Navy Tube Testers

Dave Rossetti

5/15/2016

Weston OD


MODEL OQ-3
VACUUM TUBE ANALYZING EQUIPMENT
SUPPLY: 110 TO 120VOLTS 1PHASE 60 CYCLES
35 POUNDS
SERIAL 519
EQUIPMENT CONSISTS OF ACCESSORIES AND THE FOLLOWING
1-CV-60032 VACUUM TUBE ANALYZER
PATENT NUMBERS AT [8641 1940622
NAVY DEPARTMENT-BUREAU OF SHIPS
CONTRACTOR & MANUFACTURER
WESTON ELECTRICAL INSTRUMENT CORP.
NEWARK NEW JERSEY U.S.A.
CONTRACT NXss-20398


WESTON


WESTON
ON
OFF
HEATER VOLTAGE ADJUSTER
ROTATE WATCHING NEON LAMP
METER RESET
NORM
PLATE
SECOND PLATE
PLATE VOLTAGE ADJUSTER
SHORT TEST
METER READINGS
HEATER VOLTS
A
B
C
D
TUBE TYPE
A
C
D
REJ.PT.
REMARKS
TUBE TYPE
A
C
D
REJ.PT.
REMARKS
WESTON
MODEL 788

NAVY
OZ-1
550X

NAVY
540

NAVY
OZ-1
550X

NAVY 540


REPLACE
GOOD
MICROMHOS
3000-
6000
MICROMHOS
NOISE TEST
BLST OFF
HICKOK
GAS NO. 1
LINE ADJUSTMENT
SHORTS
FUSE
TUBE TEST
POWER ON
OFF
HICKOK
RECTIFIER TEST
OZ4
ST'D
GAS
NO. 2
AMPL
TEST
LINE
TEST
DIODE
TEST
TUBE TYPE
MUT. COND.
A
B
FIL
L
R
NOTATIONS

ARMY
I-177


TEST DATA
DYNAMIC MUTUAL CONDUCTANCE
TUBE TESTER
DYNAMIC
MUTUAL
CONDUCTANCE
TUBE TESTER I-177
MADE IN U.S.A.
MICROMHOS
NOISE TEST
SHORTS
POWER
OFF
FUSE
TUBE TEST
ADJUSTMENT
LINE
RECTIFIER
ACORN CAP
GAS NO. 2
GAS NO. 1
DIODE TEST
AMPL. TEST
DO NOT PRESS FOR RECTIFIER TUBES
A
B
FIL
L
R

NAVY TV-3/U


VOLTS
OHMS
SHORTS
D.C.
BIAS
SHUNT
FILAMENT
LOW
P1
P2
P3
P4
P5
P6
P7
NOISE TEST
REVERSE
NORMAL
METER
FILAMENT
FILAMENT
GRID
PLATE
SCREEN
CATHODE
SUPPRESSOR
FUSE
SELECTORS
ON
OFF
LINE ADJUST

HICKOK 546


VOLTS MILS
OHMS CAP
G
P
BIAS
ENGLISH
SHORTS
CAP
A.C
D.C
NORM
LOW
SIG
FILAMENT
OFF 117
BLST
P1
P2
P3
P4
P5
P6
P7
NOISE TEST
REVERSE
METER
NORMAL
FILAMENT
FILAMENT
GRID
PLATE
SCREEN
CATHODE
SUPPRESSOR
FUSE
SELECTORS
ON
OFF
LINE ADJUST
HICKOK
MODEL 546

NAVY 547


OPERATING INSTRUCTIONS
HICKOK MODEL 547
MUTUAL CONDUCTANCE TUBE TESTER
FILAMENT
BIAS
ENGLISH
SHORTS
NOISE TEST
METER
REVERSE
NORMAL
P1
P2
P3
P4
P5
P6
P7
FILAMENT
FILAMENT
GRID
PLATE
SCREEN
CATHODE
SUPPRESSOR
FUSE
SELECTORS
ON
OFF
LINE ADJUST
HICKOK
MODEL 547


TEST DATA
DYNAMIC MUTUAL CONDUCTANCE
TUBE TESTER


SIGNAL CORPS
U.S.ARMY
TUBE SOCKET ADAPTER KIT MX-949A/U
SERIAL NO. 0008756
ORDER NO. 3011-PH-5
MUNSTON MFG. & SERVICE INC.


