NAVSHIPS 91678

NAVHSIPS 0967-972-2010
Formerly 2080-156-2000

INSTRUCTION BOOK

for

RADIO RECEIVING SET AN/URR-23A

COLLINS RADIO COMPANY
Cedar Rapids, Iowa

BUREAU OF SHIPS

NAVY DEPARTMENT

With Temporary Correction 1

Contract: NObsr—52527

Approved by BuShips: 6 June 1952

LIST OF EFFECTIVE PAGES

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TEMPORARY CORRECTION T-1 TO INSTRUCTION BOOK FOR
RADIO RECEIVING SET AN/URR-23A NAVSHIPS 91678

The purpose of this Temporary Correction is to correct errors, add support phrases, and supply Standard Navy Stock Numbers which were not available when the book was released for printing.

In Table 8-4, pages 8-2 through 8-161, make the following corrections and additions. Retain this Temporary Correction in the instruction book immediately after the front cover.

SYMBOL	ACTION
A-001	Delete SNSN, add "For Reference Only"
A-002	Delete SNSN, add "For Reference Only"
A-003	Delete SNSN, add "For Reference Only"
A-004	Delete SNSN, add "For Reference Only"
A-005	Delete SNSN, add "For Reference Only"
A-101	Delete SNSN, add "Shop Manufacture"
A-102	Delete SNSN, add "Shop Manufacture"
A-103	Delete SNSN, add "Shop Manufacture"
A-104	Delete SNSN, add "Shop Manufacture"
A-105	Delete SNSN, add "Shop Manufacture"
A-110	Delete SNSN, add "Shop Manufacture"
A-112	Delete SNSN, add "Shop Manufacture"
A-113	Delete SNSN, add "Shop Manufacture"
A-114	Delete SNSN, add "Shop Manufacture"
A-115	Delete SNSN, add "Shop Manufacture"
A-116	Delete SNSN, add "Low Failure item - if required requisition from ESO referencing NAVSHIPS 900,180A"
A-117	Delete SNSN, add "Shop Manufacture"
A-118	Delete SNSN, add "Shop Manufacture"
A-119	Delete SNSN, add "Shop Manufacture"
A-120	Delete SNSN, add "Shop Manufacture"

4.82

SYMBOL	ACTION
A-121	Delete SNSN, add "Shop Manufacture"
A-122	Delete SNSN, add "Shop Manufacture"
A-123	Delete SNSN, add "Low Failure item - if required requisition from ESO referencing NAVSHIPS 900,180A"
A-124	Delete SNSN, add "Shop Manufacture"
A-126	Delete SNSN, add "Shop Manufacture"
A-127	Delete SNSN, add "Shop Manufacture"
A-128	Delete SNSN, add "Shop Manufacture"
A-129	Delete SNSN, add "Low Failure item - if required requisition from ESO referencing NAVSHIPS 900,180A"
C-101	Delete SNSN, add "For replacement use SNSN N16-C-30737-3019"
C-133	Delete SNSN, add "For replacement use SNSN N16-C-15400-5828"
C-153	Delete SNSN, add "For replacement use SNSN N16-C-16363-9143"
C-173	Delete SNSN, add "For replacement use SNSN N16-C-15921-2881"
C-212	Delete SNSN, add "For replacement use SNSN N16-C-33068-7340"
C-234	Delete SNSN, add "For replacement use SNSN N16-C-16597-1215"
E-001	Delete SNSN, add "Low Failure item - if required requisition from ESO referencing NAVSHIPS 900,180A"
E-003	Delete SNSN, add "Low Failure item - if required requisition from ESO referencing NAVSHIPS 900,180A"
E-006	Delete SNSN, add "Low Failure item - if required requisition from ESO referencing NAVSHIPS 900,180A"
E-101	Delete SNSN, add "Low Failure item - if required requisition from ESO referencing NAVSHIPS 900,180A "
E-104	Delete SNSN, add "Low Failure item - if required requisition from ESO referencing NAVSHIPS 900,180A"
E-107	Delete SNSN, add "Low Failure item - if required requisition from ESO referencing NAVSHIPS 900,180A"
E-117	Delete SNSN, add "Low Failure item - if required requisition from ESO referencing NAVSHIPS 900,180A"

SYMBOL	ACTION
E-158	Delete SNSN, add "For replacement use SNSN N16-K-700350-651"
E-174	Delete SNSN, add "Assemble from Component parts"
F-101	Delete SNSN, add SNSN G17-F-16302-90
H-001	Delete SNSN, add "For Reference Only"
H-002	Delete SNSN, add "For Reference Only"
H-003	Delete SNSN, add "For Reference Only"
H-004	Delete SNSN, add "For Reference Only"
H-005	Delete SNSN, add "For Reference Only"
H-006	Delete SNSN, add "For Reference Only"
H-007	Delete SNSN, add "For Reference Only"
H-008	Delete SNSN, add "For Reference Only"
H-009	Delete SNSN, add "For Reference Only"
H-010	Delete SNSN, add "For Reference Only"
H-011	Delete SNSN, add "Low Failure item - if required requisition from ESO referencing NAVSHIPS 900,180A"
H-012	Delete SNSN, add "For Reference Only"
H-013	Delete SNSN, add "For Reference Only"
H-014	Delete SNSN, add "For Reference Only"
H-015	Delete SNSN, add "For Reference Only"
H-016	Delete SNSN, add "For Reference Only"
H-018	Delete SNSN, add "Low Failure item - if required requisition from ESO referencing NAVSHIPS 900,180A"
H-019	Delete SNSN, add "Low Failure item - if required requisition from ESO referencing NAVSHIPS 900,180A"
H-101	Delete SNSN, add "Low Failure item - if required requisition from ESO referencing NAVSHIPS 900,180A"
H-102	Delete SNSN, add "Low Failure item - if required requisition from ESO referencing NAVSHIPS 900,180A"

SYMBOL	ACTION
H-108	Delete SNSN, add "Low Failure item - if required requisition from ESO referencing NAVSHIPS 900,180A"
H-110	Delete SNSN, add "Shop Manufacture"
H-111	Delete SNSN, add "Shop Manufacture"
H-112	Delete SNSN, add "Shop Manufacture"
H-113	Delete SNSN, add "For Reference Only"
H-114	Delete SNSN, add "For Reference Only"
H-115	Delete SNSN, add "Shop Manufacture"
H-116	Delete SNSN, add "Shop Manufacture"
H-117	Delete SNSN, add "Shop Manufacture"
H-118	Delete SNSN, add "Low Failure item - if required requisition from ESO referencing NAVSHIPS 900,180A"
H-119	Delete SNSN, add "Shop Manufacture"
H-120	Delete SNSN, add "For Reference Only"
H-121	Delete SNSN, add "For Reference Only"
H-123	Delete SNSN, add "For Reference Only"
H-124	Delete SNSN, add "For Reference Only"
H-125	Delete SNSN, add "For Reference Only"
H-126	Delete SNSN, add "For Reference Only"
H-127	Change SNSN to G43-N-10714-120
H-128	Delete SNSN, add "For Reference Only"
H-129	Delete SNSN, add "For Reference Only"
H-130	Delete SNSN, add "For Reference Only"
H-131	Delete SNSN, add "For Reference Only"
H-132	Delete SNSN, add "For Reference Only"
H-133	Delete SNSN, add "For Reference Only"

SYMBOL	ACTION
H-134	Delete SNSN, add "For Reference Only"
H-135	Delete SNSN, add "For Reference Only"
H-137	Delete SNSN, add "For Reference Only"
H-139	Delete SNSN, add "For Reference Only"
H-140	Delete SNSN, add "For Reference Only"
H-141	Delete SNSN, add "For Reference Only"
H-143	Delete SNSN, add "For Reference Only"
H-144	Delete SNSN, add "For Reference Only"
H-145	Delete SNSN, add "For Reference Only"
H-146	Delete SNSN, add "For Reference Only"
H-147	Delete SNSN, add "For Reference Only"
H-148	Delete SNSN, add "For Reference Only"
H-149	Delete SNSN, add "For Reference Only"
H-150	Delete SNSN, add "For Reference Only"
H-155	Delete SNSN, add "For Reference Only"
H-156	Delete SNSN, add "For Reference Only"
H-157	Delete SNSN, add "For Reference Only"
H-158	Delete SNSN, add "Low Failure Item - if required requisition from ESO referencing NAVSHIPS 900,180A"
H-160	Delete SNSN, add "Low Failure item - if required requisition from ESO referencing NAVSHIPS 900,180A"
H-161	Delete SNSN, add "Low Failure item - if required requisition from ESO referencing NAVSHIPS 900,180A"
H-162	Delete SNSN, add "For Reference Only"
H-163	Delete SNSN, add "Low Failure item - if required requisition from ESO referencing NAVSHIPS 900,180A"

SYMBOL	ACTION
H-164	Delete SNSN, add "Low Failure item - if required requisition from ESO referencing NAVSHIPS 900,180A"
H-165	Delete SNSN, add "Low Failure item - if required requisition from ESO referencing NAVSHIPS 900,180A"
H-166	Delete SNSN, add "For Reference Only"
H-167	Delete SNSN, add "Low Failure item - if required requisition from ESO referencing NAVSHIPS 900,180A"
I-101	Change to G17-L-6297
MS-102	Delete SNSN, add "Shop Manufacture"
MS-103	Delete SNSN, add "Shop Manufacture"
O-001	Change SNSN to R77-B-115-00319-2002
O-005	Delete SNSN, add "Low Failure item - if required requisition from ESO referencing NAVSHIPS 900,180A"
O-006	Delete SNSN, add "Low Failure item - if required requisition from ESO referencing NAVSHIPS 900,180A"
O-007	Delete SNSN, add "Low Failure item - if required requisition from ESO referencing NAVSHIPS 900,180A"
O-101A	Delete SNSN, add "Low Failure item - if required requisition from ESO referencing NAVSHIPS 900,180A"
O-106	Delete SNSN, add "Low Failure item - if required requisition from ESO referencing NAVSHIPS 900,180A"
O-107	Delete SNSN, add "Low Failure item - if required requisition from ESO referencing NAVSHIPS 900,180A"
O-109	Delete SNSN, add "Low Failure item - if required requisition from ESO referencing NAVSHIPS 900,180A"
O-111	Delete SNSN, add "Low Failure item - if required requisition from ESO referencing NAVSHIPS 900,180A"
O-119	Delete SNSN, add "Low Failure item - if required requisition from ESO referencing NAVSHIPS 900,180A"
O-125	Delete SNSN, add "Low Failure item - if required requisition from ESO referencing NAVSHIPS 900,180A"
O-127	Change SNSN to F16-G-500001-437

SYMBOL	ACTION
O-127A	Add "Low Failure item - if required requisition from ESO referencing NAVSHIPS 900,180A"
O-127A-A	Add "Shop Manufacture"
O-127A-B	Add "Low Failure item - if required requisition from ESO referencing NAVSHIPS 900,180A"
O-127A-C	Add "Low Failure item - if required requisition from ESO referencing NAVSHIPS 900,180A"
O-127A-D	Add "Shop Manufacture"
O-127A-E	Add "Shop Manufacture"
O-127A-F	Add "Low Failure item - if required requisition from ESO referencing NAVSHIPS 900,180A"
O-127A-G	Add "Low Failure item - if required requisition from ESO referencing NAVSHIPS 900,180A"
O-127-B	Add "Low Failure item - if required requisition from ESO referencing NAVSHIPS 900,180A"
O-127-D	Add "Shop Manufacture"
O-127-E	Add "Low Failure item - if required requisition from ESO referencing NAVSHIPS 900,180A"
O-127-F	Add "Low Failure item - if required requisition from ESO referencing NAVSHIPS 900,180A"
O-127-H	Add "Low Failure item - if required requisition from ESO referencing NAVSHIPS 900,180A"
O-127-J	Add "Shop Manufacture"
O-127-K	Add "Low Failure item - if required requisition from ESO referencing NAVSHIPS 900,180A"
O-127-L	Add "Low Failure item - if required requisition from ESO referencing NAVSHIPS 900,180A"
O-127-M	Add "Low Failure item - if required requisition from ESO referencing NAVSHIPS 900,180A"
O-127-N	Add "Shop Manufacture"
O-127-O	Add "Low Failure item - if required requisition from ESO referencing NAVSHIPS 900,180A"

SYMBOL	ACTION
0-127-P	Add "Low Failure item - if required requisition from ESO referencing NAVSHIPS 900,180A"
0-127-Q	Add "Low Failure item - if required requisition from ESO referencing NAVSHIPS 900,180A"
0-127-R	Add "Shop Manufacture"
0-127-S	Add "Low Failure item - if required requisition from ESO referencing NAVSHIPS 900,180A"
0-127-T	Add "Shop Manufacture"
0-127-U	Add "For Reference Only"
0-127-V	Add "Low Failure item - if required requisition from ESO referencing NAVSHIPS 900,180A"
0-127-W	Add "Shop Manufacture"
0-127-X	Add "Low Failure item - if required requisition from ESO referencing NAVSHIPS 900,180A"
0-127-Y	Add "Low Failure item - if required requisition from ESO referencing NAVSHIPS 900,180A"
0-127-Z	Add "Low Failure item - if required requisition from ESO referencing NAVSHIPS 900,180A"
0-127-AA	Add "Low Failure item - if required requisition from ESO referencing NAVSHIPS 900,180A"
0-127AB	Add "Low Failure item - if required requisition from ESO referencing NAVSHIPS 900,180A"
0-127AC	Add "Low Failure item - if required requisition from ESO referencing NAVSHIPS 900,180A"
0-127AC-A	Add "Shop Manufacture"
0-127AC-B	Add "Low Failure item - if required requisition from ESO referencing NAVSHIPS 900,180A"
0-127AC-C	Add "Low Failure item - if required requisition from ESO referencing NAVSHIPS 900,180A"
0-127AC-D	Add "For Reference Only"
0-127AC-E	Add "Shop Manufacture"

SYMBOL	ACTION
0-127AC-F	Add "Shop Manufacture"
0-127AC-G	Add "Shop Manufacture"
0-127AC-J	Add "Low Failure item - if required requisition from ESO referencing NAVSHIPS 900,180A"
0-127AC-K	Add "Shop Manufacture"
0-127AC-L	Add "Shop Manufacture"
0-127AC-P	Add "For Reference Only"
0-127AC-R	Add "For Reference Only"
0-127AD	Add "Low Failure item - if required requisition from ESO referencing NAVSHIPS 900,180A"
0-127AD-A	Add "Low Failure item - if required requisition from ESO referencing NAVSHIPS 900,180A"
0-127AD-B	Add "Low Failure item - if required requisition from ESO referencing NAVSHIPS 900,180A"
0-127AD-C	Add "Low Failure item - if required requisition from ESO referencing NAVSHIPS 900,180A"
0-127AD-D	Add "Low Failure item - if required requisition from ESO referencing NAVSHIPS 900,180A"
0-127AD-E	Add "Low Failure item - if required requisition from ESO referencing NAVSHIPS 900,180A"
0-127AD-F	Add "For Reference Only"
0-127AE	Add "Low Failure item - if required requisition from ESO referencing NAVSHIPS 900,180A"
0-127AF	Add "Low Failure item - if required requisition from ESO referencing NAVSHIPS 900,180A"
0-127AG	Add "Low Failure item - if required requisition from ESO referencing NAVSHIPS 900,180A"
0-127AH	Add "For Reference Only"
0-127AJ	Add "Shop Manufacture"
0-127AK	Add "For Reference Only"

SYMBOL	ACTION
0-127AL	Add "Shop Manufacture"
0-127AM	Add "For Reference Only"
0-127AN	Add "For Reference Only"
0-127AP	Add "Shop Manufacture"
0-127AS	Add SNSN N17-S-46718-6001
0-128	Delete SNSN, add "Low Failure item - if required requisition from ESO referencing NAVSHIPS 900,180A"
0-131	Delete SNSN, add "Shop Manufacture"
0-132	Delete SNSN, add "Shop Manufacture"
0-133	Delete SNSN, add "Shop Manufacture"
0-134	Delete SNSN, add "Shop Manufacture"
0-136	Delete SNSN, add "Shop Manufacture"
0-137	Delete SNSN, add "Shop Manufacture"
0-138	Delete SNSN, add "Shop Manufacture"
0-139	Delete SNSN, add "Low Failure item - if required requisition from ESO referencing NAVSHIPS 900,180A"
0-140	Delete SNSN, add "Shop Manufacture"
0-144	Delete SNSN, add "Low Failure item - if required requisition from ESO referencing NAVSHIPS 900,180A"
0-145	Delete SNSN, add "Low Failure item - if required requisition from ESO referencing NAVSHIPS 900,180A"
0-146	Delete SNSN, add "For replacement use SNSN N17-C-98378-4051"
0-147	Delete SNSN, add "Low Failure item - if required requisition from ESO referencing NAVSHIPS 900,180A"
0-163A	Delete SNSN, add "Low Failure item - if required requisition from ESO referencing NAVSHIPS 900,180A"
0-163B	Delete SNSN, add "Low Failure item - if required requisition from ESO referencing NAVSHIPS 900,180A"

SYMBOL	ACTION
P-101	Change SNSN to G17-C-71426-2729
R-140	Delete SNSN, add "For replacement use SNSN N16-R-87023-8923
R-148	Delete SNSN, add "For replacement use SNSN N16-R-87679-4366
R-154	Delete SNSN, add "For replacement use SNSN N16-R-88179-4445
R-173	Delete SNSN, add "For replacement use SNSN N16-R-49985-131
R-181	Change SNSN to N16-R-66214-5436
TB-001	Delete SNSN, add "Low Failure item - if required requisition from ESO referencing NAVSHIPS 900,180A"
TB-105	Delete SNSN, add "Low Failure item - if required requisition from ESO referencing NAVSHIPS 900,180A"
TB-108	Delete SNSN, add "Low Failure item - if required requisition from ESO referencing NAVSHIPS 900,180A"
TB-113	Delete SNSN, add "Low Failure item - if required requisition from ESO referencing NAVSHIPS 900,180A"
W-103	Delete SNSN, add "Low Failure item - if required requisition from ESO referencing NAVSHIPS 900,180A"
W-104	Delete SNSN, add "For Reference Only"
W-105	Delete SNSN, add "For Reference Only"
W-106	Delete SNSN, add "For Reference Only"
W-107	Delete SNSN, add "For Reference Only"
W-108	Delete SNSN, add "For Reference Only"
W-109	Delete SNSN, add "For Reference Only"
W-110	Delete SNSN, add "For Reference Only"
W-111	Delete SNSN, add "For Reference Only"
W-112	Delete SNSN, add "For Reference Only"
W-113	Delete SNSN, add "For Reference Only"
W-114	Delete SNSN, add "For Reference Only"
W-115	Delete SNSN, add "For Reference Only"
W-116	Delete SNSN, add "For Reference Only"

SYMBOL	ACTION
W-117	Delete SNSN, add "For Reference Only"
W-118	Delete SNSN, add "For Reference Only"
W-119	Delete SNSN, add "For Reference Only"
W-120	Delete SNSN, add "For Reference Only"
W-121	Delete SNSN, add "For Reference Only"
W-122	Delete SNSN, add "For Reference Only"
W-123	Delete SNSN, add "For Reference Only"
W-124	Delete SNSN, add "For Reference Only"
W-125	Delete SNSN, add "For Reference Only"
W-126	Delete SNSN, add "For Reference Only"
W-127	Delete SNSN, add "For Reference Only"
W-128	Delete SNSN, add "For Reference Only"
W-129	Delete SNSN, add "For Reference Only"
W-130	Delete SNSN, add "For Reference Only"
W-131	Delete SNSN, add "For Reference Only"
W-132	Delete SNSN, add "For Reference Only"
W-133	Delete SNSN, add "For Reference Only"
W-134	Delete SNSN, add "For Reference Only"
W-135	Delete SNSN, add "For Reference Only"
W-136	Delete SNSN, add "For replacement use SNSN G17-I-2642-3250"
W-137	Delete SNSN, add "For replacement use SNSN G17-I-2642-3270"
XI-101	Delete SNSN, add "Low Failure item - if required requisition from ESO referencing NAVSHIPS 900,180A"
XV-001	Delete SNSN, add "Shop Manufacture"
XV-115	Change SNSN from N16-S-63451-1901 to read N16-S-63515-4151

SYMBOL	ACTION
Z-111	Delete SNSN, add "Assemble from Component parts"
Z-112	Delete SNSN, add "Assemble from Component parts"
Z-113	Delete SNSN, add "Assemble from Component parts"
Z-118	Delete SNSN, add "Assemble from Component parts"
Page 8-158	Speaker: add Symbol RV-101. Correct SNSN to F17-L-91368-1323
A-125	Change SNSN to F17-C-48012-2351
A-133	Delete SNSN, add "Low Failure item - if required requisition from ESO referencing NAVSHIPS 900,180A"
LS-101	Delete SNSN's N17-L-91362-2173 also N17-L-91368-1220 add "For replacement use SNSN N17-L-91367-1397"
Page 8-161	Tool, alignment: Delete SNSN, add "Shop Manufacture"
Page 8-161	Tool, alignment: Delete SNSN, add "Shop Manufacture"

NAVSHIPS 91678

NAVHSIPS 0967-972-2010
Formerly 2080-156-2000

INSTRUCTION BOOK

for

RADIO RECEIVING SET AN/URR-23A

COLLINS RADIO COMPANY
Cedar Rapids, Iowa

BUREAU OF SHIPS

NAVY DEPARTMENT

With Temporary Correction 1

Contract: NObsr—52527

Approved by BuShips: 6 June 1952

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3-1 to 3-4	Original	i-0 to i-5	Original

DEPARTMENT OF THE NAVY
BUREAU OF SHIPS
WASHINGTON 25, D. C.

IN REPLY REFER TO
Code-993-100
6 June 1952

From: Chief, Bureau of Ships
To: All Activities Concerned with the Installation, Operation and Maintenance of the Subject Equipment

Subj: Instruction Book for Radio Receiving Set AN/URR-23A NAVSHIPS 91678

1. This is the instruction book for the subject equipment and is in effect upon receipt.

2. When superseded by a later edition, this publication shall be destroyed.

3. Extracts from this publication may be made to facilitate the preparation of other Department of Defense Publications.

4. All Navy requests for NAVSHIPS Electronics publications should be directed to the nearest District Publications and Printing Office. When changes or revised books are distributed, notice will be included in the Bureau of Ships Journal and in the Index of Bureau of Ships General and Electronics Publications, NAVSHIPS 250-020.

H. N. WALLIN
Chief of Bureau

RECORD OF CORRECTIONS MADE

CHANGE NO.	DATE	SIGNATURE OF OFFICER MAKING CORRECTION

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GUARANTEE

RADIO ONE YEAR GUARANTEE: The equipment, including all parts and spare parts, except vacuum tubes, batteries, rubber and material normally consumed in operation, is guaranteed for a period of one year from the date of delivery of the equipment to and acceptance by the Government with the understanding that all such items found to be defective as to material, workmanship or manufacture will be repaired or replaced, f.o.b. any point within the continental limits of the United States designated by the Government, without delay and at no expense to the Government, provided that such guarantee will not obligate the Contractor to make repair or replacement of any such defective items unless the defect appears within the aforementioned period and the Contractor is notified thereof in writing within a reasonable time and the defect is not the result of normal expected shelf life deterioration.

To the extent the equipment, including all parts and spare parts, as defined above is of the Contractor's design or is of a design selected by the Contractor, it is also guaranteed, subject to the foregoing condition, against defects in design with the understanding that if ten per cent (10%) or more of any such said item, but not less than two of any such item, of the total quantity comprising such item furnished under the contract, are found to be defective as to design, such item will be conclusively presumed to be of defective design and subject to one hundred per cent (100%) correction or replacement by a suitably redesigned item.

All such defective items will be subject to ultimate return to the Contractor. In view of the fact that normal activities of the Naval Service may result in the use of equipment in such remote portions of the world or under such conditions as to preclude the return of the defective items for repair or replacement without jeopardizing the integrity of Naval communications, the exigencies of the Service, therefore, may necessitate expeditious repair of such items in order to prevent extended interruption of communications. In such cases the return of the defective items for examination by the Contractor prior to repair or replacement will not be mandatory. The report of a responsible authority, including details of the conditions surrounding the failure, will be acceptable as a basis for affecting expeditious adjustment under the provisions of this contractual guarantee.

The above one year period will not include any portion of time the equipment fails to perform satisfactorily due to any such defects, and any items repaired or replaced by the Contractor will be guaranteed anew under this provision.

INSTALLATION RECORD

Contract Number NObsr-52527 Date of Contract, 22 June 1951

Serial Number of equipment _____

Date of acceptance by the Navy _____

Date of delivery to contract destination _____

Date of completion of installation _____

Date placed in service _____

Blank spaces on this page shall be filled in at time of installation. Operating personnel shall also mark the "date placed in service" on the date of acceptance plate located below the model nameplate on the equipment, using suitable methods and care to avoid damaging the equipment.

REPORT OF FAILURE

Report of failure of any part of this equipment, during its entire service life, shall be made to the Bureau of Ships in accordance with current regulations using form NAVSHIPS NBS 383 (revised). The report shall cover all details of the failure and give the date of installation of the equipment. For procedure in reporting failures see Chapter 67 of the Bureau of Ships Manual or superseding instructions.

ORDERING PARTS

All request or requisitions for replacement material should include the following data:

1. Federal stock number or, when ordering from a Marine Corps or Signal Corps supply depot, the Signal Corps stock number.
2. Name and short description of part.

If the appropriate stock number is not available the following shall be specified:

1. Equipment model or type designation, circuit symbol, and item number.
2. Name of part and complete description.
3. Manufacturer's designation.
4. Contractor's drawing and part number.
5. JAN or Navy type number.

DESTRUCTION OF ABANDONED MATERIAL IN THE COMBAT ZONE

In case it should become necessary to prevent the capture of this equipment, and when ordered to do so, DESTROY IT SO THAT NO PART OF IT CAN BE SALVAGED, RECOGNIZED, OR USED BY THE ENEMY. BURN ALL PAPERS AND BOOKS.

Means:

1. Explosives, when provided.
2. Hammers, axes, sledges, machetes, or whatever heavy object is readily available.
3. Burning by means of incendiaries such as gasoline, oil, paper or wood.
4. Grenades and shots from available firearms.
5. Burying all debris, where possible and when time permits.
6. Throwing overboard or disposing of in streams or other bodies of water.

Procedure:

1. Obliterate all identifying marks. Destroy nameplates and circuit labels.
2. Demolish all panels, castings, switch and instrument boards.
3. Destroy all controls, switches, relays, connections and meters.
4. Rip out all wiring and cut interconnections of electrical equipment. Smash gas, oil, and water cooling systems in gas engine generators, etc.
5. Smash every electrical or mechanical part, whether rotating, moving or fixed.
6. Break up all operating instruments such as keys, phones, microphones, etc.
7. Destroy all classes of carrying cases, straps, containers, etc.
8. Bury or scatter all debris.

DESTROY EVERYTHING!

SAFETY NOTICE

The attention of officers and operating personnel is directed to Chapter 67 of the Bureau of Ships Manual or superseding instructions on the subject of radio-safety precautions to be observed.

This equipment employs voltage which are dangerous and may be fatal if contacted by operating personnel. Extreme caution should be exercised when working with the equipment.

While every practicable safety precaution had been incorporated in this equipment, the following rules must be strictly observed:

KEEP AWAY FROM LIVE CIRCUITS:

Operating personnel must at all time observe all safety regulations. Do not change tubes or make adjustments inside equipment with high voltage supply on. Under certain conditions dangerous potentials may exist in circuits with power controls in the off position due to charges retained by capacitors. To avoid casualties always remove power and discharge and ground circuits prior to touching them.

DON'T SERVICE OR ADJUST ALONE:

Under no circumstances should any person reach within or enter the enclosure for the purpose of servicing or adjusting the equipment without the immediate presence or assistance of another person capable of rendering aid.

DON'T TAMPER WITH INTERLOCKS:

Do not depend upon door switches or interlocks for protection but always shut down motor generators or other power equipment. Under no circumstances should any access gate, door, or safety interlock switch be removed, short-circuited, or tampered with in any way, by other than authorized maintenance personnel, nor should reliance be placed upon the interlock switches for removing voltages from the equipment.

RESUSCITATION

AN APPROVED POSTER ILLUSTRATING THE RULES FOR RESUSCITATION BY THE PRONE PRESSURE METHOD SHALL BE PROMINENTLY DISPLAYED IN EACH RADIO, RADAR, OR SONAR ENCLOSURE. POSTERS MAY BE OBTAINED UPON REQUEST TO THE BUREAU OF MEDICINE AND SURGERY.

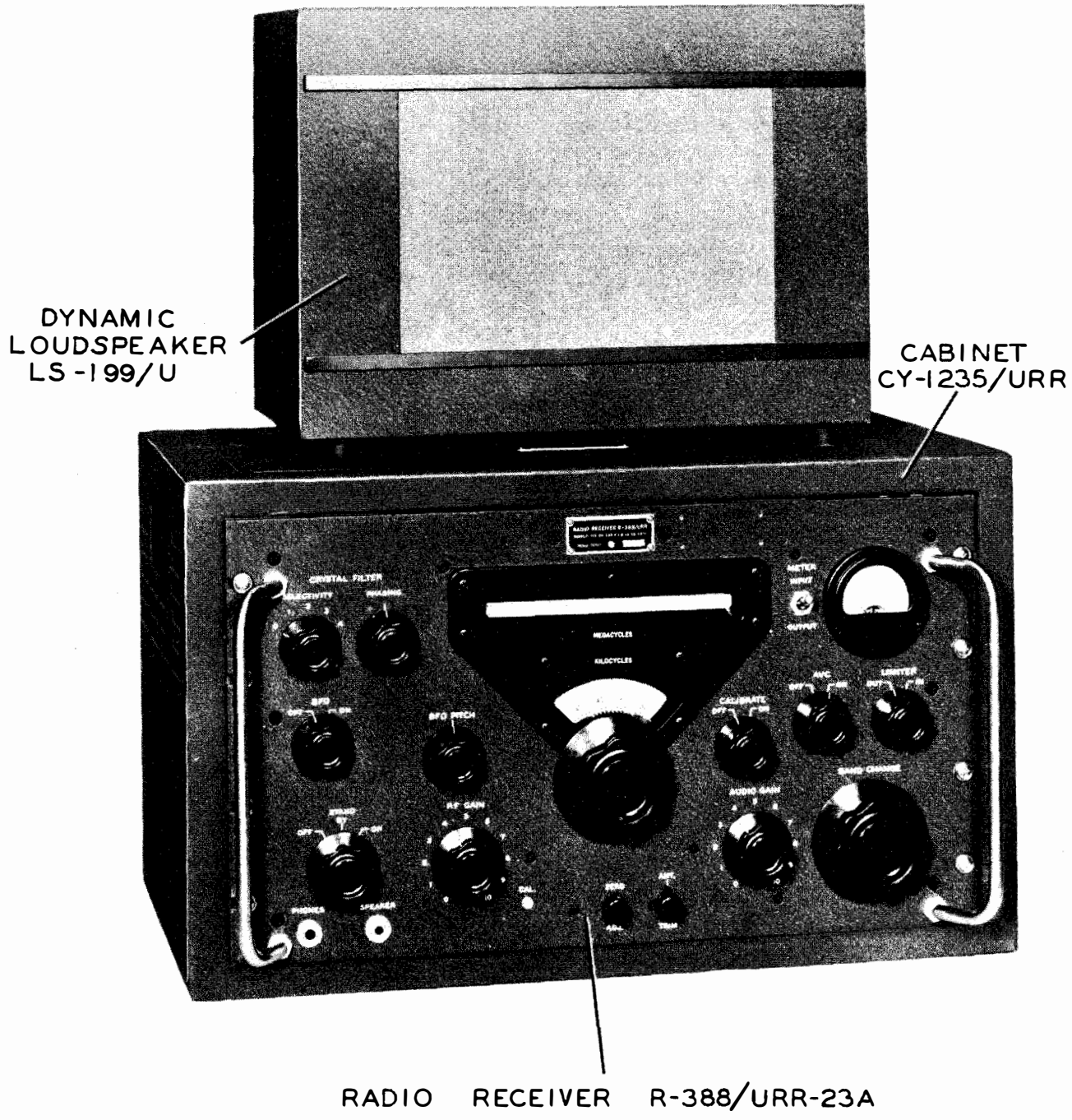


Figure 1-1. Radio Receiving Set AN/URR-23A

SECTION 1
GENERAL DESCRIPTION

1. PURPOSE OF BOOK.

This instruction book has been prepared to assist in the installation, operation, and maintenance of Radio Receiving Set AN/URR-23A.

2. PURPOSE OF EQUIPMENT.

The receiver is designed for communications applications which require the highest order of stability and dial accuracy. Under normal operating conditions, the receiver tunes the range of 540 kc to 30.5 mc with a normal setting error and drift of less than one kc at any frequency within its range. Although designed primarily for amplitude-modulated and continuous-wave reception, the accuracy and stability of the receiver also make it suitable for applications where it is desired to receive or set definite frequencies without search or frequent adjustment.

3. DESCRIPTION OF EQUIPMENT.

The receiver is suitable for 19" rack mounting or for table mounting in the cabinet supplied. Overall receiver dimensions without cabinet are: width, 19 inches; height, 10-1/2 inches; and depth behind panel, 13 inches. (See figure 3-2.) The chassis is protected by a top dust cover held in place by three wing-nuts on the rear of the chassis. (See figure 3-3.) A bottom dust cover is held in place by 15 Phillips-head screws on the bottom of the chassis and 4 screws on the rear of the chassis. The bottom cover is removed by sliding it to the rear after removing the screws that hold it in place.

The cabinet for the receiver has the following dimensions: width, 21-1/8 inches; height, 12-3/8 inches; and depth, 13-1/8 inches. The speaker dimensions are: width, 15 inches; height, 10-9/16 inches; and depth, 8-7/8 inches. The speaker, the cabinet, and the receiver front panel are finished in St. James gray wrinkle.

The following controls are located on the front panel. (See figure 1-1.):

R-F GAIN	CRYSTAL FILTER SELECTIVITY
AUDIO GAIN	CRYSTAL FILTER PHASING
BFO ON-OFF	OFF-ON-STANDBY
CALIBRATE ON-OFF	MEGACYCLE TUNING (BAND SWITCH)
BFO PITCH	KILOCYCLE TUNING
AVC ON-OFF	ZERO ADJUST
LIMITER OUT-IN	METER OUTPUT-INPUT
ANT. TRIM	CAL. (100-KC ADJUSTMENTS)

4. BASIC PRINCIPLE OF OPERATION.

a. MECHANICAL. - The tuning range of 0.5 to 30.5 mc is divided into 30 bands, each one megacycle wide. Bands are selected by the BAND CHANGE knob and indicated by a slide-rule type dial calibrated at .1-megacycle (100-kc) intervals. The KILOCYCLE tuning control covers each of these megacycle intervals with ten turns of a 100-division circular dial calibrated at one kilocycle intervals. Receiver stability is consistent with this finely divided calibration throughout the entire tuning range.

A 4-ohm headphone jack and a 600-ohm speaker jack are provided on the front panel. The antenna connector, 50-ohm i-f output connector, break-in relay terminals and 4-ohm and 600-ohm audio output terminals are provided on the rear. (See figure 3-3.) Also, a heavy duty a-c power cord extends from the rear of the chassis.

b. ELECTRICAL. - Where advantageous, the receiver uses single, double or triple conversion in tuning the entire operating range of 540-kc to 30.5 mc. Eighteen tubes, three of which are dual, are employed in the receiver. With the exception of the rectifier tube, all are of the miniature type.

The receiver tuned circuits cover the frequency spectrum from 500 kc through 30.5 mc. Thus band 1 is referred throughout this book as covering the range, 0.5 to 1.5 mc. However, the lower operating limit is considered to be 540-kc rather than 500-kc. Reception of signals in the range approaching 500-kc is limited because of proximity of the signal frequency to the fixed 500-kc intermediate frequency employed in the receiver.

The tuning range is divided into 30 one-megacycle bands by a system of switches and coils that are parts of the r-f amplifier and first mixer circuits. Bands are changed by moving powdered iron slugs into the coils in one megacycle steps until the coil's inductance limits are reached, then changing coils and repeating. Tuning involves positioning these slugs within the one-megacycle intervals. Injection voltage for the first mixer is obtained from either the fundamental or the harmonic output of an oscillator, the frequency of which is controlled by one of ten quartz crystals selected by the BAND CHANGE control. The KILOCYCLE tuning control drives a vernier dial calibrated in 100 one-kilocycle divisions. This control operates through a differential mechanism to move the slugs in the coils until they cover the range between the one megacycle band change steps. Thus the BAND CHANGE control selects coils and crystals and roughly positions the tuning slugs. It also selects one of two ranges of the variable i-f channel.

Crystal frequencies for first mixer injection are so chosen that the frequency produced by the first mixer always falls in either the 1.5 to 2.5 or the 2.5 to 3.5-mc range of the variable i-f channel.

Exceptions to the operation just described are bands 1, 2, and 3. Band 1 (0.5 to 1.5 mc) uses an intermediate mixer between the first mixer and the variable i-f coils. This mixer accepts frequencies in the range of 10.5 to 11.5 mc from the first mixer. These frequencies are produced by applying to the first mixer a 12-mc signal from the crystal oscillator. This oscillator also applies an 8-mc voltage to the band 1 mixer to produce a signal within the range of the i-f channel that tunes from 2.5 to 3.5 mc. Bands 2 and 3, which cover 1.5 to 2.5 and 2.5 to 3.5 mc respectively, are identical in span to each channel of the variable frequency i-f coils; thus they feed through to the second mixer without utilizing the first mixer.

Following the variable if and the second mixer are the crystal filter and a three-stage fixed intermediate-frequency amplifier. Conversion to the fixed if of 500 kc is accomplished by injecting into the second mixer a 2 to 3-mc variable frequency oscillator signal. This oscillator signal combines with either of the two variable intermediate frequencies, 1.5 to 2.5 and 2.5 to 3.5 mc, to produce the difference frequency of 500 kc. The variable frequency oscillator is tuned by the kilocycle tuning control in step with all other circuits.

Stability of the vfo is assured by temperature-compensated components operating in a sealed and moisture-proof housing.

Separate diodes are used to produce automatic volume control and audio voltages. D-c amplification of the automatic volume control voltage is provided to obtain essentially uniform input to the detector. Audio power output is held within 3.5 db over signal input voltage ranges of five to 125,000 microvolts at the antenna terminals. A series type noise limiter clips modulation at 50-85 percent. This allows good reception in the presence of strong noise pulses.

5. REFERENCE DATA.

CONTRACT NUMBER AND DATE:	NObsr-52527, 22 June 1951
CONTRACTOR AND MANUFACTURER:	Collins Radio Co., Cedar Rapids, Iowa
COGNIZANT NAVAL INSPECTOR:	Assistant Inpsector of Navy Material, Cedar Rapids, Iowa
NUMBER OF PACKAGES INVOLVED, INCLUDING SPARE PARTS:	
TOTAL CUBICAL CONTENTS:	
TOTAL WEIGHT:	

OPERATING RANGE:	540 kc to 30.5 mc
TYPE OF RECEPTION:	AM, CW or MCW
CALIBRATION:	Direct reading in megacycles and kilocycles
TUNING:	Linear tuning with uniform bandspread
FREQUENCY STABILITY:	Dial calibration at room temperature is within 300 cps if the nearest 100-kc calibration point is used to adjust the fiducial.
TEMPERATURE RANGE:	-20°C (-4°F) to +60°C (140°F)
SENSITIVITY:	Band 1 - Less than 15 uv gives 1 watt with 10 db s/n
	Bands 2 to 30 - Less than 5 uv gives 1 watt with 10 db s/n
SELECTIVITY:	Total bandwidth is 5.5 to 6.5 kc at 6 db down and 17 to 20 kc at 60 db down. With crystal filter in, total bandwidth is 0.2 kc at 6 db down and 12 kc at 60 db down.
SPURIOUS FREQUENCY RESPONSE:	Down at least 40 db
AUTOMATIC VOLUME CONTROL:	Less than 3.5 db increase in audio power output with an increase in r-f signal from 5 to 125,000 uv
S METER:	Meter calibrated in 20, 40, 60, 80, and 100 db above avc threshold and -10 to +6-db audio level with 6 mw as reference.
NOISE LIMITER:	Series type ahead of the first audio stage
AUDIO POWER OUTPUT:	1-1/2 watts at 1000 cps with less than 15% distortion
AUDIO FREQUENCY RESPONSE (overall):	Not more than 3 db at 200 cps and not more than 7 db at 2500 cps
AUDIO OUTPUT IMPEDANCE:	4 and 600 ohms
I-F OUTPUT IMPEDANCE:	50 ohms
R-F INPUT IMPEDANCE:	Designed to operate into a high impedance whip or single-ended antenna
POWER REQUIREMENTS:	85 watts at 115 volts 45-70 cps. Same power required when reconnected for 230-volt, 45-70 cps operation

TABLE 1-1 EQUIPMENT SUPPPLIED

QUANTITY PER EQUIPMENT	NAME OF UNIT	NAVY TYPE DESIGNATION	OVERALL DIMENSIONS			VOLUME	WEIGHT
			HEIGHT	WIDTH	DEPTH		
1	Radio Receiver	R-388/URR	10-1/2	19	13	1.5	35
1	Cabinet (for above)	CY-1235/URR	12-3/8	21-1/8	13-1/8	2.0	20
1	Speaker	LS-199/U	10-9/16	15	8-7/8	0.82	12.5
2	Instruction Manual	NAVSHIPS 91678	11	8-1/2	1/2	0.027	

TABLE 1-2 EQUIPMENT AND PUBLICATIONS REQUIRED BUT NOT SUPPLIED

QUANTITY PER EQUIPMENT	NAME OF UNIT	NAVY TYPE DESIGNATION	REQUIRED USE	REQUIRED CHARACTERISTICS
1	Antenna		Receiving Antenna	Single ended or High impedance whip
1	115 volt line		Operation of R-388/URR	Single phase 45-70 cps 85 watt minimum

TABLE 1-3 SHIPPING DATA

SHIPPING BOX NO.	CONTENTS		OVER-ALL DIMENSIONS			VOLUME	WEIGHT
	NAME	DESIGNATION	HEIGHT	WIDTH	DEPTH		
			25	35	31	15.7	208

TABLE 1-4 ELECTRON TUBE COMPLEMENT

SYMBOL DESIGNATION	TUBE TYPE	FUNCTION
V101	6AK5	Radio-frequency amplifier
V102	6BE6	First mixer
V103	6BE6	Band 1 mixer
V104	6BA6	Calibration oscillator
V105	6AK5	High-frequency crystal oscillator
V106	6BE6	Second mixer
V107	6BA6	First 500 kc i-f amplifier
V108	6BA6	Second 500 kc i-f amplifier
V109	6BA6	Third 500 kc i-f amplifier
V110	12AX7	Detector and A. V. C. rectifier
V111	12AU7	A. V. C. amplifier and i-f output cathode follower
V112	12AX7	Noise limiter and first audio amplifier
V113	6AQ5	Audio power amplifier
V114	6BA6	Beat frequency oscillator
V115	5V4	Power rectifier
V116	OA2	Voltage regulator
V001	6BA6	Variable frequency oscillator
V002	6BA6	Oscillator isolation amplifier

SECTION 2
THEORY OF OPERATION

1. MECHANICAL DESCRIPTION.

a. BAND CHANGE. - The receiver covers the frequency range of 0.5 to 30.5 mc in 30 bands: 0.5 to 1.5, 1.5 to 2.5, and so on up to 30.5 mc. Each band is one megacycle wide. Circuits affected by band changes are the r-f amplifier grid, first, second, and third mixer grids, crystal selector, and crystal harmonic tuning circuits. The third mixer is switched in only on band 1 (0.5 to 1.5 mc). See figure 2-1.

Operations involved in the changing of bands consist of selecting the proper coils in these circuits by means of tap switches and changing the position of the tables holding the tuning slugs for the r-f amplifier and first mixer slug tables. All stages are permeability tuned by powdered iron slugs. (See figure 2-2). The r-f amplifier and first mixer slug tables change position a full megacycle in tuning each time a band is changed. This is true of all three slug tables, which tune L104 through L113. However, the tap switches select the proper set of coils for the frequency desired.

Slug tables are driven from two sources: the main tuning knob and the BAND CHANGE knob. These two driving sources are connected to the slug tables through a differential gear mechanism. This is necessary since the coils for bands 4 to 7, 8 to 15, and 16 to 30 cover these tuning ranges with one complete excursion of the tuning slugs. For instance, the band 4 to 7 slug table tunes its associated coils through four megacycles; in one megacycle jumps when operated by the BAND CHANGE knob, and in complete coverage in between when operated by the tuning knob. An interesting feature of the differential gearing is its ability to combine the movements of the two driving sources so that the slug table is moved exactly one megacycle in each band change. The other slug tables operate similarly to the 4 to 7 table, except that the band 8 to 15 table tunes its associated coils through 8 mc, and the band 16 to 30 table tunes its associated coils through 15 mc. These three slug tables are moved simultaneously by means of separate cams.

