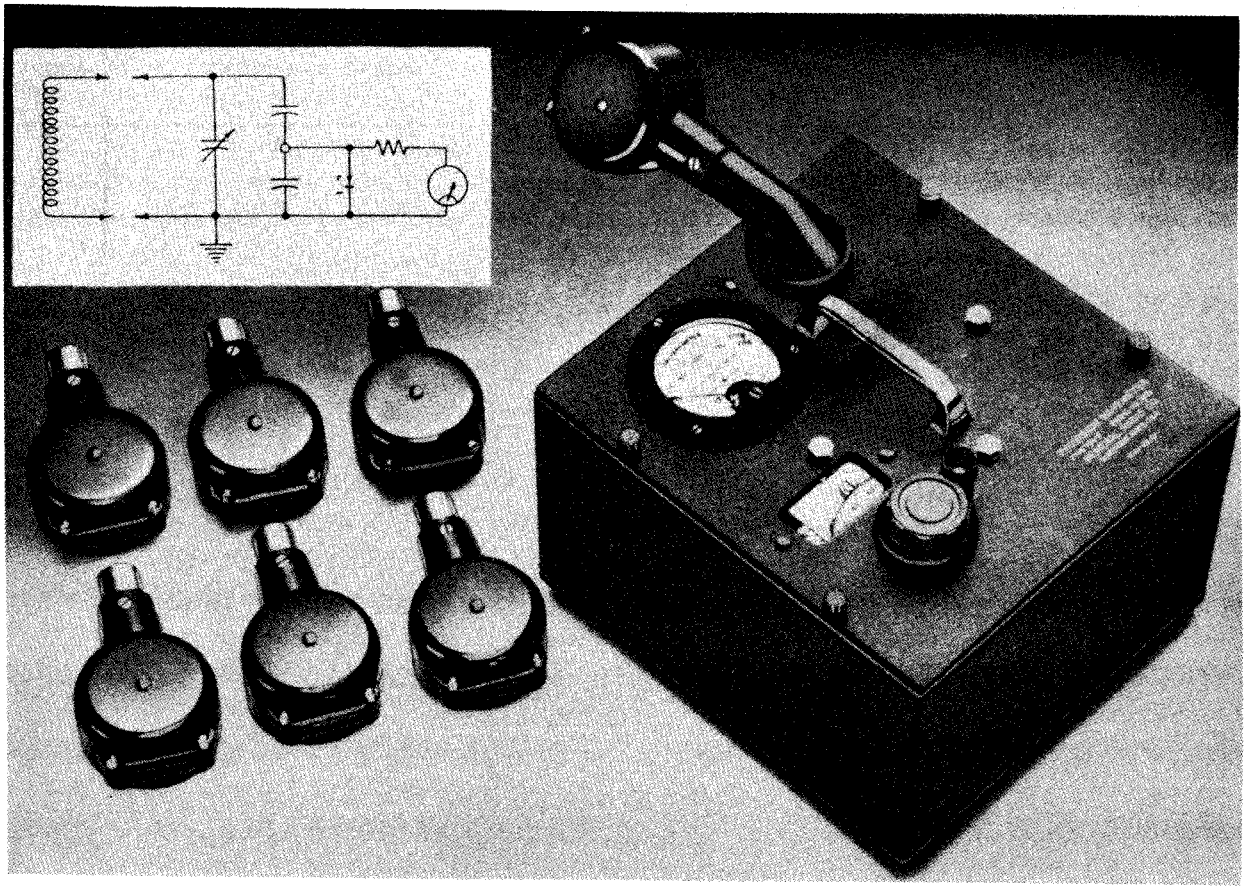
QUANTITY PER EQUIPT	NAME AND NOMENCLATURE	OVERALL DIMENSIONS (inches)	WEIGHT (lbs.)
1	Wavemeter NT-60ABO including: Carrying Case		

April 1958

Test-Frequency Measuring

WAVEMETER

60098-A



Wavemeter 60098-A

FUNCTIONAL DESCRIPTION

The 60098-A is a tuned-circuit instrument, consisting of a precision capacitor, a resonance indicator, and a set of inductors.

It is used primarily for lining up of radio transmitters and checking the freqency span of oscillators.

No field changes in effect at time of preparation (19 June 1958).

RELATION TO OTHER EQUIPMENT

This equipment is identical to General Radio Co type no. 724-B.

ELECTRICAL AND MECHANICAL CHARACTERISTICS

FREQUENCY RANGE: 16 kc to 50 mc.
ACCURACY: ±0.25%.

MANUFACTURER'S OR CONTRACTOR'S DATA

General Radio Co, Cambridge, Mass.

TUBE AND/OR CRYSTAL COMPLEMENT

No Electron Tubes used.
(1) 1N34
Total Crystal: (1)

REFERENCE DATA AND LITERATURE

Catalog N General Radio Co.

TYPE CLASSIFICATION	
DESIGN COGNIZANCE	BUSHIPS
PROCUREMENT COGNIZANCE	
STOCK NO.	
R.D.B. IDENT. NO.	

60098-A WAVEMETER

EQUIPMENT SUPPLIED DATA

QUANTITY PER EQUIPT	NAME AND NOMENCLATURE	OVERALL DIMENSIONS (inches)	WEIGHT (lbs.)
1	Wavemeter	12-1/2 X 13 X 16-7/8	34
7	Plug-in Coils		
1	Calibration Chart		

FREQUENCY METER

FUNCTIONAL DESCRIPTION

The Type 617-C (General Radio) is designed for use in conjunction with standard-frequency equipment to measure the audio-frequency beat tone between a standard 10 kilocycle harmonic and an unknown frequency. Provision is made for introducing a standard calibrating frequency in order that the frequency may be adjusted to adjust to agree with the scale. An incremental frequency scale covering a range of plus or minus 10 cycles is provided, particularly for use with the General Radio Type 698-A Duplex Multivibrator in measuring frequencies which lie very near to multiples of 10 kilocycles.

The 617-C is designed for standard 19 inch relay-rack mounting.

No field changes in effect at time of preparation (3 October 1956).

MANUFACTURER'S OR CONTRACTOR'S DATA

General Radio Co, Cambridge A, Mass.

TUBE AND/OR CRYSTAL COMPLEMENT

(2) 6J7G	(2) 6J5G
(1) 6X5G	(1) VR-150-30

Total Tubes: (6)

REFERENCE DATA AND LITERATURE

General Radio Co. Technical Manual for Type 617-C Interpolation Oscillator.

ELECTRICAL AND MECHANICAL CHARACTERISTICS

FREQUENCY RANGE: 0 to 5000 cps.
ACCURACY: ±2 cps.
OUTPUT: 7 v across 20000 ohm load.
POWER REQUIREMENTS: 105 to 125 v or 210 to 250 v, 50 to 60 cps, single ph, 20 W.

TYPE CLASSIFICATION	
DESIGN COGNIZANCE	COMMERCIAL
PROCUREMENT COGNIZANCE	
STOCK NO.	
R.D.B. IDENT. NO.	

EQUIPMENT SUPPLIED DATA

QUANTITY PER EQUIPT	NAME AND NOMENCLATURE	OVERALL DIMENSIONS (inches)	WEIGHT (lbs.)
1	Frequency Meter, General Radio Co Model 617-C	11-3/4 X 14 X 19	58
1	Calibration Chart		
1	Technical Manual		
1	Line Cord and Plug		
1	Set of Spare Lamps and Fuses		
1	Connector, Multipoint		