X1
TUBE SOCKET ADAPTER KIT
MX-949 A/U
ORDER NO. 3011-PHILA-52-04
MUNSTON MFG. & SERVICE INC.
X2
X3
X4
X5
SUBMINIATURE
LONG LEADS
X6
INDEX DOT
X8
X9
FIL
FIL
P
P
SC
SC
G
G
K
K
CAP LEAD
JACKS
CAP LEAD
1
2
3
4
5
6
7
8
9
10


TUBE SOCKET ADAPTER
MX-1417/U
SERIAL 172
USE WITH HICKOCK 540 & 547
MANUFACTURED FOR
DEPT. OF THE NAVY BUREAU OF AERONAUTICS
BY CONTRACTOR
RADIO CITY PRODUCTS CO., INC.
EASTON, PENNA.
CONTRACT NOas 53-895
CVA33
-TUBE DATA BOOK-
OPERATING AND INSTRUCTION MANUAL
FOR THE
ADAPTER TUBE SOCKET MX-1417/U
(SUBMINIATURE-TUBE-TESTER ADAPTER)
CONTRACTOR
RADIO CITY PRODUCTS CO., INC.
INSTRUCTION SHEET
FOR
TUBE SOCKET
ADAPTER
MX1417/U
FIL.
A
B
C
D
E
F
G
H

USS Kearsarge (CVA-33)
Essex-class attack aircraft carrier
1946-1970

Hickok 547A


OPERATING INSTRUCTIONS
HICKOK MODEL 547A
MUTUAL CONDUCTANCE TUBE TESTER
BIAS
ENGLISH
SHORTS
METER
FILAMENT
REVERSE
NORMAL
FILAMENT
FILAMENT
GRID
PLATE
SCREEN
CATHODE
SUPPRESSOR
FUSE
SELECTORS
OFF
LINE ADJUST
HICKOK
MODEL 547A