Switch sections of the band switch are ganged with the BAND CHANGE knob through an over-travel coupler. This over-travel coupler drops the band switch at band 16 while the r-f slug tables continue to operate one position for each band as usual. Refer to figure 2-2. This mechanical diagram shows the gears and connecting shafts associated with band change and tuning. Shafts associated with changing bands are C, D, G, H, I, K, and the overtravel shaft. On band 1, radio frequency coils L101 and L110 are switched by means of the BAND CHANGE knob through the overtravel shaft and shaft G. On bands 2 and 3, the r-f coils are selected by the BAND CHANGE knob through the overtravel shaft and shafts G and K, the coils in the variable i-f section, L116 through L119, being used as additional r-f coils on these bands. On bands 4 to 7, the coils are selected by the BAND CHANGE knob through the overtravel shaft and shaft G, and the position of the slug table is changed through shafts C and D. On these bands the same coils are used for each band. Band change is accomplished by moving the tuning slug in the coil an amount equal to one megacycle in frequency. The slug moves in the coil 0.250 inches for a one megacycle change. On bands 8 to 15, the r-f coils are changed by the overtravel shaft and shaft G, and the position of the slug table is changed one megacycle per band through shafts C and D. The movement of the slug table for a one megacycle change is 0.125 inches. On bands 16 to 30, the r-f coils are switched through the overtravel shaft and shaft G to position 16 where the band switch remains for bands 16 to 30 while the overtravel coupler allows shaft G to rotate through to the thirtieth band. The slugs in the r-f coils are driven through shafts C and D. The slugs travel 0.625 inches during band change. During operation on any band between 4 and 30 the variable i-f channel is alternated from one variable if to the other by shafts G and K. Crystals are selected by

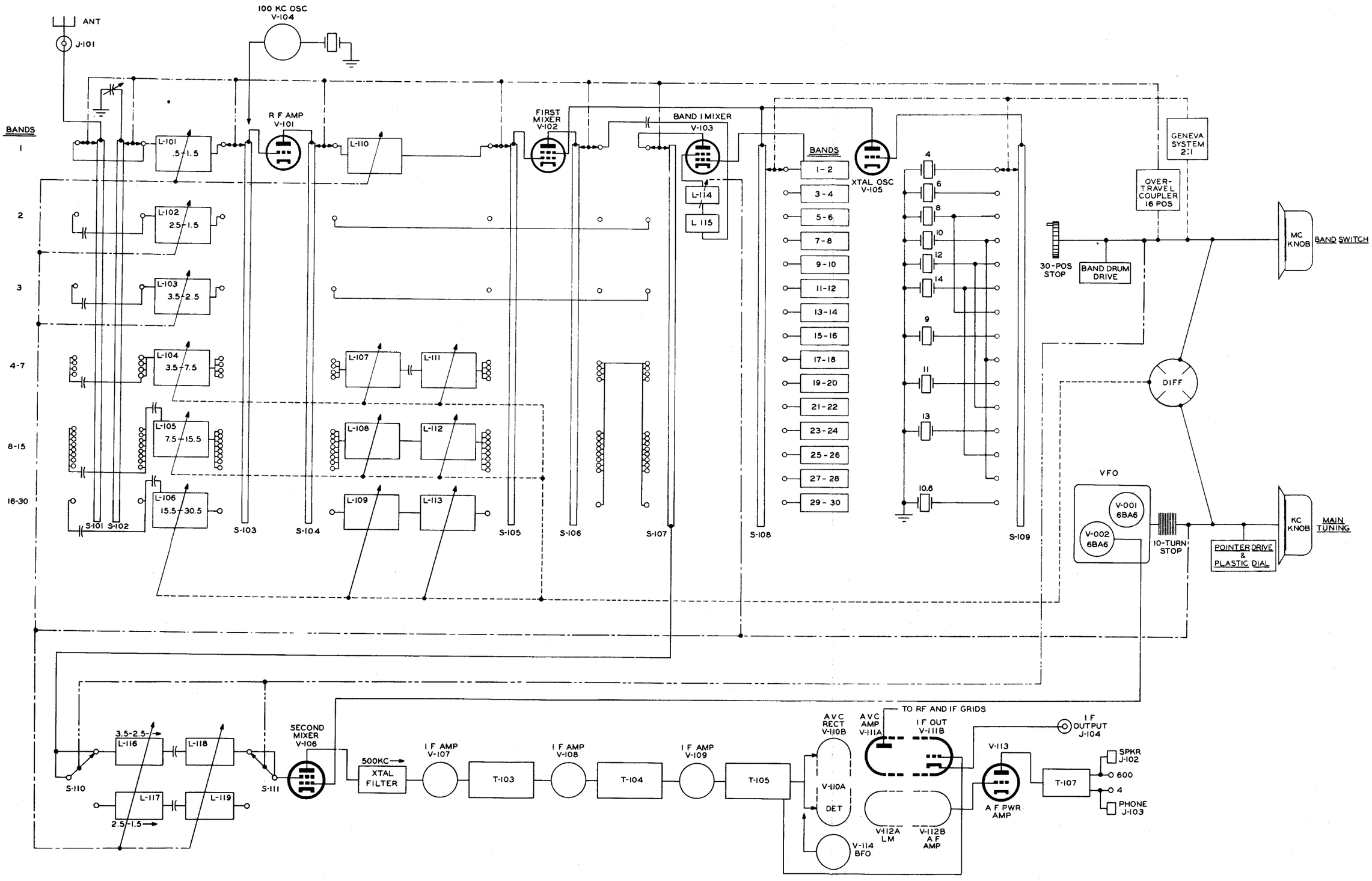


Figure 2-1. Band Change and Tuning System, Block Diagram

NOTE:
NUMBERS SHOWN ON GEARS INDICATE NUMBER OF TEETH.

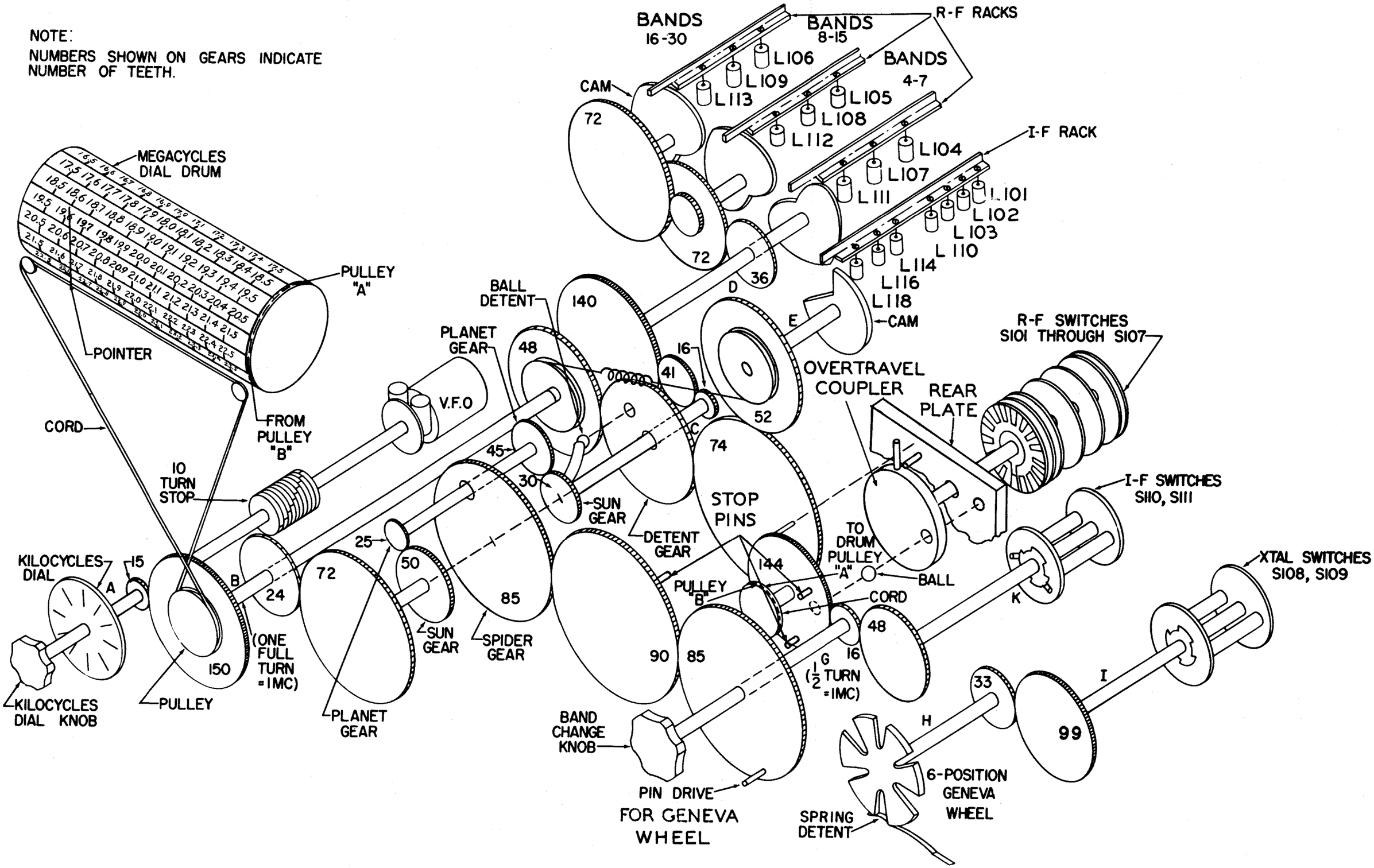


Figure 2-2. Mechanical Functional Diagram

operation of the BAND CHANGE knob through the 15-position Geneva system and shafts G, H, and I.

b. TUNING. - The r-f, mixer and variable i-f coils, as well as the variable frequency oscillator coil, are permeability-tuned by powdered iron cores. While tuning, these slugs move in and out of the coils at a rate determined by a cam or by a lead screw. Four slug racks or tables are used in the receiver to perform the function of tuning the r-f, mixer and variable i-f stages. The group of three slug tables in the rear position of the chassis tunes the r-f and first mixer stages when the receiver is operating in the 3.5 to 30.5 mc frequency range (bands 4 to 30). The fourth slug table, located at the right hand edge of the receiver, tunes the r-f stage, the first mixer grid, the third mixer grid, and the variable i-f coils when receiving in the range 0.5 to 1.5 mc. It tunes the r-f stage and variable i-f coils L116 and L118 when receiving in the range 1.5 to 2.5 and 2.5 to 3.5 mc. When receiving in the range 3.5 to 30.5 mc, this slug table tunes only the variable i-f coils L116 and L118. During tuning, positions of the slug tables are varied by a system of gears and cams; see figure 2-2.

On band 1 (0.5 to 1.5 mc) coils L101 and L110 are tuned through this frequency range by the main tuning knob through shafts A, B, C, and E. On bands 2 and 3 (2.5 to 1.5 and 3.5 to 2.5 mc), tuning is done by the main tuning knob through the same shafts -- A, B, C, and E. On band 4 to 7, the main tuning knob tunes coils L104, L107, and L111 over one-fourth of their tuning range through shafts A, B, C, and D and the differential shafts. The BAND CHANGE knob moves this same rack through shafts G, C, D, and the differential in four steps. Each step is equal to one-fourth of the coils' tuning range and the shafts are positioned by means of the spring detent. Thus, L104, L107, and L111 are tuned 1-megacycle steps by the BAND CHANGE knob, and between these steps are tuned by the main tuning knob.

On bands 8 to 15, coils L105, L108 and L112 are tuned through shafts A, B, C, D, and the differential. Each of the two variable frequency i-f channels covers a 1-megacycle range and is tuned by means of the main tuning knob through shafts A, B, and E. The proper channel is selected by the BAND CHANGE knob through shafts G and K.

c. FREQUENCY INDICATION. - The one-megacycle band on which the receiver is operating is indicated on the drum dial that is rotated by the BAND CHANGE knob through shaft G. The 1-megacycle divisions are indicated by a pointer on the slide rule dial. This pointer is driven from the main tuning knob through shaft A. The kilocycle tuning control covers each of the one-megacycle bands with ten turns of a 100-division circular dial calibrated at one kilocycle intervals. Two scales are necessary on this dial because bands 2 and 3 run in opposite directions. Mechanical stops are mounted on the control shafts to prevent overtravel.

2. ELECTRICAL DESCRIPTION.

The receiver is a complete coverage superheterodyne receiver capable of AM and CW reception in the frequency range of 0.5 to 30.5 megacycles. The set covers the tuning range in 30 bands, each band one megacycle wide. Various portions of the tuning spectrum use single, dual, and triple conversion. Three stages of intermediate-frequency amplification and a crystal filter produce the desired degree of selectivity. The receiver also features a low impedance avc, noise limiter, two stages of audio amplification, and a 100-kc frequency spotter or calibrator. See figure 2-3.

The receiver employs dual conversion on most bands and single or triple on others in order to obtain full coverage economically with a minimum of image and other spurious responses on all bands. Band 1, 0.5 to 1.5 mc, uses triple conversion, bands 2 and 3, 1.5 to 3.5 mc, use single conversion, and bands 4 to 30, 3.5 to 30.5 mc, use dual conversion. Each band is numbered on the band's center frequency. For example, band 1 covers 0.5 to 1.5 mc, band 2 covers 1.5 to 2.5 mc, and so on.

On band 1, where triple conversion is necessary, and intermediate mixer is employed between the first and second mixers used in the regular dual conversion scheme. See figure 2-4. The 0.5 to 1.5 - mc carrier on band 1 is fed to the first mixer where it is beat against a 12-mc signal from the h-f crystal oscillator to produce an 11.5 to 10.5-mc signal. This signal is beat against an 8-mc signal in the intermediate mixer to produce the variable if of 3.5 to 2.5 mc. The variable if is then combined with the 3 to 2-mc variable frequency oscillator output to produce the fixed 500-kc if.

On bands 2 and 3, the 1.5 to 3.5-mc carrier is fed directly to the second mixer without intermediate conversion steps since these bands cover the same

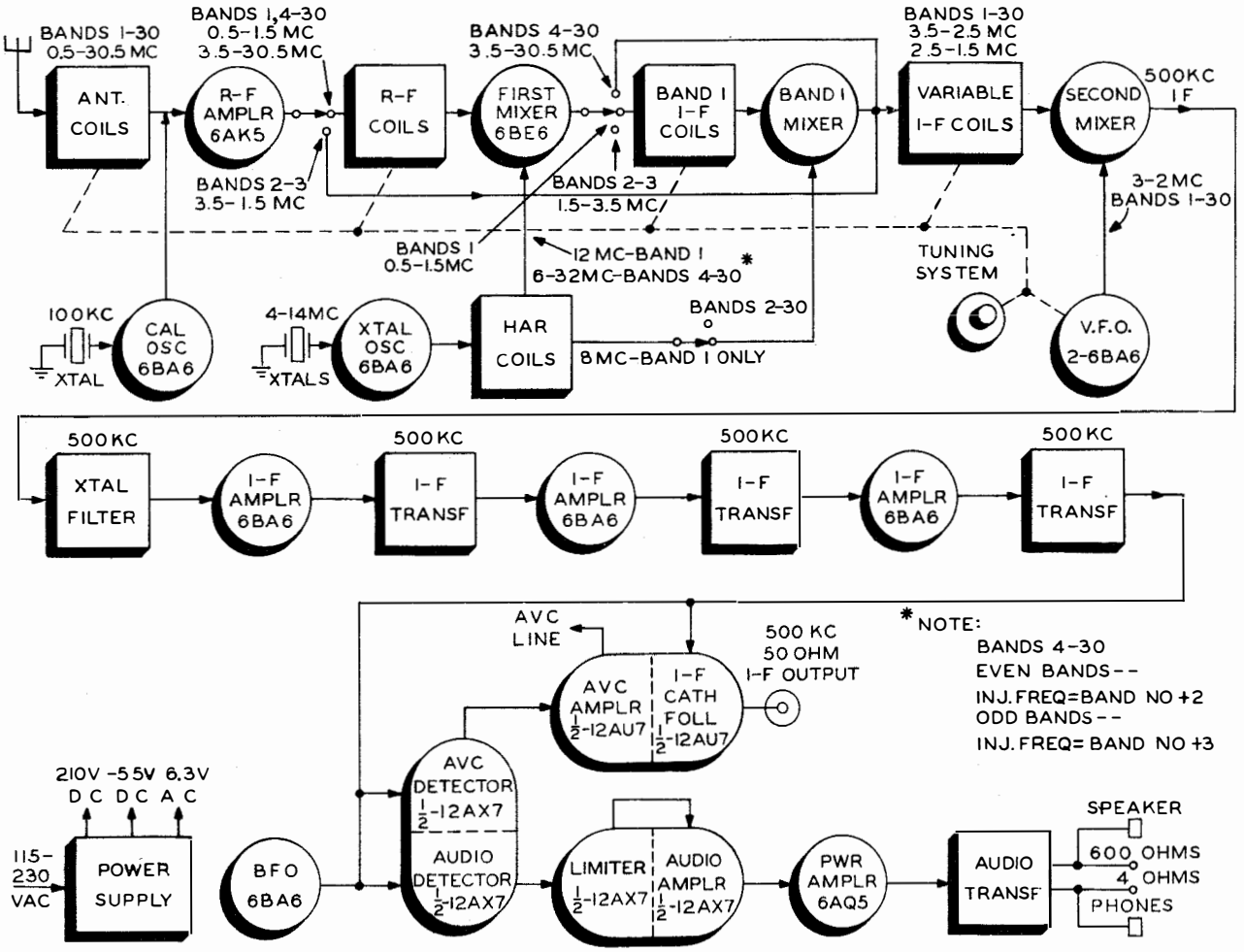


Figure 2-3. Overall Block Diagram

range as the variable if. The signal is then directly beat with the vfo output to produce the fixed 500-kc if. See figure 2-4.

On bands 4 to 30, the regular dual conversion scheme is employed. On the even numbered bands the signal frequency is beat against the high frequency oscillator output to produce a variable if of 2.5 to 1.5 mc. On the odd numbered bands a variable if of 3.5 to 2.5 mc is produced. The variable if is then combined in the second mixer with the vfo output to produce the 500-kc fixed if.

3. CIRCUIT ANALYSIS.

a. RADIO FREQUENCY AMPLIFICATION. - One stage of radio frequency amplification is used on all bands. See block diagram, figure 2-3. The circuit is a conventional r-f amplifier circuit employing a miniature r-f pentode tube 6AK5(V101). This tube type is used because of its low noise and good sensitivity characteristics at high frequencies.

The control grid circuit of this stage is tuned on all bands, the tuned circuits being selected by r-f switch, S103. (See figure 2-1.) The antenna is capacitively coupled to the tuned circuits in the control grid through r-f switches, S101 and S102.

When operating in the American broadcast band (band 1), the plate circuit of the r-f amplifier is impedance-coupled to the grid circuit of the first mixer by resistor R105, and capacitor, C117. (See figure 7-16.) On bands 2 and 3 the plate of the r-f amplifier tube is switched directly to the primary coils of the variable i-f tuner, where additional selectivity is obtained. Single conversion is used on these bands. When operated on bands 4 to 30, the plate circuit is tuned and capacitively coupled to a

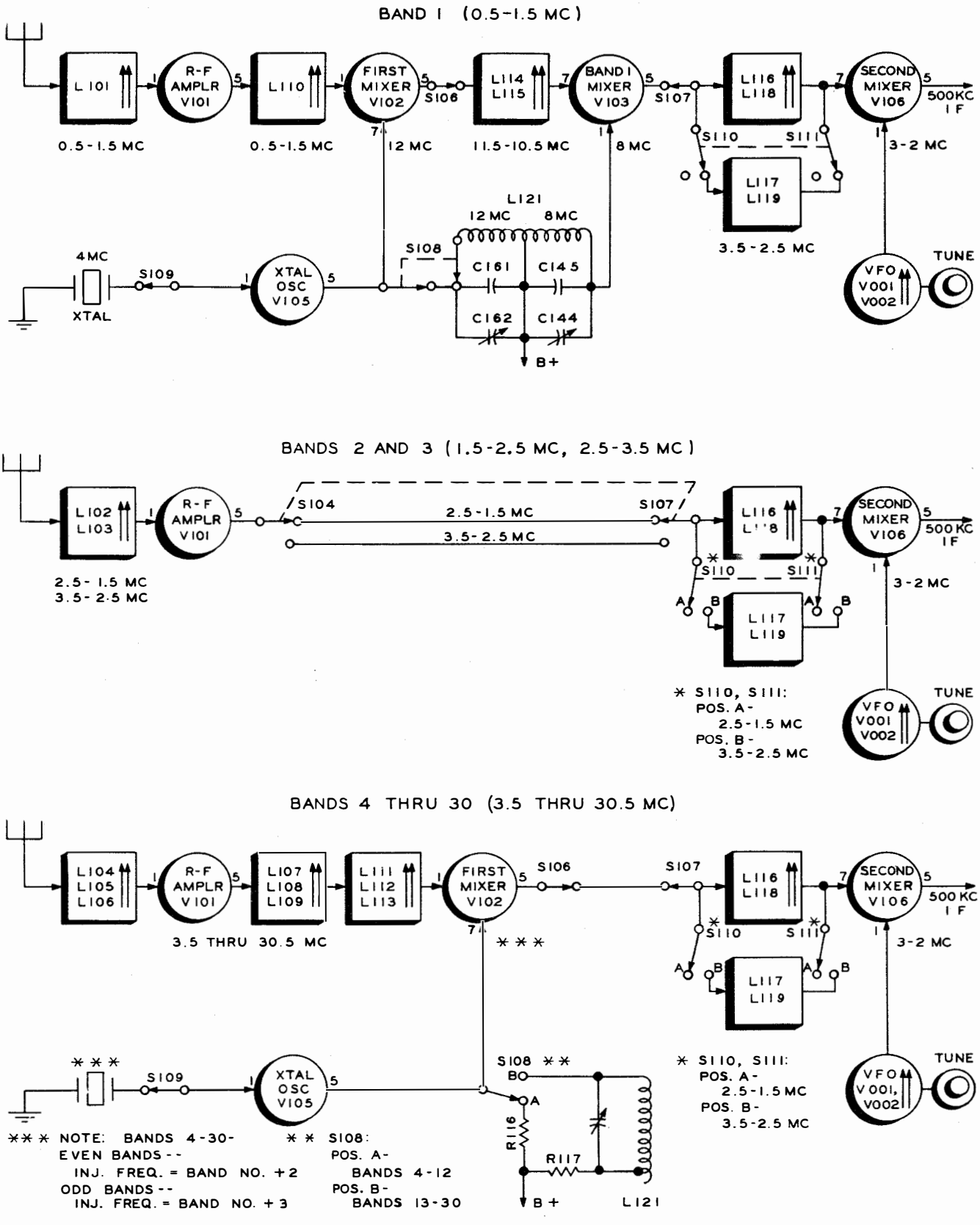


Figure 2-4. Frequency Conversion Circuits

corresponding tuned circuit in the grid of the first mixer stage.

The r-f coils and associated trimmers in the plate circuit are selected by the BAND CHANGE knob and tuned through the various band ranges via the slug table arrangements. The r-f coils for bands 1, 2, and 3 are mounted on the variable i-f slug table which is at the extreme right hand edge of the receiver as viewed from the front. See figure 5-1. The coils for bands 4 to 30 are clustered at the rear of the chassis and are tuned by slugs mounted on the three r-f and mixer slug tables.

b. MIXER STAGES.

(1) FIRST MIXER. - The first mixer stage uses a miniature pentagrid converter tube 6BE6 (V102). This stage is used on all bands except bands 2 and 3, where only one conversion stage is necessary.

The grid 1 circuit (pin 1) receives the r-f signal from the r-f amplifier stage. On band 1, this grid circuit is tuned by L110, C118, and C119, and impedance coupled to the plate of the r-f amplifier through C117 and R105. On bands 4 through 30, the circuit is tuned by the proper coil and trimmer groups selected by the r-f switch S104, and capacitively coupled to corresponding tuned circuits in the plate of the r-f amplifier stage.

The grid 3 (pin 7) input is obtained from the plate of hfo (V105). On bands 4 through 30, the frequency of the heterodyning signal applied to this grid is such as to produce an output frequency which falls in one of the two variable i-f ranges, (2.5 to 1.5 mc or 3.5 to 2.5 mc), depending on which of the bands between 4 and 30 is being operated. On band 1, a 12-mc heterodyning signal is applied to this grid, the output of the stage then being in the range of 11.5 to 10.5 mc, which is again heterodyned in the band 1 mixer stage.

The plate output frequency of this stage is then shown to be in the variable i-f spectrum on bands 4 through 30 and the output applied directly to the tuned variable i-f coils. On band 1, the plate circuit is tuned to the range of 11.5 to 10.5 mc by components L114, L115, C139, and C140, and the output applied for further conversion to the Band 1 Mixer (V103).

(2) SECOND MIXER STAGE. - The second mixer stage also employs a miniature pentagrid converter Tube 6BE6(V106). The circuit is conventional. Input to grid 3 (pin 7) of this stage is always either 3.5 to 2.5 mc or 2.5 to 1.5 mc from the variable i-f coils L116/L118 and L117/L119. The 3.0 to 2.0-mc output of the vfo is fed into the second mixer tube at grid 1 (pin 1) to heterodyne against the input signal and produce the 500-kc intermediate frequency. This mixer stage is used on all bands.

(3) BAND 1 MIXER. - This mixer stage is used only when receiving on band 1, where triple conversion is needed. A miniature pentagrid converter Tube 6BE6 is used in this stage. Grid number 3 (pin 7) of this tube is excited by an 11.5 to 10.5 - mc signal from the plate circuit of the first mixer tube, V102 and grid number 1 (pin 1) is excited by a heterodyning 8-mc signal from the crystal oscillator. The output of the third mixer is then 3.5 to 2.5 mc, which is fed to the grid of the second mixer through the variable i-f coils. This conversion scheme takes place only when receiving on band 1. This stage is not used on any other bands.

c. HIGH FREQUENCY OSCILLATOR. - The high frequency oscillator uses a miniature pentode Tube 6AK5 in a modified Colpitts oscillator circuit. No tuned coils are needed to make the circuit oscillate because in-phase feedback voltage is produced across r-f choke, L120. See figure 7-16. Ten quartz crystals are used to control the frequency of the oscillator output for the various bands. At the minimum, each crystal is switched in for two adjacent bands, i. e. 1-2, 3-4, 5-6, and so on, since the crystal switch S109 changes position only on odd numbered bands. The harmonics of certain crystals are used also for other higher bands. For example, the 8-mc crystal used for bands 5 and 6 is also used for bands 13 and 14 by utilizing its second harmonic at 16 mc. In those instances where harmonic operation is used, (bands 1, and 13 through 30), a tuned circuit picks off the correct harmonic. This tuned circuit is in the plate circuit of the high frequency oscillator, V105, and consists of the section of coil L121 in the hfo plate circuit and a number of tuning capacitors. The latter are selected by switch pie S108.

The circuit consisting of the section of L121 in the grid circuit of the band 1 mixer and capacitors C144 and C145, is tuned to 8 mc and is used when operating on band 1 to furnish the band 1 mixer with an 8-mc

heterodyning signal (second harmonic of the 4-mc crystal). At the same time, the other section of L121 and associated trimmers is tuned to 12 mc (third harmonic of the 4-mc crystal) to furnish the first mixer with the required 12-mc heterodyning signal. A list of the crystals and the bands upon which they function is outlined as follows:

CIRCUIT FREQUENCY

CRYSTAL FREQUENCY	RECEIVER FREQUENCY	BAND	INJECTION FREQUENCY
4	0.5 to 1.5	1	8 and 12
	1.5 to 2.5	2	None
6	2.5 to 3.5	3	None
	3.5 to 4.5	4	6
8	4.5 to 5.5	5	8
	5.5 to 6.5	6	8
	12.5 to 13.5	13	16
	13.5 to 14.5	14	16
10	6.5 to 7.5	7	10
	7.5 to 8.5	8	10
	16.6 to 17.5	17	20
	17.5 to 18.5	18	20
	26.5 to 27.5	27	30
	27.5 to 28.5	28	30
12	8.5 to 9.5	9	12
	9.5 to 10.5	10	12
	20.5 to 21.5	21	24
	21.5 to 22.5	22	24
14	10.5 to 11.5	11	14
	11.5 to 12.5	12	14
	24.5 to 25.5	25	28
	25.5 to 26.5	26	28
9	14.5 to 15.5	15	18
	15.5 to 16.5	16	18
11	18.5 to 19.5	19	22
	19.5 to 20.5	20	22
13	22.5 to 23.5	23	26
	23.5 to 24.5	24	26
10.67	28.5 to 29.5	29	32
	29.5 to 30.5	30	32

The above chart shows how the fundamentals and harmonics of the crystals are used to obtain a 1.5 to 2.5-mc input to the variable i-f coils on even numbered bands and a 2.5 to 3.5-mc input on odd number bands. These signals are then beat against the 2 to 3-mc output of the vfo in the second mixer to obtain the 500-kc i-f signal.

d. VARIABLE INTERMEDIATE FREQUENCY. - The variable intermediate frequency section consists of two channels, one for a frequency of 2.5 to 1.5 mc and the other for 3.5 to 2.5 mc. The 2.5 to 1.5-mc if is used on the even numbered bands which employ double conversion, and the 3.5 to 2.5-mc if is used on the odd numbered bands which employ double conversion. The 2.5 to 1.5-mc if is also used on band 2 as an additional tuned r-f circuit. The 3.5 to 2.5-mc if is used on band 3 as an additional tuned r-f circuit and on band 1, in the usual application, as a variable if.

Using two variable i-f channels in this manner cuts in half the number of crystals needed by the high frequency oscillator, since each crystal's fundamental frequency or useful harmonic is used for two bands. Inductors L116 and L118 form the lower frequency i-f coils (2.5 to 1.5 mc) and are the coils in which the tuning slug travels. The 3.5 to 2.5-mc if is obtained by shunting L117 across L116, and L119 across L118 to lower the inductances of L116 and L118. Switch sections S110 and S111 alternately switch the shunting coils in and out as the BAND CHANGE knob is rotated. The variable i-f coils are situated in the grid circuit of the second mixer stage.

e. VARIABLE FREQUENCY OSCILLATOR. - The receiver circuits described so far have the function of receiving the spectrum in 1-megacycle bands that are presented to the grid of the second mixer. The scheme for obtaining high stability is completed by a method of heterodyning the signals to a lower, fixed intermediate frequency. In this application, a highly stabilized 3 to 2-mc permeability tuned oscillator is employed to heterodyne against the 2.5 to 1.5-mc and the 3.5 to 2.5-mc outputs of the variable frequency if. The resulting 500-kc signal is amplified by the 500-kc i-f amplifier.

The coil in the oscillator is cam wound to produce extremely linear frequency change with linear movement of the tuning slug. The circuit is temperature-compensated and the components are sealed against changes in humidity. Ten turns of the oscillator lead screw produce a linear frequency change of one megacycle. The inductance of the oscillator coil is trimmed by an iron core series inductor, the value of which is adjusted at the factory and sealed. See figure 7-15.

A Tube 6BA6(V002), is used in a buffer stage following the oscillator tube, is for isolation purposes and is an integral part of the oscillator unit.

For stabilization purposes, supply voltages for the oscillator unit are regulated by Tube OA2(V116).

f. CRYSTAL FILTER. - Selectivity of the receiver is improved greatly by use of a crystal filter in the 500-kc i-f channel. The crystal filter circuit consists primarily of 500-kc i-f input transformer T101, a 500-kc crystal, and a high impedance tuned circuit T102, connected as shown in figure 2-5. When SELECTIVITY switch S114 is in position 0, the crystal is shorted and T101 is connected directly to T102. Thus, there is no crystal filter action when S114 is in position 0 and selectivity is determined by the receiver's tuned circuits above. When S114 is in any other position, crystal filter action takes place -- position 4 giving the greatest selectivity.

To analyze the operation of this circuit consider only the loop containing T101 secondary, crystal Y112, and tuned circuit T102. This loop is shown in figure 2-6, considering SELECTIVITY switch to be in position 1. The secondary of T101 is a low impedance coil with a grounded center tap. The primary of T101 is tuned to 500 kc. Consider crystal Y112 in series with T102 as a voltage divider, grid voltage to V107 being taken from the point between Y112 and T102 (point A, figure 2-6). For an i-f signal of exactly 500 kc, impedance of the crystal is very low ---- in the order of 2000 to 4000 ohms. The impedance of T102 is very high----in the order of 100,000 ohms. Thus, for an input to the filter section of exactly 500 kc, nearly all of the voltage output of T101 appears across T102 and is applied to the grid of the first i-f amplifier, V107.

For frequencies a few kilocycles further away from 500 kc, the impedance of the crystal increases greatly. At the frequency where the impedance of the crystal equals that of T102, one half the output of T101 is applied to the grid of the first i-f amplifier. As the frequency deviates farther from the 500-kc value, successively smaller portions of the signal are applied to the first i-f amplifier, V107. This

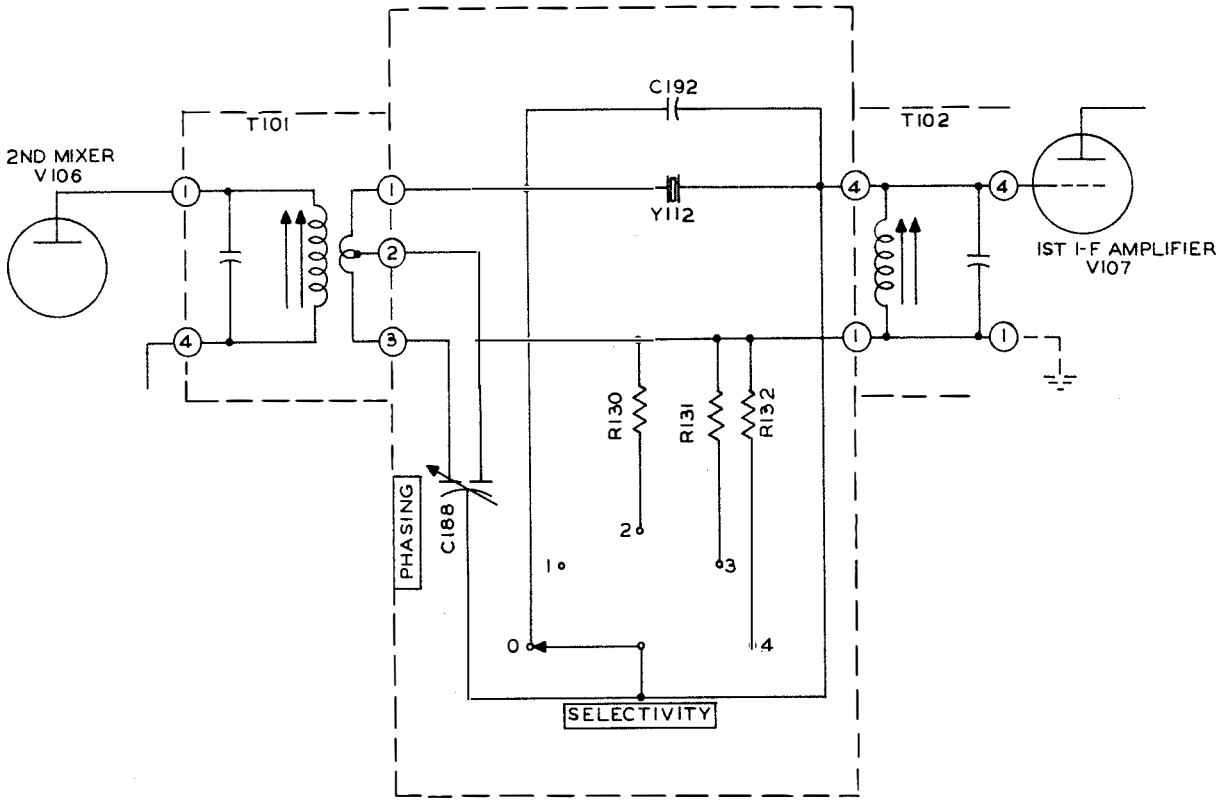


Figure 2-5. Crystal Filter

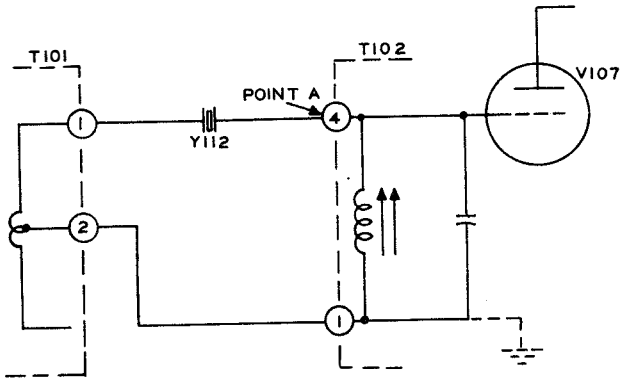


Figure 2-6. Crystal Filter - Simplified, Position 1

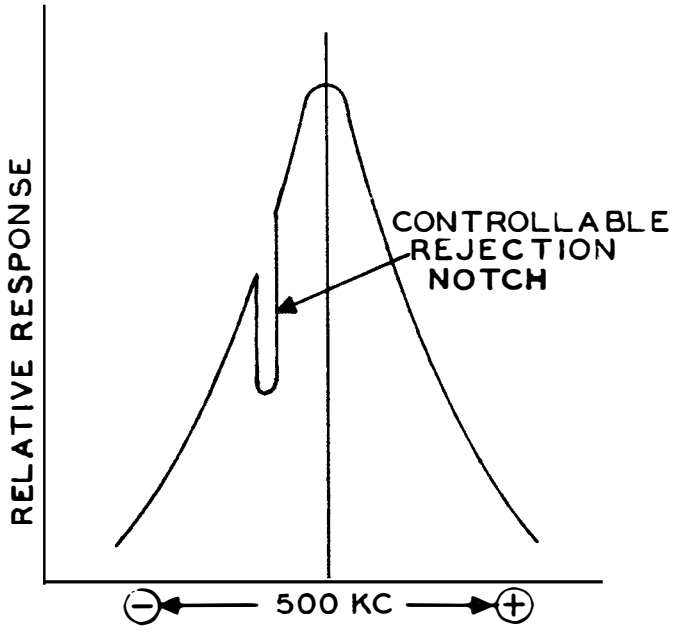


Figure 2-7. Crystal Phasing Rejection Notch

results in a narrower i-f response curve, or in greater selectivity, than that obtained without crystal filtering.

Switching the SELECTIVITY control to positions 2, 3, or 4, merely shunts T102 with successively smaller values of resistance which effectively lower the impedance to T102. Thereby, due to the voltage divider action with the crystal, less output is applied to the grid of the first i-f amplifier. As the effective impedance of T102 decreases, selectivity increases. In the sharpest position the bandwidth is from 200 to 300 cps at 6 db down.

The primary purpose of the crystal phasing capacitor, C188, is to produce a controllable rejection notch in the i-f response curve so that unwanted heterodynes may be tuned out. Referring to figure 2-5, the section of C188 connected to the bottom end of T101 secondary provides a capacitive path around the crystal that balances out the shunt capacitance of the crystal in its holder and external capacitor C187. Varying C188 on either side of the balance point varies the anti-resonant frequency of the crystal circuit within 3 kc on either side of 500 kc. Since the impedance of the crystal circuit at anti-resonance is extremely high, the crystal filter rejects signals at the anti-resonant frequency. Thus at anti-resonant frequency points, the phasing action gives a sharp dip in response and the selectivity curve takes on a notch as illustrated in figure 2-7. This notch can be varied through the response bandwidth by positioning the phasing control.

In order to avoid detuning the tuned circuit T102 when varying C188, a section of C188 is shunted across T102. Since C188 has a split stator and single rotor, the total shunt capacitance across T102 remains practically constant as the setting of C188 is varied.

g. SECOND INTERMEDIATE FREQUENCY AMPLIFIER SECTION. - The second intermediate frequency amplifier section is fixed-tuned to 500 kc. It consists of three stages each employing a Tube 6BA6. Input tube, V107, is excited by the crystal filter output coil, T102. Permeability-tuned transformers, with output taps taken off the secondary coils near the ground end, are used to produce the desired i-f selectivity. All three stages are supplied with avc voltage. Plate and fixed screen voltages in these three stages are controlled by the ON-STANDBY-OFF switch and the remote operation relay, K101, which remove these voltages to render the receiver inoperative during transmission periods.

h. DETECTOR. - The detector in the receiver consists of one half of a dual triode Tube 12AX7(V110), pin numbers 6, 7, and 8. The circuit, as shown in figure 7-16, uses the tube as a diode, the grid being tied to the plate. Rectificiation takes place between the cathode and plate, with resistors R150 and R151 acting as load resistors and C202 supplying the necessary r-f filtering.

i. NOISE LIMITER. - A series type noise limiter is used in the receiver. This limiter employs one-half (pins 1, 2, and 3) of a dual triode Tube 12AX7 (V112). Refer to figure 2-8. Due to the a-c loading of the detector, heavy noise impulses are automatically clipped from the positive audio peaks in the detector. The noise appearing on the negative side of the audio cycle is clipped by the noise limiter.

In operation, a negative voltage produced by rectification of the carrier is developed across capacitor C205C. This voltage cannot change rapidly due to the value of the time constant formed by C205C and R152. This negative potential is placed upon the cathode of the noise limiter tube through R153. The cathode is then negative with respect to the plate of the noise limiter tube, due to the voltage divider action of R150 and R151, and current flows in the tube. This current is modulated by the audio which then appears on the noise limiter cathode to which the grid of the audio amplifier section of V112 is connected. The noise limiter diode will conduct as long as the cathode is negative with respect to the plate.