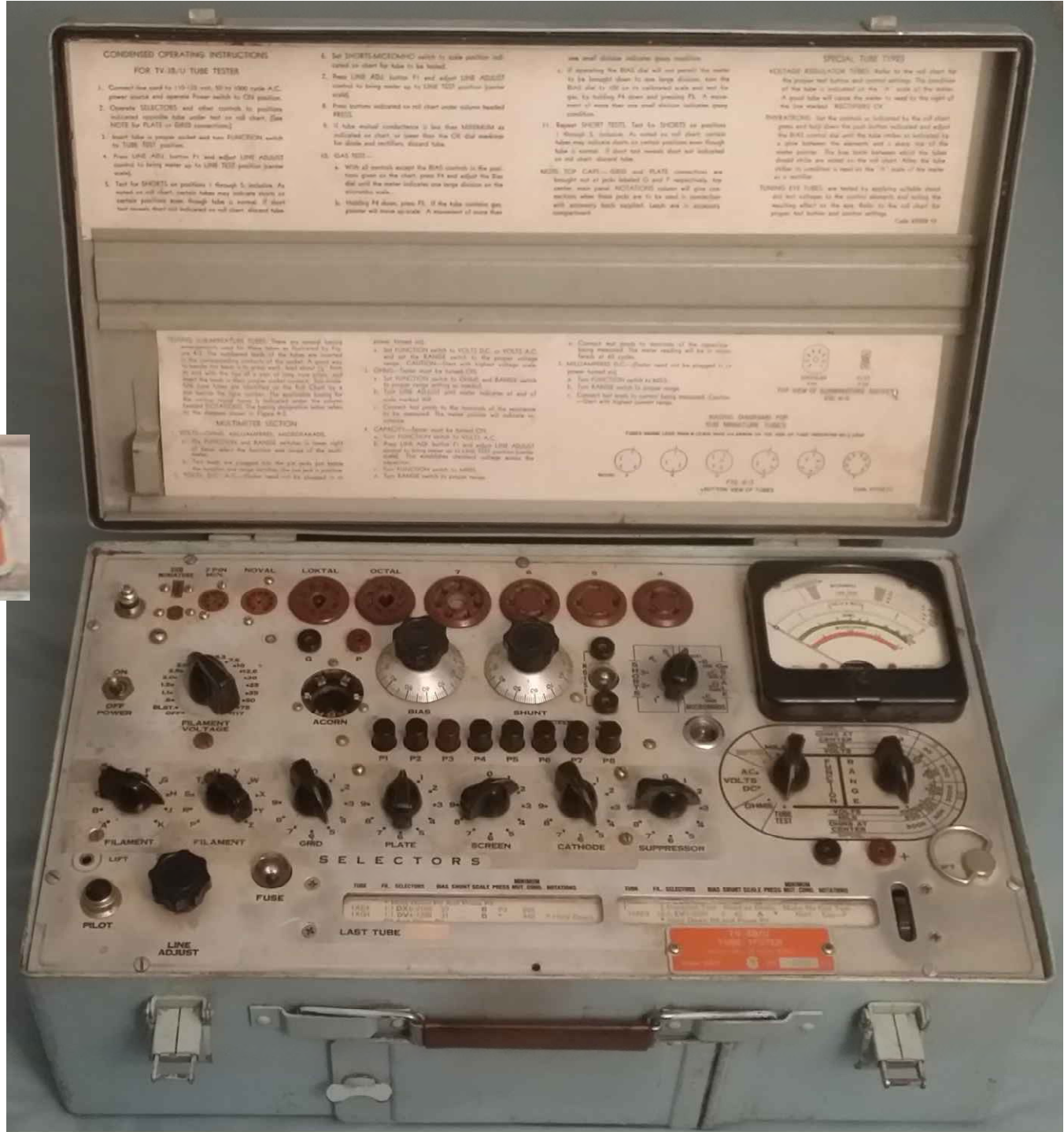

OPERATING INSTRUCTIONS
DYNAMIC MUTUAL CONDUCTANCE TUBE TESTER
MODEL 547A
HICKOK
Hickok
Dynamic Mutual
Conductance Tester
Reads Directly In
MICROMHOS
World Famous
THE HICKOK ELECTRICAL INSTRUMENT COMPANY
OPERATING INSTRUCTIONS
HICKOK MODEL 547A
MUTUAL CONDUCTANCE TUBE TESTER
BIAS
ENGLISH
SHORTS
METER
FILAMENT
GRID
PLATE
SCREEN
CATHODE
SUPPRESSOR
SELECTORS
FUSE
LINE
ADJUST
MODEL
547A


UNCLASSIFIED
INSTRUCTION BOOK
for
TUBE TESTER
TV-5/U
U. S. NAVY DEPARTMENT
BIAS
SHUNT
SHORTS
METER
FILAMENT
GRID
PLATE
SCREEN
CATHODE
SUPPRESSOR
SELECTORS
FUSE
LINE
ADJUST

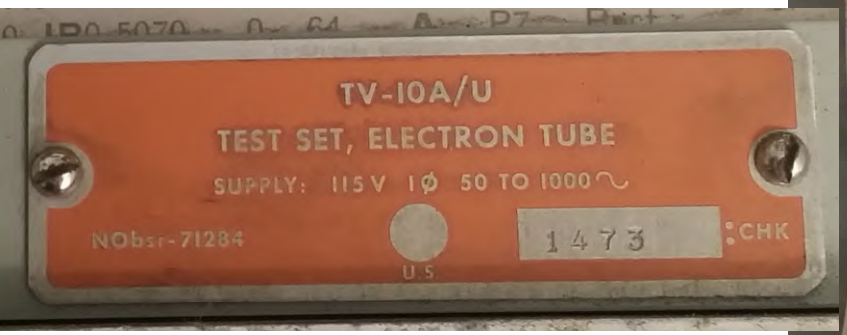
NAVY
TV-3A/U


OPERATING INSTRUCTIONS FOR
TV-3A/U TUBE TESTER
TUBE TESTER SECTION
BIAS
SHUNT
MICROMHOS
SHORTS
FILAMENT
FILAMENT
GRID
PLATE
SCREEN
CATHODE
SUPPRESSOR
SELECTORS
MASTER
FUSE
ON
OFF
POWER
LINE
ADJUST


TV-3B/U
TUBE TESTER
SER 435


CONDENSED OPERATING INSTRUCTIONS
FOR TV-3B/U TUBE TESTER
SPECIAL TUBE TYPES
MULTIMETER SECTION
FILAMENT VOLTAGE
ACORN
BIAS
SHUNT
P1 P2 P3 P4 P5 P6 P7 P8
FILAMENT
FILAMENT
GRID
PLATE
SCREEN
CATHODE
SUPPRESSOR
SELECTORS
PILOT
LINE ADJUST
FUSE
LAST TUBE


SUB MINIATURE
7 PIN MIN.
NOVAL
LOKTAL
OCTAL
7
6
5
4
ON
OFF
POWER
FILAMENT VOLTAGE
BLST.
OFF
ACORN
G
P
BIAS
SHUNT
NOISE
SHORTS
SCALE
MICROMHOS
LINE
MUT.
GAS
GAS
RECTIFIERS
METER
P1
P2
P3
P4
P5
P6
P7
P8
MFDS.
OHMS AT CENTER
MILS
VOLTS
AC
VOLTS
DC
OHMS
FUNCTION
RANGE
TUBE TEST
FILAMENT
FILAMENT
GRID
PLATE
SCREEN
CATHODE
SUPPRESSOR
SELECTORS
LIFT
PILOT
LINE ADJUST
FUSE
IFT
TUBE
FIL. SELECTORS
BIAS
SHUNT
SCALE
PRESS
MINIMUM MUT. COND.
NOTATIONS
* Hold Down P2 And Press P3
1AE4 1.1 DX6-2100 22 .... B P3 600
1AG4 1.1 DV4-1200 31 .... B " 440 * Hold Down P2 And Press P3
LAST TUBE
12AF3 12.6 EV0-0020 0 45 A * Rect. Cap=P
* Hold Down P8 and Press P7
TV-3B/U
TUBE TESTER


TV-10A/U
TEST SET, ELECTRON TUBE
SUPPLY: 115 V 1Ø 50 TO 1000~
NObsr-71284
1473
CHK
U.S.


CONDENSED OPERATING INSTRUCTIONS
FOR TEST SET, TV-10A/U
SELECTORS

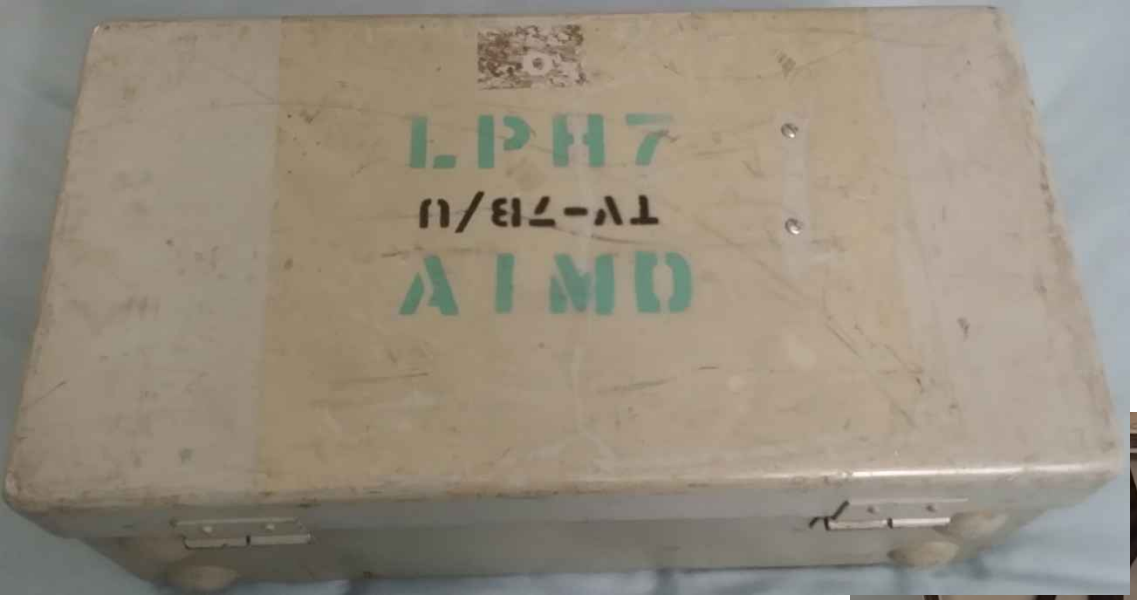

NOVAL
LOKTAL
OCTAL
7
5
4
MICROAMPS
LINE TEST
G
P
BIAS
SHUNT
ON
OFF
POWER
FILAMENT
ACORN
P1
P2
P3
P4
P5
P6
P7
P8
FILAMENT
FILAMENT
GRID
PLATE
SCREEN
SUPPRESSOR
SELECTORS
FUSE
TV-10A/U
TEST SET, ELECTRON TUBE


LINE VOLTAGE
CAPACITY
TUBE SELECTOR
MICROFARADS-60
BAD
GOOD
WESTON
TUBE-CAR-CHECKER
TUBE DATA
INDEX
NORMAL TUBES
SPECIAL TUBES
BATTERY TUBES
DIODE
LINE SHORT CHECK
OFF
C÷10
C×1
C÷10
C÷100
TUBE TESTER TV-4/U
FILAMENT SELECTOR
IN POSITION
CIRCUIT SELECTOR
A
B
OUT


AN/USM-3
TEST-TOOL SET
SERIAL
FOR COMPLETE LIST OF UNITS SEE INSTRUCTION BOOK
NAVY DEPARTMENT
BUREAU OF SHIPS
RADIO FREQUENCY LABORATORIES INC.
CONTRACT


WARNING
SIGNAL TRACER
TS-673/U
TUBE DATA
INDEX
TUBE SELECTOR
LINE VOLTAGE
FILAMENT SELECTOR
CIRCUIT SELECTOR
16-B-670001-101
A
B
C
D
OUT
E
F
G
H