However, should a heavy noise impulse be received, the plate would be driven negative faster than the cathode could follow due to the time constant of R152 and C205C. If the plate is driven more negative than the cathode, the tube will cease to conduct and no audio will reach the grid of the following audio tube. The audio cannot reach the cathode of the limiter tube directly from the diode load because of the filtering action of R152 and C205C. The value of modulation at which the limiter clips can be adjusted by changing the value of some of the components in the circuit. In this receiver, limiting starts between 50 and 85 percent modulation. Switch S116 bypasses the signal around the noise limiter when receiving conditions do not require its use.

j. AUTOMATIC VOLUME CONTROL. - The pro-

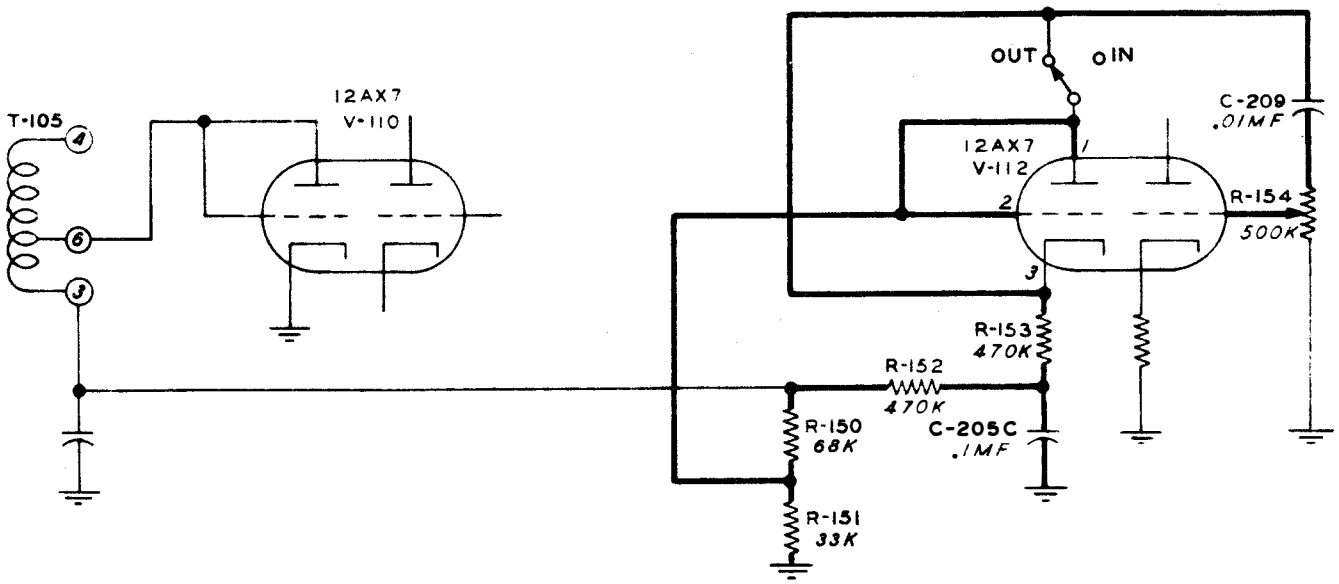


Figure 2-8. Noise Limiter Circuit

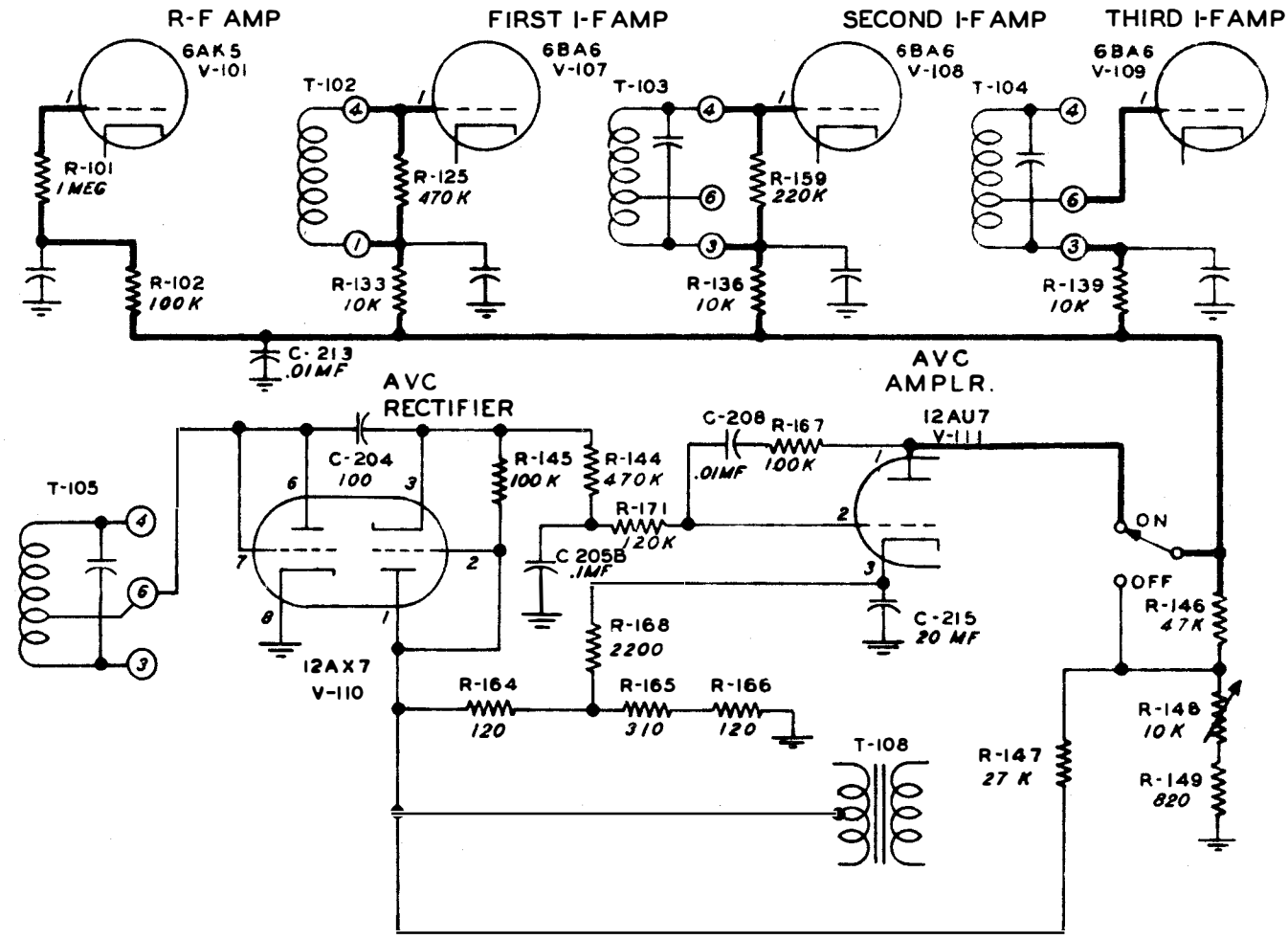


Figure 2-9. AVC Circuit

blem of blocking that is created by strong signals or heavy static is eliminated by use of an amplified avc system and a low impedance avc line. Refer to figure 2-9. The second triode section of V110 is used as an avc rectifier to produce control voltage for the avc amplifier which uses one half of dual triode V111. The avc voltage that is applied to grids of the controlled tubes is produced when plate current flowing through one-half of avc amplifier tube V111 causes a voltage drop across resistor R146. Plate voltage for the amplifier half of V111 is obtained from the voltage drop across resistors R165 and R166, which are in series with the center tap of the power transformer to ground. However, V111 will not draw plate current when there is no signal input to the receiver because of approximately 11 volts of bias that is placed upon its grid by the voltage drop through R164. This bias voltage for V111 is taken from the end of R145, through which the rectified carrier flows in opposition to the bias voltage.

Thus, when the rectified carrier becomes strong enough to overcome the bias voltage on V111, V111 will draw plate current and produce a voltage drop across R146, thereby producing avc voltage in proportion to the strength of the received signal. The bias on the grid of V111 is high enough to produce a delay in the generation of avc voltage and thus allows the receiver to function at full sensitivity on weak signals. Resistor R144 and capacitor C205B form the time constant in the avc circuit. R171, C208, and R167, are used in a degenerative circuit to prevent the avc amplifier tube from responding to low audio frequencies.

Avc is turned off by opening the plate circuit of avc amplifier tube V111. Tubes controlled by avc bias include the r-f amplifier V101 and the 500-kc i-f amplifier tubes, V107, V108, and V109.

k. AUDIO AMPLIFIER. - Two stages of audio amplification are employed in the receiver. The first stage utilizes the second triode section of V112 in a resistance-coupled amplifier arrangement. A miniature pentode power amplifier Tube 6AQ5 is used in the audio output stage. This stage has fixed bias obtained from the voltage drop produced across R166 in the center tap lead of the high voltage transformer secondary. The secondary of the audio output transformer has both 600-ohm and 4-ohm outputs. Both outputs are terminated on the rear of the chassis at terminal strip E102. Plug-in connections to both outputs are also made on the front panel.

l. 50 OHM I-F OUTPUT. - One-half of the dual triode V111 supplies a 50-ohm, 500 kc i-f signal to coaxial connector J104 on the rear of the chassis. This section of V111 is connected as a cathode follower. Excitation is obtained from the voltage drop across R178, which is connected in a series circuit across the secondary of i-f transformer T105.

m. 100-KC CALIBRATOR OSCILLATOR. - This calibrator is included with the receiver for use when extreme accuracy of calibration in the order of 200 cycles is desired. It is coupled to the grid of r-f amplifier tube V101, and is made operable when the CALIBRATE-ON-OFF switch S111 is turned on. The calibrator utilizes a Tube 6BA6 in a Pierce circuit, a low drift 100-kc crystal between the control grid and screen, and a 5-25 uuf capacitor C169 between the grid and ground. The capacitor permits the making of small frequency corrections that set the calibrator to zero beat with a primary frequency standard. Variable capacitor C224 on the front panel provides for fine adjustment of frequencies.

n. BEAT FREQUENCY OSCILLATOR. - The receiver is equipped with a bfo for CW reception. This oscillator is a modified Hartley circuit employing electron coupling. A pentode Tube 6BA6 is used. The output frequency is 500±3 kc, which is beat against the 500-kc if signal to produce an audio tone. Pitch is varied by the BFO PITCH control on the front panel. This control varies the capacitance in the oscillator control grid circuit and thus varies the frequency of oscillation. The BFO is turned off by grounding the screen grid.

o. POWER SUPPLY. - The receiver is equipped with a power transformer that is connected for a 115-volt source. However the transformer can be used on a 230-volt source by re-connecting the primary winding in series. See figure 7-16. The power supply is capable of producing 220 d-c volts at 125 ma. A two-section choke input filter is used following a 5V4 high vacuum rectifier. The filter consists of a 3-henry input choke, a 5-henry output choke, and two 35-mfd-filter capacitors. B+ for the audio output is taken from the junction of the two chokes. The receiver's ON-OFF switch, and a 1.5 ampere, slow-blow fuse are located in the primary circuit of the power supply. 6.3 volts a-c are supplied for the tube filaments and dial lights from a winding on the power transformer.

SECTION 3
INSTALLATION AND INITIAL ADJUSTMENT

1. UNPACKING PROCEDURE.

No special procedure is necessary in unpacking this equipment other than exercising the normal care essential to the safeguarding of electronic equipment. Refer to figure 3-1.

2. INSTALLATION.

The receiver cabinet is designed for table mounting. Outline dimensions of the cabinet and speaker are given in figure 3-2. Cabinet dimensions are: width, 21-1/8 inches; height, 12-3/8 inches; and

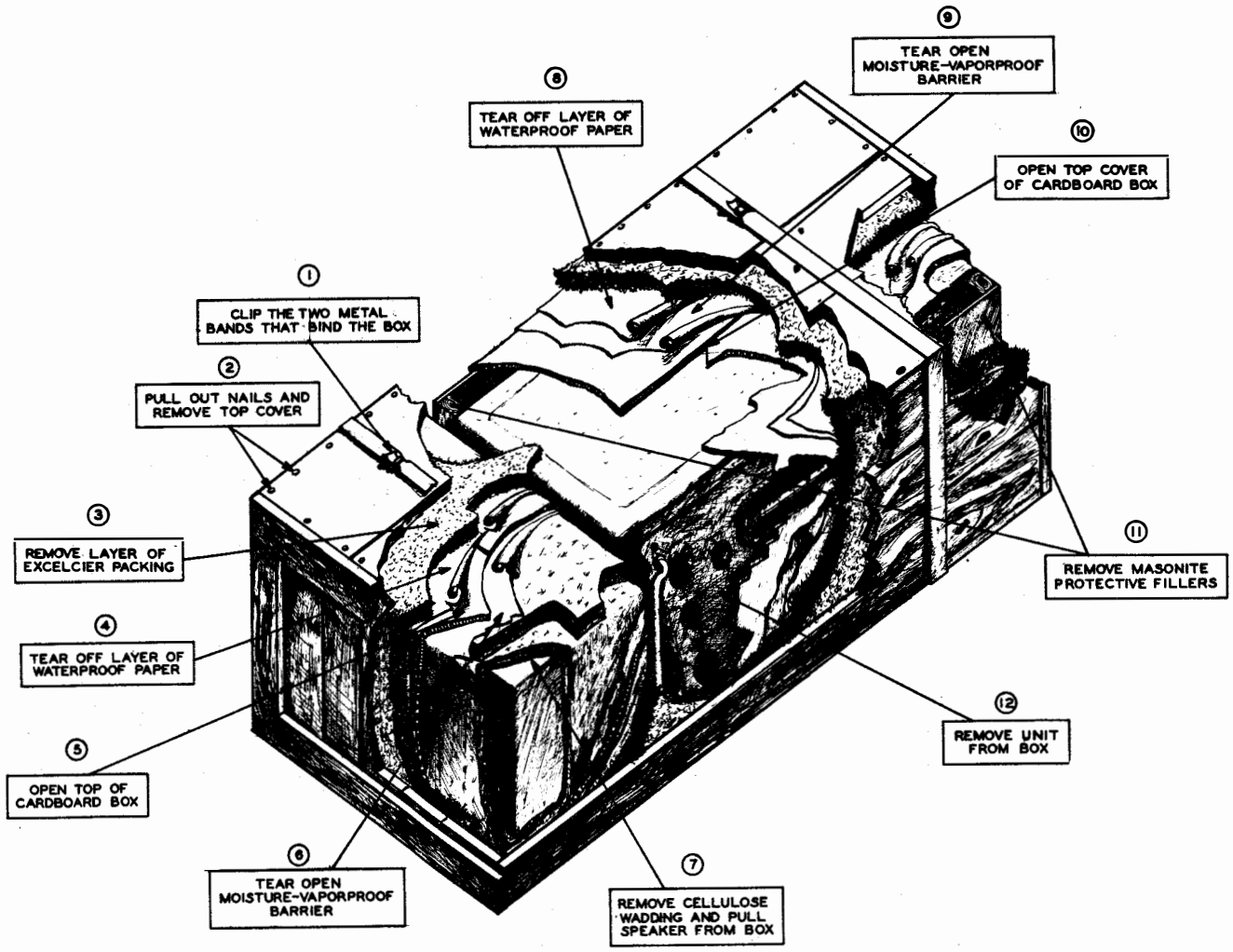
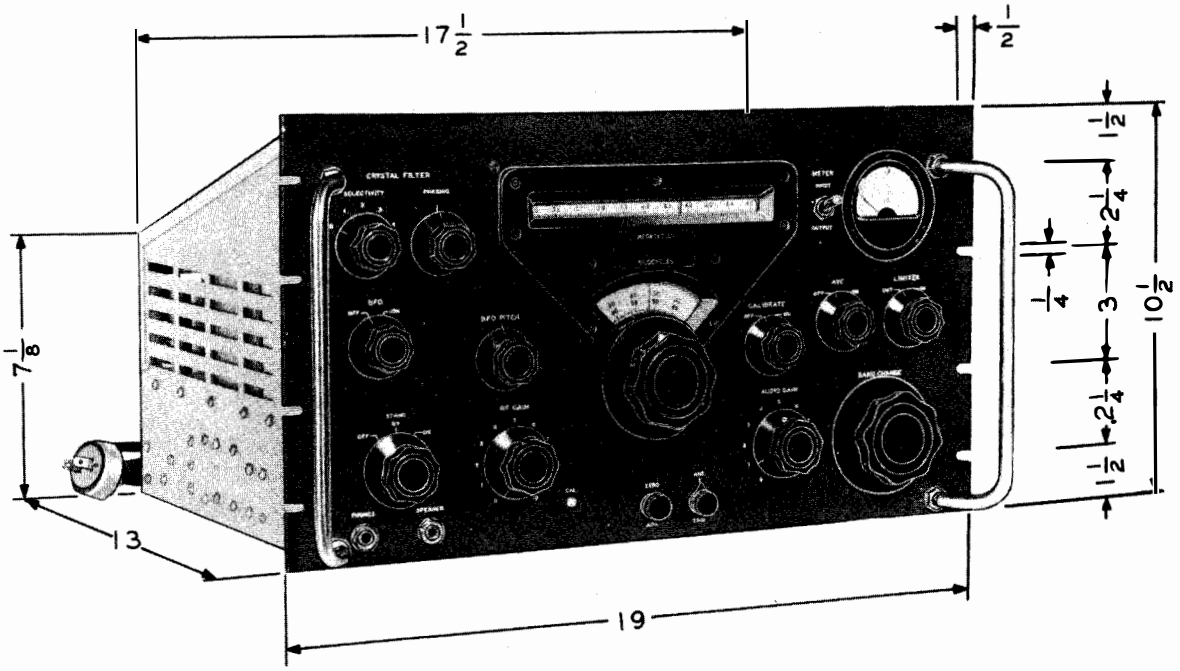


Figure 3-1. Unpacking Procedure



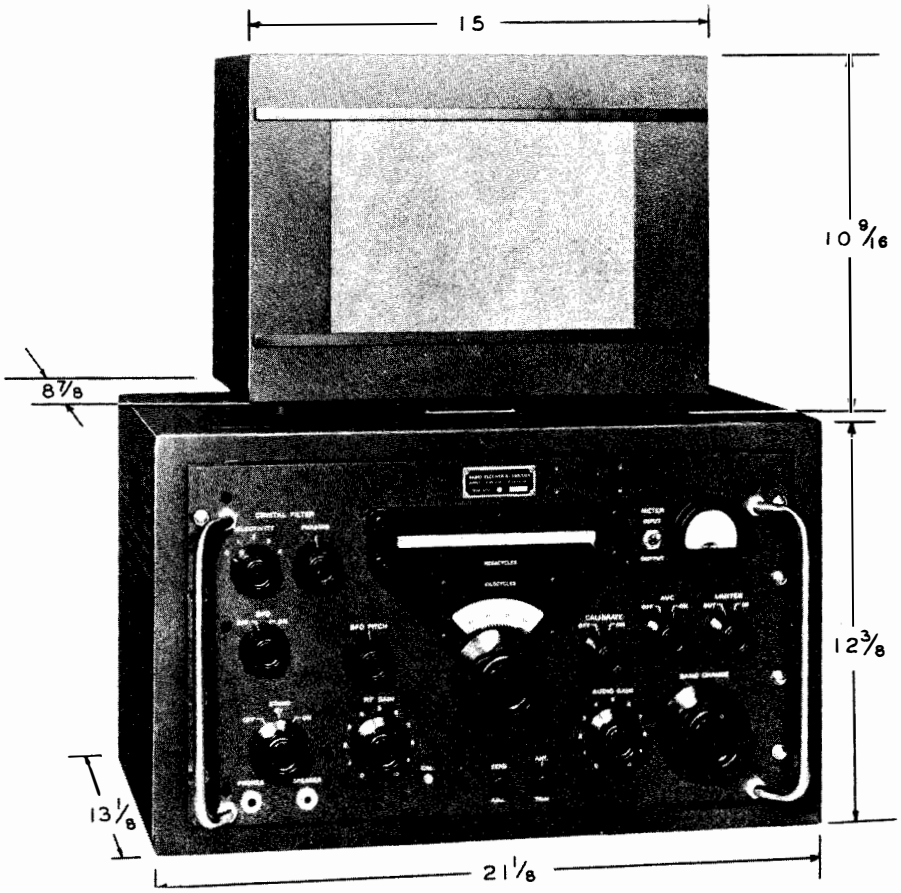


Figure 3-2. Mounting Dimensions

depth, 13-1/8 inches. Speaker dimensions are: width, 15 inches; height, 10-9/16 inches; and depth, 8-7/8 inches.

When choosing a position for the equipment, give consideration to the convenience of power, antenna and ground connections, to placement of cables and to convenience in servicing the equipment. Rear panel connections, shown in figure 3-3, should be accessible without moving the receiver cabinet. Antenna lead and speaker cable lengths are not critical.

a. ANTENNA CONNECTIONS. - Connect a cable from a high impedance whip or a single-ended antenna to antenna jack, J101, on the rear panel. See figure 3-3. If the receiver is to be operated near a powerful transmitter, the r-f input circuit of the receiver should be protected by connecting break-in relay, K101, to operate when the transmitter is radiating. Break-in relay connections and functions are discussed in the following paragraph.

b. REMOTE STANDBY CONNECTIONS. - Break-in relay connections are available at terminal strip E101 at the rear of the chassis. Terminals are marked 1, 2 and 3. Terminal 1 is connected to receiver ground. Terminals 2 and 3 are connected to the break-in relay coil, which is rated at 8.5 d-c volts minimum and 135 ohms d-c resistance. During operation, terminals 2 and 3 are usually connected in series with a source of voltage and a set of normally open contacts on the carrier control relay of a transmitter in order to silence the receiver during transmission. Refer to figure 3-4. When the break-in relay coil is energized, one pair of contacts shorts the antenna to ground; another pair, connected in series with a section of the OFF-STANDBY-ON switch, removes plate voltage from the three i-f amplifier stages. When using the remote relay, place the OFF-STANDBY-ON switch in the ON position. When this switch is placed in STANDBY position, it also removes plate voltage from the three i-f stages and thereby silences the receiver, however,

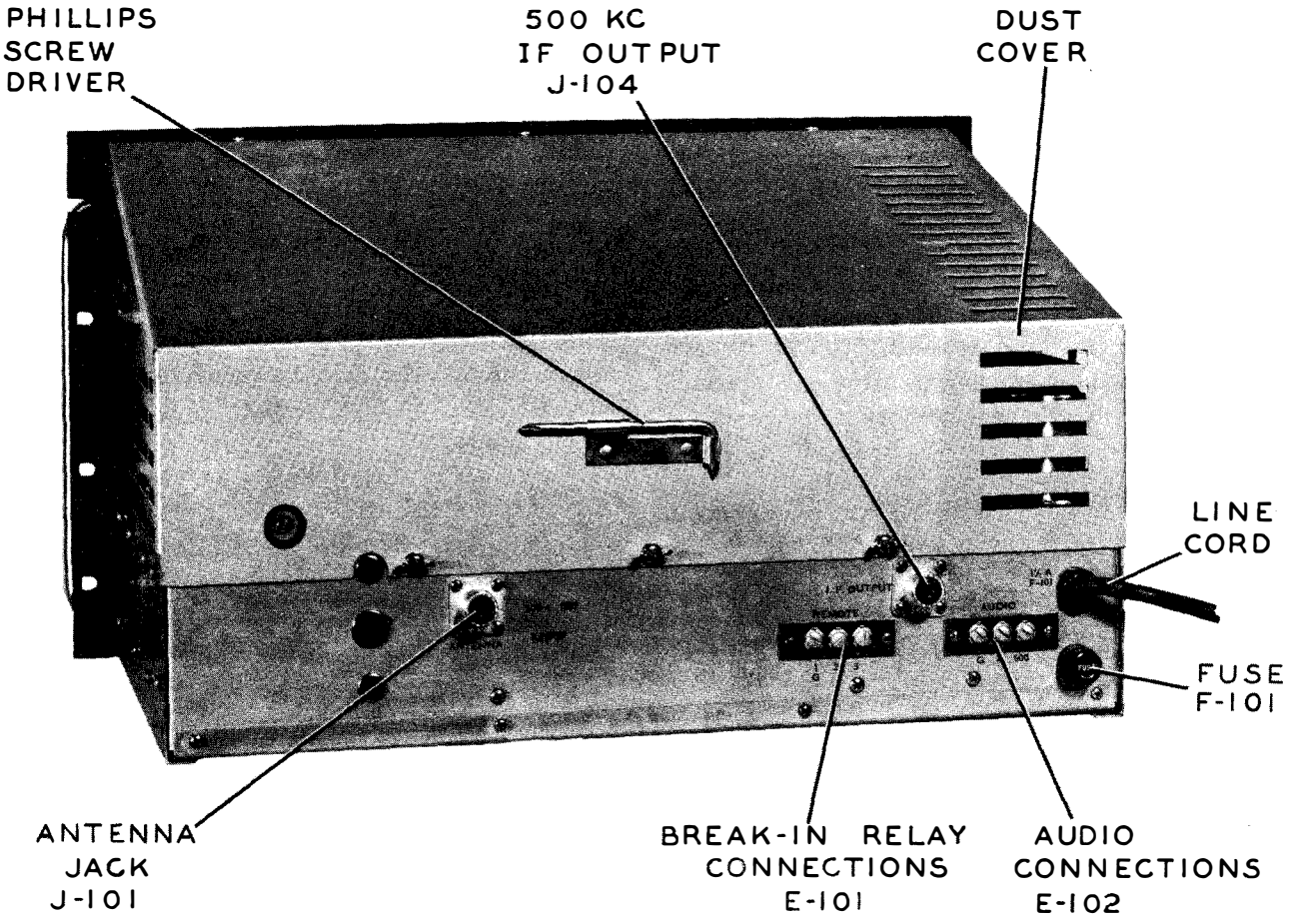


Figure 3-3. Rear Connections

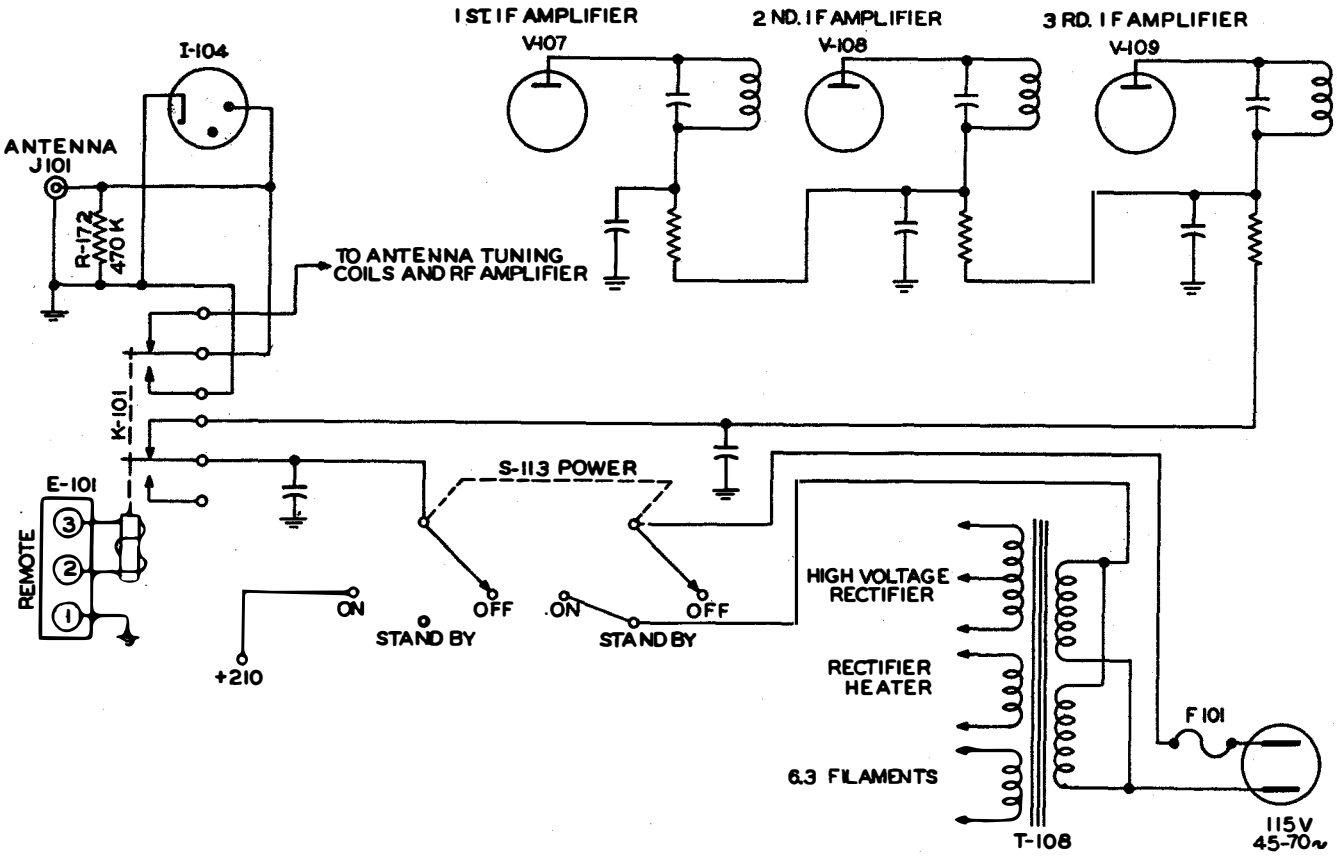


Figure 3-4. On-Off Standby Functions and Remote Operation Relay Circuit

no protection is given the r-f stages since the antenna is not shorted to ground.

c. I-F OUTPUT CONNECTION. - A 100-200 millivolt, 50-ohm, 500-kc i-f output is available at coaxial jack, J104, on the rear panel. This output is available for special applications only, and is not pertinent to normal operation, alignment, or adjustment of this equipment.

d. AUDIO OUTPUT CONNECTIONS. - Two audio output jacks are located on the front panel. One is designated PHONES, and the other SPEAKER. Their output impedances are 4 and 600 ohms respectively. An audio output terminal strip is provided on the rear panel. Terminal G is a ground connection and terminals marked "4" and "600" are audio outputs of four-ohms and 600-ohms impedance respectively. Terminal "4" is connected in parallel with the PHONES jack, and terminal "600" is connected in parallel with the SPEAKER jack. Use these output jacks and terminals as required.

e. POWER CONNECTIONS. - Make power connection by using the rubber covered cord that is permanently attached at the rear of the chassis. This cord is six feet long and is equipped with a standard male plug. The power source must supply 85 watts at 115 volts, 45-70 cps. If 230-volt operation is desired, reconnect the primary coils of T108 by removing the jumpers between terminals 2 and 4 and between 1 and 3; then connect a jumper between terminals 2 and 3.

3. INITIAL INSPECTION AND ADJUSTMENTS.

Before turning on the equipment for the first time, remove the dust cover and make a visual inspection of all tubes. Be certain that they are in their correct positions and well seated in their sockets. Also check for evidences of cracked or broken parts and general damage which might have been inflicted during shipment.

This equipment is completely tested and aligned before leaving the factory. A few initial adjustments in the form of operational checks should be made before actual operation. These are outlined in Section 4, paragraph 3. (OPERATIONAL TUNING ADJUSTMENTS).

SECTION 4
OPERATION

1. FUNCTION OF CONTROLS.

Operation of the receiver is exceedingly simple if the functioning of the controls is understood. The following paragraphs explain the functions of controls on the receiver's front panel. See figure 4-1.

a. OFF-STANDBY-ON. - In the OFF position, this control opens the primary power circuit to turn the equipment completely off. In the STAND-BY position the power transformer is excited, thus producing filament voltage for all stages and plate voltage for all except the three i-f amplifier stages. In the ON position the receiver is completely operative.

b. RF GAIN. - The RF GAIN control is located in the grid return circuit of the avc controlled tubes and is operative at all times. It varies the amount of fixed bias placed upon the grids of these tubes.

c. AUDIO GAIN. - The AUDIO GAIN control is located in the grid circuit of the first audio amplifier and is operative at all times. It varies the amount of

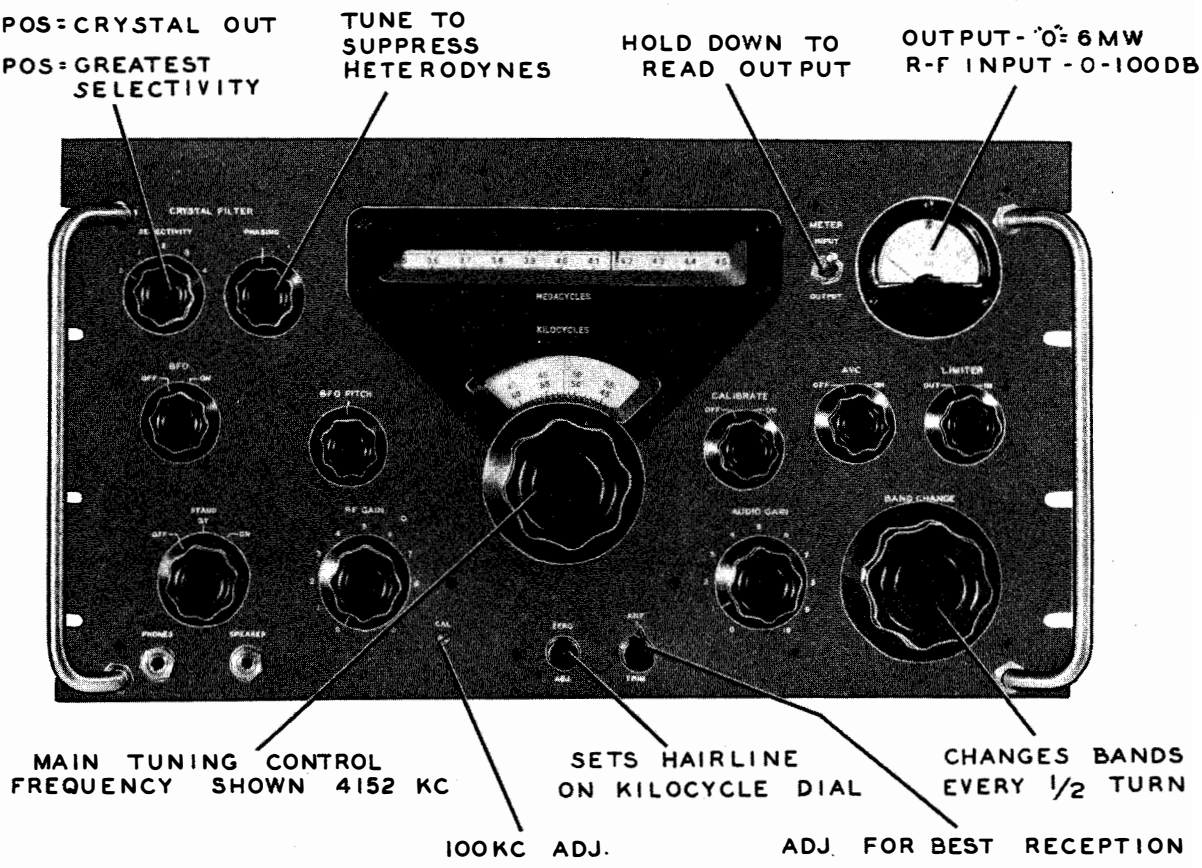


Figure 4-1. Operating Controls

a-f signal applied to the grid of this tube, and thereby controls the amount of audio power produced by the receiver.

d. BAND CHANGE. - Any one of the 30 bands may be selected at 1/2 revolution intervals by means of this knob. A stiff detent accurately positions the controlled switches on each band.

e. MEGACYCLE. - The MEGACYCLE scale is on the slide-rule type dial. It is calibrated in ten 100-kc divisions, each of which equals one full turn of the circular KILOCYCLE dial. The 1.5 to 2.5-mc and 2.5 to 3.5-mc bands are printed in red, indicating that the red scale on the KILOCYCLE dial must be used when operating on these bands. The pointer on the MEGACYCLE dial is operated by the KILOCYCLE control while the scale is changed by operation of the BAND CHANGE control.

f. KILOCYCLE. - The KILOCYCLE dial is the main tuning control on the receiver. Each division on its circular face represents one kilocycle. One full turn of the dial tunes the receiver through 100 kilocycles, or one division of the MEGACYCLE scale. To read the tuning dials, merely combine the figures of the MEGACYCLE dial with those of the KILOCYCLE dial, thus arriving at the frequency in kilocycles. For example, a reading of 14.1 on the MEGACYCLE dial and of 78 on the KILOCYCLE dial indicates a frequency of 14178 kc. The KILOCYCLE scale for the 1.5 to 2.5 and 2.5 to 3.5 mc bands is in reverse order to the scale for the rest of the bands, and is printed in red similar to corresponding scales on the MEGACYCLE dial.

g. ZERO ADJ. - The ZERO ADJ moves the indicator line on the KILOCYCLE control a few divisions in either direction for calibration purposes. The receiver may be calibrated against either any receivable station whose frequency is known or the internal calibration oscillator. This oscillator emits a harmonic every 100 kc in the tuning spectrum. An example of how the receiver may be calibrated using this oscillator follows. If the desired signal is about 14100 kc, turn the 100 KC CRYSTAL ON and the BFO ON with BFO PITCH control at panel mark. Next, using the KILOCYCLE knob, tune to zero beat with the 100-kc marker at 14100 kc. Then move the ZERO ADJ control until the hair line is exactly on 14100 kc. The dial reading in this region is now very accurate, and the receiver may be set within a few hundred cycles of the desired frequency.

NOTE

WHEN READING THE FREQUENCY OF AN INCOMING SIGNAL, THE BFO PITCH CONTROL MUST BE LEFT IN THE SAME POSITION AS IT WAS WHEN THE RECEIVER WAS CALIBRATED.

A ten division scale (five divisions either side of center) is engraved on the lower edge of the excutcheon opening for the KILOCYCLE dial, and is used to log the calibrated position of the hair line on the various bands in lieu of recalibrating each time the band is used.

h. METER INPUT-OUTPUT. - The METER switch is a momentary spring-return type toggle switch. In the normal or INPUT position the meter is connected as an S meter. In the OUTPUT position, the meter is connected in the audio output circuit as a db meter.

CAUTION

NEVER DEPRESS THE METER SWITCH TO OUTPUT POSITION WHEN AUDIO GAIN IS SET FOR SPEAKER OPERATION. THE OUTPUT METER LEVEL IS VERY LOW AND DAMAGE TO THE MOVEMENT MAY RESULT FROM EXTREME OVERLOAD.

i. BFO OFF-ON. - In the ON position this control turns ON the beat frequency oscillator for CW reception. In the OFF position, it grounds the screen grid of the bfo tube.

j. BFO PITCH. - The BFO pitch control varies the frequency of the beat frequency oscillator to change the pitch of the audio tone which is produced by combining the bfo signal with the incoming signal. A range of about ±3 kc minimum can be obtained with this control.

k. CALIBRATE OFF-ON. - This switch is in the cathode circuit of 100 kc crystal oscillator tube V104 and turns the 100-kc oscillator to ON or OFF. For an explanation of how to use the oscillator, see paragraph g. above.

l. AVC OFF-ON. - This switch turns AVC to ON or OFF. In most cases AVC should be ON for both AM and CW reception, but may be turned OFF for CW reception if desired.

m. LIMITER OUT-IN. - The noise limiter is useful for both AM and CW reception. When noise is

not a problem, turn the LIMITER to OFF, as the distortion will be less in this position. When noise of the impulse type is being received, turn the LIMITER to ON. Adjustment of RF and AF gain controls is necessary for best CW noise limiting.

n. CRYSTAL FILTER.

(1) SELECTIVITY. - In position 0 of this control, the crystal filter is not used and selectivity is determined by the receiver's tuned circuits alone. In positions 1 through 4, the crystal filter is in the circuit, the selectivity being increased as position 4 is approached. Position 4 gives a bandwidth of about 200 cps at 6 db down.

(2) PHASING. - The PHASING control is used to reject unwanted heterodynes. When positioned on the panel mark, the control is properly set for crystal phasing with no rejection notch. If a high frequency heterodyne is interfering with reception, move the control back and forth near the panel mark until the heterodyne is attenuated. If the heterodyne is of lower frequency, move the control farther to left or right of the panel mark. This control will attenuate heterodynes ranging from 1 to 3 kc.

o. METER. - The tuning meter is calibrated in 20, 40, 60, 80 and 100 db above avc threshold when reading r-f input. When reading audio output, the meter is calibrated from -10 to +6 db, zero reference being 6 milliwatts into a 500 ohm load.

p. CAL. - If supreme accuracy is desired, the frequency of the 100-kc oscillator should be checked against WWV or some other station whose frequency is known to be extremely accurate. This oscillator frequency may be varied through small limits by turning the CAL control with a screw driver. Additional range can be obtained by turning C169, located just behind the 100 kc crystal.

q. ANTENNA TRIM. - This control has a limited effect on matching the antenna impedance to the r-f amplifier grid circuit at various signal frequencies. It is adjusted to obtain the best response at a given frequency. Proper setting can be obtained by peaking the S meter when tuned to a station. This control may not have sufficient range for this peak adjustment at all frequencies but the receiver sensitivity is such that no appreciable unsatisfactory reception will be noted if the antenna cannot be perfectly tuned.

2. OPERATION - CW AND A.M.

Operation of the receiver provides for reception of either modulated CW or amplitude-modulated signals. Procedure in either case is as follows.

a. For reception of amplitude-modulated signals, proceed as follows: Turn OFF-STANDBY-ON switch to ON. Turn AVC on. Turn CALIBRATE OFF-ON switch to OFF. (The calibrator oscillator is used only in calibration of the tuning dials.) Turn the BFO off. Then select the desired band by means of the BAND SWITCH, and turn the KILOCYCLE tuning knob to read the desired frequency. Adjust the RF GAIN and the AUDIO GAIN controls for best reception. The LIMITER can be turned on if noise persists and interfering signals can be eliminated by placing the SELECTIVITY switch in the various positions (selectivity increasing with position numbers). Should unwanted heterodynes be interfering with reception, adjustment of the CRYSTAL PHASING control will suppress heterodynes ranging from 1 to 3 kc.

b. For reception of CW signals, procedure is as above with the exception that the BFO is turned on and the BFO PITCH control varied for the desired audio pitch.

3. OPERATIONAL TUNING ADJUSTMENTS.

Alignment and adjustment of the BFO PITCH and CRYSTAL PHASING controls should not be attempted without proper test equipment. Such adjustments are covered in detail in Section 7 (CORRECTIVE MAINTENANCE). However, the operator may make operational adjustments which require no test equipment as follows.

a. ZEROING S METER.--Ordinarily this meter will not need zeroing until component part tolerances have drifted, receiver alignment has been changed, or new component parts placed in the receiver. However, should the meter become sufficiently out of zero adjustment that weak signals show little or no response on the meter, it may be adjusted by the operator as follows.

Remove receiver from cabinet or rack. Remove antenna cable and short antenna terminals. Turn the receiver ON, BFO Off, AVC On, and 100 KC CRYSTAL OFF; then turn the RF GAIN fully clockwise.

The meter should read zero with these settings. If not, turn the meter zeroing control until the meter reads zero. The location of this control is shown in figure 7-2. Normally, this adjustment need not be made by the operator unless tube replacements have been made by the operator, at which time the zeroing adjustment control would be accessible and the meter zero should be checked.

b. KILOCYCLE DIAL ZERO ADJUST. - A frequently made pre-operational adjustment to be made by the operator is that of calibrating the receiver dials against a known frequency or against the 100 KC CALIBRATION OSCILLATOR. A station of known frequency may be used for this adjustment by turning the BFO on, setting BFO pitch to 500-kc and zero beating the receiver signal with the BFO. If the dial reading at this point is not correct, the indicator line on the KILOCYCLE dial may be moved to the correct position on the dial by means of the ZERO ADJUST. knob on the front panel.

The 100-KC CALIBRATION OSCILLATOR may be used for properly calibrating the dial by turning the CALIBRATE control on and the BFO on. Set BFO at panel mark (500kc). A series of zero beats will be heard at every 100-kc point on the dial. The KILOCYCLE dial reading at any of these 100-kc checkpoints should be 0-0; if not, the indicator line may be moved a few divisions by means of the ZERO ADJUST. knob.

In either of the above methods, should the dial reading be off more than ±5 kc from the correct point, additional dial alignment will have to be performed. See Section 7 (CORRECTIVE MAINTENANCE).

c. 100-KC CALIBRATION OSCILLATOR ADJUSTMENT. - By means of the CAL control on the front panel, the frequency of the 100-kc oscillator can be varied through a small range. When supreme accuracy is desired in setting the dials, the frequency of the calibration oscillator should be checked against a station whose frequency is known to be accurate. Station WWV offers a means of calibrating the 100-kc oscillator directly.

The receiver is carefully tuned to one of WWV's channels with the BFO off. The CALIBRATE control is turned on, and by means of the CAL. control, the frequency of the calibration oscillator is adjusted to zero beat with WWV at the time when WWV is not modulating its carrier. Consult WWV's schedule for transmission frequencies and types of transmission.

For best results, the relative signal strengths of the 100-kc oscillator and the WWV carrier should be the same. The receiver should be tuned to other WWV frequencies if the one originally chosen is not of sufficient strength to give a zero beat. Several should be tried to obtain the one which gives the most desirable signal strength.

If difficulty in obtaining a beat between the two signals is encountered, no adjustment of the CAL. control should be attempted. Should a definite beat be heard, the CAL. adjustment can be made for the best zero beat indication. Additional aid in obtaining the correct setting of the CAL control may be had by turning the BFO on and further adjusting for elimination of a resulting rise and fall of intensity (not tone) of the beat.

d. ANTENNA TRIM ADJUSTMENT. - This control is used to match the antenna impedance to the grid of the first r-f amplifier stage as the receiver is tuned over the band range available. This control should be adjusted for maximum receiver response by peaking the S meter. The effect of the adjustment is limited and may not have sufficient effect for absolute matching over the entire frequency spectrum. However, the receiver sensitivity is high enough such that a small mismatch will not appreciably interfere with good reception.

SECTION 5
OPERATOR'S MAINTENANCE

1. ROUTINE CHECK CHARTS

During normal operation of the receiver, the operation of the basic functioning of the set should be checked as in Table 5-1.

TABLE 5-1 ROUTINE CHECK CHART, EACH WATCH

WHAT TO CHECK	HOW TO CHECK
1. BFO	Turn BFO to ON position and observe whether beat is heard.
2. BFO PITCH	Vary BFO Pitch control with BFO on and observe variation in pitch of audio beat.
3. 100 KC Calibration Osc.	Turn CALIBRATE control to ON and adjust tuning dials for peak on input meter at 100 kc checkpoints.
4. HFO Crystals	Check for 100-kc checkpoint peaking on S meter at a minimum of one position on bands 1, 4, 5, 7, 9, 11, 15, 19, 23, and 29. This will check the operation of each of the ten crystals employed in the HFO.
5. AUDIO GAIN	Check to see that the audio output increases when audio gain is turned clockwise. Can be checked on meter in OUTPUT position.
6. RF GAIN	Check to see that the r-f input as observed on the INPUT METER varies as the RF GAIN control is varied.
7. DIAL ALIGNMENT (ZERO SET)	Check the dial readings against a 100-kc checkpoint with CALIBRATE ON. At these checkpoints the KILOCYCLE dial should read 0.0. If not, adjust reading line with ZERO SET knob on front panel.

2. FUSE LOCATION AND SYMPTOMS OF FAILURE.

The fuse, F101, is located on the rear of the chassis.