LINE VOLTAGE
CAPACITY
TUBE SELECTOR
BAD
GOOD
DIODES OK
LINE CHECK
WESTON
TUBE-CAP.-CHECKER
MODEL 685
TYPE 5
NORMAL TUBES
SPECIAL TUBES
BATTERY TUBES
DIODE
LINE SHORT CHECK
OFF
C×10
C×1
C÷10
C÷100
FILAMENT SELECTOR
TUBE TESTER TV-4/U
IN POSITION
CIRCUIT SELECTOR
A
B
OUT
TUBE DATA
INDEX


LPH7
TV-7B/U
AIMD

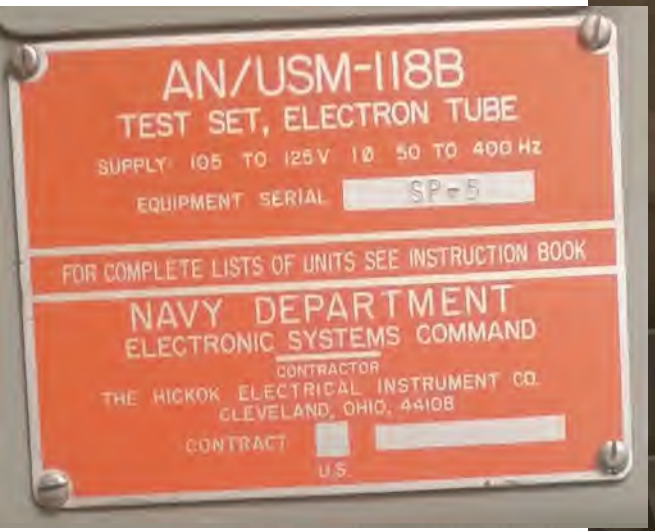

NAVWEPS 16-45-637
TB 11-6625-274-12/1
DEPARTMENT OF THE ARMY TECHNICAL BULLETIN
TEST DATA FOR
ELECTRON TUBE TEST SETS
TV-7/U,
TV-7A/U,
TV-7B/U,
AND
TV-7D/U
This copy is a reprint which includes current pages from Changes 1.
HEADQUARTERS, DEPARTMENT OF THE ARMY
JANUARY 1962
TUBE TESTER, TV-7B/U
FORJAY INDUSTRIES INC.
SHORTS
FUNCTION SWITCH
TV-7B/U

USS Guadalcanal (LPH-7)

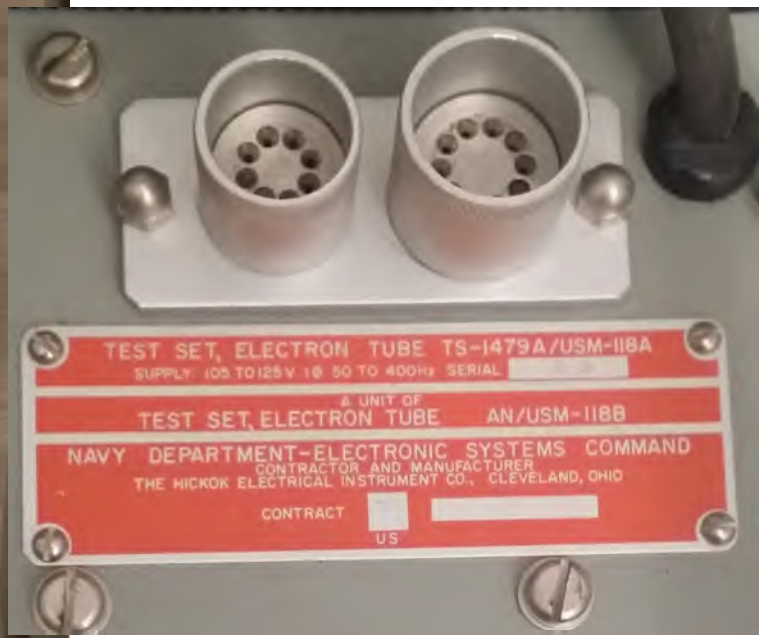
Iwo Jima-class amphibious assault ship (helicopter)

1963-1994


CY-3873/USM-118A
P1
1/2 SET
SCAT 4548
CY-3874/USM-118A
SCAT 4548
S/N: SP-5
P1
1/2 SET
SCAT 4548


AN/USM-118B
TEST SET, ELECTRON TUBE
SUPPLY 105 TO 125 V 1Ø 50 TO 400 Hz
EQUIPMENT SERIAL SP-5
FOR COMPLETE LISTS OF UNITS SEE INSTRUCTION BOOK
NAVY DEPARTMENT
ELECTRONIC SYSTEMS COMMAND
CONTRACTOR
THE HICKOK ELECTRICAL INSTRUMENT CO.
CLEVELAND, OHIO, 44108
CONTRACT
U.S.