CAUTION

NEVER REPLACE A FUSE WITH ONE OF HIGHER RATING UNLESS CONTINUED OPERATION OF THE EQUIPMENT IS MORE IMPORTANT THAN PROBABLE DAMAGE. IF A FUSE BURNS OUT IMMEDIATELY AFTER REPLACEMENT, DO NOT REPLACE IT A SECOND TIME UNTIL THE CAUSE OF TROUBLE HAS BEEN CORRECTED.

FUSE SYMBOL AND VALUE	FUNCTION	SYMPTOMS OF FAILURE
F-101 1-1/2 amp	Power Supply Protection (115 V or 230 V)	Complete operational failure. No panel or tube filaments lighted

3. REPLACEMENT OF ELECTRON TUBES.

a. LOCATION. - All tubes are accessible from the top of the receiver chassis after dust cover removed. Figure 5-1 shows the tube layout on the chassis.

b. PRECAUTIONS. -

(1) Remove tubes by pulling them straight up.

(2) Before inserting a tube, make certain that the pins are straight and that it is of the correct type for the socket into which it is to be placed.

4. REPLACEMENT OF PILOT LAMPS.

The lights for the slide rule dial are mounted in sockets which are clipped to the metal structure above the dial. To replace light bulbs, slide the clips off the metal structure and pull out the sockets. Exert a slight down-pressure on the bulb and turn bulb slightly counter clockwise to release. When replacing the sockets, press the wires up into the channel.

To remove the KILOCYCLE dial bulb, reach under the drum of the MEGACYCLE drum and grasp the dial light socket; then pull it back far enough to replace the bulb.

The lamp designations and other nomenclature are related as follows:

LAMP			SOCKET DESIGNATION	BULB TYPE	BASE
DESIGNATION	VOLT	AMP			
I-101	6.3	0.15	XI - 101	T - 3-1/4	Min. Bayonet
I-102	6.3	0.15	XI - 102	T - 3-1/4	Min. Bayonet
I-103	6.3	0.15	XI - 103	T - 3-1/4	Min. Bayonet

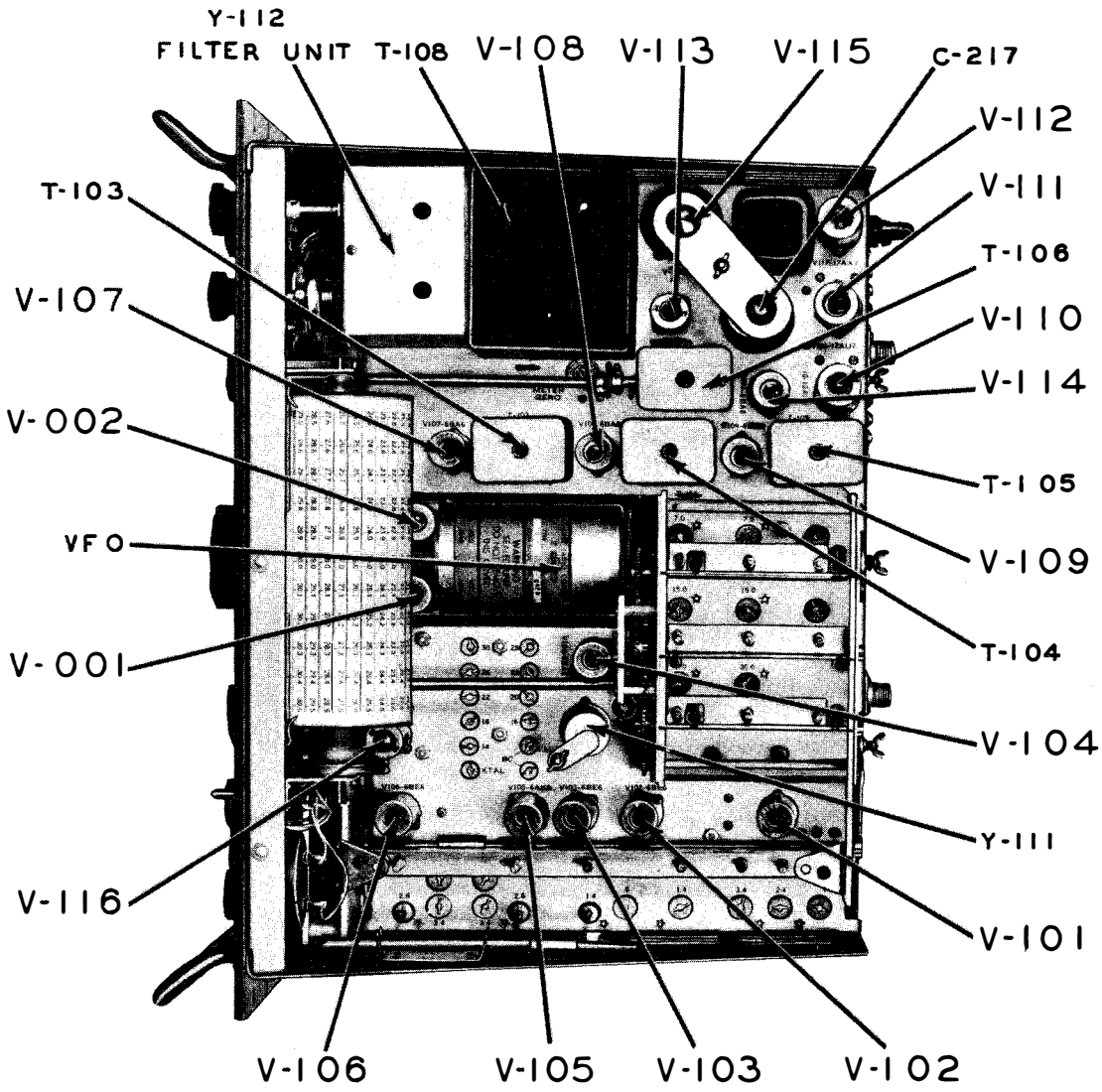


Figure 5-1. Top View, Tube and Parts Identification

SECTION 6
PREVENTIVE MAINTENANCE

1. GENERAL.

A certain amount of checking and servicing is necessary to maintain efficient and dependable operation of any type of electronics gear. Preventive maintenance in the form of periodic checks upon the mechanical and electrical systems of this receiver is just as important as corrective maintenance. If routine inspection of the equipment is carried out faithfully, the chances of improper operation of the equipment are greatly minimized.

The worst enemies of uninterrupted service in equipment of this type are dirt and corrosion. Dirt reduces efficiency and causes undue wear of rotating parts. Corrosion most seriously affects contacts such as those on tap switches, tubes, relays and cable. Salt-laden air, dirt, and moisture accelerate corrosion. The result may be equipment failure for no apparent reason.

Under certain conditions it is difficult or virtually impossible to prevent accumulation of moisture. Even so, frequent wiping of parts lessens danger of corrosion. If the atmosphere is corrosive, frequent inspection and wiping of parts is of special importance.

2. ROUTINE MECHANICAL AND ELECTRICAL CHECKS.

NOTE

THE ATTENTION OF MAINTENANCE PERSONNEL IS INVITED TO THE REQUIREMENTS OF CHAPTER 67 OF THE "BUREAU OF SHIPS MANUAL", OF THE LATEST ISSUE.

TABLE 6-1 ROUTINE MAINTENANCE CHECKS

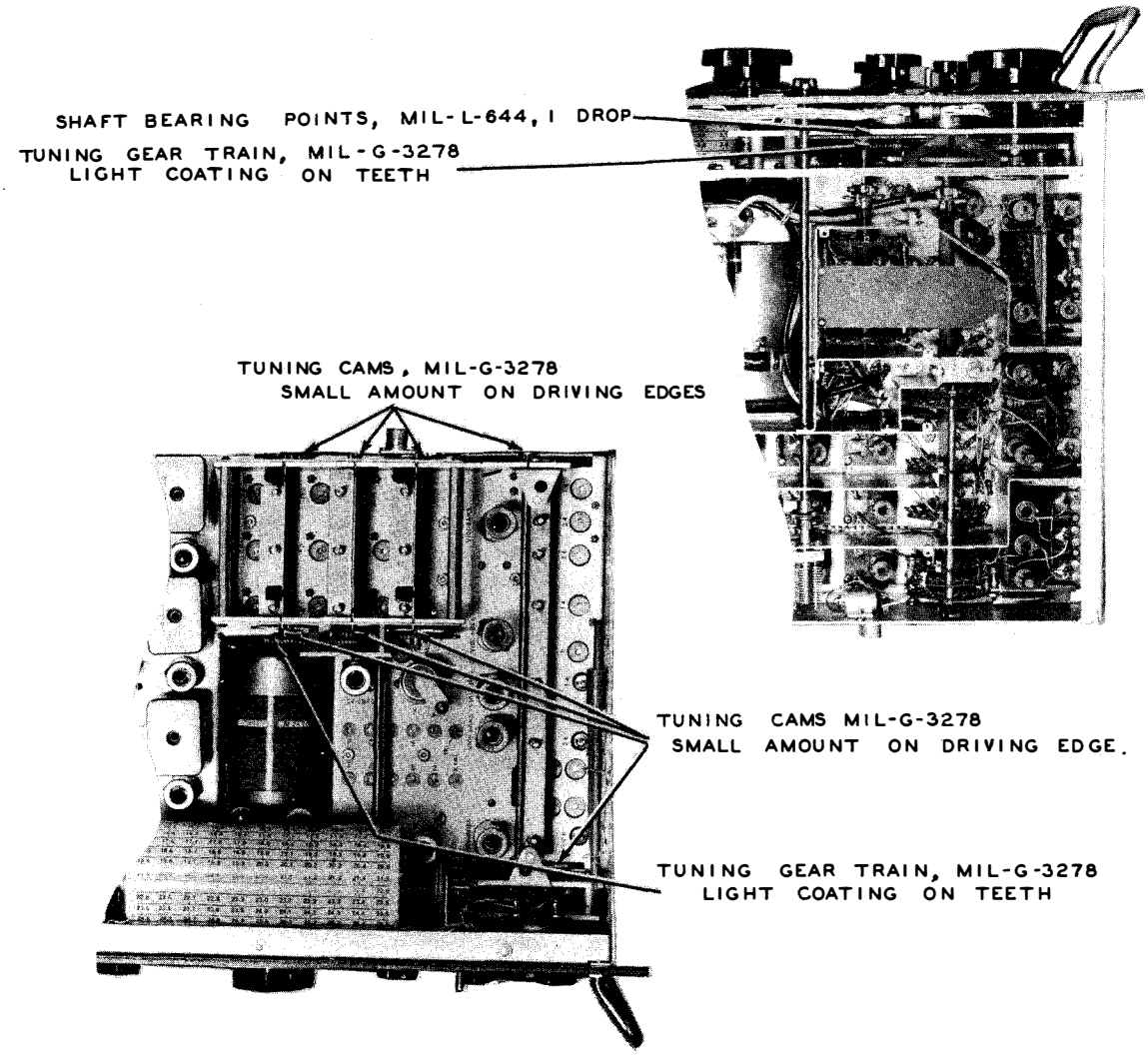
	WHAT TO CHECK	HOW TO CHECK	PRECAUTIONS AND REMEDIES
DAILY	1. Accumulation of dust and dirt on front panel and rear terminal connections.	Visual inspection	Remove with a soft brush or rag.
WEEKLY	1. Components inside receiver	Remove receiver from cabinet and remove dust cover. Check for dust, dirt, corrosion, and evidences of overheating in components.	Clean with soft brush or dry, oil-free jet of air. Check components showing evidences of overheating and replace if necessary.
	2. Rotary contacts and switch contacts	Inspect for loss of tension, poor contacts, or evidences of pitting and corrosion.	Clean, repair, or replace as needed. Crocus cloth or carbon stoddard solvent may be used.

TABLE 6-1. ROUTINE MAINTENANCE CHECKS, CONT.

	WHAT TO CHECK	HOW TO CHECK	PRECAUTIONS AND REMEDIES
WEEKLY	3. Antenna remote relay contacts	Check for evidences of pit marks, uneveness of contacts, or corrosion.	Remedy with burnishing tool and stoddard solvent.
MONTHLY	1. Tuning shafts, cams, and gears	Make visual inspection while rotating each tuning control through entire range.	Clean with carbon tetra-chloride if dirty and apply lubrication when necessary.
	2. Tube sockets and crystal sockets	Examine socket contacts Check for cracked or broken sockets Examine tube and crystal pins or contact area for corrosion.	Replace if cracked or broken. Replace. Remove with crocus cloth and stoddard solvent.
	3. Electron tubes	Check emission	Replace if necessary

3. LUBRICATION.

Under normal operating conditions, very little lubrication is necessary. Figure 6-1 indicates those parts of the tuning mechanism which should receive a very minimum amount of lubrication when needed. The need for lubrication can in general be ascertained by visual inspection or an indication of mechanical binding. No specific period is recommended as the need for lubrication will vary immensely with the type of operation.



NAVY LUBRICANT		STANDARD NAVY STOCK NUMBER								
Specification	Title	4 oz.	8 oz.	1 lb.	5 lb.	25 lb.	35 lb.	100 lb.	1 qt.	5 gal.
MIL-G-3278	Aircraft and Instrument Grease		R14-G-984-500	R14-G-982-20	R14-G-984-520	R14-G-984-540	R14-G-984-550	R14-G-984-560		
MIL-L-644	Special Preservative Lubricating Oil	W14-0-2833-944							W14-0-2834-10	W14-0-2834-15

Figure 6-1. Lubrication Data-Radio Receiver R/388/URR-23A

SECTION 7
CORRECTIVE MAINTENANCE

1. INTRODUCTION.

The two-fold purpose of any corrective maintenance procedure is to sectionalize the faulty stage or circuit, then to localize the faulty component in the defective stage for circuit. The maintenance technician should familiarize himself with the overall operation of the equipment prior to servicing. Reference to schematics and wiring diagrams should be made frequently to aid in servicing.

Necessary repairs should be made by competent radio technicians, supplied with suitable tools and equipment.

In making all repairs and replacements, try to duplicate the original condition of the equipment. Use standard replacement parts, such as those supplied in the spare parts accompanying this equipment or parts taken from stock. Take care to run replacement wiring in the same position and manner as the original wiring. When soldering use resin-core solder only. Use only enough to make a good mechanical and electrical connection. Remove excess solder that may have dropped on other components.

In the case of temporary emergency repairs, where exact replacement of parts is not possible, conspicuously tag the equipment so repaired to indicate the temporary nature of the repair, and restore it to its original condition at the first possible opportunity.

2. LOCALIZATION OF TROUBLE.

A definite system of localizing trouble is necessary for prompt and efficient maintenance. In some cases, trouble may be localized by observing the operation of panel controls. Check these controls and accessible components such as vacuum tubes, which are a major source of electronic troubles, before proceeding to any intricate servicing.

In this receiver, the best means of localizing trouble is through signal tracing. Having localized the faulty stage, check the tubes involved. If the tubes are not faulty, systematically check the defective circuit and its associated components for continuity, defective resistors, shorted capacitors, loose connections, etc. Use test equipment such as as ohmmeter or electronic voltmeter for these checks.

When performing circuit continuity checks or resistance measurements, make careful reference to schematics in order to take into account other components which may be shunted with the part under test. For accurate results, disconnect one lead of the part being checked before proceeding with measurements. Make full use of all schematic diagrams and troubleshooting charts contained in Section 7.

The following RECEIVER FAILURE CHART Table 7-1 lists some of the more obvious failures and possible remedies. Signal tracing by means of a signal generator and voltmeter or headset for output indication will be of considerable aid in the localization of troubles. Also, complete voltage and resistance checks in suspected circuits will aid in locating faulty circuit components. (See figure 7-1).

Overall weak performance would suggest that the receiver is out of alignment. Complete alignment procedures follow in this section. Final receiver testing is outlined in paragraph 4. m. of this section.

FAILURE REPORTS

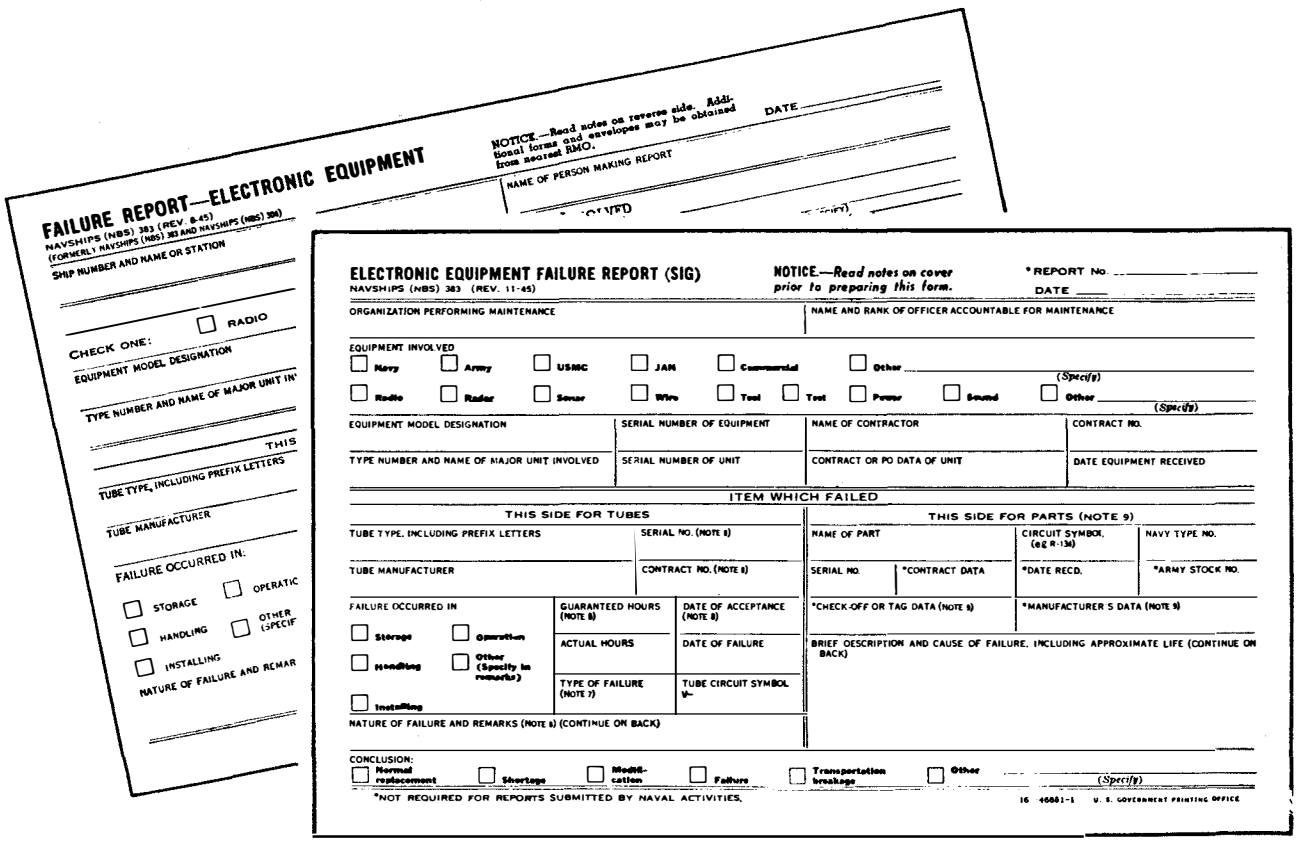
A FAILURE REPORT must be filled out for the failure of any part of the equipment whether caused by defective or worn parts, improper operation, or external influences. It should be made on Failure Report, form NBS-383, which has been designed to simplify this requirement. The card must be filled out and forwarded to BUSHIPS in the franked envelope which is provided. Full instructions are to be found on each card.

Use great care in filling the card out to make certain it carries adequate information. For example, under "Circuit Symbol" use the proper circuit identification taken from the schematic drawings, such as T-803, in the case of a transformer, or R-207, for a resistor. Do not substitute brevity for clarity. Use the back of the card to completly describe the cause of failure and attach an extra piece of paper if necessary.

The purpose of this report is to inform BUSHIPS of the cause and rate of failures. The information is used by the Bureau in the design of future equipment and in the maintenance of adequate supplies to keep the present equipment going. The cards you send in, together with those from hundreds of other ships, furnish a store of information permitting the Bureau to keep in touch with the performance of the equipment of your ship and all other ships of the Navy.

This report is not a requisition. You must request the replacement of parts through your Officer-in-Charge in the usual manner.

Make certain you have a supply of Failure Report cards, and envelopes on board. They may be obtained from any Electronics Officer.



FAILURE REPORT—ELECTRONIC EQUIPMENT
NAVSHIPS (NBS) 383 (REV. 8-45)
(FORMERLY NAVSHIPS (NBS) 383 AND NAVSHIPS (NBS) 384)
SHIP NUMBER AND NAME OR STATION
CHECK ONE: RADIO
EQUIPMENT MODEL DESIGNATION
TYPE NUMBER AND NAME OF MAJOR UNIT IN
THIS
TUBE TYPE, INCLUDING PREFIX LETTERS
TUBE MANUFACTURER
FAILURE OCCURRED IN:
STORAGE OPERATIC
HANDLING OTHER (SPECIF
INSTALLING
NATURE OF FAILURE AND REMAR

NOTICE.—Read notes on reverse side. Addi-tional forms and envelopes may be obtained from nearest RMO.
DATE
NAME OF PERSON MAKING REPORT

ELECTRONIC EQUIPMENT FAILURE REPORT (SIG)
NAVSHIPS (NBS) 383 (REV. 11-45)
NOTICE.—*Read notes on cover prior to preparing this form.*
*REPORT NO.
DATE
ORGANIZATION PERFORMING MAINTENANCE
NAME AND RANK OF OFFICER ACCOUNTABLE FOR MAINTENANCE
EQUIPMENT INVOLVED
Navy Army USMC JAN Commercial Other (Specify)
Radio Radar Sonar Wire Test Test Power Sound Other (Specify)
EQUIPMENT MODEL DESIGNATION
SERIAL NUMBER OF EQUIPMENT
NAME OF CONTRACTOR
CONTRACT NO.
TYPE NUMBER AND NAME OF MAJOR UNIT INVOLVED
SERIAL NUMBER OF UNIT
CONTRACT OR PO DATA OF UNIT
DATE EQUIPMENT RECEIVED
ITEM WHICH FAILED
THIS SIDE FOR TUBES
TUBE TYPE, INCLUDING PREFIX LETTERS
SERIAL NO. (NOTE 8)
TUBE MANUFACTURER
CONTRACT NO. (NOTE 8)
FAILURE OCCURRED IN
Storage Operation
Handling Other (Specify in remarks)
Installing
GUARANTEED HOURS (NOTE 8)
DATE OF ACCEPTANCE (NOTE 8)
ACTUAL HOURS
DATE OF FAILURE
TYPE OF FAILURE (NOTE 7)
TUBE CIRCUIT SYMBOL
NATURE OF FAILURE AND REMARKS (NOTE 8) (CONTINUE ON BACK)
THIS SIDE FOR PARTS (NOTE 9)
NAME OF PART
CIRCUIT SYMBOL (eg R-136)
NAVY TYPE NO.
SERIAL NO.
*CONTRACT DATA
*DATE RECD.
*ARMY STOCK NO.
*CHECK-OFF OR TAG DATA (NOTE 8)
*MANUFACTURER S DATA (NOTE 9)
BRIEF DESCRIPTION AND CAUSE OF FAILURE, INCLUDING APPROXIMATE LIFE (CONTINUE ON BACK)
CONCLUSION:
Normal replacement Shortage Modification Failure Transportation breakage Other (Specify)
*NOT REQUIRED FOR REPORTS SUBMITTED BY NAVAL ACTIVITIES.
16 46681-1 U. S. GOVERNMENT PRINTING OFFICE

Failure Report, Sample Form

TABLE 7-1 RECEIVER FAILURE CHART

SYMPTOM	PROBABLE CAUSE	CORRECTION
Set completely dead. No panel lights or filaments lighted.	Set not plugged in.	Connect P-101 to 115-v or 230-v source according to primary winding hookup in power transformer.
	Power fuse blown.	Replace F-101
	Power switch S113 defective.	Check contacts and operation of switch.
Panel lights and filaments lighted, but no plate volts.	Power rectifier tube faulty.	Replace tube V115.
Fuse blows whenever set is turned to ON position	H. V. rectifier circuit defective	Check V115, C207, filter capacitor C217A, C217B.
	Short in plate or screen voltage lines.	Check for shorts in all plate and screen circuits.
No audio output--no reading on input meter or output meter. R-f amplifier, vfo and hfo operative. Crystal filter out.	No plate voltage on fixed i-f stages, V107, V108, V109. See figure 3-3.	Check relay contacts on K101.
		Check contacts on power Switch, S113.
	Faulty i-f amplifier circuits, V107, V108, and V109	Check tubes. Make voltage and resistance checks in these stages.
	I-f transformers badly out of alignment.	See FIXED 500-kc IF alignment procedure in paragraph 4.c., this section.
Same as above, but crystal filter in.	Crystal filter not passing 500 kc.	Replace 500-kc crystal, Y112, in filter unit.
I-f and audio O. K. Weak reception on Even Numbered bands.	1.5 to 2.5 mc variable i-f misaligned.	Align as in section 7, paragraph 4.j.(2).(a).
I-f and audio O. K. Weak reception on Odd Numbered bands.	2.5 to 3.5 mc variable i-f misaligned.	Align as in section 7, paragraph 4.j.(2).(b).
Overall weak reception.	Band antenna connections	Check antenna connections for dirt and corrosion.
	R-f amplifier or 2nd Mixer stages bad	Check V101 and V106 circuits for bad tubes.
		Make voltage and resistance checks in these stages.
	Overall alignment is bad.	Check alignment as in I-F and R-F alignment procedures in section 7, paragraph 4.j.

TABLE 7-1. RECEIVER FAILURE CHART, CONT.

SYMPTOM	PROBABLE CAUSE	CORRECTION
No reception on the following bands:		
1	Hfo not operating	Replace 4 mc crystal, Y110.
4	Hfo not operating	Replace 6 mc crystal, Y109.
5, 6, 13, 14	Hfo not operating	Replace 8 mc crystal, Y108.
7, 8, 17, 18, 27, 28	Hfo not operating	Replace 10 mc Xtal, Y107.
9, 10, 21, 22	Hfo not operating	Replace 12 mc Xtal, Y106.
11, 12, 25, 26	Hfo not operating	Replace 14 mc Xtal, Y105.
15, 16	Hfo not operating	Replace 9 mc Xtal, Y104.
19, 20	Hfo not operating	Replace 11 mc Xtal, Y103.
23, 24	Hfo not operating	Replace 13 mc Xtal, Y102.
29, 30	Hfo not operating	Replace 10.67 mc Xtal, Y101.
Weak reception:		
Band 1 only	Band 1 r-f alignment out.	See section 7, paragraph 4.j.(2).(f).
Bands 2-3 only	R-f alignments out.	See section 7, paragraph 4.j.(2).(a),(b).
Bands 4-7 only	R-f alignments out.	See section 7, paragraph 4.j.(2).(c)
Bands 8-15 only	R-f alignments out.	See section 7, paragraph 4.j.(2).(d).
Bands 16-30 only	R-f alignments out.	See section 7, paragraph 4.j.(2).(e).
Distorted audio with limiter in or out.	Faulty detector	Check tube V110, C202, R151, R150.
Distorted audio with limiter in only.	Clipping in noise limiter taking place at too low a value of modulation.	Check time constant consisting of R152 and C205C in circuit of V112. Make overall voltage and resistance checks in this stage.
Weak output with AVC ON.	Avc amplifier threshold bias too high.	Check R164, R165, R166, and R146. Make complete voltage and resistance checks on pins 1, 2, and 3 of V110 and V111.

TABLE 7-1. RECEIVER FAILURE CHART, CONT.

SYMPTOM	PROBABLE CAUSE	CORRECTION
Input to 2nd mixer V106 is O.K. No audio output.	Vfo not operating to give 500-kc i-f output.	Check plate voltages on tubes V001 and V002. If no plate voltage--check voltage regulator tube V116. Make complete voltage and resistance checks in the vfo stages.
No audio beat observed with BFO ON.	Bfo inoperative	Check tube V114. Make voltage and resistance checks in the stage.
CALIBRATE ON - No 100-kc checkpoints observed.	Faulty 100-kc oscillator stage.	Check tube V104. Check 100-kc Xtal, Y111. Make voltage and resistance checks in this stage.

3. VOLTAGE AND RESISTANCE MEASUREMENTS.

Figure 7-1 gives typical voltage and resistance measurements with respect to ground taken at electron tube terminals. Conditions for measurements are given with the table and must be duplicated to make valid comparisons.

In making resistance checks, bear in mind that the resistance measured may be the series, parallel, or series-parallel combinations of several components. Should a measured value show a considerable discrepancy from the value tabulated, make a further check of the components included in the measurement. When necessary, unsolder terminals to investigate parallel combinations thoroughly. In considering discrepancies, take into account the allowances for manufacturing tolerances on resistor ratings.

WARNING

VOLTAGES UP TO 300 VOLTS WILL BE ENCOUNTERED WHEN MAKING THE FOLLOWING MEASUREMENTS. EXERCISECARE WHEN PLACING LEADS ON THE MINIATURE TUBE TERMINALS. IF TERMINALS ARE CONGESTED, PREVENT SHORTS AND POSSIBLE DAMAGE TO CIRCUIT COMPONENTS BY TURNING OFF POWER BEFORE AFFIXING VOLTMETER LEAD.

4. ELECTRICAL ADJUSTMENTS.

a. CRYSTAL OSCILLATOR TRIMMER ADJUSTMENT.

(1) TEST EQUIPMENT NEEDED FOR ALIGNMENT.

(a) "Q" meter or accurate capacitance measuring bridge.

(b) 470K-ohm resistor.

(c) Electronic voltmeter. (Multimeter ME-25/U Series or equivalent.

(2) PROCEDURE.

(a) Remove any one of the hfo crystals and set the BAND SWITCH to the related band. (See paragraph 8, this section.) With capacitance measuring device, adjust trimmer C167 (marked XTAL on the chassis)to provide an input capacitance of 32 mmf acrossthe crystal holder. This value will occur at or near minimum capacitance setting. If this capacitor is badly mistuned, the crystals will be off frequency and low in output.

(b) Connect 470K-ohm resistor to pin 7 of tube V102. Connect a d-c electronic voltmeter between free end of resistor and the chassis. This resistor reduces the effect of the capacitance of the meter lead.

In all of the following adjustments, peak the trimmers if the indicated voltage is not more than 2 volts. If it is more than 2 volts, detune the trimmer toward minimum capacitance, until voltage reads 2. See figure 7-2 for location of trimmer adjustments.

1. Turn receiver on. Set bandswitch on band 30; then tune trimmer marked 30 according to the above procedure.

2. Repeat, tuning trimmer marked 28, with bandswitch on band 28.

3. Repeat on even bands from 26 through 14, tuning correspondingly marked trimmers.

4. Repeat with bandswitch on band 1. Adjust trimmer labeled B. C. that is nearer V105.

(c) Remove 470K-ohm resistor from V102. Connect the resistor to pin 1 of V103. Connect VTVM between free end of resistor and chassis.

1. Place bandswitch on band 1. Tune for maximum indication on the voltmeter the trimmer marked B. C. that was not previously tuned.

b. 100-KC CALIBRATION OSCILLATOR ALIGNMENT.

(1) TEST EQUIPMENT NEEDED.

(a) Accurate frequency standard or WWV carrier reception.

(2) PROCEDURE.

(a) See SECTION 4--paragraph 3-c.

c. FIXED 500 KC I-F AMPLIFIER ALIGNMENT.

(1) TEST EQUIPMENT NEEDED.

(a) Signal generator (R. F. Signal Generator Set AN/URM-25 Series or equivalent).

(b) Electronic voltmeter (Multimeter ME-25/U Series or equivalent).

(c) Detuning network consisting of 0.01-mf capacitor in series with a 4700-ohm resistor.

NOTE

THE CALIBRATION OSCILLATOR MAY BE USED IF A SIGNAL GENERATOR IS NOT AVAILABLE. USE THE PROCEDURE OUTLINED BUT LEAVE THE CALIBRATION OSCILLATOR ON. SET THE BFO AT EXACTLY 500 KC AS OUTLINED IN THIS SECTION, PARAGRAPH 4.e. COUPLE THE OUTPUT OF THE CALIBRATION OSCILLATOR, C173, TO PIN 7 OF V106 WITH A CLIP LEAD. TUNE THE RECEIVER TO EACH ALIGNMENT FREQUENCY BY ZERO BEATING WITH BFO. (TUNING MAY ALSO BE ACCOMPLISHED BY PEAKING THE INPUT METER INSTEAD OF ZERO BEATING WITH BFO.

(2) PROCEDURE.

(a) Connect signal generator between pin 7 of V106 and chassis. Set the signal generator output at exactly 500-kc as follows. Connect one end of a clip lead to output of 100-kc calibration oscillator at C173. Hold other end near the grid of V106. Turn BFO on. Set signal generator to zero beat at 500 kc with the 100-kc oscillator. Turn off the 100-kc calibration oscillator and remove clip lead. Connect detuning network from the plate of V107 to chassis. Connect VTVM from diode load resistor R151 to chassis. Place SELECTIVITY switch, S114, in "0" position. Refer to figures 7-2 and 7-11 through 7-14 for location of adjustments.

1. Tune secondary of T103 by adjusting the bottom slug for maximum indication of the VTVM. Keep diode load voltage below 3 volts by adjusting the signal generator output.

2. Connect detuning network from terminal 4 of T103 to chassis. Tune top slug (primary) for maximum indication on the VTVM.

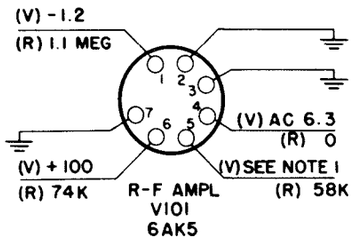
3. Connect detuning network from plate of V108 to chassis. Tune secondary of T104 for maximum indication on the VTVM.

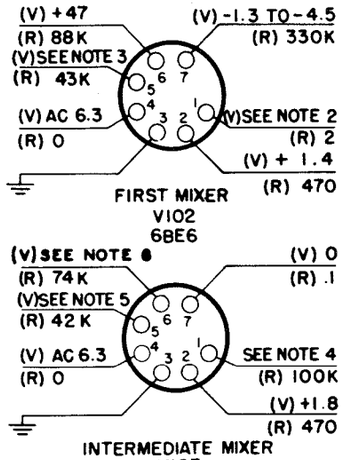
4. Connect detuning network to terminal 4 of T104. Tune primary of T104 for maximum indication on VTVM.

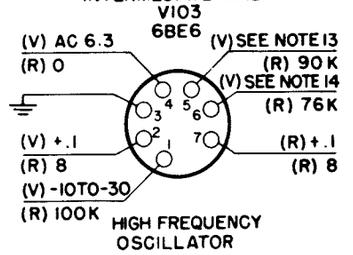
5. Connect detuning network to plate of V109. Tune secondary of T105 for maximum indication on VTVM.

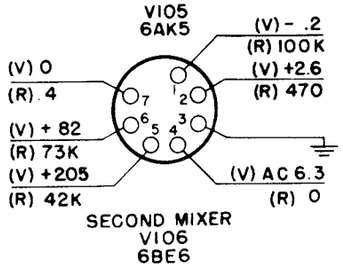
NOTES:

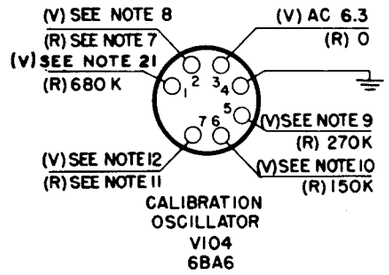
ALL MEASUREMENTS TAKEN FROM SOCKET PINS TO GROUND, RESISTANCE MEASUREMENTS TAKEN WITH NO AC INPUT, BUT POWER SWITCH ON.
GAIN CONTROLS ARE ON FULL. AVC IS ON.
ALL OTHER SWITCHES ARE OFF UNLESS OTHERWISE NOTED.
VOLTAGE MEASUREMENTS TAKEN WITH 115V AC INPUT, POWER SWITCH ON, BUT NO INPUT SIGNAL.
RF GAIN FULL ON, AUDIO GAIN OFF, AVC ON.
ALL OTHER SWITCHES ARE OFF UNLESS OTHERWISE NOTED.
VOLTAGES MEASURED WITH ELECTRONIC VOLTMETER, 11 MEGOHMS INPUT RESISTANCE.
ALL VOLTAGES EXCEPT HEATERS ARE D.C.
NC MEANS NO CONNECTION.

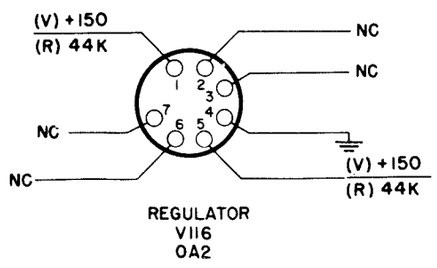


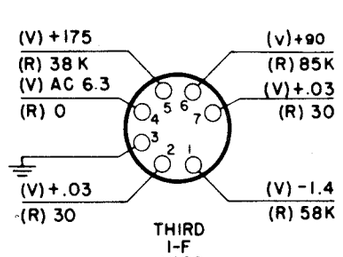


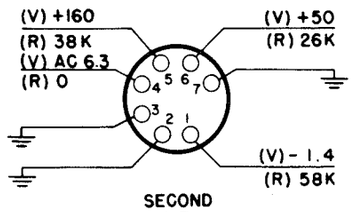


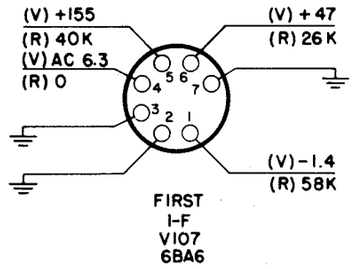


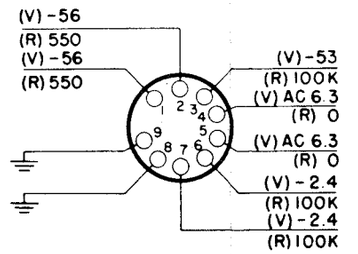


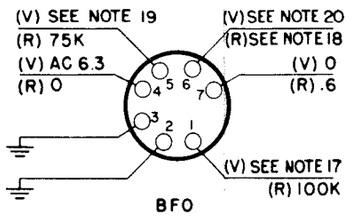


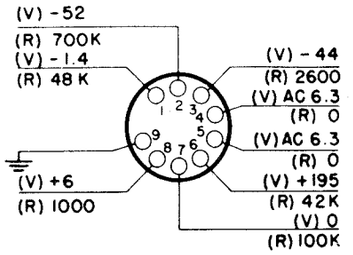


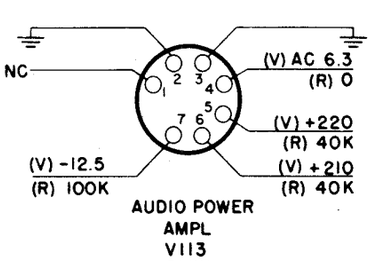


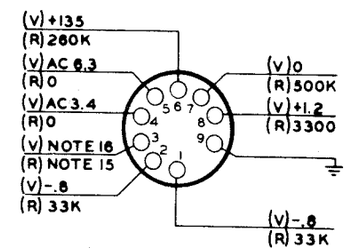


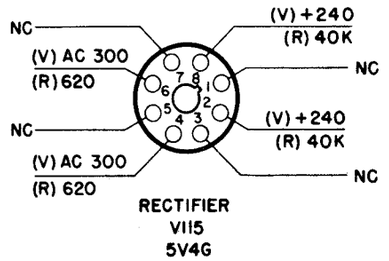












NOTES:

1. BAND 1 (V) +58
   BANDS 2 TO 3 (V) + 190
   BANDS 4 TO 30 (V) + 125
2. (V) 0 SMALL INDICATION ON BANDS 2 AND 3.
3. BAND 1 (V) +180
   BANDS 2 TO 3 SMALL IND.
   BANDS 4 TO 30 (V)+210
4. BAND 1 (V) -1.3
   BAND 2 (V) - 2.0
   BANDS 3 TO 30 (V) 0
5. BAND 1 (V) +210
   BANDS 2 TO 30 (V) 0
6. BAND 1 (V) +85
   BANDS 2 TO 30 (V) + 70
7. (R) 0 CAL. OFF
   (R) 4700 CAL. ON
8. (V) +60 CAL. OFF
   (V) + 7.2 CAL. ON
9. (V) +170 CAL. OFF
   (V) +80 CAL. ON
10. (V) +175 CAL. OFF
    (V) + 64 CAL. ON
11. (R) ∞ CAL. OFF
    (R) 4700 CAL. ON
12. (V) +60 CAL. OFF
    (V) +7.2 CAL. ON
13. BANDS 1 TO 2 (V) +39
    BANDS 3 TO 12 (V) +165
    BANDS 13 TO 30 (V) +39
14. BANDS 1 TO 2 (V) +105
    BANDS 3 TO 12 (V) +115
    BANDS 13 TO 30 (V) +105
15. (R) 33K LIM. OUT
    (R) 1 MEG. LIM. IN
16. (V) -.8 LIM. OUT
    (V) -.3 LIM. IN
17. (V) -.5 BFO OFF
    (V) -10 BFO ON
18. (R) 0 BFO OFF
    (R) 142K BFO ON
19. (V) 200 BFO OFF
    (V) 140 BFO ON
20. (V) 0 BFO OFF
    (V) 69 BFO ON
21. (V) 0 CAL. OFF
    (V) -24 CAL. ON

Figure 7-1. Receiver Voltage and Resistance Chart

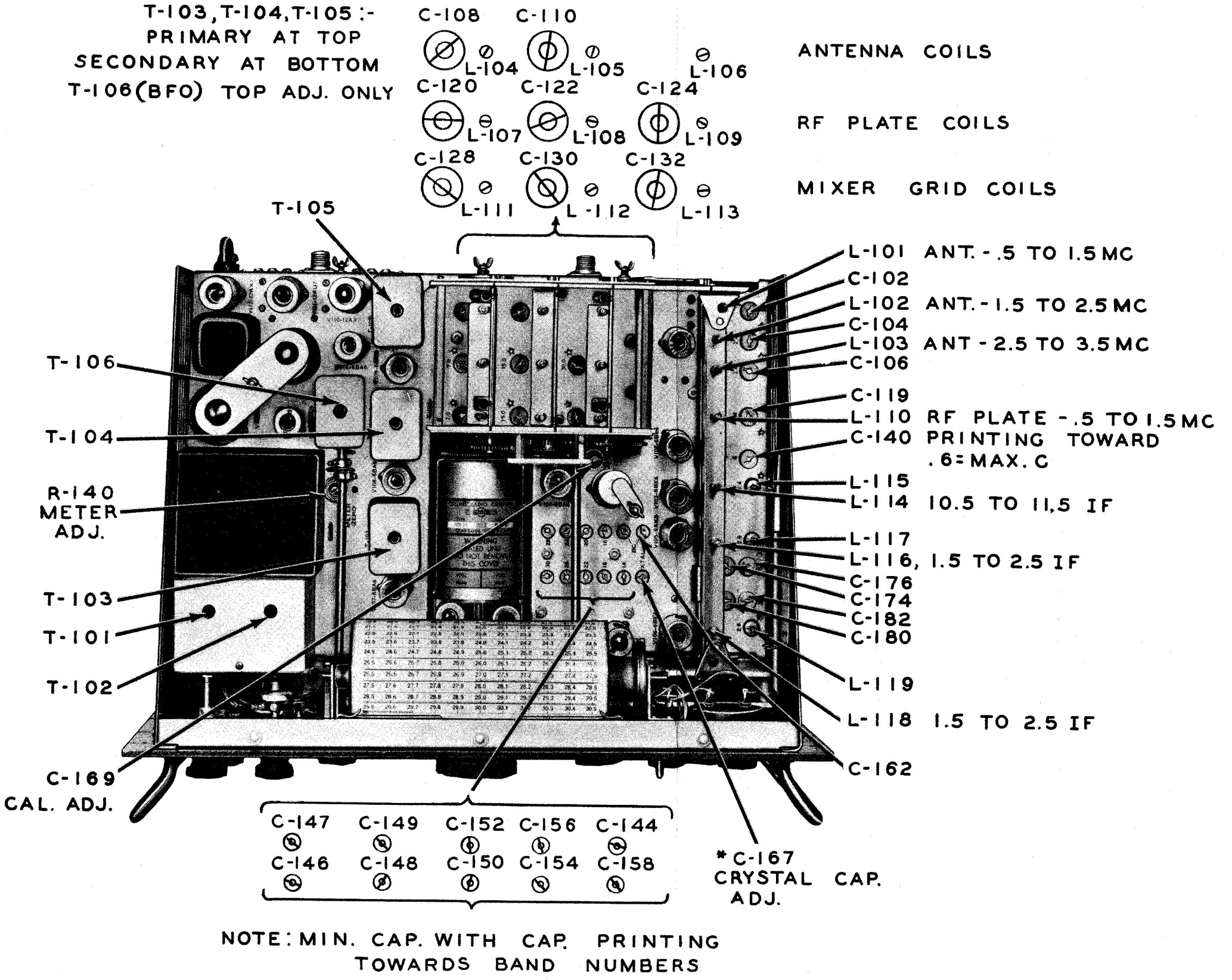


Figure 7-2. Alignment Adjustments

6. Connect detuning network to terminal 4 of T105. Tune primary of T105 for maximum indication of VTVM.

7. Remove detuning network from terminal 4 of T105. Tune T101 for maximum indication on VTVM.

d. BFO ALIGNMENT.