HEY!
TUCK ME IN-
WHEN REMOVING TEST CARD PLEASE USE THIS FLAG AS MARKER IN PLACE WHERE CARD BELONGS.
RETURN TEST CARD TO STORAGE TRAY IN NUMERICAL SEQUENCE.
HICKOK


TEST SET, ELECTRON TUBE TS-1479A/USM-118A
SUPPLY 105 TO 125 V 1Ø 50 TO 400Hz SERIAL
A UNIT OF
TEST SET, ELECTRON TUBE AN/USM-118B
NAVY DEPARTMENT-ELECTRONIC SYSTEMS COMMAND
CONTRACTOR AND MANUFACTURER
THE HICKOK ELECTRICAL INSTRUMENT CO., CLEVELAND, OHIO
CONTRACT
US

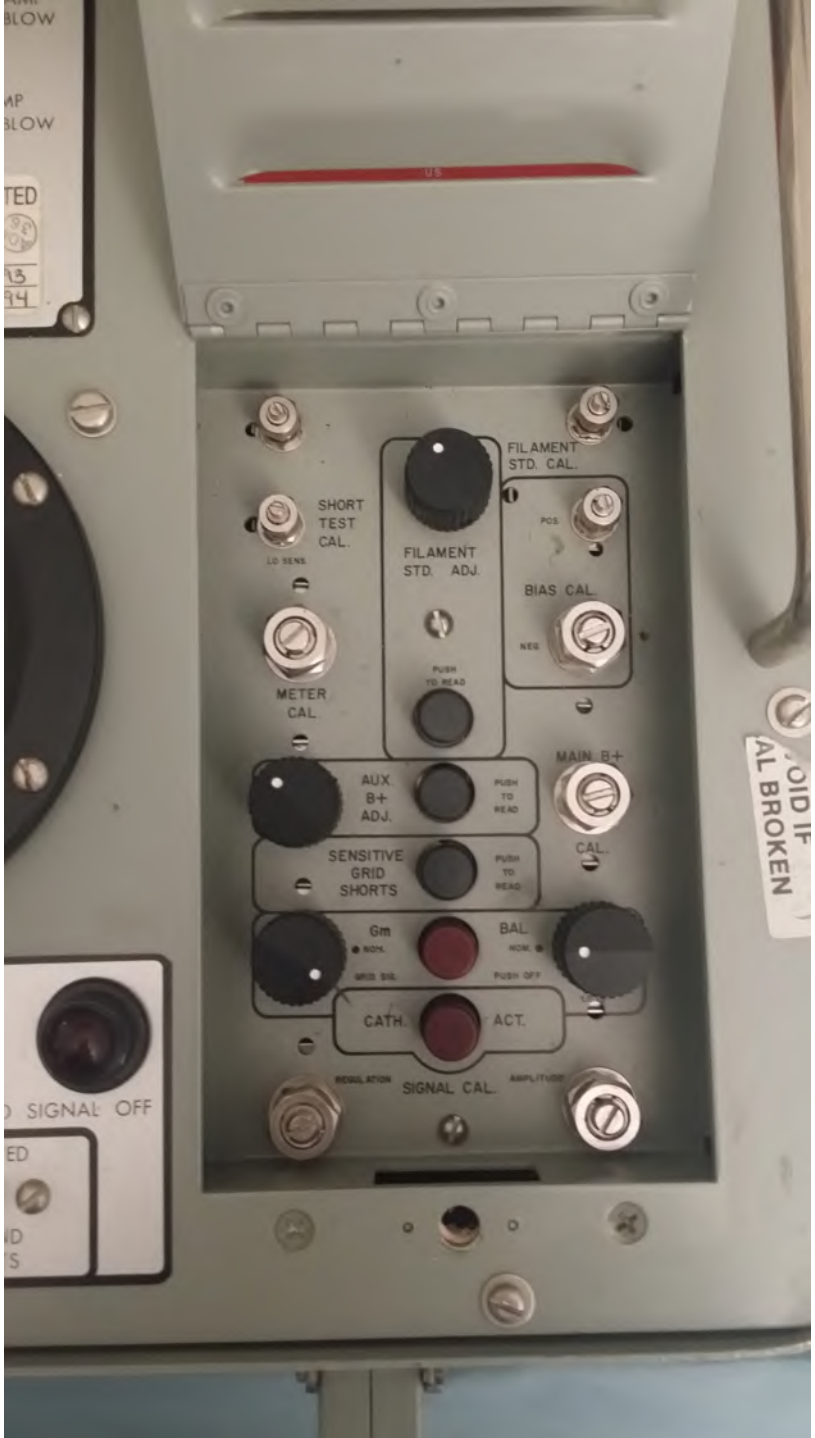

OFF
ON
PILOT
CALIBRATED
REPLACE
REPLACE
REPLACE
PUSH TO
REJECT CARD
INSERT CARD HERE
SHORT TEST LAMPS
P Sc Su G K
GRID SIGNAL OFF
CATHODE
ACTIVITY
TEST
2
3
QUALITY GAS
Gm OR Ib
4
PRESS 4 AND
REPEAT TESTS