(1) TEST EQUIPMENT NEEDED.

(a) Signal generator (R. F. Signal Generator Set AN/URM-25 Series or Equivalent).

(2) PROCEDURE.

(a) Set signal generator at exactly 500 kc by zero beating with the 100-kc calibration oscillator as in this section, paragraph 4. c. (2)(a), above.

1. If the BFO PITCH knob has never been off the shaft, align the bfo as follows: Turn BFO on. Set the line on the BFO PITCH knob at the fiducial mark on the panel. Adjust core in top to T106 (figure 7-2) to zero beat. BFO PITCH is now set at 500 kc.

2. If the BFO PITCH knob has been removed from the shaft, align the bfo as follows: Turn BFO on. Adjust core in top of T106 to produce a beat note. Line up the BFO PITCH knob with the panel mark and with the mid-range point of the bfo pitch capacitor by turning the BFO PITCH knob to either the right or the left of the fiducial panel mark until the pitch of the beat note rises to a maximum. Leave BFO PITCH knob exactly at point of maximum pitch. BFO PITCH capacitor plates are now either all in or all out. Loosen set screws in BFO PITCH knob and rotate knob on shaft until knob mark is 90 degrees from the panel mark. Tighten set screws. Set knob mark at the fiducial mark on the panel. BFO PITCH capacitor is now at mid-range. Adjust core in top of T106 to zero beat. Bfo is now set at 500 kc.

e. ALTERNATE BFO ALIGNMENT--WITHOUT SIGNAL GENERATOR.

(1) TEST EQUIPMENT NEEDED.

(a) Uses no special equipment.

(2) PROCEDURE.

(a) Disconnect antenna from terminal at rear of chassis. Turn 100-kc calibration oscillator on.

(b) Tune receiver to a 100-kc check point on bands 2 or 3. For example, tune receiver to 2.0 mc.

(c) Line up the BFO PITCH knob with the panel mark and with the mid-range of BFO PITCH capacitor as follows:

1. If the BFO PITCH knob has never been off the shaft, turn the knob until the knob mark lines up with the panel mark on the receiver. Then proceed as in steps 3 and 4 below.

2. If the BFO PITCH knob has been removed from the shaft, adjust the core in T106 to produce a beat note. Turn BFO PITCH knob either to the right or to the left of the panel mark until the beat note's pitch rises to a maximum. Leave knob exactly at point of maximum pitch. BFO PITCH capacitor plates are now either all in or all out. Loosen set screws in BFO PITCH knob and rotate knob on shaft until knob mark is 90 degrees from panel mark. Tighten set screws. Turn knob to mark on panel. BFO PITCH is now at mid-range.

3. After performing either step 1 or step 2, above, tune the receiver at least 10 kc off any 0.1 megacycle point on bands 2 or 3, and turn up AUDIO GAIN until a constant pitch beat note is audible. If the constant pitch beat note is not audible, adjust tuning core in top of T106 until it is. Make certain that this is the correct note by turning the KILOCYCLE dial ±10 kc and noting whether the pitch of the beat note remains constant.

This constant pitch beat note, which occurs only on bands 2 and 3, is produced by a small amount of fifth harmonic from the 100-kc calibration oscillator that leaks into the i-f strip through the second mixer stage and beats with the signal from the bfo. Because of the superior strength of the calibration beat note in the vicinity of a 100-kc check point, this constant pitch beat note is most audible about half-way between check points.

4. Adjust tuning core of T106 for zero beat. The bfo frequency is now 500 kc when the BFO PITCH knob is set at the fiducial mark on the panel.

f. CRYSTAL PHASING ADJUSTMENT (T-102 ALIGNMENT)

(1) TEST EQUIPMENT NEEDED.

(a) Oscilloscope OS-8/U Series or equivalent.

(b) Frequency-modulated signal generator.

(c) Fiber or bakelite adjusting tool (Supplied).

(2) PROCEDURE.

(a) Line up the crystal filter PHASING control knob with the panel mark and with the mid-range position of the phasing capacitor. To accomplish this, use a flashlight and look into the right-hand hole in the top of the crystal filter cover in order to see the plates of the phasing capacitor (See figure 5-1). Turn the PHASING control until the rotor plates are straight down toward the bottom of the receiver, i. e., until the rotor plates completely engage the bottom set of stator plates. Loosen set screws in PHASING control knob. Set knob line 90 degrees to the left of the panel mark. Tighten set screws. Turn knob to panel mark. Phasing capacitor is now at mid-range.

(b) Connect the frequency-modulated signal generator to pin 7 of V106. The carrier frequency of the generator should be between 1.5 and 3.5 mc. The frequency excursion of the carrier should be about 20 kc. The rate of excursion should be as rapid as possible without blocking the signal in the crystal filter. The rate will be low due to the inertia of the 500-kc filter crystal.

Connect the vertical plate input of the oscilloscope to the junction of R150 and R151 (detector load resistors).

(c) Turn SELECTIVITY switch to position 1. Turn AVC off, LIMITER off, BFO off, CALIBRATE off, and AUDIO GAIN to position 0.

(d) Tune receiver to the carrier frequency of the signal generator, which should be in the range between 1.5 and 3.5 mc.

(e) Turn RF GAIN to position 5, and synchronize scope. Two fairly symmetrical peaks should appear on the scope screen. If they do not, adjust receiver tuning, RF GAIN, and oscilloscope controls until they do. Each of these two peaks is essentially an i-f response curve. Two peaks appear for one complete frequency excursion of the generator carrier because the excursion sweeps through and returns through a given number of cps. Therefore a double indication of response is shown on the oscilloscope, one being the image of the other. Either peak can be used to make the following adjustment.

(f) Rotation of the PHASING control of the left should cause rejection notch to appear at one side of each peak. If this notch does not appear, set the PHASING control about one-eighth turn to the left of center and adjust the core in the top of T102 (accessible through the right-hand hole in the crystal filter cover (figure 7-2) until it does appear and is well-defined on the scope screen. Adjust until no evidence of damped oscillations appears on the notch.

(g) Turn PHASING control about one-eighth turn to the right of center. Check to see that the rejection notch appears on the opposite side of the peaks, and without further adjustment, is well defined and without evidence of damped oscillations. If this is not the case, adjust core in T102 slightly.

(h) Repeat steps (f) and (g) until the notch obtained is symmetrical and well defined as it is moved through the range.

(i) ALTERNATE METHOD -- In the event that a frequency modulated signal generator is not available, T-102 may be aligned using an AM signal generator and d-c electronic voltmeter as follows:

1. Perform step (2)(a) above.

2. Apply a 1.5 to 3.5-mc signal from signal generator to pin 7 of V106. Connect d-c voltmeter to the junction of R150 and R151.

3. With the SELECTIVITY control in position 4, carefully tune the receiver to the signal generator frequency and adjust the fiducial line on the KILOCYCLE dial so that it is placed directly over a scale mark (to be used as reference line).

4. Place SELECTIVITY control in position 1 and back the KILOCYCLE dial off 3-kc from the reference point. At this dial setting, adjust the core in T102 for a peak reading on the voltmeter.

5. Set KILOCYCLE dial 3-kc off reference in the opposite direct on to that above and again adjust T102 for a peak reading on the voltmeter. Carefully note the direction and magnitude of this second adjustment and set the T102 adjustment midway. T102 is now approximately aligned for correct crystal phasing.

g. 500-KC I-F PERFORMANCE MEASUREMENTS.

(1) TEST EQUIPMENT NEEDED.

(a) R-F Signal Generator Set AN/URM-25 Series or equivalent.

(b) Electronic voltmeter (Multimeter ME-25/U Series or equivalent.

(2) PROCEDURE.

(a) SENSITIVITY. - With AVC turned off, apply a 500-kc signal from the signal generator between pin 7 of V106 and chassis. (Calibration of the signal generator should be checked as in this section, paragraph 4.c.(2) (a).) Connect VTVM from diode load resistor R151 to chassis.

The input to pin 7 of V106 at 500 kc should be within the range of 25 to 40 uv for a 4-volt reading at the diode load. If not, re-check alignment and circuits in the i-f stages and check tubes involved to locate fault.

(b) SELECTIVITY. -

1. Adjust the output level of the signal generator for 4 volts at the diode load. Note the signal generator output reading at this setting. This voltage and the 4-volt diode load reading are the reference voltages.

2. Increase the output level of the signal generator to twice the previously noted voltage (6 db increase). Detune signal generator on either side of the initial 500-kc setting until the diode load voltage drops back to the 4-volt reference. The resulting change in input frequency is the measure of selectivity at 6 db down.

3. Re-set the signal generator frequency to the 500-kc reference and adjust the output level for the 4-volt diode load reading as in step 1. Increase the output level of the signal generator 1000 times (60 db increase), and proceed as in step 2 to determine the selectivity at 60 db down.

4. OVERALL SELECTIVITY SPECIFICATIONS.

Minimum selectivity (crystal filter out)

6 db	5.5 kc min.	6.5 kc max.
60 db	17.0 kc min.	20.0 kc max.

Maximum selectivity (crystal filter in)

6 db	0.2 kc min.	0.3 kc max.
60 db	0.2 kc min.	12.0 kc max.

5. Typical Curves for positions 0, 1, and 4 of the SELECTIVITY control are shown in figure 7-3.

h. ALIGNMENT OF DIALS WITH VFO.

(1) TEST EQUIPMENT NEEDED.

(a) No special equipment needed.

(2) Megacycle dial procedure. - It is very unlikely that the pointer on the MEGACYCLE dial will become inaccurate through normal use of the receiver. However, if the dial pointer has accidently been slipped with respect to the cord, reset it as follows: Take off escutcheon plate; then rotate KILOCYCLE knob counterclockwise until it hits the mechanical stop. Then rotate it a fraction of a turn clockwise until the zero-zero mark lines up with fiducial. From this point rotate KILOCYCLE knob exactly five turns clockwise. Grasp the dial cord and slide the MEGACYCLE pointer along it to the center frequency of the band. For example, if the receiver is set at band 2, set pointer exactly at 2.0 mc. Replace escutcheon plate. Should the position of the drum incorrectly line up the scales with the escutcheon opening, correct by loosening the two set screws on the drum hub and turning drum to correct position.

(3) KILOCYCLE DIAL PROCEDURE. - If the KILOCYCLE dial reading is incorrect first determine the magnitude and direction of the errors and then correct them according to the procedures below.

To determine the nature of the errors, set the receiver on band 2 with the BAND CHANGE knob, and set the KILOCYCLE dial fiducial line to center mark on escutcheon opening by turning the ZERO ADJ. knob. Set the receiver at 1.5 mc by means of the KILOCYCLE knob. Set bfo to exactly 500 kc as in Section 7, paragraph 4.e.(ALTERNATE BFO ALIGNMENT). Turn on the 100-kc calibration oscillator by turning the CAL switch to ON. Turn KILOCYCLE dial to zero beat with the bfo. Note the magnitude and direction of error in KILOCYCLE dial reading (should read zero-zero).

Tune receiver to 2.5 mc. With the bfo set at

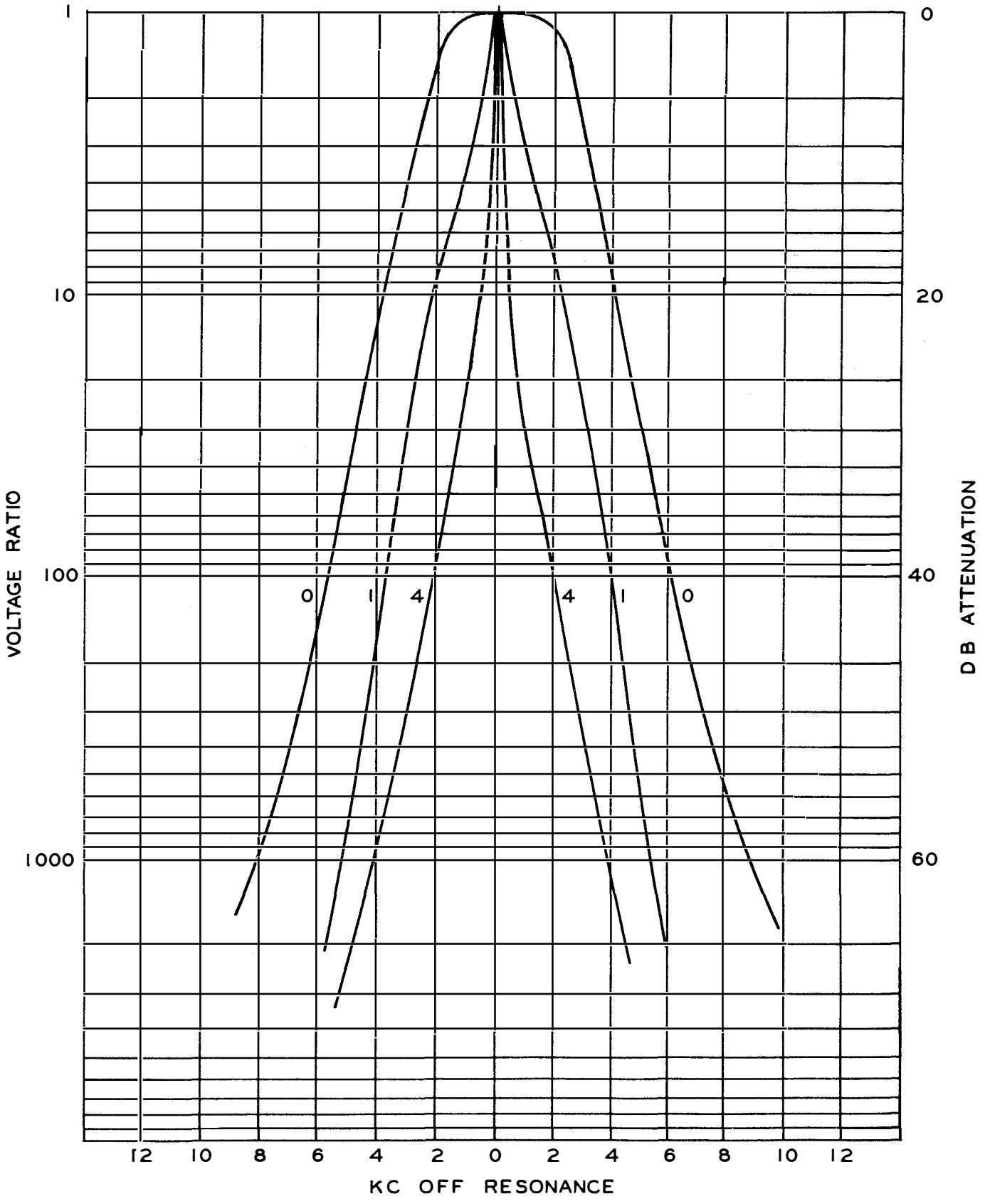


Figure 7-3. I-F Selectivity Curve

exactly 500 kc, turn KILOCYCLE knob to zero beat. Again, note the magnitude and direction of the error in the KILOCYCLE dial reading.

With the magnitude and direction of error at the extreme ends of the dial now recorded, follow appropriate procedure below.

(a) KILOCYCLE DIAL READING ERROR LESS THAN 3 KC IN SAME DIRECTION BY SAME AMOUNT AT BOTH ENDS OF MEGACYCLE DIAL:

1. Be sure bfo is set at 500 kc as in section 7, paragraph 4.e.

2. Tune the receiver to zero beat at some 100-kc check point on the dial.

3. Set KILOCYCLE dial fiducial line to zero-zero on the KILOCYCLE dial by turning the ZERO ADJ knob.

(b) KILOCYCLE DIAL READING ERROR MORE THAN 3 KC IN SAME DIRECTION BY SAME AMOUNT AT BOTH ENDS OF MEGACYCLE DIAL:

1. Be sure bfo is set at 500 kc as in paragraph 4.e. Tune to zero beat at 1.5 mc.

2. Set KILOCYCLE fiducial line to center index mark on the escutcheon opening by turning ZERO ADJ. knob.

3. Keep in mind the magnitude and direction of the dial correction to be made. Loosen set screws in KILOCYCLE dial hub with a #4 Bristol wrench. The position of the shaft may have to be changed to give access to the set screws. The position at which the final set screw is loosened is the reference position. Note the dial reading at this point, and turn the circular dial in the proper direction by the amount of correction needed.

4. Tighten one set screw and check dial reading against zero beat as in paragraph (3) above. NOTE: Inaccessibility of the set screws may present a problem during necessary adjustments of dial positions on the shaft. The adjustments must be made until the error in dial reading is sufficiently small to fall within the range of the ZERO SET control (about 5 kc on either side of the center mark on the escutcheon opening).

(c) KILOCYCLE DIAL READING ERROR EITHER OPPOSITE IN DIRECTION OR DIFFERENT IN MAGNITUDE AT THE ENDS OF THE MEGACYCLE DIAL: (VFO ENDPOINT DRIFT).

1. Be sure bfo is set at 500 kc as in Section 7, paragraph 4.e. Tune to zero beat at 1.5 mc.

2. If the zero-zero mark lies outside the lines on the escutcheon opening, set KILOCYCLE fiducial line to the center line in the escutcheon opening. Loosen set screws in the KILOCYCLE dial and rotate KILOCYCLE dial until zero-zero mark lines up with the fiducial. Tighten set screws.

4. Rotate KILOCYCLE knob approximately ten turns to zero beat. This procedure tunes the receiver to the high end of band 2 at 2.5 mc.

5. Note the error in the KILOCYCLE dial reading. (Should be zero-zero at this point.)

6. IF THIS ERROR IS LESS THAN ±3 KC, set the fiducial to 2.5 mc by turning the ZERO ADJ. knob. This procedure sets the point of maximum accuracy at 2.5 mc. If maximum accuracy is desired near some other check point in the band, tune the receiver to zero beat at the desired check point. Then adjust fiducial to zero-zero on the KILOCYCLE dial.

7. IF THIS ERROR IS MORE THAN ±3 KC, refer to paragraph 4.1. (VFO ALIGNMENT) for instructions.

i. VFO SHAFT POSITION CHECK FOR 100-KC ERROR.

(1) TEST EQUIPMENT NEEDED FOR CHECK.

(a) Signal Generator Set AN/URM-25 Series or equivalent.

(b) Accurately aligned R-388/URR-23A, receiver (for alternate method).

(c) #6 Bristo wrenches.

(2) PROCEDURE. - Check the bfo frequency against a known source to determine whether the vfo shaft has been displaced a full turn, and thereby has shifted the vfo frequency exactly 100 kc.

(a) IF A SIGNAL GENERATOR IS USED, set the receiver bfo at exactly 500 kc as in paragraph 4.e. Turn the 100-kc oscillator off. Connect the output of the signal generator to pin 7 of V106 with a clip lead. Set the signal generator at 2.0 mc

and tune the receiver to the input signal by zero beating. (The vfo is now operating at approximately 2.5 mc).

If the vfo shaft is displaced a full turn, zero beat will occur at approximately 1.9 or 2.1 mc instead of 2.0 mc. For exact setting of receiver, remove the signal generator and connect a clip lead from pin 7 of V106 to the 100-kc oscillator output at C173. Turn on the 100-kc oscillator and tune receiver to zero beat with the bfo.

(b) IF AN ACCURATELY ALIGNED R-388/URR-23A, hereafter called the test receiver, is used, couple the antenna jack of the test receiver to the output of the vfo that is being checked. (A few turns in the clip lead placed near the vfo tubes will provide sufficient coupling.) Set the bfo of the test receiver at 500 kc using the 100-kc oscillator in the test receiver as in this section, paragraph 4.e. Tune the test receiver dials to 2.5 mc and check this setting by zero beating the bfo with the 100-kc oscillator as in step (2) (a) above. Turn the test receiver 100-kc oscillator off.

Tune the receiver containing the vfo being checked to where zero beat is observed in the test receiver output. If the shaft of the vfo being checked has been displaced one full turn, zero beat will occur at 1.9 mc or 2.1 mc instead of 2.0 mc.

(c) If steps (a) or (b) reveal that the vfo shaft is displaced a full turn, correct as follows.

1. Note whether zero beat observed by the above steps was above or below the 2.0 mc dial position.

2. Loosen the set screws in vfo coupler with a #6 Bristo wrench.

NOTE

THE KILOCYCLE DIAL MUST BE ROTATED TO DIFFERENT POSITIONS TO PROVIDE ACCESS TO THE VFO COUPLING SET SCREWS. LOOSEN ONE SCREW AND TURN THE SHAFT TO A POSITION WHERE THE SECOND SCREW CAN BE LOOSENED. IMPORTANT--NOTE THE DIAL READING AT THIS POINT BEFORE COMPLETELY UNCOUPLING THE VFO. THE 100-KC CORRECTION WILL USE THIS DIAL SETTING AS A REFERENCE.

3. Hold the vfo shaft rigid at this position and set the receiver dials to read 100 kc higher than the reference setting if zero beat occurred at 1.9 mc or 100 kc lower than the reference setting if zero beat occurred at 2.1 mc.

4. Tighten the coupling set screw which is accessible at this shaft position. Turn the KILOCYCLE dial until the second coupling set screw can be tightened. Tune the receiver dials for zero beat at the 2.0 mc reading.

5. Additional fine adjustment can be made by moving the KILOCYCLE dial on the shaft or by moving the fiducial line on the KILOCYCLE dial opening.

j. VARIABLE I-F AND R-F ALIGNMENTS.

(1) TEST EQUIPMENT NEEDED FOR ALIGNMENTS.

(a) Signal Generator Set AN/URM-25 Series or equivalent.

(b) Electronic voltmeter (Multimeter ME-25/U Series or equivalent.

(c) 47-ohm resistor and 100-uuf capacitor.

NOTE

THE CALIBRATION OSCILLATOR MAY BE USED IF A SIGNAL GENERATOR IS NOT AVAILABLE. USE THE PROCEDURE OUTLINED BELOW BUT LEAVE THE CALIBRATION OSCILLATOR ON. SET THE BFO AT EXACTLY 500 KC AS OUTLINED IN PARAGRAPH 4.e. WITH A CLIP LEAD, COUPLE THE OUTPUT OF THE CALIBRATION OSCILLATOR, AT C173, TO PIN 7 OF V106. TUNE THE RECEIVER TO EACH ALIGNMENT FREQUENCY BY ZERO BEATING WITH THE BFO. (TUNING MAY ALSO BE ACCOMPLISHED BY PEAKING THE INPUT METER IN PLACE OF ZERO BEATING WITH THE BFO.)

(2) PROCEDURE. - Connect the signal generator in series with a 47-ohm resistor and 100-uuf capacitor to the ANTENNA terminal. Connect VTVM between diode load resistor R151 and chassis. Set ANT TRIM to mid-range. Set bfo at exactly 500 kc as in paragraph 4.e. Proceed as follows, referring to figure 7-2 and 7-10 through 7-12 for location of cores and trimmers.

(a) VARIABLE I-F AND R-F BAND 2 ALIGNMENTS.

1. Set Bandswitch to band 2. Set dial to read 1.6 mc.

2. Turn BFO on and set signal generator to zero beat at 1.6 mc. Turn BFO off. Adjust output of signal generator to give some value of diode load voltage below 5 volts. Tune slugs marked 1.6 (in L116, L118, and L102) for a maximum indication while adjusting the signal generator to keep diode load voltage below 5 volts.

3. Set dial to read 2.4 mc. Set generator to zero beat with the bfo at 2.4 mc. Turn BFO off. Tune adjustments marked 2.4 (trimmer capacitors C174, C180, and C104) for a maximum indication, keeping diode load voltage below 5 volts.

4. Repeat tuning procedures at 1.6 and 2.4 mc until no further increase in output can be obtained.

NOTE

IN THE FOLLOWING R-F ALIGNMENT PROCEDURES, KEEP DIODE LOAD VOLTAGE BELOW 5 VOLTS BY ADJUSTING THE SIGNAL GENERATOR OUTPUT, AND BFO SET AT 500 KC.

(b) VARIABLE I-F AND R-F BAND 3 ALIGNMENTS.

1. Set bandswitch to band 3. Set dial to read 2.6 mc. Turn BFO on and set signal generator to zero beat at 2.6 mc. Turn BFO off. Adjust tuning cores marked 2.6 (in L117, L119, and L103) for a maximum indication.

2. Set dial to read 3.4 mc. Set signal generator to zero beat at 3.4 mc with the bfo. Turn BFO off. Adjust trimmer capacitors marked 3.4 (C176, C182, and C106) for maximum indication.

3. Repeat tuning procedures at 2.6 and 3.4 mc until no further increase in output can be obtained.

(c) RF ALIGNMENT BANDS 4-7.

1. Set bandswitch to band 4. Set dial to read 4.0 mc. Turn BFO on and set signal generator to zero beat at 4.0 mc. Turn BFO off. Adjust tuning cores marked 4.0 (in L104, L107, and L111) for maximum indication.

2. Set bandswitch to band 7. Set dial to read 7.0 mc. Turn BFO on and set signal generator to zero beat at 7.0 mc. Turn BFO off. Tune trimmer capacitors marked 7.0 (C108, C120, and C128) for maximum indication.

3. Repeat tuning procedures at 4.0 and 7.0 mc until no further increase in output can be obtained.

(d) RF ALIGNMENT BANDS 8-15.

1. Set bandswitch to band 8. Set dial to read 8.0 mc. Set signal generator to zero beat with the bfo at 8.0 mc. Turn BFO off. Adjust tuning cores marked 8 (in L105, L108, and L112) for maximum indication.

2. Set bandswitch to band 15. Set dial to read 15.0 mc. Set signal generator to zero beat with the bfo at 15.0 mc. Turn BFO off. Tune trimmer capacitors marked 15 (C110, C122, and C130) for maximum indication.

3. Repeat tuning procedures at 8.0 and 15.0 mc until no further increase in output can be obtained.

(e) RF ALIGNMENT BANDS 16-30.

1. Set bandswitch to band 16. Set dial to 16.0 mc. Set signal generator to zero beat with the bfo at 16.0 mc. Turn BFO off. Adjust tuning cores marked 16 (in L106, L109, and L113) for a maximum indication.

2. Set bandswitch to band 30. Set dial to read 30.0 mc. Set signal generator to zero beat with the bfo at 30.0 mc. Turn BFO off. Adjust trimmer capacitors marked 30.0 (C124, C132), and ANT TRIM (front panel) for a maximum indication.

3. Repeat tuning procedures at 16.0 and 30.0 mc until no further increase in output can be obtained.

(f) RF ALIGNMENT BAND 1.

1. Set bandswitch to band 1. Set dial to read 0.6 mc. Set signal generator to zero beat with the bfo at 0.6 mc. Turn BFO off. Adjust core in L114 so that it is in approximately the same position in the inductor as are the cores in L116 and L118. Adjust cores marked 0.6 (in L101 and L110) for a maximum indication. Adjust trimmer capacitor marked 0.6 (C140) for a maximum indication.

NOTE

TWO PEAKS MAY BE FOUND WHEN TUNING C140. USE THE PEAK THAT REQUIRES THE HIGHER VALUE OF CAPACITANCE. REFER TO C140 IN FIGURE 7-2.

2. Set dial to read 1.4 mc. Set signal generator to zero beat with the bfo at 1.4 mc. Turn BFO off. Tune trimmers marked 1.4 (C102 and C119) for a maximum indication. Adjust core marked 1.4 (in L115) for a maximum indication.

3. Repeat tuning procedures at 0.6 and 1.4 mc until no further increase in output can be obtained.

k. SPURIOUS SIGNAL ATTENUATION ADJUSTMENT.

(1) On band 1, where triple conversion is employed, the circuits present a spurious signal when tuned to 1.25 mc. A spurious filter has been inserted in the plate lead of the band 1 mixer to attenuate this signal.

(2) Correct this situation as follows:

(a) Tune the receiver to 1.25 mc. Turn BFO on.

(b) Adjust L124 for the greatest attenuation of the spurious signal. See figure 7-12.

l. VFO ALIGNMENT.

(1) TEST EQUIPMENT NEEDED.

(a) Signal Generator. Set AN/URM-25 Series or equivalent.

(b) Vfo Adjustment tool (not supplied - see figure 7-4).

(2) GENERAL. - During manufacture of the vfo the frequency-determining elements are hermetically sealed within the outer cylindrical cover while held at a high temperature. This drives out practically all moisture and creates a partial vacuum within the sealed compartment. Because of the method of fabrication and the efficiency of design, it is quite unlikely that the vfo will become misaligned through normal use or treatment. However, if it does become sufficiently misaligned, as indicated by the procedure outlined in this Section, paragraph 4.h. (3) (c), it must be returned to the factory for permanent alignment. Because alignment procedure involves breaking of the hermetic seal by removal of a small plug, the future stability of the vfo will be seriously impaired if conditions under which it was manufactured are not duplicated during alignment. Therefore, it is possible to align the vfo only temporarily without sending it back to the factory. If the vfo is to be sent back to the factory refer to paragraph 5 in this section (COMPLETE VFO REMOVAL AND REPLACEMENT) for instructions on removal. This temporary alignment can be performed by a qualified and properly equipped service technician, but should be attempted only in case of emergency. All components not contained within the sealed cover can be maintained in the field.

WARNING

DO NOT, UNDER ANY CIRCUMSTANCES, ATTEMPT TO REMOVE THE OUTER CYLINDRICAL COVER. THIS NOT ONLY BREAKS THE HERMETIC SEAL BUT EXPOSES THE FREQUENCY CORRECTOR MECHANISM AND THE CAREFULLY COMPENSATED FREQUENCY-DETERMINING ELEMENTS.

(3) PROCEDURE.

(a) Before aligning the vfo be sure that the bfo is set at 500 kc as in this section, paragraph 4.e., that the 500-kc i-f channel is aligned, and that the 100-kc oscillator is turned off.

(b) Use a signal generator having an output of 1.5 mc with better than ±25 kc accuracy.

(c) Loosen set screws in the flexible vfo coupler, and slide the coupler hubs apart. Remove the receiver's front panel and the vfo mounting screws. Pull out the vfo and carefully allow it to hang on the connecting wires. Mount a small circular dial on the vfo shaft. This dial must have a linear scale from 0 to 100 completely around its periphery. Affix a small wire for use as a pointer on one of the VFO mounting screws. One division of the dial will equal one kilocycle.

(d) Turn the receiver ON and short the antenna terminal to chassis. Because none of the receiver's variable tuned circuits are used in this procedure, leave the receiver dials at whatever frequency they happen to be on when the receiver is turned on.

(e) Couple the 1.5-mc output from the signal generator to pin 1 of V106.

(f) Find the low frequency endpoint (2.0 mc) of the vfo by turning the vfo shaft clockwise to the last zero beat obtainable in that direction.

CAUTION

DO NOT FORCE THE VFO SHAFT BY ATTEMPTING TO TURN IT FURTHER WHEN IT REACHES THE STOP AT EITHER END OF THE RANGE.

(g) The vfo setting is now within 20 kc of 2.0 mc and must be adjusted more accurately as follows. Uncouple signal generator from pin 1 of V106. Connect a clip lead from the 100-kc oscillator at C173 to pin 1 of V106. Turn 100-kc oscillator on. Carefully rotate vfo shaft to the nearest zero beat. Vfo setting is now exactly 2.0 mc. Place vfo dial pointer at zero, being careful to retain the zero beat setting.

(h) Rotate the vfo shaft exactly 10 turns in a counter-clockwise direction, counting exact turns with the vfo shaft dial. Find zero beat by turning the vfo shaft a few divisions toward either side of the 10-turn mark.

(i) If zero beat occurs on either side of the 10-turn mark, note the magnitude and direction of the error by counting divisions between zero and the pointer. Multiply this number of error divisions by 1.5.

(j) If zero beat occurs at less than 10 turns, rotate the vfo shaft counterclockwise by the number of divisions arrived at in step (i) (1.5 times the error divisions).

(k) If zero beat occurs at more than 10 turns, rotate the vfo shaft clockwise by the number of divisions arrived at in step (i) (1.5 times the error divisions).

(l) Remove the hex plug from the front of the oscillator. Using the outer part of the special vfo adjustment tool illustrated in figure 7-4, loosen the lock nut that is visible when the hex plug is removed. Insert the screwdriver portion of the vfo tool into the outer portion. Adjust the trimmer screw by turning the screwdriver until zero beat is again reached. Tighten lock nut, being careful to retain zero beat.

NOTE

THE TOOL USED FOR THIS ADJUSTMENT IS NOT SUPPLIED, MACHINING DIMENSIONS ARE SHOWN IN FIGURE 7-4.

(m) The high and low end (2.0 and 3.0 mc) zero beat positions should now be exactly ten turns apart. If this is not the case, repeat the above procedure until they are. It will be necessary to zero the dial pointer at the initial zero beat position each time this procedure is repeated. Be sure to tighten the lock nut after making each trimmer adjustment. Be careful not to lose the endpoints by counting incorrectly or forgetting the count. If the endpoints are lost turn off the 100-kc oscillator and start the procedure over at step (e).

(n) After separating the 2.0 and 3.0 mc endpoints of the vfo by exactly 10 turns, replace the hex plug, put the vfo in the receiver and replace the front panel. Align the receiver dials with the vfo according to the procedure outlined in this section, paragraph 5.a.(2)(a). It is not necessary to readjust the r-f and i-f amplifiers for small changes in the vfo adjustment.

(4) EXAMPLES. - The following examples illustrate the procedure outlined in paragraph (3).

NOTE

DO NOT ATTEMPT TO FOLLOW THESE EXAMPLES AS INSTRUCTIONS. THEY ARE PURELY HYPOTHETICAL AND ARE INCLUDED FOR ILLUSTRATIVE PURPOSES ONLY.

(a) Zero the pointer at the low frequency endpoint (2.0 mc) of the vfo. Read zero on the shaft dial. Rotate shaft exactly 10 turns counterclockwise. Again read zero on the dial. A beat note is audible at this setting. Find zero beat by turning vfo shaft by 4 divisions clockwise. This indicates that the endpoints are 4 divisions less than 10 turns apart. Multiply the 4-error divisions by 1.5 to arrive at 6. Rotate vfo shaft counterclockwise by 6 divisions since zero beat occurs at less than 10 turns. Turn trimmer screw to zero beat. Rotate vfo shaft exactly 10 turns clockwise to check whether the endpoints are now exactly 10 turns apart. If they are not, repeat procedure in paragraph (b) until they are.

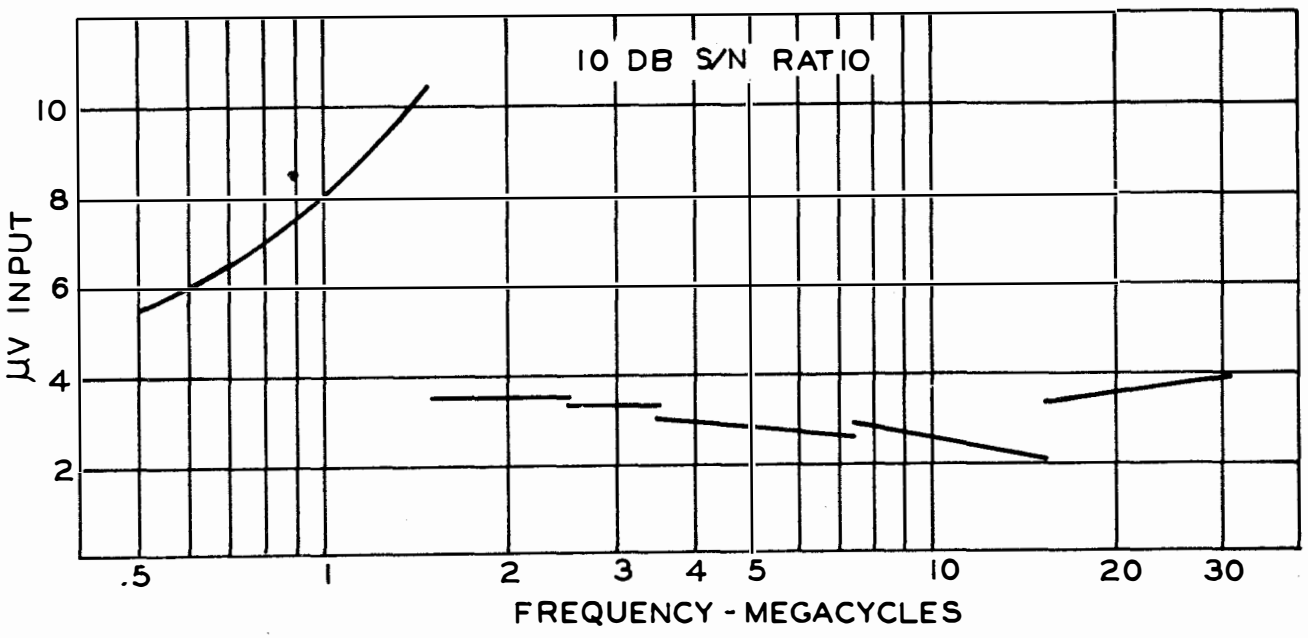


Figure 7-4. VFO Adjustment Tool

(b) Zero the pointer at the low frequency endpoint (2.0 mc) of the vfo. Read zero on the shaft dial. Rotate shaft exactly 10 turns counterclockwise. Again read zero on the dial. A beat note is audible at this setting. Find zero beat by turning bfo shaft by 5 divisions counterclockwise. This indicates that the endpoints are 5 divisions more than 10 turns apart. Multiply the 5 error divisions by 1.5 to arrive at 7.5. Rotate vfo shaft clockwise by 7.5 divisions since zero beat occurs at more than 10 turns. Turn trimmer screw to zero beat. Rotate vfo shaft exactly 10 turns clockwise to check whether the endpoints are now exactly 10 turns apart. If they are not, repeat procedure in paragraph (b) until they are.

m. RECEIVER FINAL TESTING.

(1) SENSITIVITY

(a) Set the controls as follows:

AVC switch	OFF
RF GAIN	Maximum
AUDIO GAIN control	As required for 10:1 signal plus noise-to-noise ratio.
SELECTIVITY	0
LIMITER switch	OFF
BFO	OFF

(b) Apply an r-f signal, modulated 30 percent at 400 cps to the ANTENNA jack through a 47-ohm resistor in series with a 100-uuf capacitor.

(c) Make tests at the low-, middle-, and high-frequency points of each band.

(d) The sensitivity on Band 1 shall be better than 15 uv. The sensitivity on Bands 2 through 30 shall be better than 5 uv. Figure 7-5 illustrates typical measurements throughout the tuning range of the receiver.

(e) The over-all gain on Bands 2 through 30 shall be enough to give one watt of audio output with less than 5 uv input (AVC off).

(f) The c-w sensitivity on Band 1 shall be better than 5 uv and on Bands 2 through 30 the c-w sensitivity shall be better than 1.6 uv.

(2) SIGNAL PLUS NOISE-TO-NOISE RATIO.

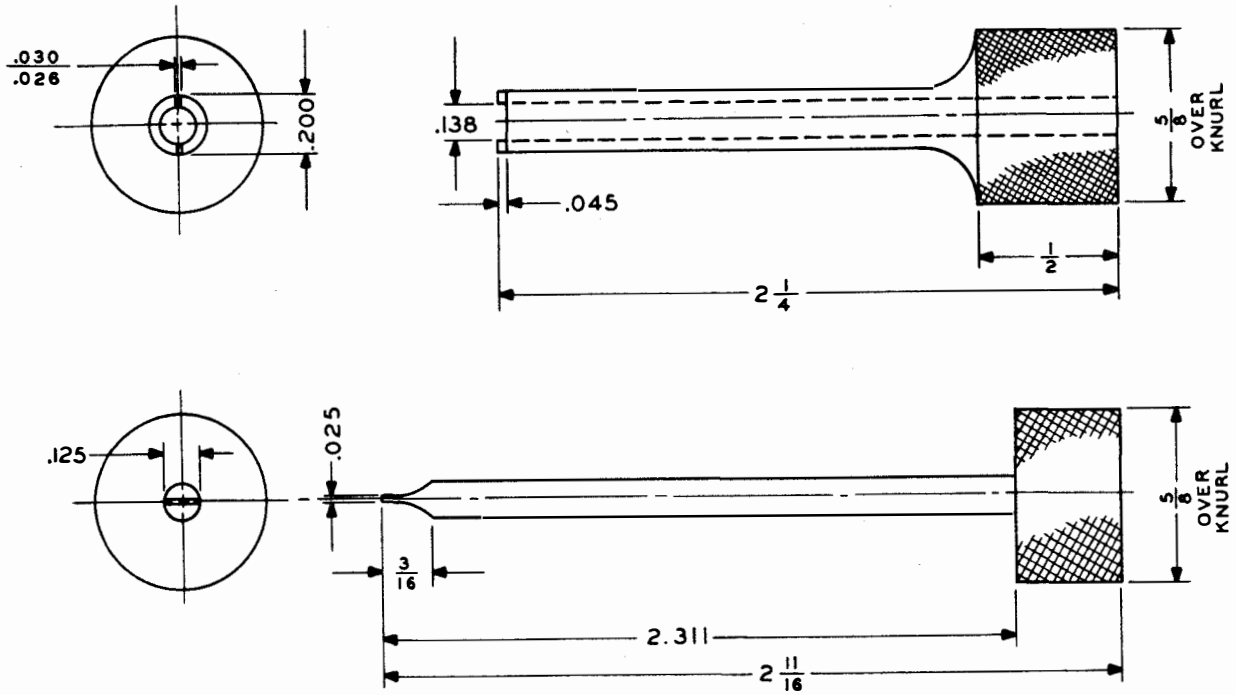


Figure 7-5. Receiver Sensitivity

(a) This test is made most conveniently along with the sensitivity test described above.

(b) After each section of the band is tested as outlined in paragraph (1) above, apply a 1,000 uv signal modulated 30 percent at 400 cps. The AUDIO GAIN should be adjusted to give a 500-mw output.

(c) Turn the generator modulation off-- The noise level should be better than 45-db below the 500-mw level.

(3) AVC CHARACTERISTIC. The avc will begin to take over on Band 1 at a threshold of 6 uv of input signal. On Bands 2 through 30, the avc will begin to take over at a threshold of 3 uv of input signal. For a rise of 0.5 uv of input signal to 125 uv of input signal, the output level should increase no more than 3.5 db. For a rise of 125 uv to 500,000 uv in the input signal, the output level should not increase more than 5 db. For references, apply a 4.9-mc input signal modulated 30 percent at 400 cps to the ANTENNA jack through a series-connected 100-uuf capacitor and a 47-ohm resistor.

5. REPLACEMENT OF PARTS.

a. VFO. - If it is necessary to completely remove the vfo from the receiver for servicing or replacement, employ the following procedure to prevent damage to the unit and to obtain correct alignment with dials when replaced.

(1) VFO REMOVAL.

(a) Remove the front panel and allow it to swing forward on the wires. This will necessitate removal of the KILOCYCLE, BAND CHANGE, AND TRIM, BFO PITCH, SELECTIVITY, and PHASING knobs and the collar, tension washer, and flat washer from the KILOCYCLE shaft, after which the screws holding the panel to the chassis are removed and the front panel allowed to hang to one side on the cable wires.

(b) Loosen set screws on the vfo coupler. Pull coupler apart and remove the center disc.

(c) Mark the vfo connecting wires so that they may be reconnected correctly. Unsolder the wires.

(d) Remove the three screws that hold the vfo to the gear mounting plate. The upper right screw, as viewed from front of plate, is made accessible through a hole in the gear by turning the KILOCYCLE shaft to align the hole over the screw.

(e) Slide the vfo back and tip the rear downward.

(f) Pull the vfo from the receiver.

(2) VFO REPLACEMENT.

(a) To replace a vfo unit in the receiver, reverse the above procedure. Replace the front panel and knobs; reassemble the vfo coupler. Tighten coupler set screws on this VFO but do not tighten the set screws on the front end of the coupler. The procedure used in aligning the vfo with the receiver tuning dials is as follows:

1. Carefully turn the oscillator shaft in a clockwise direction until the stop in the oscillator is reached. (DO NOT FORCE THE SHAFT BEYOND THIS STOP). Back off one turn.