HEY!
TUCK ME IN-
WHEN REMOVING TEST CARD PLEASE USE THIS FLAG AS MARKER IN PLACE WHERE CARD BELONGS. RETURN TEST CARD TO STORAGE TRAY IN NUMERICAL SEQUENCE.
HICKOK


OFF
ON
PILOT
CALIBRATED
SER NO SP-5
DATE APR 6 93
DUE JUN 6 94
REPLACE
REPLACE GOOD
REPLACE
LEAKAGE
QUALITY
GAS
PUSH TO
REJECT CARD
INSERT CARD HERE
SHORT TEST LAMPS
P Sc Su G K
GRID SIGNAL OFF
CATHODE
ACTIVITY
TEST
2 3
QUALITY GAS
Gm OR Ib
WHEN LIGHTED
4
PRESS 4 AND
REPEAT TESTS
CALIBRATION
SEAL BROKEN


INSTRUCTIONS
PLACE TUBE IN SOCKET AND INSERT CARD.
1. OBSERVE SHORT TEST LAMPS. GLOWING LAMPS INDICATE SHORTED ELEMENTS. READ METER SCALE 1, HEATER CATHODE LEAKAGE. WARNING NOTE! STOP TEST IF TUBE IS DEFECTIVE.
2. PUSH BUTTON 2 AND READ METER SCALE 2.
3. PUSH BUTTON 3 AND READ METER SCALE 3.
4. WHEN NEON LIGHT NEXT TO BUTTON 4 IS LIT TEST THE SECOND IDENTICAL TUBE SECTION BY HOLDING BUTTON 4 DOWN AND REPEATING ABOVE TESTS 1, 2, & 3.


NAVELEX 0967-LP-113-6050
TECHNICAL MANUAL,
TUBE TEST CONDITIONS
FOR
TUBE TEST PROGRAMMING
CARD KIT
MK-827/USM-118
USED WITH
ELECTRON TUBE TEST SETS
AN/USM-118 A
AND
AN/USM-118 B
PUBLISHED BY DIRECTION OF COMMANDER,
NAVAL ELECTRONIC SYSTEMS COMMAND
INSTRUCTIONS
OFF
ON
PILOT
SHORT TEST LAMPS
CATHODE ACTIVITY TEST
GRID SIGNAL OFF
QUALITY GAS


FILAMENT STD. CAL.
SHORT TEST CAL.
FILAMENT STD. ADJ.
BIAS CAL.
METER CAL.
PUSH TO READ
AUX B+ ADJ.
MAIN B+ CAL.
SENSITIVE GRID SHORTS
Gm
BAL.
CATH.
ACT.
SIGNAL CAL.
SIGNAL OFF

USS Mahlon S. Tisdale (FFG-27)

Oliver Hazard Perry class of guided-missile frigate

1982-1998

GE
Industrial Tube Analyzer
Type YTW-3

Model	Army/Navy	Mfr.	Date	Notes
OD	Navy	Weston	OD-2 1937 OD-5 1940 OD-7 1943	similar to model 686 type 9A
OQ	Navy	Weston		also OQ-1, OQ-2, OQ-3 (1942)
OZ	Navy	Hickok	1942	also OZ-1, OZ-2
540	Navy	Hickok	1942	Navy version of 530, with new selector switches and AC line meter.
546	Navy	Hickok	1947	similar to Navy TV-3/U (1949)
547	Navy	Hickok	1949	similar to Navy TV-3/U (1949)
547-A	Navy	Hickok	1950	similar to Navy TV-3/U (1949)
550X	Navy	Hickok	1942	540 with VOM, also known as Navy OZ-1
TV-3	Navy	Hickok	1949	similar to Hickok 546
TV-3A	Navy	Hickok	1949, 1950	
TV-3B	Navy	Hickok	1949,	
TV-3C	Navy	Jetronic	1954	
TV-4	Navy	Weston	1951?	USM-3
TV-4A	Navy	Weston	1952	Part of tool set USM-3A by Radio Frequency Laboratories
TV-5	Navy	San Francisco Naval Shipyard		Electrometer tube tester. $972
TV-7	Army	Hickok Supreme	1952 1953	
TV-7A	Army	"SLE"	1954	
TV-7B	Army/Navy	Hickok Forway Industries	1957 1957	
TV-8	Navy	Weston, USM-31.		Has more Gm, I, V ranges than OD-7, also low-range Gm amp.
TV-10	Navy	Hickok Forway Industries	1957 1955	 TV3 replacement
TV-10A	Navy	Hickok	1957	
TV-10B	Navy	Jetronic		
TV-10C	Navy	Forway Industries		
TV-10D	Navy	Western Reserve Electronics	1962	
USM-31				see TV-8/USM-31
USM-118		Hickok Cardmatic		
USM-118B		Hickok	1974, 1988	Manual dated 1968 Panel nameplate reads: "TS-1479A/USM-118A, a unit of AN/USM-118B"