2. Set the receiver dials at 1.5 mc (low end of band 2).

3. Proceed as in section 7, paragraph 4. i. (VFO SHAFT POSITION CHECK FOR 100-KC ERROR). The procedure outlined in paragraph 4. i. implies correct KILOCYCLE dial readings but a full turn (100 kc) error. However this procedure is applicable to correction of any errors between the dial readings and the vfo shaft position. An example of this follows:

EXAMPLE: Suppose in 4. i. (a) or (b), zero beat occurs at a reading of 2.153 mc rather than 2.0 mc (0.153 mc high). At this setting the vfo shaft set screws are not accessible for loosening. The KILOCYCLE dial is turned until the screws can be reached, and at the position where the second screw is loosened the dial readings are 2.0 and 22 (2.022 mc). Since a correction of minus 0.153 mc was indicated from the zero beat dial readings, the vfo shaft is held stationary and the KILOCYCLE dial turned until the reading is 2.022 minus 0.153, or 1.869 mc. This is represented by readings of 1.8 on the MEGACYCLE dial and 69 on the KILOCYCLE dial.

One vfo coupling screw is now tightened without moving the vfo shaft and the shaft is turned until the second screw is accessible for tightening. The dials are then turned to a 2.0 mc reading and zero beat is heard at, or very near, this point. Fine corrections are then made by adjusting the KILOCYCLE dial position on the shaft or by adjusting the ZERO SET control to move the fiducial line to the correct reading point.

b. DIAL CORD REPLACEMENT.

(1) MEGACYCLE POINTER CORD.

(a) Refer to figure 7-6. Remove the front panel as in paragraph 5. a. (1)(a). If the cord is to be replaced, use 36-5/8 inches nylon coated cord. (Parts List Item O-163).

1. Turn kilocycle shaft counterclockwise to stop.

2. Tie a loop in the cord. Loop the cord over the tab at point x in figure 7-6.

3. Wind cord about one-half turn clockwise on pulley A, continue to pulley B, pointer, pulley C, and back to pulley A.

4. Wind cord about 1-1/2 turns clockwise around pulley A. Fasten cord to the spring on pulley A with spring at full tension.

5. Replace front panel, KILOCYCLE dial shaft flat washer, tension washer and collar, and knobs.

(2) DRUM CORD.

(a) If the drum cord has jumped the pulley, restring it without removing the front panel. If the cord is broken, remove the front panel as in paragraph 5. a. (1)(a). Use 27 inches of nylon coated cord, for replacement. (Parts List Item O-163).

1. Turn BAND CHANGE knob to band 30.

2. Turn pulley E, figure 7-6, about one-half turn and hold tension of spring.

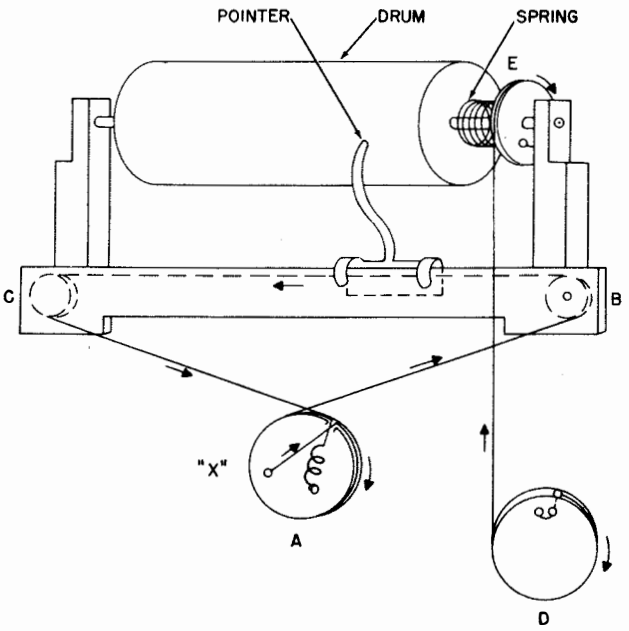


Figure 7-6. Dial Cord Arrangement

3. Insert cord in pulley D and knot it. Wind cord about three fourths of a turn on pulley D; extend to pulley E, and wind it 1-1/2 turns or more around pulley E as needed. Insert cord in hole and knot it.

4. Replace panel and knobs.

5. Turn BAND CHANGE knob to band 15.

6. Loosen set screw in drum hub and turn drum until 15-mc band is centered in the escutcheon opening; then tighten set screw.

c. STATIC DISCHARGE BULB.

(1) Should this bulb fail to fire with the application of 65 volts ac or 90 volts dc, it must be replaced to maintain protection from high voltages on the antenna.

(a) Refer to figure 7-12 for location of bulb in rear-underside of chassis.

(b) Unsolder wires from base of bulb, loosen clamp holding bulb to chassis and remove bulb.

(c) Connect bulb in series with 30K-ohm resistor to 115-volt a-c source, and check to see if bulb fires. If bulb fires, replace in mounting. If bulb fails to fire, replace with new bulb. Bulb description is as follows:

LAMP DESIGNATION	I-104
BULB TYPE	T-4-1/2
BASE TYPE	Bayonet candelabra
RATINGS:	
Watts	1/4 watts nominal
Starting volts	65 volts ac--90 volts dc
Operating volts	105-125 volts ac with 30K-ohms external series resistance

6. MECHANICAL MAINTENANCE.

a. DIAL AND BAND CHANGE GEAR MAINTENANCE.

WARNING

IF DISASSEMBLY OF THE GEAR UNIT IS UNDERTAKEN, INSTRUCTIONS IN PARAGRAPHS 6.a.(1) and 6.a.(2) MUST BE FOLLOWED CLOSELY OR IT WILL BE IMPOSSIBLE TO SYNCHRONIZE THE GEARS UPON REASSEMBLY.

(1) DISASSEMBLY OF GEAR BOX.

(a) If the gear box is to be returned to the factory for servicing, proceed as follows.

1. Set the receiver on its back. Remove the following knobs: SELECTIVITY, PHASING, BFO PITCH, BAND CHANGE, KILOCYCLE tuning, and ANT TRIM. Remove the collar, tension washer and flat washer from the kilocycle shaft. Remove the screws that fasten the front panel to the chassis. Lift the panel off and carefully allow it to hang to one side on the cable wires.

2. Remove the right-hand end bracket from the chassis.

3. Loosen set screws in the following couplers: vfo, r-f slug rack and i-f slug rack shafts, all accessible from the top of the receiver, and two band change shafts, accessible from the bottom.

4. Remove the vfo mounting screws and the gear box mounting screws. Lift the gear box from the receiver.

(b) If repairs are to be made in the field, the gear box may either be removed from the receiver or left in, depending on the extent of repairs. If the box is to be removed, turn the MEGACYCLE knob to its clockwise stop and the KILOCYCLE knob to its counterclockwise stop, and follow the instructions in paragraph 6.a.(1)(a); then proceed according to the following steps. If the box is to be left in the receiver, perform steps 1 and 2 under paragraph 6.a.(1)(a); then proceed according to the following steps. Refer to figures 7-7 and 7-8 for location of gears and shafts.

1. Turn shaft G (BAND CHANGE) clockwise to the stop below band 1. Turn shaft A counterclockwise to the stop.

2. Scribe a mark across the 85-tooth spider gear that carries the planetary gears, and across the 90-tooth stop-pin gear, using the top of the front gear panel as a guide.

3. Scribe a radial mark, precisely under the Geneva wheel spring detent, on the 144-tooth gear that has two stop pins attached.

4. Using the circumference of the Geneva

wheel as a guide, scribe a mark on the 85-tooth gear that drives the Geneva wheel.

5. Scribe a mark through the edge of the small dial cord pulley and the front gear panel.

6. Remove pin from hub of large dial cord pulley.

7. Remove large dial cord pulley and gear.

8. Remove small dial cord pulley.

9. Remove retaining ring from shaft I (shown as shaft Z in the front view of gear plate in figure 7-8).

10. Using a pair of right angle TRUARC pliers or two bent (right angle) scribes, remove retaining ring from shaft F.

11. Using a pair of dividers, measure and record the length of loading spring.

12. Remove four mounting screws from front gear panel.

13. Remove front gear panel, being very careful not to let shafts ride up with plate. While removing this panel do not allow gears to unmesh or rotate.

14. Keep shim washers with respective gears or shafts.

15. Before moving or disengaging any gears other than the 90-tooth gear on shaft F, scribe a line through detent spring, 48-tooth detent gear, and rear gear panel, and another line through the 52-tooth gear on shaft E and rear gear panel.

16. Mark all gears being removed in such a manner that they may be identified later for reassembly.

17. If the overtravel coupler is removed, note that the disc and gear are detented. Do not lose detent ball.

18. Make all necessary repairs. If any parts that have been scribed are to be replaced, be sure to scribe the new parts in exactly the same manner before placing them in the equipment. If the loading cord is to be replaced, form a small loop at one end of each of the two pieces to provide anchors for the spring. Push free ends of the cords through the proper pulley-holes. Knot the free ends after allowing for five-inch lengths of cord between the loops and knots. Coat the knots with Duco cement.

(2) REASSEMBLY OF GEAR BOX. - The following procedure assumes that all gears have been removed, that all repairs have been made, and that the gear and shaft assemblies have been reassembled after repairs were made.

(a) Use AN-G-25 grease on all bearing surfaces during assembly.

(b) If the 74-tooth idler gear whose shaft is riveted to the rear gear panel was removed, replace it first.

(c) Replace a 48-tooth gear and shaft K assembly and shim washers, item J. Replace retaining ring.

(d) Replace 52-tooth gear and shaft E assembly and washer, item G. Line up scribe marks on gear and rear panel. Replace retaining ring.

(e) Replace 48-tooth detent gear, shaft C, detent, and 16-tooth gear assembly. Line up marks on rear panel, 48-tooth gear, and detent spring.

(f) Replace 85-tooth spider gear, 45-tooth, and 25-tooth planetary gear assembly, and shim washer, item AP, on shaft C. Do not move other gears already lined up with the scribe marks.

(g) Replace 48-tooth gear, shaft B, 24-tooth gear assembly, and washers, items C and D as follows:

Wind the loading cord about 1-1/2 turns clockwise on the pulley that is attached to the 52-tooth gear on shaft E. Do not move gears while doing this. Hook spring onto both halves of the loading cord. Insert shaft B into hole on rear plate, but do not yet engage the 48-tooth gear with the detent gear. While holding the 52-tooth gear and shaft E assembly, and the detent gear at their respective scribe marks, rotate shaft B counterclockwise until loading spring stretches to the length measured before disassembly. Engage 48-tooth gear with detent gear while maintaining tension on the loading spring.

(h) Replace the 72-tooth gear and 50-tooth sun gear assembly and shim washer, item W, while holding 85-tooth spider gear so that the scribe mark on it is horizontal (parallel with the top and bottom edges of the gear panels). Keep all other gears set at the scribe marks.

NOTE:
NUMBERS SHOWN ON GEARS INDICATE NUMBER OF TEETH.

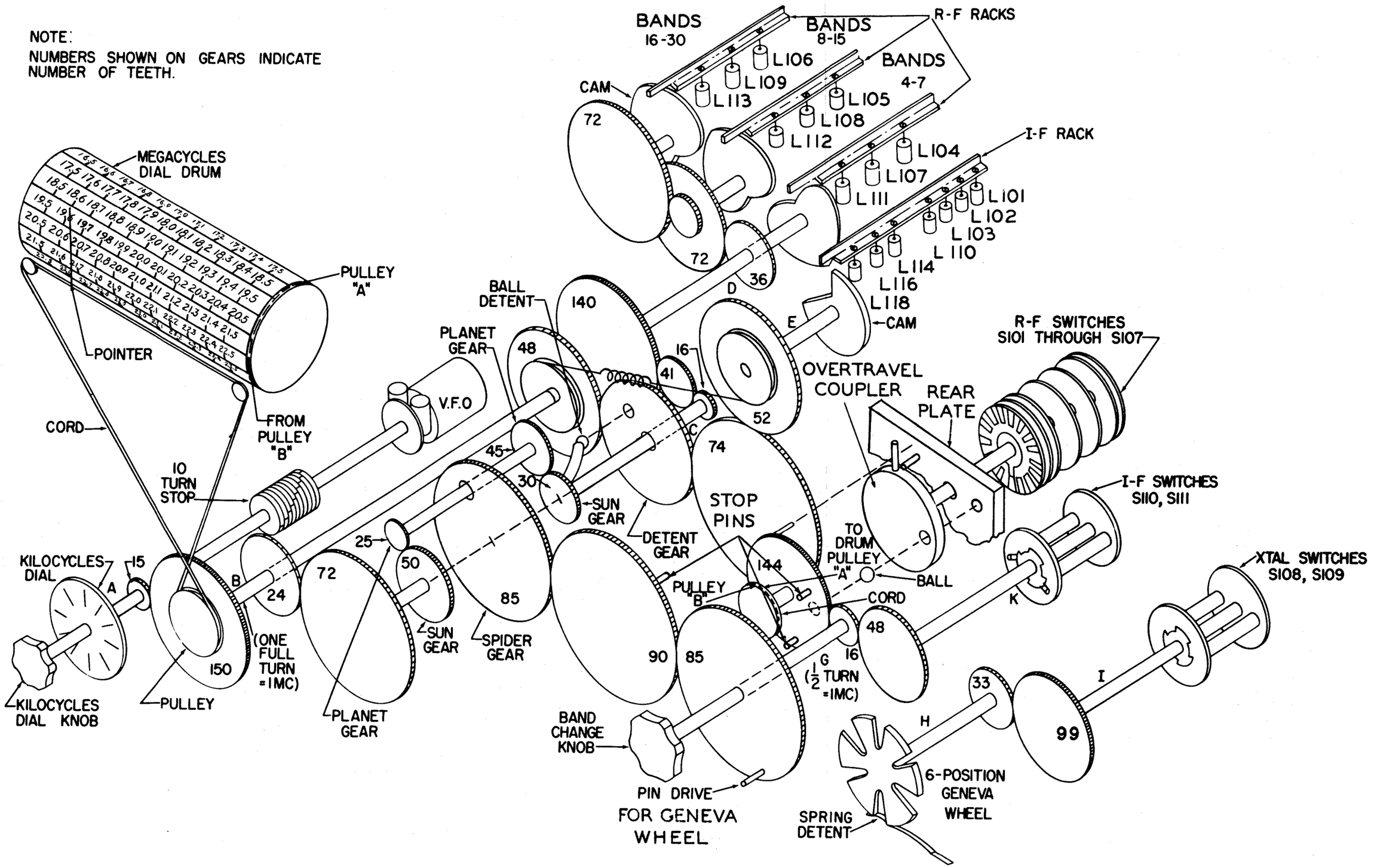
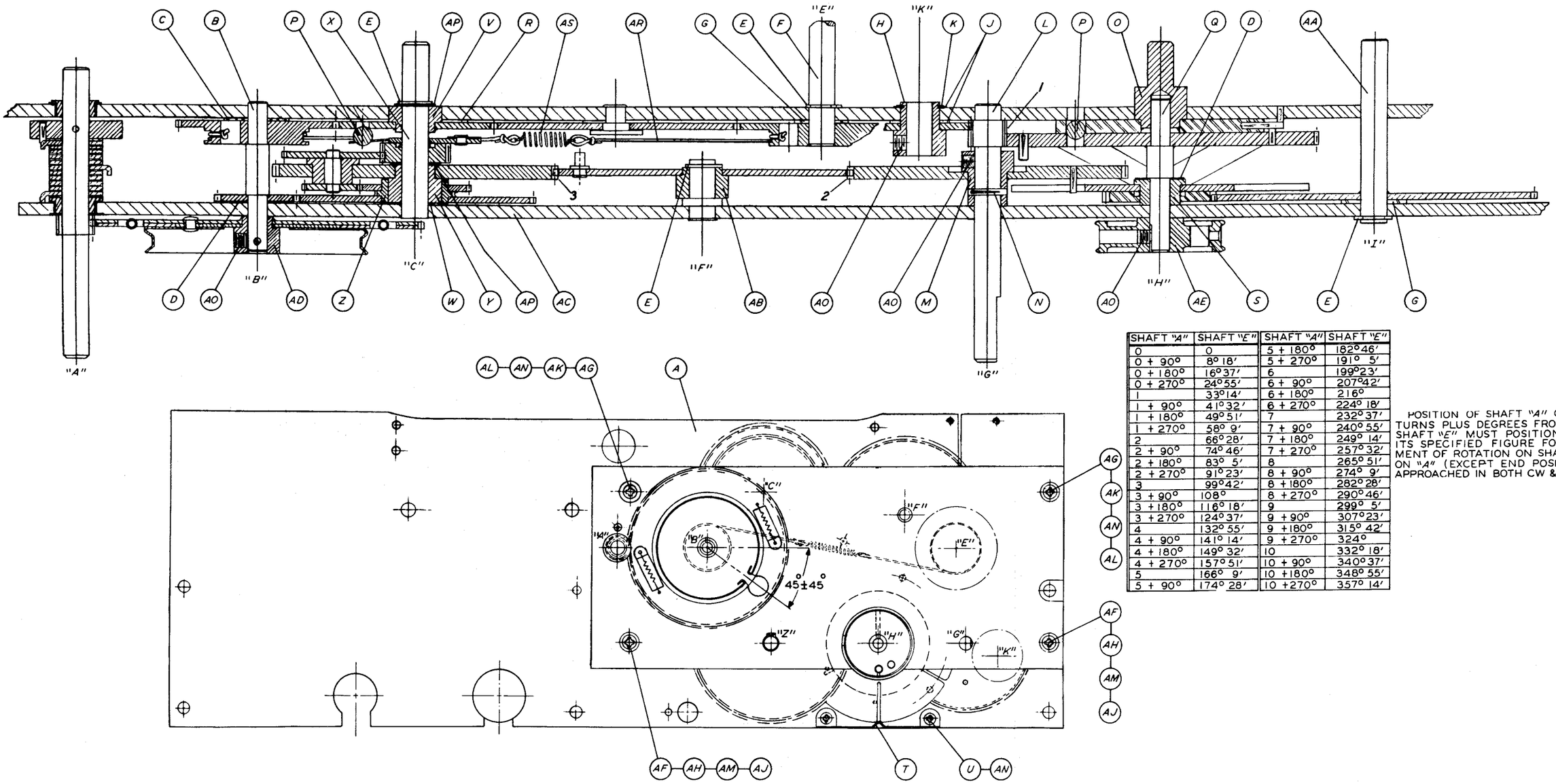


Figure 7-7. Mechanical Functional Diagram

ITEM NO.	QUANTITY	PART NO.	PART NAME
A	1	505 2179 003	BACK GEAR PANEL ASSY
B	1	504 3111 002	REV. GEARS & SHAFT ASSY
C	1	504 2973 001	WASHER
D	2	500 2112 002	WASHER
E	4	340 0025 00	RETAINING RING
F	1	504 3014 001	I.F. DRIVER GEAR & SHAFT ASSY
G	2	500 1081 003	WASHER
H	1	504 3004 001	GEAR ASSY-SWITCH, I.F.
J	2	500 1109 003	WASHER
K	1	340 0013 00	RETAINING RING
L	1	504 2956 001	MC KNOB SHAFT
M	1	504 3013 001	KNOB GEAR & HUB ASSY
N	1	311 1122 30	GROOVE PIN
O	1	504 3006 001	SHAFT ASSY-BAND SWITCH
P	2	309 5200 00	BALL-3/16 DIA.
Q	1	504 3012 001	SHAFT ASSY-GENEVA WHEEL
R	1	504 2972 001	THRUST BEARING
S	1	504 3015 001	HUB ASSY-GENEVA WHEEL
T	1	504 2932 001	CENTERING SPRING
U	2	343 0165 00	6-32 X 1/8 PBH SCREW
V	1	504 3018 001	HUB ASSY-DETENT GEAR
W	1	504 2974 001	WASHER
X	1	504 3025 001	DETENT SPRING ASSY
Y	1	504 3020 001	CENTER PLANET-GEAR & HUB ASSY
Z	1	504 3016 001	HUB ASSY-FLOATING
AA	1	504 3005 001	SHAFT & GEAR ASSY
AB	1	504 3009 001	STOP IDLER GEAR HUB ASSY
AC	1	505 2180 003	FRONT GEAR PANEL ASSY
AD	1	504 5645 002	POINTER PULLEY ASSY
AE	1	504 2954 001	PULLEY-DRUM
AF	2	505 2128 001	STANDOFF-LOWER
AG	2	505 2127 001	STANDOFF-UPPER
AH	4	343 0186 00	8-32 X 5/16 SCREW
AJ	4	310 6360 00	WASHER #8 FLAT
AK	4	343 0167 00	6-32 X 1/4 SCREW
AL	4	310 6360 00	WASHER #6 FLAT
AM	4	373 0003 00	WASHER #8 SHAKE
AN	6	373 0001 00	WASHER #6 SHAKE
AO	6	328 0002 00	6-40 X 1/8 SET SCREW
AP	4	500 1112 003	WASHER
AR	1	432 1011 00	LOADING CORD FT.
AS	1	502 1158 002	SPRING

NOTE:-
CROSS-SECTIONAL DETAIL AT LEFT IS NOT A TRUE LAYOUT.
SHAFTS ARE LOCATED TO SHOW GEAR MESH.
FOR TRUE LOCATION OF SHAFTS, GEARS AND PINS, REFER TO FRONT VIEW OF ASSEMBLY BELOW.



SHAFT "A"	SHAFT "E"	SHAFT "A"	SHAFT "E"
0	0	5 + 180°	182° 46′
0 + 90°	8° 18′	5 + 270°	191° 5′
0 + 180°	16° 37′	6	199° 23′
0 + 270°	24° 55′	6 + 90°	207° 42′
1	33° 14′	6 + 180°	216°
1 + 90°	41° 32′	6 + 270°	224° 18′
1 + 180°	49° 51′	7	232° 37′
1 + 270°	58° 9′	7 + 90°	240° 55′
2	66° 28′	7 + 180°	249° 14′
2 + 90°	74° 46′	7 + 270°	257° 32′
2 + 180°	83° 5′	8	265° 51′
2 + 270°	91° 23′	8 + 90°	274° 9′
3	99° 42′	8 + 180°	282° 28′
3 + 90°	108°	8 + 270°	290° 46′
3 + 180°	116° 18′	9	299° 5′
3 + 270°	124° 37′	9 + 90°	307° 23′
4	132° 55′	9 + 180°	315° 42′
4 + 90°	141° 14′	9 + 270°	324°
4 + 180°	149° 32′	10	332° 18′
4 + 270°	157° 51′	10 + 90°	340° 37′
5	166° 9′	10 + 180°	348° 55′
5 + 90°	174° 28′	10 + 270°	357° 14′

POSITION OF SHAFT "A" GIVEN IN NO. OF TURNS PLUS DEGREES FROM CCW STOP. SHAFT "E" MUST POSITION WITHIN 27′ OF ITS SPECIFIED FIGURE FOR EACH INCREMENT OF ROTATION ON SHAFT "A" SETTINGS ON "A" (EXCEPT END POSITIONS) TO BE APPROACHED IN BOTH CW & CCW DIRECTIONS.

Figure 7-8. Dial and Bandswitch Gear Box

(i) Reassemble overtravel disc with the 144-tooth overtravel gear. Detent the two together with detent ball. Use AN-G-25 grease to hold ball in place.

(j) Replace overtravel assembly, lining up mark on overtravel gear with notch on Geneva detent spring.

(k) Replace 85-tooth gear, shaft G, and 16-tooth gear assembly, lining up a arcuate scribe mark with circumference of overtravel gear. This mark will later line up with the Geneva wheel, but at present it is concentric with the overtravel gear. Make sure that alignment described in step (h) is maintained.

(l) Replace Geneva wheel and 33-tooth gear assembly and shim washer, item D. Be sure Geneva drive pin is engaged with slot in the Geneva wheel while the Geneva wheel detent is engaged, and that the arcuate scribe mark on the 85-tooth drive gear lines up with the circumference of the Geneva wheel.

(m) Replace 99-tooth gear and shaft I assembly, and washer, item G. Position is not critical.

(n) Lay the 90-tooth stop-pin gear in position with the scribe mark horizontal across the top, and collinear with scribe mark on the 85-tooth spider gear (parallel to the top and bottom edges of the gear panels).

(o) Replace front gear panel as follows: While sliding the panel into position, slide the 90-tooth stop-pin gear on its shaft which is attached to the front panel, being careful to keep scribe mark lined up with the mark on the 85-tooth spider gear. Also keep arcuate mark on the 85-tooth Geneva drive gear lined up with the circumference of the Geneva wheel. Further, keep the mark on the 144-tooth overtravel coupler gear lined up with notch in the Geneva wheel detent. Replace screws in front gear panel.

(p) Check operation of the BAND CHANGE gear. If the gear box has been removed from the receiver, make the check while holding the gear box in a horizontal plane with the front gear panel facing down, so that the 90-tooth stop-pin gear will not fall off during the check. If the gear box has not been removed from the receiver, replace the retaining ring on the 90-tooth stop-pin gear shaft before making the check. Then, in either case, proceed as follows:

1. Shaft G should now be against the clockwise stop, and should detent when turned counterclockwise approximately 45°. The ball on shaft C will now detent shaft G every 180°.

2. When shaft G is turned counterclockwise 7-1/2 revolutions, or 15 detent positions from the first detent position, the pin in the 144-tooth gear on shaft H (figure 7-8), and the radial pin on the overtravel disc rotate clockwise until the radial pin just touches or is about to touch the pin in the rear gear panel. Further rotation of shaft G causes the pin in the gear to leave the radial pin that was stopped by the pin in the rear gear panel. Thus the overtravel coupler output shaft, which drives r-f switches S101 through S107 (figure 7-7), rotates 300° for the first 16 detent positions of shaft G and remains at that setting for further counterclockwise rotation of shaft G.

3. Shaft G should rotate 14 more detent positions or 7 revolutions from the sixteenth detent position, and should hit the counterclockwise stop approximately 45° past the thirtieth detent position. If the stop pins intersect before this, adjust them by changing phase relations of the gears at points 1, 2, and 3, shown in figure 7-8. Before deciding to change the relative positions of these gears, double check the conditions in steps 1, 2, and 3. If instructions in paragraphs 6.a.(1) and 6.a.(2) were followed precisely, operation of the BAND CHANGE gear train should meet the conditions set forth in these steps.

4. The Geneva wheel should turn one notch when shaft G turns counterclockwise from an even-numbered to an odd-numbered detent position. (Count the first detent position from the clockwise stop as number 1.) Thus shaft I should rotate through 14 positions, or 280°, for 30 detent positions, or 14-1/2 turns, of shaft G. The initial position of shaft I should correspond to detent positions 1 and 2 of shaft G, the second shaft I position should correspond to detent positions 3 and 4 of shaft G, and so on through to the thirtieth detent position of shaft G.

(q) After accomplishing proper operation of the BAND CHANGE gear train, replace the retaining ring on the 90-tooth stop-pin gear shaft.

(r) Replace large dial cord pulley and gear assembly as follows: Turn shaft A to counterclockwise stop. Make sure that the 52-tooth gear on shaft E and the 48-tooth detent gear on shaft C are still set at their respective scribe marks. Place pulley and gear assembly far enough on shaft B to engage the rear section of the split gear with the 15-tooth gear on shaft A. Be sure that groove-pin holes on shaft and hub are lined up and that the pulley slot is within 45° of the position shown in figure 7-8. Rotate front section of split gear so that springs stretch to 3/4 inches. Engage front section with 15-tooth gear on shaft A. Replace groove pin and tighten set screw.

(s) Check operation of loading cord by turning shaft A clockwise. Be sure that the loading spring travels from the drum on shaft E to the same relative position at the drum on shaft B when shaft A hits the clockwise stop. The loading spring should not touch either drum at either end of its travel.

(t) Replace small dial cord pulley. Line up with scribe mark and tighten set screw.

(u) Rotate shaft A to its counterclockwise stop, and shaft G to its clockwise stop; then replace the gear box in the receiver. Reconnect couplers; then replace dial cords, front panel and right-hand end bracket. Replace flat washer, tension washer and collar on KILOCYCLE shaft. Push collar against tension washer until tension washer is almost flat; then tighten collar set screws. Replace knobs.

b. RF TUNER ASSEMBLY MAINTENANCE.

(1) GENERAL. - The r-f tuner assembly will require very little maintenance. However, should it be taken apart for any reason, the following information will indicate the correct positions of the cams.

(2) POSITIONS OF CAMS. - The front plate of the slug rack assembly contains three alignment holes as indicated in figure 7-9. If the cams are correctly synchronized, the tips of the front cams will be directly opposite these holes. Use a dental mirror to accurately inspect the position of the cam tips in relation to the alignment holes. If a dental mirror is not available, check positions and operation of the cams in the following manner.

(a) Turn BAND CHANGE knob to band 30. Turn KILOCYCLE knob clockwise to stop.

(b) Viewing the right-hand slug-moving cam from the front, the slug table cam rider should be approximately 1/16-inches to the right of the cam tip. The cam rider should descend this same right-hand edge when step (c) is performed.

(c) Turn BAND CHANGE knob to band 16. Turn KILOCYCLE knob counterclockwise to stop. The cam rider should still be on the same side of the cam as in step (b), and not bottomed in the low spot of the cam.

(d) Turn BAND CHANGE knob to band 15. Turn KILOCYCLE knob clockwise to stop.

(e) Viewing the center cam from the front, the cam rider should be approximately 1/32-inches to the left of the cam tip. The cam rider should descend this same left-hand edge when step (f) is performed.

(f) Turn BAND CHANGE knob to band 8. Turn KILOCYCLE knob counterclockwise to stop. The cam rider should still be on the same side of the cam as in step (e) and not bottomed in the low spot of the cam.

(g) Turn BAND CHANGE knob to band 7. Turn KILOCYCLE knob clockwise to stop.

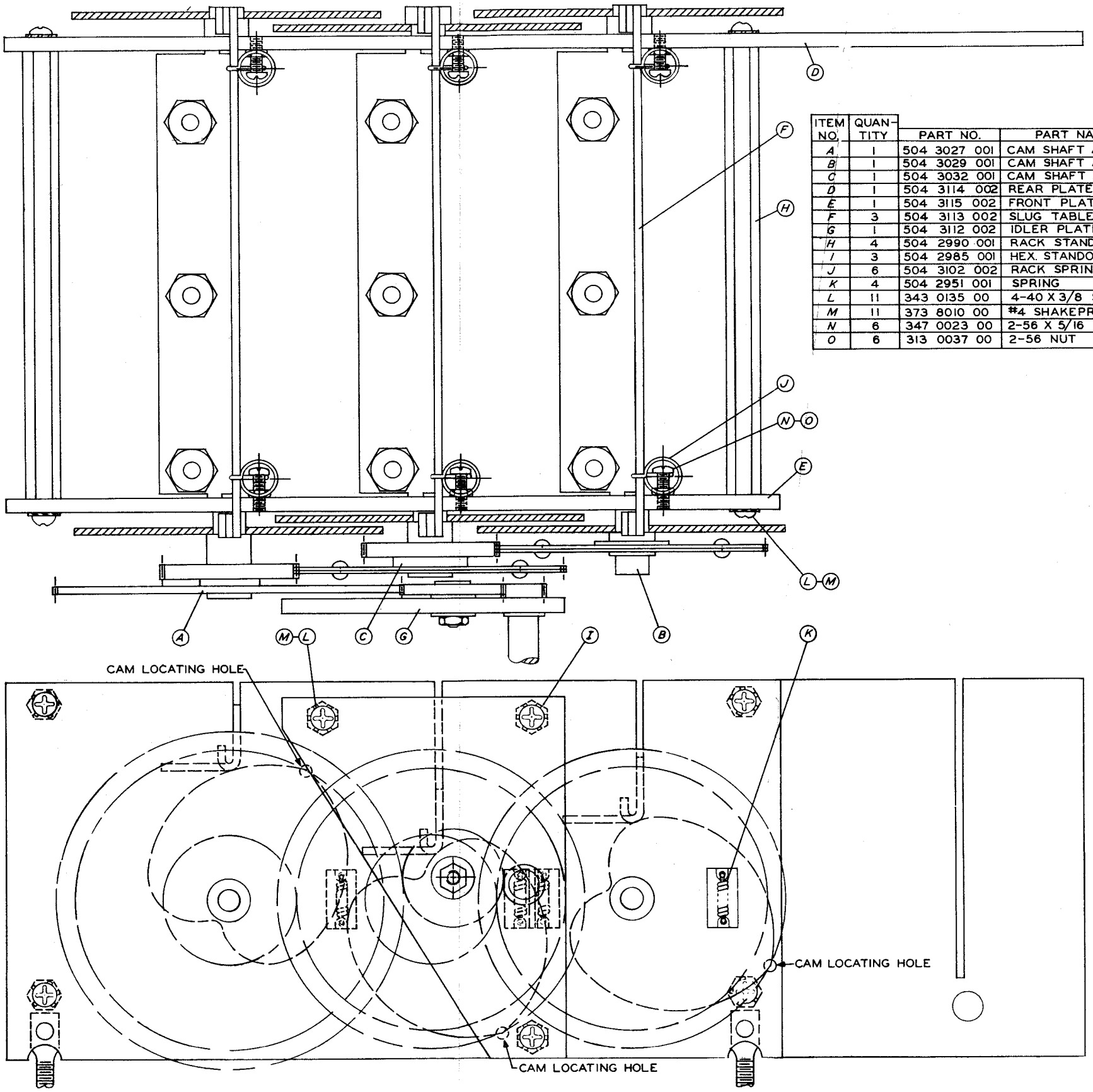
(h) Viewing the left-hand cam from the front, the cam rider should be approximately 1/32-inches to the right of the cam tip. The cam rider should descend this same right-hand edge when step (i) is performed.

(i) Turn BAND CHANGE knob to band 4. Turn KILOCYCLE knob counterclockwise to stop. The cam rider should still be on the same side of the cam as in step (h) and not bottomed in the low spot of the cam.

(j) Before putting the receiver into operation again, investigate the electrical alignment of the stages affected by any repair operations, and check the synchronization of the slug rack with the BAND CHANGE mechanism.

7. DISCARDING VACUUM TUBES.

In the course of trouble shooting in the equipment, it may be necessary to replace a defective or inoperative vacuum tube. Tubes should be given a thorough check before being discarded. Before discarding any electron tube, the technician should determine without question that replacement will remedy the trouble. Check the tube in a standard tube tester or



ITEM NO.	QUANTITY	PART NO.	PART NAME
A	1	504 3027 001	CAM SHAFT ASSY
B	1	504 3029 001	CAM SHAFT ASSY
C	1	504 3032 001	CAM SHAFT ASSY
D	1	504 3114 002	REAR PLATE ASSY
E	1	504 3115 002	FRONT PLATE ASSY
F	3	504 3113 002	SLUG TABLE ASSY
G	1	504 3112 002	IDLER PLATE ASSY
H	4	504 2990 001	RACK STANDOFF
I	3	504 2985 001	HEX. STANDOFF
J	6	504 3102 002	RACK SPRING
K	4	504 2951 001	SPRING
L	11	343 0135 00	4-40 X 3/8 SCREW
M	11	373 8010 00	#4 SHAKEPROOF
N	6	347 0023 00	2-56 X 5/16 SCREW
O	6	313 0037 00	2-56 NUT

Figure 7-9. R-F Slug Rack

in actual operation and discard only if it shows one of the following faults:

a. Low emission: sufficient to prevent minimum efficient operation.

b. No filament continuity.

c. Microphonics: noise interference with operation.

d. Shorted element.

e. Intermittent shorts: tube cannot continue in use until reception is completed.

When it is definitely ascertained that the tube is valueless in operation and requires replacement, observe the following rule: "ALL TUBES OF A GIVEN TYPE SUPPLIED WITH THE EQUIPMENT SHALL BE CONSUMED PRIOR TO EMPLOYMENT OF TUBES FROM GENERAL STOCK."

TABLE 7-2 TUBE CHARACTERISTICS

TUBE TYPE	Filament Voltage (volts)	Filament Current (ma.)	Plate Voltage (d-c volts)	Grid Bias (d-c volts)	Screen Voltage (d-c volts)	Plate Current (ma.)	Screen Current (ma.)	A-C Plate Resistance (ohms)	Voltage Amplification Factor (mu)	Trans-conductance (micromhos)
			TYPICAL OPERATING CHARACTERISTICS							
6AK5	6.3	0.175	180	----	120	7.7	2.4	0.69m	3500	5100
6BA6	6.3	0.3	250	-20	100	11.0	4.2	1.5 m	---	4400
6BE6	6.3	0.3	250	- 1.5	100	3.0	7.11	1.0 m	---	475
12AX7	6.3	0.3	250	- 2.0	---	1.2*	---	62,500*	100*	1600*
12AU7	6.3	0.3	250	- 8.5	---	10.5*	---	7,700*	17*	2200*
6AQ5	6.3	0.45	250	-12.5	250	45.0	4.5	52,000	---	4100
5V4	5.0	2.0	500x	----	---	525x	---	---	---	---
OA2	---	---	150#	----	---	30#	---	---	---	---

* Each triode

x With choke-input filter--a-c plate voltage per plate (RMS). Current per plate. peak inverse plate voltage--1400

\# D-c operating voltage and current
185-volt minimum d-c anode supply
155 volts starting

8. CRYSTAL DATA.

a. HIGH FREQUENCY OSCILLATOR. - The high frequency oscillator in this receiver is crystal controlled, supplying injection frequencies to the first mixer, V102, on bands 4 to 30, and injection frequencies to both the first mixer and the band 1 mixer, V103, when operating on band 1. No injection frequency is employed on bands 2 and 3 since these bands cover the identical frequency range of the two variable i-f channels. The injection principal is such that, by utilizing fundamental crystal frequencies along with harmonics and associated harmonic selector circuits, injection frequencies for the 28 bands employing hfo injection are obtained from only 10 crystals.

The ten crystals are mounted on one board (XY-101, XY-110). Crystal data is as follows:

Temperature range	-55°C (-67°F) to 90°C (194°F)
Tolerance	±0.005% of nominal frequency when measured over the temperature range.
Load capacitance	32 ± 0.5 uuf
Crystal holders	Two pins on bottom spaced 0.486" c to c.
	Solid pins 0.050" diam, x 0.234" lg.
	2 pins only.
	Oval metal body 0.750" lg x 0.345" wd x 0.788" h.
	No air gap adj.

The following data outlines the injection frequency scheme.

CRYSTAL	MARKED NOMINAL FREQUENCY-KC	USED ON BANDS	HARMONIC EMPLOYED	1ST MIXER INJECTION FREQUENCY-MC
Y-101	10,666.67	29-30	3rd	32
Y-102	13,000.00	23-24	2nd	26
Y-103	11,000.00	19-20	2nd	22
Y-104	9,000.00	15-16	2nd	18
Y-105	14,000.00	11-12	Fund.	14
		25-26	2nd	28
Y-106	12,000.00	9-10	Fund.	12
		21-22	2nd	24
Y-107	10,000.00	7-8	Fund.	10
		17-18	2nd.	20
		27-28	3rd	30
Y-108	8,000.00	5-6	Fund.	8
		13-14	2nd	16
Y-109	6,000.00	4 only	Fund.	6
Y-110	4,000.00	1 only	2nd.	8*
			3rd	12

* 8 mc injection to Band 1 Mixer on Band 1 only.

b. 100-KC CALIBRATION OSCILLATOR. - The frequency of the calibration oscillator is controlled by a 100-kc crystal, using the fundamental mode. Data on this crystal, Y111, is as follows:

Temperature range	0°C (32°F) to 70°C (158°F).
Nominal frequency	100 kc
Tolerance	Within ±0.01% at 25°C (77°F) and shall not deviate from the frequency at this temperature by more than ± 0.007% over the temperature range.
Crystal holder	Two pins on bottom spaced 0.486" c to c.
	Solid pins 0.093" diam x 15/32" lg.
	2 pins only.
	Cylindrical body 1-1/8" diam x 2-1/4" lg.
	No air gap adj.
	Marked 100 kc.

c. 500-KC I-F FILTER. - A 500-kc filter unit is placed between the output of the Second Mixer and the input to the First I-F Amplifier. The filter employs a 500-kc crystal, the data on which is as follows:

Nominal frequency	500 kc
Tolerance	500 kc ± 500 cycles at series resonance at 25°C (77°F)
Crystal holder	Two pins on bottom spaced 0.486" c to c.
	Solid pins 0.030" diam. x 1" lg.
	2 pins only.
	Oval body 3/4" lg x 3/8" wd x 19/32" h less term.
	No air gap adj.
	Marked 500-kc.

TABLE 7-3 WINDING DATA

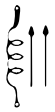
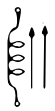
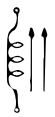
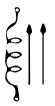
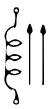
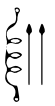
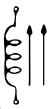
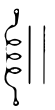
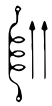
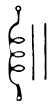
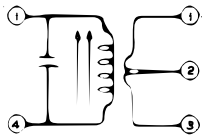
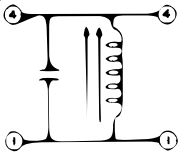
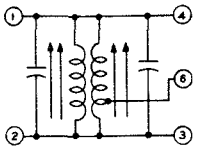
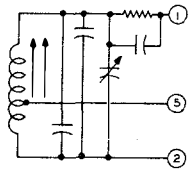
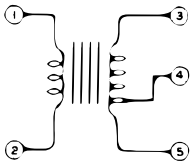
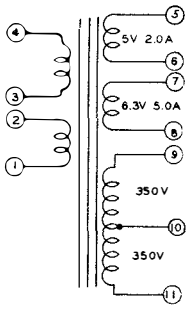
DESIGNATION	COLLINS PART NUMBER	DIAGRAM	WINDING	WIRE SIZE	TURNS	DC RESISTANCE IN OHMS	Z RATIO	TEST VOLTS
L-101 L-110	504-3056-001		Single layer Single cam wound	35E	75	less than 1 ohm		
L-102	505-2147-002		Single layer Single cam wound	28E	48	less than 1 ohm		
L-103	505-2148-002		Single layer Single cam wound	28E	43	less than 1 ohm		
L-104 L-107 L-111	504-3060-001		Single layer Single cam wound	28E	27	less than 1 ohm		
L-105 L-108 L-112	504-3061-001		Single layer Single cam wound	28E	20	less than 1 ohm		
L-106 L-109 L-113	504-3062-001		Single layer Single cam wound	28E	15	less than 1 ohm		
L-114 L-116	504-3064-001		Single layer Single cam wound	28E	48	less than 1 ohm		
L-115	504-3057-001		Single layer Single cam wound	28E	16	less than 1 ohm		
L-117 L-119	504-3066-001		Universal Single wound	9-41 Litz	46	less than 1 ohm		
L-118	504-5347-001		Single layer Single cam wound	28E	48	less than 1 ohm		
L-120	503-4535-001		Universal Triple wound	36 nylon E	112 each winding	less than 1 ohm		

TABLE 7-3. WINDING DATA, CONT.

DESIGNATION	COLLINS PART NUMBER	DIAGRAM	WINDING	WIRE SIZE	TURNS	DC RESISTANCE IN OHMS	Z RATIO	TEST VOLTS
L-121	504-3074-001		Single layer Single wound Closely spaced Tapped at 13 turns	30EE	46	less than 1 ohm		
L-122	678-0432-00		Multi-layer Single wound	31PE	1923	100		2500 rms
L-123	678-0431-00		Multi-layer Single wound	35PE	2745	300		2500 rms
L-124	504-6646-002		Single layer Single wound	28E	46			
L-125	240-0073-00		Pie Universal Triple wound	36 nylon E8	112 each winding			
T-101	278-0093-00		Universal Pri Sec	10/41 SNNTE*	 213 46 tap at 23	 4.4 1.7		150 DC
T-102	278-0092-00		Universal	10/41 SNNTE	227	4.8		150 DC
T-103 T-104 T-105	278-0090-00		Universal Pri Sec	10/41 SNNTE	 102 102	 1.3 1.3		150 DC

*Single Nylon, Nylon type Enamel

TABLE 7-3. WINDING DATA, CONT.

DESIGNATION	COLLINS PART NUMBER	DIAGRAM	WINDING	WIRE SIZE	TURNS	DC RESISTANCE IN OHMS	Z RATIO	TEST VOLTS
T-106	270-0091-00		Single Tapped at 31 turns	10/41 SNNTE*	81 tap at 31	1.3		150 DC
T-107	677-0430-00		Pri 1-2 Sec 3-4 Sec 4-5	38 34 24	1736 574 52	362±19% 51±13% 0.36±6%		1500 rms 1500 rms 1500 rms
T-108	672-0429-00	 Series Pri 230V line 1-4 Tie 2-3 Parallel Pri 115V line 1-4 Tie 1-3 Tie 2-4	Pri 1-2 Pri 3-4 Sec 5-6 Sec 7-8 Sec 9-11	25PE 25PE 21PE 16PE 32PE	376 376 18 22.5 2404 ct at 1202	14.6±6% in series 0.19±6% 0.075±6% 197±11%		2500 rms 2500 rms 2500 rms 2500 rms

*Single Nylon, Nylon type Enamel

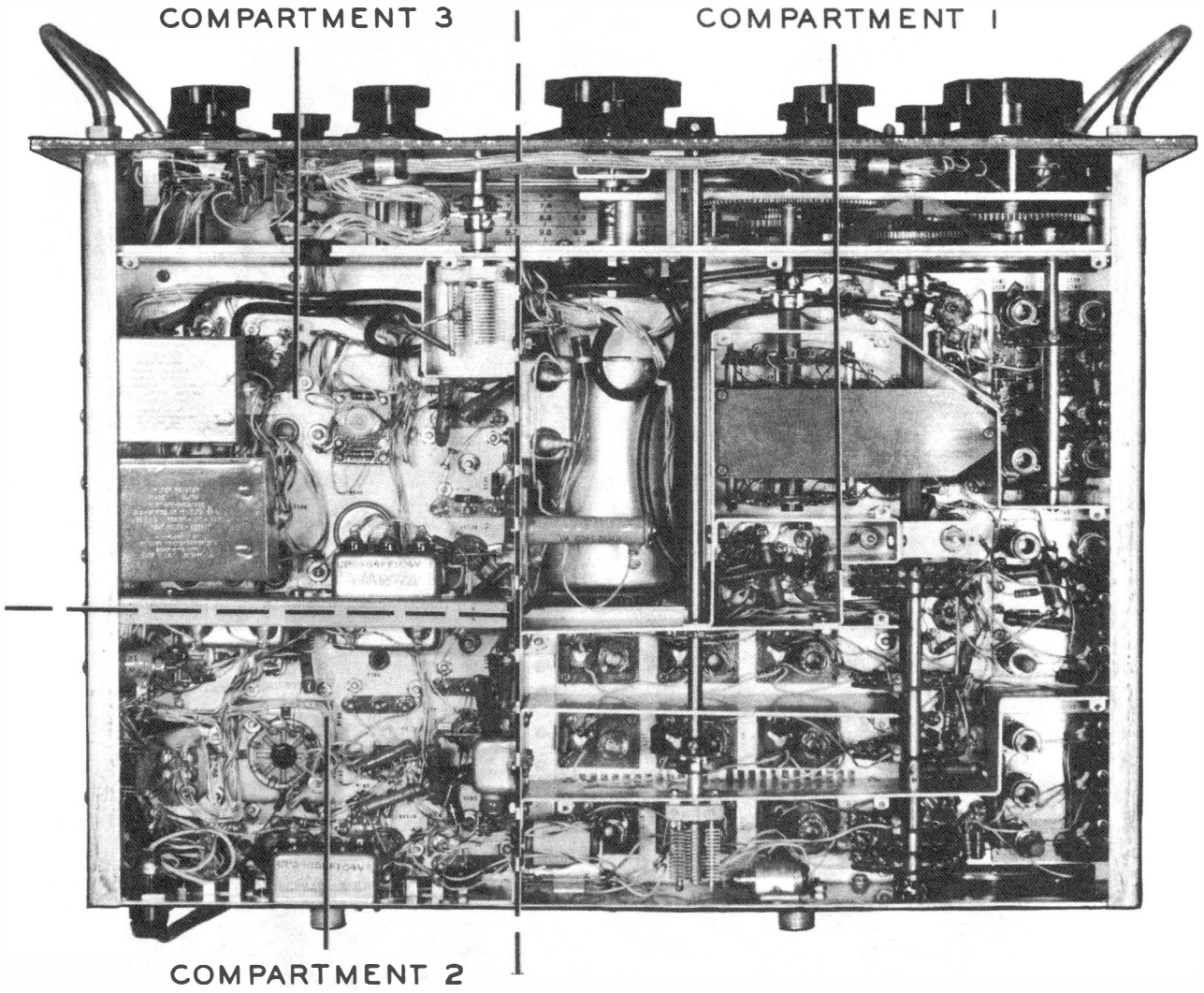


Figure 7-10. Bottom View

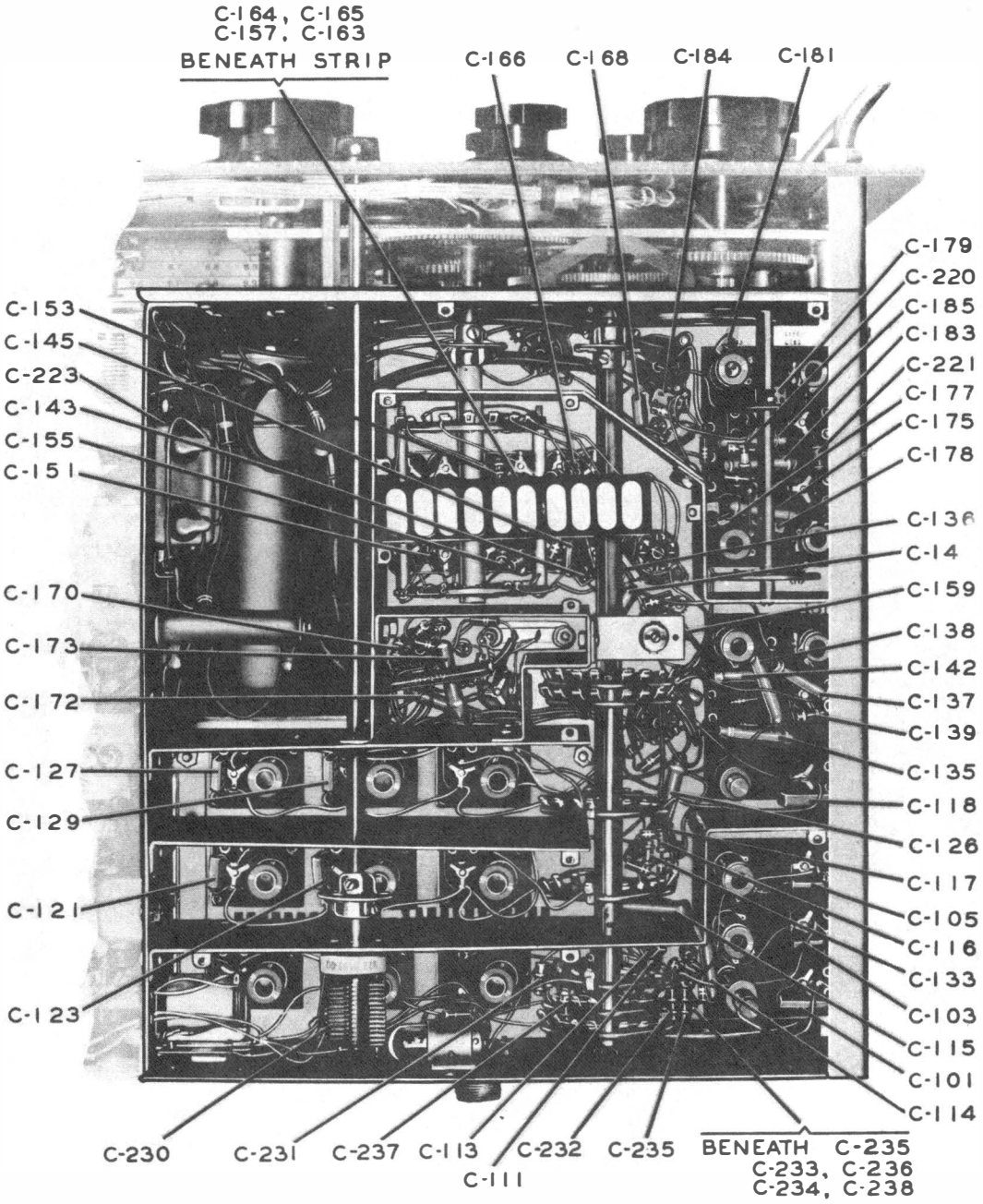


Figure 7-11. Bottom View, Compartment 1, Capacitor

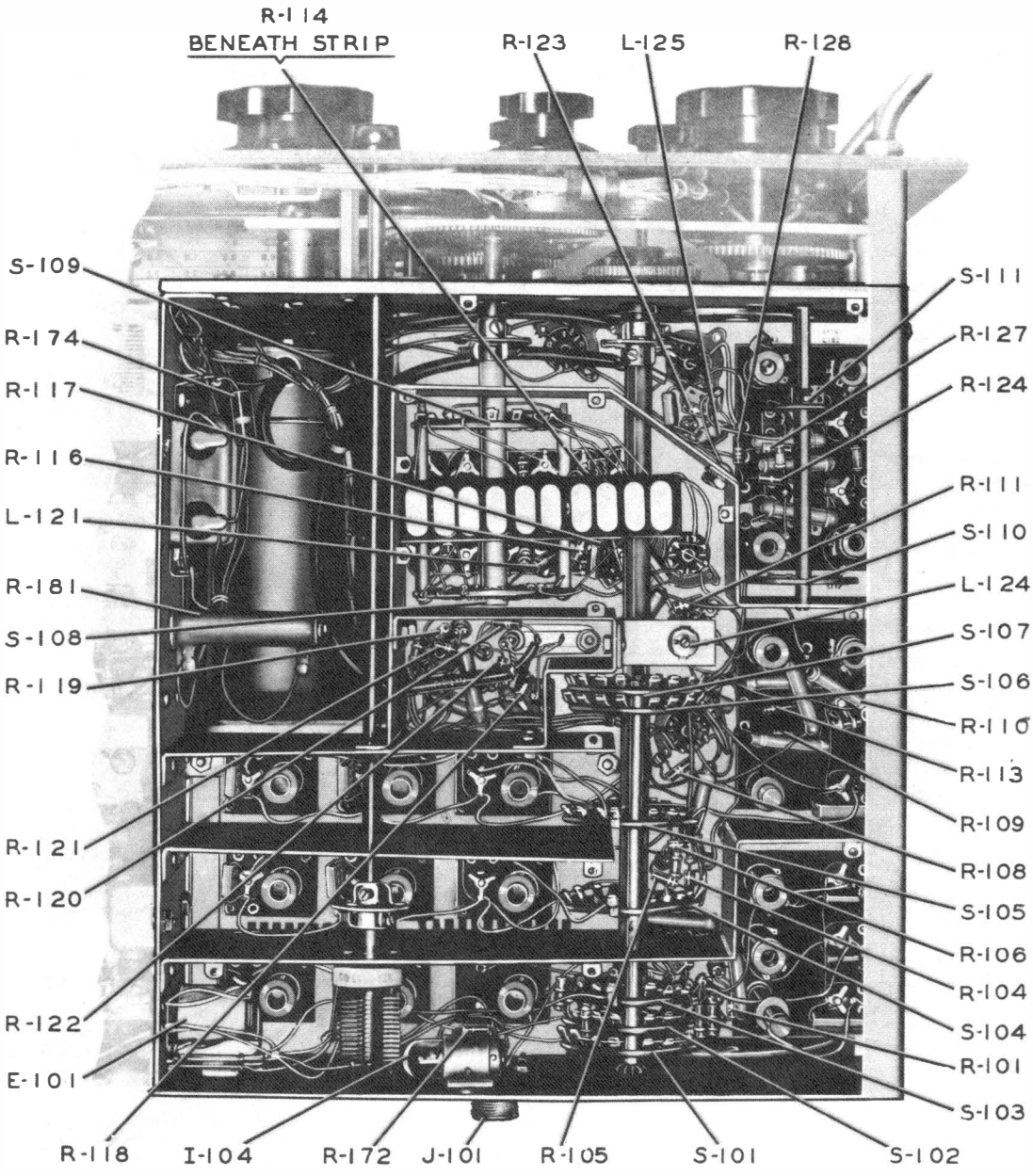


Figure 7-12. Bottom View, Compartment 1, General

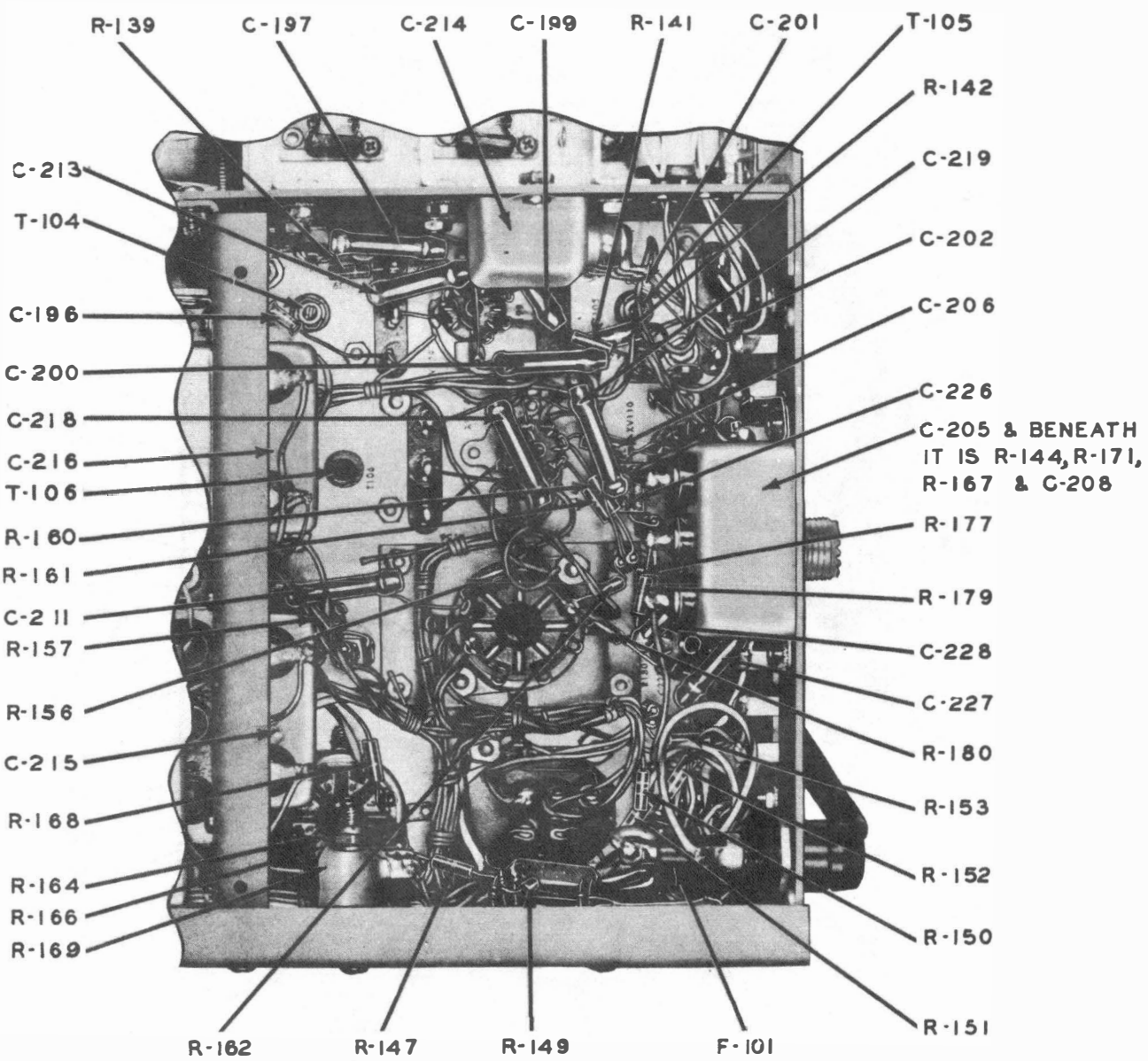


Figure 7-13. Bottom View, Compartment 2

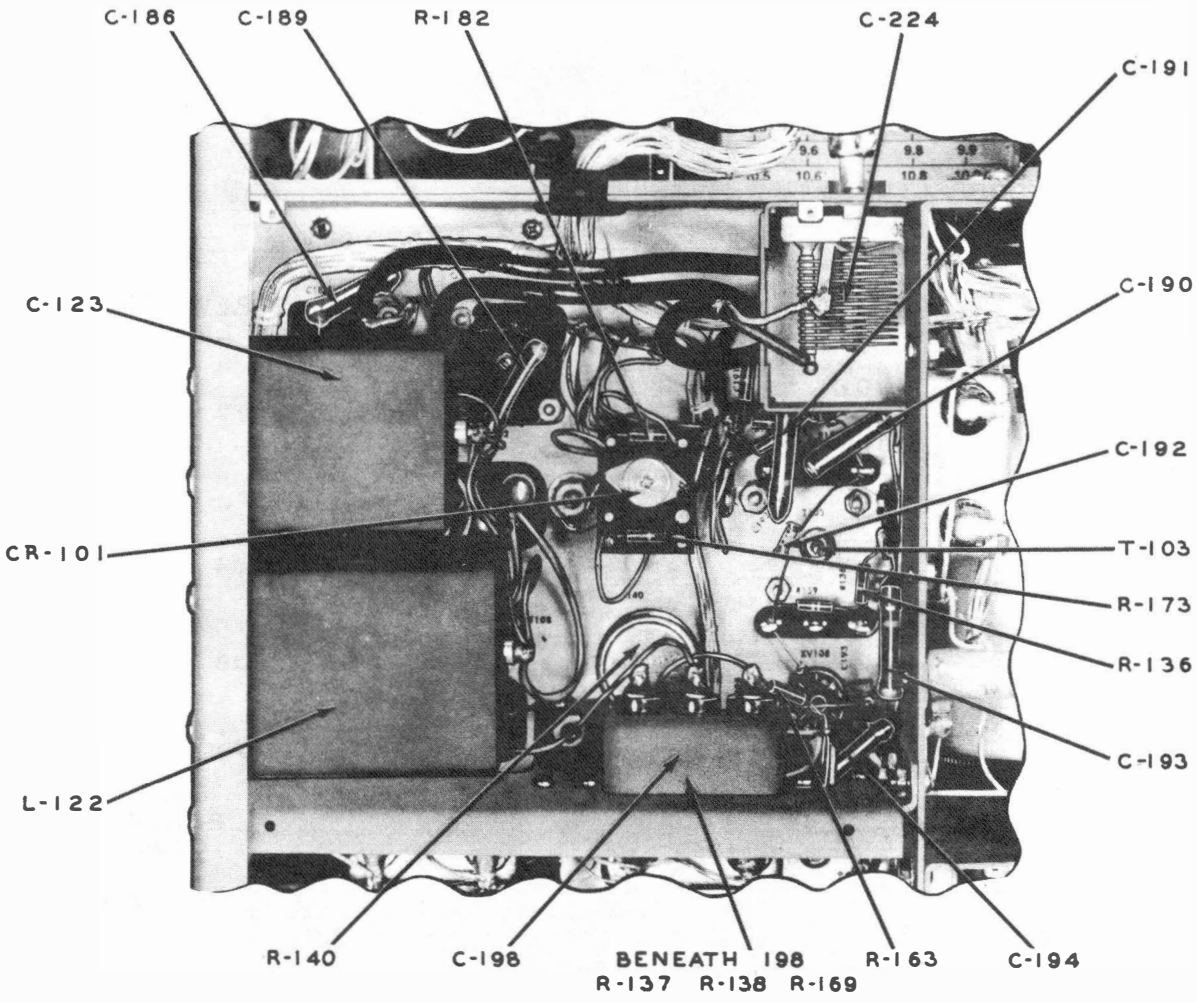


Figure 7-14. Bottom View, Compartment 3,

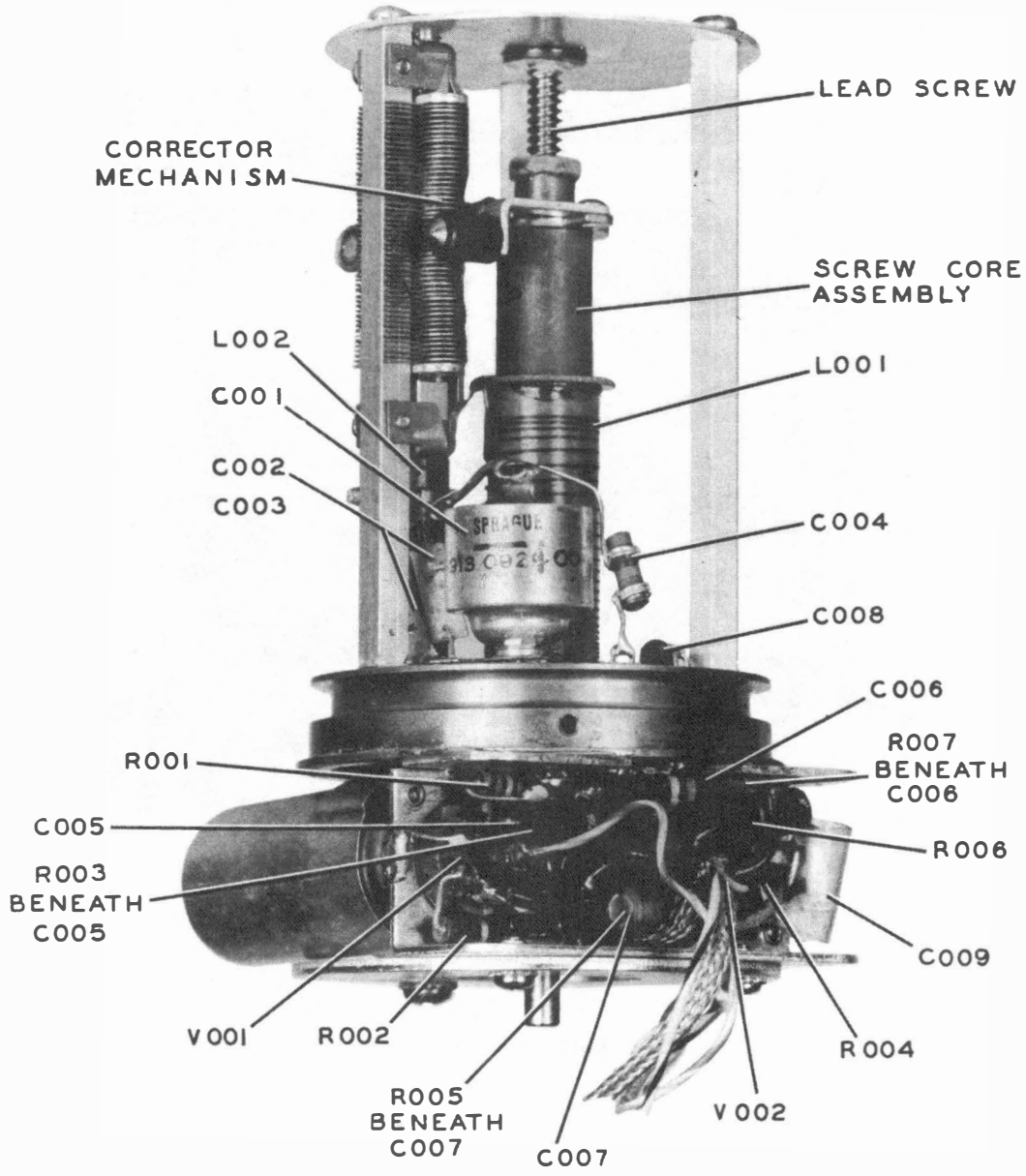


Figure 7-15. Variable Frequency Oscillator, Cover and Shield Removed

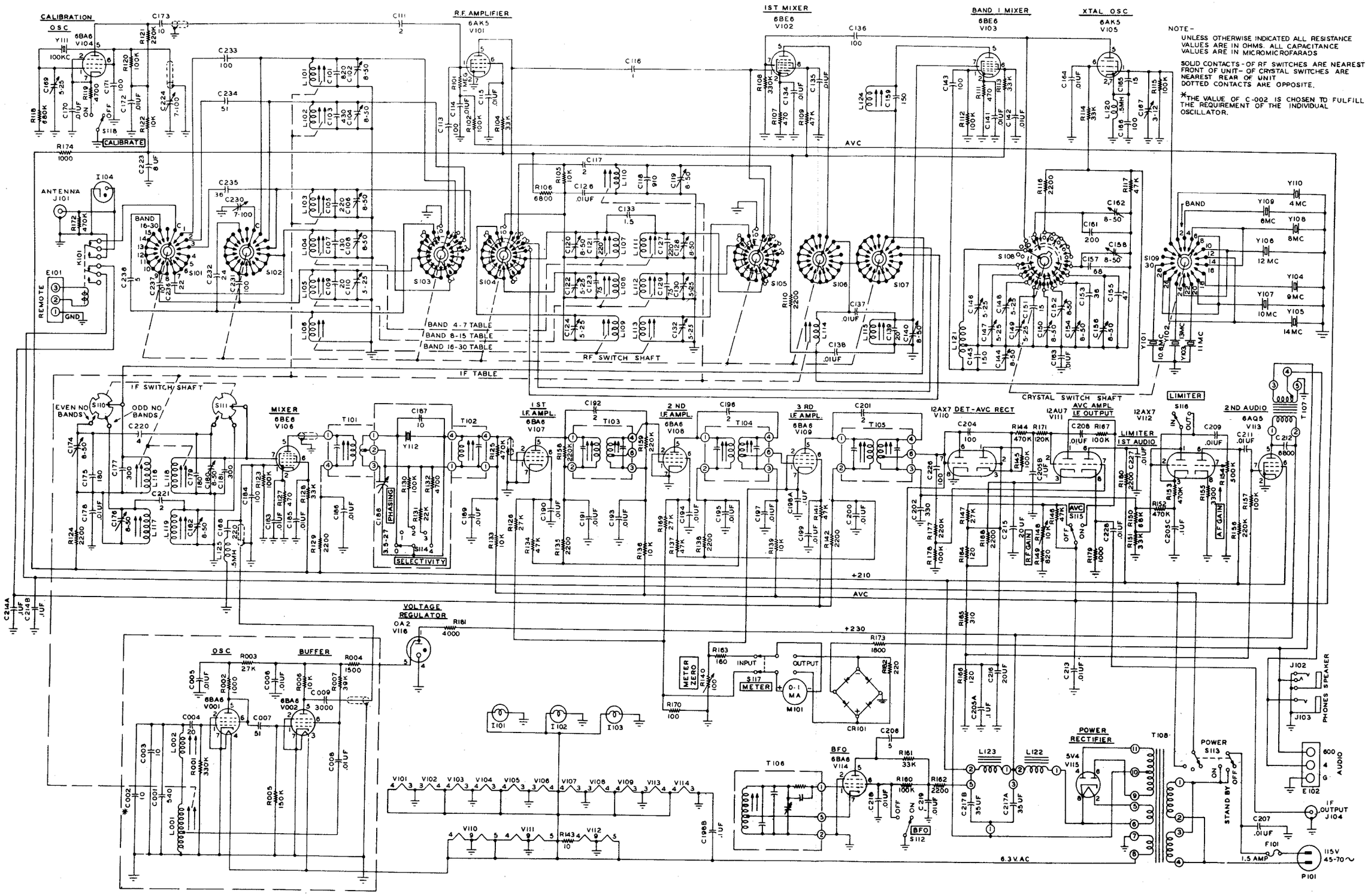


Figure 7-16. Main Schematic Diagram

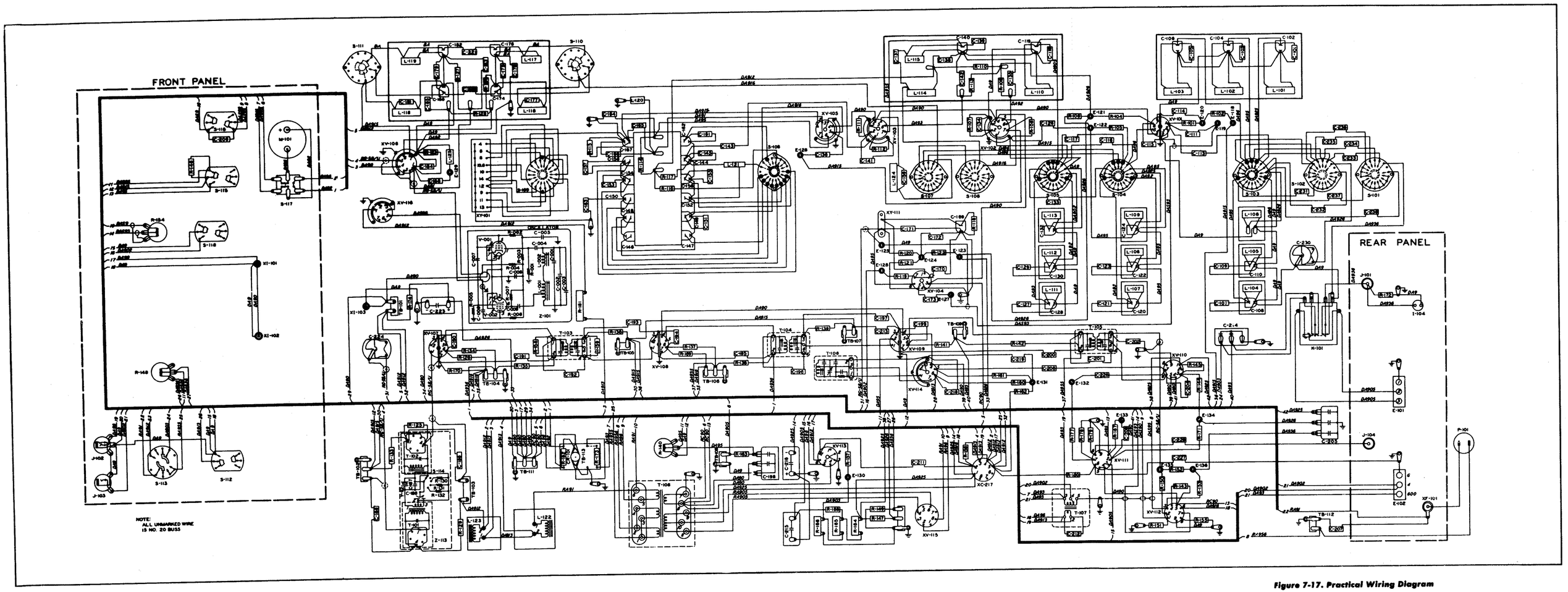


Figure 7-17. Practical Wiring Diagram

NOTES

TABLE 8-1 WEIGHTS AND DIMENSIONS OF SPARE PARTS BOXES

EQUIPMENT SPARES						TENDER SPARES						STOCK SPARES					
SPARE PARTS BOX	OVERALL DIMENSIONS			VOLUME	WEIGHT	SPARE PARTS BOX	OVERALL DIMENSIONS			VOLUME	WEIGHT	SPARE PARTS BOX	OVERALL DIMENSIONS			VOLUME	WEIGHT
	Height	Width	Depth				Height	Width	Depth				Height	Width	Depth		

TABLE 8-2 SHIPPING WEIGHTS AND DIMENSIONS OF SPARE PARTS BOXES

EQUIPMENT SPARES							TENDER SPARES							STOCK SPARES						
SHIPPING BOX NUMBER	SPARE PARTS BOX	OVERALL DIMENSIONS			VOLUME	WEIGHT	SHIPPING BOX NUMBER	SPARE PARTS BOX	OVERALL DIMENSIONS			VOLUME	WEIGHT	SHIPPING BOX NUMBER	SPARE PARTS BOX	OVERALL DIMENSIONS			VOLUME	WEIGHT
		HEIGHT	WIDTH	DEPTH					HEIGHT	WIDTH	DEPTH					HEIGHT	WIDTH	DEPTH		

TABLE 8-3 LIST OF MAJOR UNITS

SYMBOL GROUP	QUANTITY	NAME OF MAJOR UNIT	NAVY TYPE DESIGNATION
001-299	1	Receiver,	R-388/URR-23A
	1	Cabinet, Receiver	CY-1235/URR
	1	Dynamic Loudspeaker	LS/199/U

MODEL: AN/URR-23A

TABLE 8-4 COMBINED PARTS AND SPARE PARTS LIST

MAJOR ASSEMBLY: RECEIVER R-388/URR

PARTS								SPARE PARTS				
									EQUIPMENT		STOCK	
SYMBOL DESIG.	NAME OF PART AND DESCRIPTION	FUNCTION	JAN AND (NAVY TYPE) NO.	STANDARD NAVY & (SIGNAL CORPS) STOCK NO.	MFGR. AND MFGR'S. DESIG-NATION	CONTRACTOR DRAWING & PART NO.	ALL SYMBOL DESIG. INVOLVED	NO. USED IN EQUIPMENT	ITEM NUMBER	BOX	QUAN.	BOX	QUAN.
	RECEIVING SET, radio: AN/URR-23A; receives AN, CW and FSK; for general communi-cations, freq measurement; freq coverage 0.5 to 30.5 mc in 30 bands of 1 mc ea; 115/230 v, 45/70 cps, 85 w receiver, speaker input 8 w normal; receiver and speaker mtd separately in steel cabinets; 21-1/8" lg x 12" h x 13-13/16" wd o/a receiver, 15" lg x 10-9/16" h x 8-7/8" d o/a speaker; incl speaker Army-Navy LS-199/U and Receiver Army-Navy R-388/URR; 18 JAN tube single, double and triple conversion superheterodyne ckt, fungicided; incl spare pilot lamp and fuse; xtal filter BFO, xtal std noise limiter, input-output meter			F16-R-38281-9206 (2C4565-23A)	Collins Rad part/dwg #505 5951 001	505 5951 001						
	RECEIVER, radio: Radio Receiver R-388/URR; receives FSK, CW or AM voice transmissions; for com use; 0.5 mc to 30.5 mc in thirty 1 mc ranges; for 115/230 v operation at 45/70 cyc, 85 w power con-sumption; chassis only w/ panel 10-1/2" h x 19" wd x 3/16" thk for	Reception of MCW, CW and voice (AM) signals		**F16-R-32112-6619 (2C4180-388)	Collins Rad part/dwg #505 5947 001	505 5947 001						

PARTS									SPARE PARTS				
										EQUIPMENT		STOCK	
SYMBOL DESIG.	NAME OF PART AND DESCRIPTION	FUNCTION	JAN AND (NAVY TYPE) NO.	STANDARD NAVY & (SIGNAL CORPS) STOCK NO.	MFGR. AND MFGR'S. DESIG-NATION	CONTRACTOR DRAWING & PART NO.	ALL SYMBOL DESIG. INVOLVED	NO. USED IN EQUIPMENT	ITEM NUMBER	BOX	QUAN.	BOX	QUAN.
	(Cont.) std rack mtg; 10-1/2" h x 19" wd x 13-1/2" d behind panel; self-contained; 18 tube superheterodyne ckt, employs single, double or triple conversion, depending upon freq or receiver signal 500 kc IF, h freq osc is xtal controlled, beat-freq osc, xtal filter, integral calibration xtal osc (100 kc), amplified AVC, series type noise limiter												
	**This unit should not be replaced unless repair is beyond the capacity of the using activity. If replacement is required, the item must be turned in to the activity from which the replacement is received.												
	STRUCTURAL PARTS												
A-001	PLATE, bearing: bearing plate; CRS, cad pl; round; 2.250" OD x .375" ID x .0359" thk; three .116" diam holes spaced 1.676" x 1.468" and one .375" diam hole in ctr (P/o Z-101, within sealed enclosure) Listed for reference only	Lead screw rear bearing plate		N16-P-400861-127 (2Z7090 .241)	Collins Rad part/dwg #504 6530 001	504 6530 001	A-001	1					
A-002	COVER: shield; incl silver pl grommet; CRS, cad pl; angular shape	Cover shield		N16-C-650001-	Collins Rad	505 9474 002	A-002	1					

	0.0359" thk, 2.531" lg x 0.952" wd x 0.765" h o/a; two 0.111" diam mtg holes one on ea end diagonally spaced 19/32" c to c Listed for reference only	on XV-001/ XV-002 assembly		655 (2Z3351-469	part/dwg #505 9474 002			
A-003	HEAD ASSEMBLY: osc head; 2 insulator feed-thrus soldered into head; brass casting; round; 2.500" OD x .1880" ID x 1.226" d o/a; three #4-40 NC-2 x 5/32" d tapped mtg holes equally spaced on 1-3/16" rad (p/o Z-101 within sealed enclosure) Listed for reference only	Front lead screw bearing plate, mounts XV-001		N16-0-66001-2501 (2C45 65-23A-1)	Collins Rad part/dwg #504 6562 003	504 6562 003	A-003	1
A-004	COVER: cover for osc; 2S H-12 aluminum, chromate dipped; cylindrical; 3-59/64" h x 2.500" OD; 3 mtg holes .125" diam equally spaced (p/o Z-101 within sealed enclosure) Listed for reference only	Covers sealed units		N17-C-945002-166 (2Z3351 -462)	Collins Rad part/dwg #504 6566 002	504 6566 002	A-004	1
A-005	PLATE, mounting: flat; CRS; 2.250" OD x 1.062" ID x .0745" thk; three .159" diam mtg holes triangularly spaced on 1.750" x 1.436" mtg/c (p/o Z-101) Listed for reference only	Mounts 70E-15 assembly to chassis		N16-P-404101-327 (2Z70 90.240)	Collins Rad part/dwg #505 0406 002	505 0406 002	A-005	1
A-101	BRACKET: holds shaft at left end of band indicator drum; "L" shape; CRS, cad pl; 3-3/4" lg x 2-1/16" wd x 25/32" d o/a; mtg holes, one .196" diam on one side, two .171" diam on other side	Holds shaft at left end of band indicator drum		*N16-B-750001-729 (2Z1244 -275)	Collins Rad part/dwg #505 2158 002	505 2158 002	A-101	1
				*Not furnished as a maintenance part. If failure occurs, do not request replacement unless the item cannot be repaired or fabricated.				

TABLE 8-4 COMBINED PARTS AND SPARE PARTS LIST

MAJOR ASSEMBLY: RECEIVER R-388/URR

PARTS								SPARE PARTS				
									EQUIPMENT		STOCK	
SYMBOL DESIG.	NAME OF PART AND DESCRIPTION	FUNCTION	JAN AND (NAVY TYPE) NO.	STANDARD NAVY & (SIGNAL CORPS) STOCK NO.	MFGR. AND MFGR'S. DESIG-NATION	CONTRACTOR DRAWING & PART NO.	ALL SYMBOL DESIG. INVOLVED	NO. USED IN EQUIPMENT	ITEM NUMBER	BOX	QUAN.	BOX	QUAN.
A-102	BRACKET: holds shaft at right end of band indicator drum; "L" shape; CRS, cad pl; 3-3/4" lg x 2-1/16" wd x 25/32" d o/a; mtg holes, one .196" diam on one side, two .171" diam on other side	Holds shaft at right end of band indicator drum		*N16-B-750001-746 (2Z1244-280)	Collins Rad part/dwg #505 2159 002	505 2159 002	A-102	1					
A-103	PLATE, end: right end plate of receiver cabinet; CRS, cad pl; 4 groups of five 2" x 1/4" slots ea, groups 3/8" apart, slots 3/8" apart; .064" thk sheet, 12-11/16" lg x 10-1/8" h front, 7" h rear, front and bottom w/ 1/2" at 90 deg; three #8-32 self-clinching fasteners located on side angle 4.750" and 2.750" apart	Right end plate of receiver cabinet		*N16-P-402301-123 (2Z7090-239)	Collins Rad part/dwg #505 2190 004	505 2190 004	A-103	1					
A-104	PLATE, electrical shield: converter; .050" thk aluminum, chromate dipped; rectangular; 6-3/16" lg x 3.062" h, 7/16" lg 90 deg angle; two #6-32 spade bolts riveted to plate 2-3/8" apart to fasten it to bottom plate and ctr plate of cabinet	Converter located between rack		*N16-P-402241-141 (2Z7090-238)	Collins Rad part/dwg #505 2143 002	505 2143 002	A-104	1					

A-105	PLATE, electrical shield: for calibration osc; .050" thk aluminum, chromate dipped; angular, irregularly shaped; 3.031" lg x 1-25/32" wd x 3-9/32" h o/a; two #6-32 spade bolts riveted to plate 2-3/8" apart, mts it to bottom and ctr plate of cabinet	For calibration oscillator		*N16-P-402241-143 (2Z3351-461)	Collins Rad part/dwg #505 2145 002	505 2145 002	A-105	1					
A-106	PLATE, electrical shield: shields grid circuit from plate circuit, gnd point; silver pl brass; flat; 1-9/64" lg o/a, .640" lg x .359" h inside; mtd by tube socket hardware w/ solder connection to socket ctr shield 2 mtg holes #4-40 NC-2 .875" c to c	Shields grid circuit from plate circuit gnd point		*N16-P-402241-110 (2Z7093-264)	Collins Rad part/dwg #502 1427 002	502 1427 002	A-106, A-107, A-108, A-109	4					
A-107	PLATE: Same as A-106	Shields grid circuit from plate circuit gnd point		*									
A-108	PLATE: Same as A-106	Shields grid circuit from plate circuit gnd point		*									
A-109	PLATE: Same as A-106	Shields grid circuit from plate circuit gnd point		*									

*Not furnished as a maintenance part. If failure occurs, do not request replacement unless the item cannot be repaired or fabricated.

TABLE 8-4 COMBINED PARTS AND SPARE PARTS LIST

MAJOR ASSEMBLY: RECEIVER R-388/URR

PARTS								SPARE PARTS				
									EQUIPMENT		STOCK	
SYMBOL DESIG.	NAME OF PART AND DESCRIPTION	FUNCTION	JAN AND (NAVY TYPE) NO.	STANDARD NAVY & (SIGNAL CORPS) STOCK NO.	MFGR. AND MFGR'S. DESIG-NATION	CONTRACTOR DRAWING & PART NO.	ALL SYMBOL DESIG. INVOLVED	NO. USED IN EQUIPMENT	ITEM NUMBER	BOX	QUAN.	BOX	QUAN.
A-110	BRACKET: holds springs to create tension on variable IF cam rack; "L" shape; SS; 1-3/16" lg x .437" wd x 1.077" h o/a; mts by two .125" diam holes .875" c to c	Holds springs to create tension on variable i-f cam rack		*N16-B-750001-385 (2Z1244-98)	Collins Rad part/dwg #504 3108 002	504 3108 002	A-110, A-111	2					
A-111	BRACKET: Same as A-110	Holds springs to create tension on variable i-f cam rack											
A-112	RACK: mts tuning slugs for IF coils; SS; empty; 11.031" lg o/a; 90 deg angle 5/8" x 9/16"; holes spaced 2-1/2", 4.062", 6.062", 7.375", 8.250", 9.125" from first holes, w/ nut and spring secured to ea (incl O-147, O-148, O-149, O-150, O-151, O-152, O-153)	Mounts tuning slugs for i-f coils		*N16-R-400096-659 (2Z6820.278)	Collins Rad part/dwg #504 3116 002	504 3116 002	A-112	1					
A-113	PLATE, bottom: aluminum, chromate dipped; rectangular shape; .064" thk sheet, 16.938" lg x 12.625" wd w/ 1/2" d mtg fl at 90 deg on two sides; four .171" diam holes w/ fasteners in fl	Cover for bottom		*N16-P-401041-132 (2Z7090.237	Collins Rad part/dwg #505 2161 005	505 2161 005	A-113	1					

A-114	PLATE, electrical shield: for xtals; aluminum, chromate dipped; angular, irregular shape; 4-31/32" h x 3-9/32" wd x 5-35/64" lg o/a; four #6-32 spade bolts for mtg to top and ctr plate	For crystals Y-101 thru Y-110		*N16-P-402241-140 (2Z7090 236	Collins Rad part/dwg #505 2171 003	505 2171 003	A-114	1					
A-115	PLATE, electrical shield: RF shield; aluminum, chromate dipped; "L" shape; 6-3/16" lg x 3-9/32" wd x .050" thk, w/ 1/2" wd mtg fl; incl one #6-32 spade bolt; two .171" diam holes for mtg	R-f section containing coils		*N16-P-402241-142 (2Z7090 235)	Collins Rad part/dwg #505 2144 002	505 2144 002	A-115	1					
A-116	COVER: dust shield for receiver chassis, extends over top and down half of back; incl spcl tool and Bristo Wrench clamp riveted to cover; aluminum, chromate dipped; 15 slots in row in top, 5 in back, 3/4" from left edge ea 2" x 1/4", spaced 3/8" apart; angular shape; 17-7/16" lg x 13-3/32" wd x 4" h in back, 7" h in front; mtd by six 25/64" x 7/32" open end slots, 3 in top, 3 in bottom; circuit label decal cemented to cover	Dust cover for Receiver		*N16-C-650001-863 (2Z3351-541)	Collins Rad part/dwg #505 2719 004	505 2719 004	A-116	1					
A-117	CHASSIS: ctr plate w/ cutouts; aluminum, chromate dipped; 17-3/16" lg x 11" wd x 3-11/32" d o/a; 7/8" fl for mtg, 24 fasteners staked to chassis	Chassis		N16-C-68730-6941 (2Z2490 .35)	Collins Rad pa :/dwg #505 2195 005	505 2195 005	A-117	1					

*Not furnished as a maintenance part. If failure occurs, do not request replacement unless the item cannot be repaired or fabricated.