Questions

Since Hickok tube testers were always expensive and had limited sales, there would not be enough to go around now, if it were not for the military services. They standardized on the Hickok circuit after World War 2, and bought tube testers in large numbers. Most were not actually made by Hickok, but were of equal quality, and better than civilian models. Updated test data is available for many of these. Here is a rundown on the strong and weak points of the more desirable military models:

OD (Weston)

Capable of doing accurate testing on most older tubes, but the unamplified Gm meter loads the plate circuit and needs correction factors applied. Setup is by patch cords. Rarely found in good condition, as the 10k and 20k 200-watt potentiometers are prone to breakage in the resistance elements. Similar to Weston 686 9A.

OQ (Weston)

Simplified version of OD. A gorgeous piece of work, in its quartered oak case, but hopelessly antiquated for regular testing now.

OZ

1942 version of prewar 510X, with new A-B selector switches, and AC line meter (the rarer 540 was the same model without the VOM). Same caveats as I-177.

I-177

1944 repackaging of a pre-war design, using "A" and "B" switches to select socket connections. These switches interchange pairs of wires (heater pins are permanently connected) to allow testing of most tubes up to 1945, but not all socket combinations are possible. For instance the 6SN7 gets a proper test on only one section, while the other is run with no grid bias. The I-177 will test a few 7-pin miniatures, but has no 9-pin sockets. Later tubes were handled with an outboard adapter MX-949, with connections set up by jumper cords. This is very tedious, and considering the scarcity and high price of the MX-949, the I-177 is best used only for antique tubes, in conjunction with a "modern" tester such as a B&K or Hickok 6000A without 4-5-6-7 pin sockets.

TV-3

An update of the wartime OZ, eliminating the obsolete A and B socket switching. Also contains VOM functions, and unlike the Army TV-7, a roll chart and direct readout in micromhos. The TV-3 has a 1000 ohms per volt VOM; the A,B,C versions are 20,000 ohms per volt, and the manuals are quite different.

TV-3s often show a lot of wear and heavy use, but a good one works well. Superseded by the TV-10. Both models use the older socket-numbering scheme whereby the usual heater pins always have the same letters on the heater switches: the four-pin socket for instance is numbered in order: 1-2-3-8, the 5-pin is 1-2-3-4-8, and the 7-pin miniature is really mixed up: 3-2-1-8-5-6-7.

Model TV-3B/U

This can be exasperating when trying to determine connections for a tube not on the chart. In the TV-7, by contrast, all sockets are numbered normally.

TV-4

A Weston emission tester, part of an amazingly compact tool kit that also includes signal tracer with AF and RF probes and headphones, signal injector, resistance and capacitance substitution boxes, ohmmeter, RF indicator, AC-DC polarity probe, flashlight, soldering iron and a complete set of hand tools! The TV-4 itself does work, but is awkward out of its case, particularly the flip-open test-data cards that are often missing.

Model TV-4A/U

TV-7

This is by far the most common military model, made in large numbers over a long period. Standard Hickok circuit in all respects. Test data is on cards inside the lid, and reprints are available. The grid signal is rather high at 5 volts AC, too much for some low-bias tubes such as the 12AX7. Gm readout is on a meter calibrated only 0–120, but in fact the ranges are:

Range	Full Scale	Grid Signal
B	3,000 micromhos	5V
C	6,000 micromhos	5V
D	15,000 micromhos	1V
E	30,000 miccromhos	0.5V
F	60,000 micromhos	0.5V (TV-7D only)

Model TV-7B/U

TV-10

Replacement for the Navy TV-3, without the VOM functions. Direct readout in micromhos. Same goofy socket numbering as the TV-3. Apt to be in better shape, since it is newer. Uses the same roll chart.

Model TV-10D/U

USM-118

Military version of the Hickok Cardmatic. Uses Mylar cards in a separate case as large as the tester; a full set occupies two rows. Subject to heavy use and wear, but a good one is an excellent instrument. Two caveats: it reads out only on a good-bad scale, with no Gm reference, and because all settings are done automatically, you can't change anything, such as grid bias. Refer to the Hickok chapter for further discussion.

Model USM-118B

USM-118B and card storage case