TABLE 8-4 COMBINED PARTS AND SPARE PARTS LIST

MAJOR ASSEMBLY: RECEIVER R-388/URR

PARTS								SPARE PARTS				
									EQUIPMENT		STOCK	
SYMBOL DESIG.	NAME OF PART AND DESCRIPTION	FUNCTION	JAN AND (NAVY TYPE) NO.	STANDARD NAVY & (SIGNAL CORPS) STOCK NO.	MFGR. AND MFGR'S. DESIG-NATION	CONTRACTOR DRAWING & PART NO.	ALL SYMBOL DESIG. INVOLVED	NO. USED IN EQUIPMENT	ITEM NUMBER	BOX	QUAN.	BOX	QUAN.
A-118	PLATE, end: left end plate of receiver cabinet; aluminum, cad pl; 4 groups of five 2" x 1/4" slots ea, groups 3/8" apart, slots 3/8" apart; .060" thk sheet, 12-11/16" lg x 10-1/8" h front, 7" h in rear; three #8-32 self-clinching fasteners located on side angle 4.750" and 3.750" apart	Left end plate of receiver cabinet		*N16-P-402301-122 (2Z7090.234)	Collins Rad part/dwg #505 2191 004	505 2191 004	A-118	1					
A-119	COVER: partial shield for capacitor; aluminum, chromate dipped; rectangular, c/o top and 3 sides; 2" lg x 1-7/16" wd x 1-1/4" h o/a; two .140" diam holes for mtg	Partial shield for C-224		*N16-S-33261-1004 (2Z3351-463)	Collins Rad part/dwg #505 2718 002	505 2718 002	A-119	1					
A-120	BRACKET: pulley support; straight shape w/ 15/32" 90 deg projection at ea end; SS pointer track, CRS pulleys (2); 11" lg x 1-1/8" wd x .0418" thk o/a; mts by 2 standoffs tapped for #6 screws located 9.125" c to c; 1/32" groove for string in pulleys (incl O-144, O-162)	Pulley support		N16-P-850501-110 (2S5508 23-13)	Collins Rad part/dwg #504 3163 002	504 3163 002	A-120	1					
A-121	BRACKET: connects two end plates; rectangular CRS, cad pl; 17.187" lg x 5/8" wd x 3/4" h o/a; mts by two #6-32 self-clinching fasteners,	Connects 2 plates A-103 and A-118		N16-B-750001-728 (2Z124	Collins Rad part/dwg #505	505 2175 003	A-121	1					

	1 ea end; three spacer-rivet washer assem 6" apart to hold top dust cover, two .250" diam holes in rear lip			4-276)	2175 003				
A-122	BRACKET: supports capacitor; "U" shape w/ mtg fl; aluminum, chromate dipped; 1-5/8" wd x 5/8" h less fl, .064" thk; six .140" diam holes, 2 in ea fl on 2-1/8" x 1-1/4" mtg/c; 1.125" diam hole in ctr for capacitors	Capacitor C-217 support		*N16-M-60911-4161 (2Z6820.498)	Collins Rad part/dwg #505 2146 002	505 2146 002	A-122	1	
A-123	CABINET: CY-1235/URR; Receiver; steel, gray wrinkle finish; outside, flat inside; empty; 21-1/8" wd x 13-1/8" d x 12-3/8" h o/a plus 2" clearance to cover handles on front panel; two channels on bottom; inside hinged cover; incl felt strip, 4 rubber feet, and hand guard (incl A-129, A-130, A-131, A-132)	For Radio Receiver R-388/URR		F16-C-10635-4951 (2Z1578-43)	Collins Rad part/dwg #505 5946 001	505 5946 001	A-123	1	
A-124	PLATE, anchor: retains crystal in position; phenolic, insulex 27-SA varnish finish; 4-19/32" lg x 1-1/2" wd x .062" thk; three .140" diam mtg holes spaced on 4.375" x 1.250" mtg/c	Retains crystal in position		*N16-R-501081-124 (2Z7780-208)	Collins Rad part/dwg #505 2152 002	505 2152 002	A-124	1	
A-125	CABINET: See Page 158								

*Not furnished as a maintenance part. If failure occurs, do not request replacement unless the item cannot be repaired or fabricated.

PARTS								NO. USED IN EQUIPMENT	SPARE PARTS				
										EQUIPMENT		STOCK	
SYMBOL DESIG.	NAME OF PART AND DESCRIPTION	FUNCTION	JAN AND (NAVY TYPE) NO.	STANDARD NAVY & (SIGNAL CORPS) STOCK NO.	MFGR. AND MFGR'S. DESIG-NATION	CONTRACTOR DRAWING & PART NO.	ALL SYMBOL DESIG. INVOLVED		ITEM NUMBER	BOX	QUAN.	BOX	QUAN.
A-126	PLATE, anchor: brass, cad pl; oval shape; 3-3/4" lg x 1-1/4" wd x 0.025" thk; single 0.170" diam mtg hole located in ctr of plate; w/ two cutouts, one 7/16" diam, one 3/4" spaced 2-1/2" c to c;	Tube hold-down for V-115		*N16-P-400321-111 (2Z70 90.347)	Collins Rad part/dwg #505 2111 001	505 2111 001	A-126	1					
A-127	BRACKET: mts RF coil; 90 deg angle shape; aluminum, chromate dipped; 0.064" thk, 1-3/8" lg x 5/8" wd x 1" h o/a; two 0.140" diam mtg holes spaced 3/8" c to c; w/ 0.417" diam cutout to accom coil (p/o Z-111)	Mounts Z-111		*N16-B-750001-943 (2Z12 39.365)	Collins Rad part/dwg #505 2156 002	505 2156 002	A-127	1					
A-128	BRACKET: vernier; channel shape; brass, cad pl; 0.062" thk, 2-3/8" lg x 0.375" wd x 0.437" h o/a; two 0.125" diam holes located on 0.562" lg mtg fl, spaced 2" c to c	Mounting for vernier drive assem		*N16-B-750001-944 (2Z12 39.366)	Collins Rad part/dwg #505 2109 001	505 2109 001	A-128	1					
A-129	BUMPER: black rubber; round, 1" diam x 5/8" h excluding stud; 1/4"-20 x 9/16" lg stud for mtg; w/ rounded edge on bottom (p/o A-123)	Mounting for Receiver Cabinet A-123		*N17-B-775001-241 (6Z16 50-24)	Sun Rubber Co. to Collins Rad Spec #200 5020 00	200 5020 00	A-129, A-130, A-131, A-132	4					

*Not furnished as a maintenance part. If failure occurs, do not request replacement unless the item cannot be repaired or fabricated.

A-130	BUMPER: Same as A-129 (p/o A-123)	Mounting for Receiver cabinet A-123												
A-131	BUMPER: Same as A-129 (p/o A-123)	Mounting for Receiver cabinet A-123												
A-132	BUMPER: Same as A-129 (p/o A-123)	Mounting for Receiver cabinet A-123												
A-133	BUMPER: See Page 158													
A-134	BUMPER: See Page 159 & 160													
A-135	BUMPER: See Page 159 & 160													
A-136	BUMPER: See Page 159 & 160													
	CAPACITORS													
C-001	CAPACITOR, fixed: ceramic dielectric; 540 mmf p/m 2%; temp coef variable neg 40 min to neg 70 max mmf/mf/°C from plus 30°C to plus 70°C; 500 vdcw; 3/4" diam x 3/4" lg case; 1 axial 1 radial lug term; #6-32 NC-2 stud for mtg; uninsulated (p/o Z-101, within sealed enclosure)	Main tank capacitor		N16-C-18250-4238 (3D9540-2)	Herlec Corp type B01	913 0924 00	C-001	1						

PARTS									SPARE PARTS				
										EQUIPMENT		STOCK	
SYMBOL DESIG.	NAME OF PART AND DESCRIPTION	FUNCTION	JAN AND (NAVY TYPE) NO.	STANDARD NAVY & (SIGNAL CORPS) STOCK NO.	MFGR. AND MFGR'S. DESIG-NATION	CONTRACTOR DRAWING & PART NO.	ALL SYMBOL DESIG. INVOLVED	NO. USED IN EQUIPMENT	ITEM NUMBER	BOX	QUAN.	BOX	QUAN.
*C-002	CAPACITOR, fixed: ceramic dielectric; 10 mmf p/m 1.0 mmf; temp coef 0 (tol p/m 30) mmf/mf/°C; 500 vdcw; .520" lg x .395" wd x 3/32" thk; axial wire leads; uninsulated (p/o Z-101, within sealed enclosure)	Temperature compensator		N16-C-15920-8853 (3D9010-186)	Centralab to Collins Rad spec #913 0043 00	913 0043 00	*C-002, *C-003	2					
*C-002	CAPACITOR, fixed: ceramic dielectric; 10 mmf p/m 1.0 mmf; neg temp coef 200 (tol p/m 30) mmf/mf/°C; 500 vdcw; .520" lg x .395" wd x 3/32" thk; axial wire leads; uninsulated (p/o Z-101, within sealed enclosure)	Temperature compensator		N16-C-15923-4258 (3D9010-170)	Centralab to Collins Rad spec #913 0044 00	913 0044 00	*C-002, *C-003	2					
*C-002	CAPACITOR, fixed: ceramic dielectric; 10 mmf p/m 1.0 mmf; neg temp coef 400 (tol p/m 60) mmf/mf/°C; 500 vdcw; .520" lg x .203" wd x 3/32" thk; axial wire leads; uninsulated (p/o Z-101, within sealed enclosure)	Temperature compensator		N16-C-15924-3401 (3D90 10-187)	Centralab to Collins Rad spec #913 0045 00	913 0045 00	*C-002, *C-003	2					
*C-002	CAPACITOR, fixed: ceramic dielectric; 10 mmf p/m 1.0 mmf; neg temp coef 600 (tol p/m 90) mmf/mf/°C; 500 vdcw; .520" lg x .203" wd x 3/32" thk; axial wire leads; (p/o Z-101, within sealed enclosure)	Temperature compensator		N16-C-15924-7558 (3D90 10-173)	Centralab to Collins Rad spec #913 0046 00	913 0046 00	*C-002, *C-003	2					

*C-002	CAPACITOR, fixed: ceramic dielectric; 10 mmf p/m 1.0 mmf; neg temp coef 800 (tol p/m 120) mmf/mf/°C; 500 vdcw; .520" lg x .203" wd x 5/32" thk; axial wire leads; uninsulated (p/o Z-101, within sealed enclosure)	Temperature compensator	N16-C-15925-2220 (3D90 10-172)	Centralab to Collins Rad spec #913 0047 00	913 0047 00	*C-002, *C-003	2
*C-002	CAPACITOR, fixed: ceramic dielectric; 10 mmf p/m 1.0 mmf; neg temp coef 1000 (tol p/m 150) mmf/mf/°C; 500 vdcw; .520" lg x .203" wd x 3/32" thk; axial wire leads; uninsulated (p/o Z-101, within sealed enclosure)	Temperature compensator	N16-C-15925-2360 (3D9010-217)	Centralab to Collins Rad spec #913 0048 00	913 0048 00	*C-002, *C-003	2
*C-002	CAPACITOR, fixed: ceramic dielectric; 10 mmf p/m 1.0 mmf; neg temp coef 1200 (tol p/m 180) mmf/mmf/°C 500 vdcw; .520" lg x .203" wd x 3/32" thk; axial wire leads; uninsulated (p/o Z-101, within sealed enclosure)	Temperature compensator	N16-C-15925-2480 (3D9010-169)	Centralab to Collins Rad spec #913 0049 00	913 0049 00	*C-002, *C-003	2
*C-002	CAPACITOR, fixed: ceramic dielectric; 10 mmf p/m 1.0 mmf; neg temp coef 1400 (tol p/m 210) mmf/mf/°C; 500 vdcw; .520" lg x .203" wd x 3/32" thk; axial wire leads; uninsulated (p/o Z-101, within sealed enclosure)	Temperature compensator	N16-C-15925-2642 (3D9010-174)	Centralab to Collins Rad spec #913 0050 00	913 0050 00	*C-002, *C-003	2

*NOTE: This capacitor is individually chosen to fulfill the operation requirements of each oscillator.

PARTS									SPARE PARTS				
										EQUIPMENT		STOCK	
SYMBOL DESIG.	NAME OF PART AND DESCRIPTION	FUNCTION	JAN AND (NAVY TYPE) NO.	STANDARD NAVY & (SIGNAL CORPS) STOCK NO.	MFGR. AND MFGR'S. DESIGNATION	CONTRACTOR DRAWING & PART NO.	ALL SYMBOL DESIG. INVOLVED	NO. USED IN EQUIPMENT	ITEM NUMBER	BOX	QUAN.	BOX	QUAN.
*C-002	CAPACITOR, fixed: ceramic dielectric; 10 mmf p/m 1.0 mmf; neg temp coef 1600 (tol p/m 240) mmf/mf/°C 500 vdcw; .520" lg x .203" wd x 3/32" thk; axial wire leads; uninsulated (p/o Z-101, within sealed enclosure)	Temperature compensator		N16-C-15925-2811 (3D9010-202)	Centralab to Collins Rad spec #913 0227 00	913 0227 00	*C-002, *C-003	2					
*C-002	CAPACITOR, fixed: ceramic dielectric; 10 mmf p/m 1.0 mmf; neg temp coef 1800 (tol p/m 270) mmf/mf/°C 500 vdcw; .520" lg x .203" wd x 3/32" thk; axial wire leads; uninsulated (p/o Z-101 within sealed enclosure)	Temperature compensator		N16-C-15925-2911 (3D9010-203)	Centralab to Collins Rad spec #913 0228 00	913 0228 00	*C-002, *C-003	2					
*C-002	CAPACITOR, fixed: ceramic dielectric; 10 mmf p/m 1.0 mmf; neg temp coef 2000 (tol p/m 300) mmf/mf/°C 500 vdcw; .520" lg x .203" wd x 3/32" thk; axial wire leads; uninsulated (p/o Z-101 within sealed enclosure)	Temperature compensator		N16-C-15925-3011 (3D9010-204)	Centralab to Collins Rad spec #913 0229 00	913 0229 00	*C-002, *C-003	2					
*C-002	CAPACITOR, fixed: ceramic dielectric; 10 mmf p/m 1.0 mmf; neg temp coef 2200 (tol p/m 330) mmf/mf/°C; 500 vdcw; .520" lg x .203" wd x 3/32" thk; axial wire leads;	Temperature compensator		N16-C-15925-3111 (3D9010-205)	Centralab to Rad spec #913	913 0230 00	*C-002, *C-003	2					

	uninsulated (p/o Z-101, within sealed enclosure)				0230 00				
*C-002	CAPACITOR, fixed: ceramic dielectric; 10 mmf p/m 1.0 mmf; neg temp coef 2400 (tol p/m 360) mmf/mf/°C; 500 vdcw; .520" lg x .203" wd x 3/32" thk; axial wire leads; uninsulated (p/o Z-101, within sealed enclosure)	Temperature compensator		N16-C-15925-3211 (3D90 10-206)	Centralab to Collins Rad spec #913 0231 00	913 0231 00	*C-002, *C-003	2	
*C-003	CAPACITOR: Same as *C-002 series (p/o Z-101 within sealed enclosure)	Temperature compensator							
C-004	CAPACITOR, fixed: ceramic dielectric; JAN type #CC30CK200J (p/o Z-101, within sealed enclosure)	Grid coupling capacitor	CC30CK-200J	N16-C-16081-6531 (3D90 20-63)		JAN-C-20A	C-004, C-139	2	
C-005	CAPACITOR, fixed: paper dielectric; 10,000 mmf p/m 10%; 200 vdcw at 85°C; molded phenolic case; 1.062" lg x 0.175" diam case; impr w/ special high temp organic matl; 2 axial wire leads; term mtg (p/o Z-101)	Bypass capacitor		N16-C-42730-1277 (3DA 10-472)	Sprague catalog #65P10 392	931 0321 00	C-005, C-006, C-008	3	
C-006	CAPACITOR: Same as C-005	Bypass capacitor							
C-007	CAPACITOR, fixed: ceramic dielectric; JAN type #CC30RH510J (p/o Z-101)	Grid coupling capacitor	CC30RH-510J	N16-C-16595-5927 (3D90 51-61)		JAN-C-20A	C-007	1	

*NOTE: This capacitor is individually chosen to fulfill the operation requirements of each oscillator.

PARTS									SPARE PARTS				
										EQUIPMENT		STOCK	
SYMBOL DESIG.	NAME OF PART AND DESCRIPTION	FUNCTION	JAN AND (NAVY TYPE) NO.	STANDARD NAVY & (SIGNAL CORPS) STOCK NO.	MFGR. AND MFGR'S. DESIG-NATION	CONTRACTOR DRAWING & PART NO.	ALL SYMBOL DESIG. INVOLVED	NO. USED IN EQUIPMENT	ITEM NUMBER	BOX	QUAN.	BOX	QUAN.
C-008	CAPACITOR: Same as C-005 (p/o Z-101, within sealed enclosure)	Bypass capacitor											
C-009	CAPACITOR, fixed: ceramic; 3,000 mmf guaranteed min; 2/ Hi-K material; 500 vdcw; 11/16" lg x 0.250" diam; 2 radial wire lead term; term mtd; Durez dip coating; fungi resistant (p/o Z-101)	Output coupling		N16-C-18919-1251 (3DA3-151)	Electrical Reactance Corp to Collins Rad spec #913 0996 00	913 0996 00	C-009	1					
C-1	CAPACITOR	P/o T-101											
C-1	CAPACITOR	P/o T-102											
C-1	CAPACITOR	P/o T-103											
C-1	CAPACITOR	P/o T-104											
C-1	CAPACITOR	P/o T-105											
C-1	CAPACITOR	P/o T-106											
C-2	CAPACITOR	P/o T-103											
C-2	CAPACITOR	P/o T-104											
C-2	CAPACITOR	P/o T-105											

C-2	CAPACITOR	P/o T-106										
C-3	CAPACITOR	P/o T-106										
C-4	CAPACITOR KIT: for temperature compensating transformer; c/o 7 flat ceramic capacitors, ea 50 mmf; polyethelene bag, 6" x 8"; incl instructions for selecting individual capacitor (incl C-4.1 thru C-4.7)	For temp compensating transformer T-106		N16-C-66401-1012 (3DE50-4)	Collins Rad part/dwg #505 9018 001	505 9018 001	C-4	1			1	5
*C-4.1	CAPACITOR, fixed: ceramic dielectric; 50 mmf p/m 1.0 mmf; neg temp coef 200 (tol p/m 30) mmf/mf/°C; 500 vdcw; 1.020" lg x .395" wd x 3/32" thk; axial wire term; term mtg (p/o T-106) (p/o C-4 kit)	p/o Bfo assembly (compensating cap)		N16-C-16556-6594 (3D90 50-159)	Centralab to Collins Rad spec #913 0060 00	913 0060 00	*C-4.1	1				
*C-4.2	CAPACITOR, fixed: ceramic dielectric; 50 mmf p/m 1 mmf; neg temp coef 400 (tol p/m 60) mmf/mf/°C; 500 vdcw; 1.020" lg x .395" wd x 3/32" thk; axial wire leads; uninsulated (p/o T-106) (p/o C-4 kit)	p/o Bfo assembly (compensating cap)		N16-C-16556-9314 (3D90 50-160)	Centralab to Collins Rad spec #913 0061 00	913 0061 00	*C-4.2	1				
*C-4.3	CAPACITOR, fixed: ceramic dielectric; 50 mmf p/m 1 mmf; neg temp coef 600 (tol p/m 90) mmf/mf/°C; 500 vdcw; .520" lg x .520" wd x 3/32" thk; axial wire leads; term mtd; uninsulated (p/o T-106) (p/o C-4 kit)	p/o Bfo assembly (compensating cap)		N16-C-16557-1694 (3D90 50-161)	Centralab to Collins Rad spec #913 0062 00	913 0062 00	*C-4.3	1				
*NOTE:	Choose 1 of 7, so that freq does not vary more than p/m 300 cps from freq at 30°C over temp range of 0°C to plus 60°C.											

PARTS									SPARE PARTS				
										EQUIPMENT		STOCK	
SYMBOL DESIG.	NAME OF PART AND DESCRIPTION	FUNCTION	JAN AND (NAVY TYPE) NO.	STANDARD NAVY & (SIGNAL CORPS) STOCK NO.	MFGR. AND MFGR'S. DESIG-NATION	CONTRACTOR DRAWING & PART NO.	ALL SYMBOL DESIG. INVOLVED	NO. USED IN EQUIPMENT	ITEM NUMBER	BOX	QUAN.	BOX	QUAN.
*C-4.4	CAPACITOR, fixed: ceramic dielectric; 50 mmf p/m 1 mmf; neg temp coef 800 (tol p/m 120) mmf/mf/°C; 500 vdcw; .520" lg x .395" wd x 3/32" h; 2 axial wire leads; term mtd; uninsulated; (p/o T-106) (p/o C-4 kit)	p/o Bfo assembly (compensating cap)		N16-C-16557-2771 (3D9050-168)	Centralab to Collins Rad spec #913 0063 00	913 0063 00	*C-4.4	1					
*C-4.5	CAPACITOR, fixed: ceramic dielectric; 50 mmf p/m 1 mmf; neg temp coef 1000 (tol p/m 150) mmf/mf/°C; 500 vdcw; .520" lg x .395" wd x 3/32" h; 2 axial wire leads; mts by leads; uninsulated (p/o T-106) (p/o C-4 kit)	p/o Bfo assembly (compensating cap)		N16-C-16557-2801 (3D9050-169)	Centralab to Collins Rad spec #913 0064 00	913 0064 00	*C-4.5	1					
*C-4.6	CAPACITOR, fixed: ceramic dielectric; 50 mmf p/m 1 mmf; neg temp coef 1200 (tol p/m 180) mmf/mf/°C; 500 vdcw; .520" lg x .395" wd x 3/32" h; 2 axial wire leads; mts by leads; uninsulated (p/o T-106) (p/o C-4 kit)	p/o Bfo assembly (compensating cap)		N16-C-16557-2825 (3D9050-170)	Centralab to Collins Rad spec #913 0065 00	913 0065 00	*C-4.6	1					
*C-4.7	CAPACITOR, fixed: ceramic dielectric; 50 mmf p/m 1 mmf; neg temp coef 1400 (tol p/m 210) mmf/mf/°C; 500 vdcw; .520" lg x .395" wd x 3/32" h; 2 axial wire lead term;	p/o Bfo assembly (compensating cap)		N16-C-16557-2851 (3D90 50-171	Centralab to Collins Rad spec	913 0066 00	*C-4.7	1					

	term mtd; uninsulated; (p/o T-106) (p/o C-4 kit)				#913 0066 00							
C-5	CAPACITOR	p/o T-106										
C-101	CAPACITOR, fixed: mica; 820 mmf p/m 2%; 300 vdcw; temp coef E; 51/64" lg x 15/32" wd x 7/32" h; molded bakelite case; 2 axial wire leads; term mtd; (p/o Z-115)	L-101 padder		N16-C-30737-1412 (3D9820-14)	Electro Motive to Collins Rad spec #935 5014 00	935 5014 00	C-101	1			1	
C-102	CAPACITOR, variable: ceramic dielectric; rotary type; 8 to 50 mmf, one sect; 350 vdcw; temp coef minus 750 mmf/mf/°C; 3/4" lg x 17/32" wd x 15/64" h; solder lug term; two 0.120" diam mtg h holes in base 5/16" c to c; scdr slot adj; low loss laminated phenolic insulation; (p/o Z-115)	L-102 trimming		N16-C-64172-4565 (3D9050-V-117)	Erie type #557	917 1038 00	C-102, C-104, C-106, C-108, C-119, C-120, C-128, C-140, C-144, C-150, C-152, C-154, C-156, C-158, C-162, C-174, C-176, C-180, C-182	19			2	
*NOTE	Choose 1 of 7, so that freq does not vary more than p/m 300 cps from freq at 30°C over temp range of 0°C to plus 60°C.											

PARTS								SPARE PARTS				
									EQUIPMENT		STOCK	
SYMBOL DESIG.	NAME OF PART AND DESCRIPTION	FUNCTION	JAN AND (NAVY TYPE) NO.	STANDARD NAVY & (SIGNAL CORPS) STOCK NO.	MFGR. AND MFGR'S. DESIG-NATION	CONTRACTOR DRAWING & PART NO.	ALL SYMBOL DESIG. INVOLVED	NO. USED IN EQUIPMENT	ITEM NUMBER	BOX	QUAN.	BOX	QUAN.
C-103	CAPACITOR, fixed: mica; 430 mmf p/m 2%; 300 vdcw; temp coef D; 1/2" lg x 9/32" wd x 11/64" h; molded bakelite case; 2 axial wire leads; mts by term (p/o Z-115)	L-102 padder		N16-C-29996-2750 (3D9430-5)	Electro Motive #605	912 0538 00	C-103	1			1		
C-104	CAPACITOR: Same as C-102 (p/o Z-115)	L-102 trimming											
C-105	CAPACITOR, fixed: mica; 220 mmf p/m 2%; 500 vdcw; temp coef letter D; 1/2" lg x 9/32" wd x 11/64" d; molded phenolic case; 2 axial wire leads; mts by leads (p/o Z-115)	L-103 padding		N16-C-29365-5775 (3D9920-34)	Electro Motive type #605	912 0517 00	C-105, C-121, C-127, C-168	4			1		
C-106	CAPACITOR: Same as C-102 (p/o Z-115)	L-103 trimming											
C-107	CAPACITOR, fixed: mica; 130 mmf p/m 5%; 500 vdcw; temp coef letter D; 1/2" lg x 9/32" wd x 11/64" h case; molded bakelite case; 2 axial wire leads 1-1/2" lg; mts by leads (p/o Z-110)	L-104 tuned circuit		N16-C-28816-8015 (3D9130-23)	Electro Motive type #605	912 0503 00	C-107	1			1		
C-108	CAPACITOR: Same as C-102 (p/o Z-110	L-104 trimming											

C-109	CAPACITOR, fixed: mica; 20 mmf p/m 5%; 500 vdcw; temp coef letter D; 1/2" lg x 9/32" wd x 11/64" h case; molded bakelite case; 2 axial wire leads 1-1/2" lg; mts by leads (p/o Z-109)	L-105 tuned circuit		N16-C-26732-9444 (3D90 20-77)	Electro Motive type #605	912 0443 00	C-109	1			1		
C-110	CAPACITOR, variable: ceramic dielectric; rotary type; 5 to 25 mmf, one sect; 350 vdcw; temp coef 0 mmf/mf/°C; 19/32" lg x 17/32" wd x 3/4" h; solder lug term; two 0.120" diam mtg holes in base 5/16" c to c; scdr slot adj; low loss laminated phenolic insulation; (p/o Z-109)	L-105 trimming		N16-C-64039-6960 (3D902 5V-93)	Erie type #557	917 1036 00	C-110, C-122, C-124, C-130, C-132, C-146, C-147, C-148, C-149, C-169	10			2		
C-111	CAPACITOR, fixed: ceramic dielectric; JAN type #CC30CK020C	100 kc injection	CC30CK-020C	N16-C-15432-5844 (3D900 2-27)		JAN-C-20A	C-111, C-117, C-192, C-196, C-201, C-221	6					
C-112	Not used												
C-113	CAPACITOR, fixed: mica; 100 mmf p/m 5%; 500 vdcw; temp coef letter D; 1/2" lg x 9/32" wd x 11/64" d; molded phenolic case; 2 axial wire leads; mts by leads	V-101 grid coupling		N16-C-28553-1046 (3D910 0-294)	Electro Motive type #605	912 0494 00	C-113, C-136, C-143, C-166, C-171, C-184, C-204, C-226	8			2		

PARTS								SPARE PARTS				
									EQUIPMENT		STOCK	
SYMBOL DESIG.	NAME OF PART AND DESCRIPTION	FUNCTION	JAN AND (NAVY TYPE) NO.	STANDARD NAVY & (SIGNAL CORPS) STOCK NO.	MFGR. AND MFGR'S. DESIG-NATION	CONTRACTOR DRAWING & PART NO.	ALL SYMBOL DESIG. INVOLVED	NO. USED IN EQUIPMENT	ITEM NUMBER	BOX	QUAN.	BOX	QUAN.
C-114	CAPACITOR, fixed: ceramic dielectric; 10,000 mmf, guaranteed min value tol; 350 vdcw; 1.130" lg x .350" diam; 2 radial wire leads; mts by leads; Durez insulation; max change in cap from its value at 250°C over temp range of minus 55°C to 85°C shall be minus 50%, plus 25%	V-101 AVC isolation		N16-C-19111-1025 (3DA10-527)	Centralab to Collins Rad spec 913 0566 00	913 0566 00	C-114, C-115, C-126, C-134, C-135, C-137, C-138, C-141, C-142, C-163, C-164, C-170, C-172, C-178, C-183, C-185, C-186, C-189, C-190, C-191, C-193, C-194, C-195, C-197, C-199, C-200, C-207, C-208, C-209,	35			4		20

							C-211, C-213, C-218, C-219, C-227, C-228						
C-115	CAPACITOR: Same as C-114	V-101 screen isolation											
C-116	CAPACITOR, fixed: ceramic dielectric; JAN type #CC30CK010C	V-102 grid coupling	CC30CK-010C	N16-C-15368-5855 (3D900 -29)		JAN-C-20A	C-116	1					
C-117	CAPACITOR: Same as C-111	V-101 plate coupling, band 1											
C-118	CAPACITOR, fixed: mica; 910 mmf p/m 1%; 300 vdcw; temp coef letter E; 51/64" lg x 15/32" wd x 7/32" h max; molded phenolic case; 2 axial wire leads 1-1/8" lg; mts by leads (p/o Z-116)	L-110 padding		N16-C-30921-1810 (3D991 0-3)	Electro Motive to Collins Rad spec #935 5015 00	935 5015 00	C-118	1			1		5
C-119	CAPACITOR: Same as C-102 (p/o Z-116)	L-110 trimming											
C-120	CAPACITOR: Same as C-102 (p/o Z-106)	L-107 trimming											
C-121	CAPACITOR: Same as C-105 (p/o Z-106)	L-107 padding											

PARTS								SPARE PARTS				
									EQUIPMENT		STOCK	
SYMBOL DESIG.	NAME OF PART AND DESCRIPTION	FUNCTION	JAN AND (NAVY TYPE) NO.	STANDARD NAVY & (SIGNAL CORPS) STOCK NO.	MFGR. AND MFGR'S. DESIG-NATION	CONTRACTOR DRAWING & PART NO.	ALL SYMBOL DESIG. INVOLVED	NO. USED IN EQUIPMENT	ITEM NUMBER	BOX	QUAN.	BOX	QUAN.
C-122	CAPACITOR: Same as C-110 (p/o Z-104)	L-108 trimming											
C-123	CAPACITOR, fixed: mica; 75 mmf p/m 5%; 500 vdcw; temp coef letter D; 1/2" lg x 9/32" wd x 11/64" d; molded phenolic case; 2 axial wire leads; mts by leads (p/o Z-104)	L-108 padding		N16-C-28130-9720 (3D9075-51)	Electro Motive type #605	912 0485 00	C-123, C-129	2			1		
C-124	CAPACITOR: Same as C-110 (p/o Z-102)	L-109 trimming											
C-125	Not used												
C-126	CAPACITOR: Same as C-114	V-101 plate isolation											
C-127	CAPACITOR: Same as C-105 (p/o Z-107)	L-111 padding											
C-128	CAPACITOR: Same as C-102 (p/o Z-107)	L-111 trimming											
C-129	CAPACITOR: Same as C-123 (p/o Z-105)	L-112 padding											
C-130	CAPACITOR: Same as C-110 (p/o Z-105)	L-112 trimming											

C-131	Not used															
C-132	CAPACITOR: Same as C-110 (p/o Z-103)	L-113 trimming														
C-133	CAPACITOR, fixed: ceramic dielectric; JAN type #CC30CK1R5C	V-102 grid coupling, band 4-7	CC30CK-1R5C	N16-C-15400-5842 (3D900 1-E5-11)			JAN-C-20A	C-133	1							
C-134	CAPACITOR: Same as C-114	V-102 cathode isolation														
C-135	CAPACITOR: Same as C-114 (p/o Z-116)	V-102 screen isolation														
C-136	CAPACITOR: Same as C-113	V-102 injection coupling														
C-137	CAPACITOR: Same as C-114 (p/o Z-116)	L-114, L-115 coupling														
C-138	CAPACITOR: Same as C-114 (p/o Z-116)	V-102 plate isolation														
C-139	CAPACITOR: Same as C-004 (p/o Z-116)	L-115 padding														
C-140	CAPACITOR: Same as C-102 (p/o Z-116)	L-115 trimming														

PARTS								SPARE PARTS				
									EQUIPMENT		STOCK	
SYMBOL DESIG.	NAME OF PART AND DESCRIPTION	FUNCTION	JAN AND (NAVY TYPE) NO.	STANDARD NAVY & (SIGNAL CORPS) STOCK NO.	MFGR. AND MFGR'S. DESIG-NATION	CONTRACTOR DRAWING & PART NO.	ALL SYMBOL DESIG. INVOLVED	NO. USED IN EQUIPMENT	ITEM NUMBER	BOX	QUAN.	BOX	QUAN.
C-141	CAPACITOR: Same as C-114	V-103 cathode isolation											
C-142	CAPACITOR: Same as C-114 (p/o Z-116)	V-103 screen isolation											
C-143	CAPACITOR: Same as C-113	V-103 injection coupling											
C-144	CAPACITOR: Same as C-102 (p/o Z-117)	L-121 trimming											
C-145	CAPACITOR, fixed: mica; 150 mmf p/m 5%; 500 vdcw; temp coef letter D; 1/2" lg x 9/32" wd x 11/64" d; molded phenolic case; 2 axial wire leads; mts by leads (p/o Z-117)	L-121 padding		N16-C-28975-1458 (3D9150-92)	Electro Motive type #605	912 0506 00	C-145, C-159	2			1		
C-146	CAPACITOR: Same as C-110 (p/o Z-117)	Crystal oscillator tuning											
C-147	CAPACITOR: Same as C-110 (p/o Z-117)	Crystal oscillator tuning											

C-148	CAPACITOR: Same as C-110 (p/o Z-117)	Crystal oscillator tuning										
C-149	CAPACITOR: Same as C-110 (p/o Z-117)	Crystal oscillator tuning										
C-150	CAPACITOR: Same as C-102 (p/o Z-117)	Crystal oscillator tuning										
C-151	CAPACITOR, fixed: ceramic dielectric; JAN type #CC30CK150J (p/o Z-117)	Crystal oscillator tuning	CC30CK-150J	N16-C-15985-7401 (3D9015-133)			JAN-C-20A	C-151, C-165	2			
C-152	CAPACITOR: Same as C-102 (p/o Z-117)	Crystal oscillator tuning										
C-153	CAPACITOR, fixed: ceramic dielectric; JAN type #CC30CK360J (p/o Z-117)	Crystal oscillator tuning	CC30CK-360J	N16-C-16369-7401 (3D90 36-14)			JAN-C-20A	C-153, C-235	2			
C-154	CAPACITOR: Same as C-102 (p/o Z-117)	Crystal oscillator tuning										
C-155	CAPACITOR, fixed: ceramic dielectric; JAN type #CC30CK470J (p/o Z-117)	Crystal oscillator tuning	CC30CK-470J	N16-C-16529-6533 (3D904 7-38)			JAN-C-20A	C-155	1			

PARTS								SPARE PARTS				
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SYMBOL DESIG.	NAME OF PART AND DESCRIPTION	FUNCTION	JAN AND (NAVY TYPE) NO.	STANDARD NAVY & (SIGNAL CORPS) STOCK NO.	MFGR. AND MFGR'S. DESIG-NATION	CONTRACTOR DRAWING & PART NO.	ALL SYMBOL DESIG. INVOLVED	NO. USED IN EQUIPMENT	ITEM NUMBER	BOX	QUAN.	BOX	QUAN.
C-156	CAPACITOR: Same as C-102 (p/o Z-117)	Crystal oscillator tuning											
C-157	CAPACITOR, fixed: ceramic dielectric; JAN type #CC30UK680J (p/o Z-117)	Crystal oscillator tuning	CC30UK-680J	N16-C-16789-1562 (3D9068-27)		JAN-C-20A	C-157	1					
C-158	CAPACITOR: Same as C-102 (p/o Z-117)	Crystal oscillator tuning											
C-159	CAPACITOR: Same as C-145 (p/o L-124, used in Z-111)	Spurious filter tuning											
C-160	Not used												
C-161	CAPACITOR, fixed: mica; 200 mmf p/m 2%; 500 vdcw; temp coef letter D; 1/2" lg x 9/32" wd x 11/64" d; molded phenolic case; 2 axial wire leads; mts by leads (p/o Z-117)	Crystal oscillator tuning		N16-C-29260-1376 (3D9200-109)	Electro Motive type #605	912 0514 00	C-160	1			1		10

C-162	CAPACITOR: Same as C-102 (p/o Z-117)	Crystal oscillator tuning											
C-163	CAPACITOR: Same as C-114 (p/o Z-117)	V-105 plate isolation											
C-164	CAPACITOR: Same as C-114 (p/o Z-117)	V-105 screen isolation											
C-165	CAPACITOR: Same as C-151 (p/o Z-117)	Oscillator feedback											
C-166	CAPACITOR: Same as C-113 (p/o Z-117)	Oscillator feedback network											
C-167	CAPACITOR, variable: ceramic dielectric; rotary type; 3 to 12 mmf, one sect; 350 vdcw; temp coef 0 mmf/mf/°C; 19/32" lg x 17/32" wd x 3/4" h; solder lug term; two 0.120" diam mtg holes in base 5/16" c to c; scdr slot adj; low loss laminated phenolic insulation (p/o Z-117)	Oscillator trimming		N16-C-63934-2551 (3D9012V-25)	Erie type #557	917 1035 00	C-167	1			1		
C-168	CAPACITOR: Same as C-105	Converter grid trap											
C-169	CAPACITOR: Same as C-110	Calibration adjustment											
C-170	CAPACITOR: Same as C-114	V-104 cathode insolation											

PARTS								SPARE PARTS				
									EQUIPMENT		STOCK	
SYMBOL DESIG.	NAME OF PART AND DESCRIPTION	FUNCTION	JAN AND (NAVY TYPE) NO.	STANDARD NAVY & (SIGNAL CORPS) STOCK NO.	MFGR. AND MFGR'S. DESIG-NATION	CONTRACTOR DRAWING & PART NO.	ALL SYMBOL DESIG. INVOLVED	NO. USED IN EQUIPMENT	ITEM NUMBER	BOX	QUAN.	BOX	QUAN.
C-171	CAPACITOR: Same as C-113	V-104 screen bypass											
C-172	CAPACITOR: Same as C-114	V-104 plate isolation											
C-173	CAPACITOR, fixed: ceramic dielectric; JAN type #CC30CK100F	V-104 plate coupling	CC30CK-100F	N16-C-15921-6262 (3D9010-180)		JAN-C-20A	C-173, C-187, C-237	3					
C-174	CAPACITOR: Same as C-102 (p/o Z-114)	L-116 trimming											
C-175	CAPACITOR, fixed: mica dielectric; 180 mmf p/m 2%; 500 vdcw; temp coef letter D; 1/2" lg x 9/32" wd x 11/64" d; molded phenolic case; 2 axial wire leads; mts by leads (p/o Z-114)	L-117 padding		N16-C-29128-2301 (3D9180-38)	Electro Motive type #605	912 0511 00	C-175, C-179	2			1		10
C-176	CAPACITOR: Same as C-102 (p/o Z-114)	L-117 trimming											
C-177	CAPACITOR, fixed: mica dielectric; 300 mmf p/m 2%; 500 vdcw; temp coef letter D; 1/2" lg x 9/32" wd x 11/64" d; molded phenolic case; 2 axial wire leads; mts by leads; (p/o Z-114)	L-117 padding		N16-C-29655-7383 (3D9300-69	Electro Motive type #605	912 0526 00	C-177, C-181	2			1		10

C-178	CAPACITOR: Same as C-114 (p/o Z-114)	V-103 plate isolation												
C-179	CAPACITOR: Same as C-175 (p/o Z-114)	L-118 padding												
C-180	CAPACITOR: Same as C-102 (p/o Z-114)	L-118 trimming												
C-181	CAPACITOR: Same as C-177 (p/o Z-114)	L-119 padding												
C-182	CAPACITOR: Same as C-102 (p/o Z-114)	L-119 trimming												
C-183	CAPACITOR: Same as C-114 (p/o Z-114)	V-106 cathode isolation												
C-184	CAPACITOR: Same as C-113	V-106 grid bypass												
C-185	CAPACITOR: Same as C-114 (p/o Z-114)	V-106 screen isolation												
C-186	CAPACITOR: Same as C-114	V-106 plate isolation												
C-187	CAPACITOR: Same as C-173 (p/o Z-113)	Filter crystal parallel												
C-188	CAPACITOR, variable: air; single sect, plate meshing type; 3.5-27 mmf; SLC characteristic; 0.030" air gap; 1-19/64" lg excluding shaft x 1-3/8" wd x 1-3/8" d, .250" diam	Crystal filter phasing capacitor		N16-C-62233-1001 (3D9027 V-6)	Johnson EF, type #LA (167)	922 0079 00	C-188	1						

PARTS									SPARE PARTS				
										EQUIPMENT		STOCK	
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C-188	(Cont.) shaft x 7/16" lg beyond bushing, bushing 3/8"-32 NEF-2 x 3/8" lg; scdr adj; 10 plates; 180 deg clockwise rotation; steatite insulation; solder lug term; two #6-32 NC-2 mtg holes on front, 1-3/32" c to c (p/o Z-113)												
C-189	CAPACITOR: Same as C-114	V-107 Avc isolation											
C-190	CAPACITOR: Same as C-114	V-107 screen isolation											
C-191	CAPACITOR: Same as C-114	V-107 plate isolation											
C-192	CAPACITOR: Same as C-111	T-103 top coupling											
C-193	CAPACITOR: Same as C-114	V-108 Avc isolation											
C-194	CAPACITOR: Same as C-114	V-108 screen isolation											
C-195	CAPACITOR: Same as C-114	V-108 plate isolation											

C-196	CAPACITOR: Same as C-111	T-104 top coupling													
C-197	CAPACITOR: Same as C-114	V-109 Avc isolation													
C-198 AB	CAPACITOR, fixed: paper dielectric; JAN type #CP54B4FF104V	V-109 cathode (A section) V-109 filament (B section)	CP54B4 FF-104V	N16-C-53204-4121 (3DA 100-111)		JAN-C-25	C-198 AB	1							
C-199	CAPACITOR: Same as C-114	V-109 screen isolation													
C-200	CAPACITOR: Same as C-114	V-109 plate isolation													
C-201	CAPACITOR: Same as C-111	T-105 top coupling													
C-202	CAPACITOR, fixed: mica; 330 mmf p/m 2%; 500 vdcw; temp coef letter D; 1/2" lg x 9/32" wd x 11/64" d; molded phenolic case; 2 axial wire leads; mts by leads	Diode load bypass		N16-C-29708-5101 (3D9330-27)	Electro Motive, type #605	912 0529 00	C-202	1							
C-203	Not used														
C-204	CAPACITOR: Same as C-113	Avc rectifier coupling													
C-205 ABC	CAPACITOR, fixed: paper dielectric; JAN type #CP54B5FF104V	Neg bypass (A section) Avc time constant (B section)	CP54B5FF 104V	N16-C-54460-4463 (3DA 100-		JAN-C-25	C-205 ABC	1							

PARTS								SPARE PARTS				
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SYMBOL DESIG.	NAME OF PART AND DESCRIPTION	FUNCTION	JAN AND (NAVY TYPE) NO.	STANDARD NAVY & (SIGNAL CORPS) STOCK NO.	MFGR. AND MFGR'S. DESIG-NATION	CONTRACTOR DRAWING & PART NO.	ALL SYMBOL DESIG. INVOLVED	NO. USED IN EQUIPMENT	ITEM NUMBER	BOX	QUAN.	BOX	QUAN.
C-205 ABC	(Cont.)	Noise limiter filter (C section)		804)									
C-206	CAPACITOR, fixed: mica; 5 mmf p/m 10%; 500 vdcw; temp coef letter D; 1/2" lg x 9/32" wd x 11/64" d; molded phenolic case; two 1-1/2" lg axial wire lead term	Bfo coupling		N16-C-15953-6532 (3D9012-72)	Electro Motive type #605	912 0429 00	C-206	1					
C-207	CAPACITOR: Same as C-114	Avc amp feed-back											
C-208	CAPACITOR: Same as C-114	Avc amp feed-back											
C-209	CAPACITOR: Same as C-114 (p/o Z-118)	Audio coupling											
C-210	Not used												
C-211	CAPACITOR: Same as C-114	Audio coupling											
C-212	CAPACITOR, fixed: mica; JAN type #CM35B682K	Audio output equalizer	CM35B682K	N16-C-33068-5823 (3K3568221)		JAN-C-5	C-212	1					

C-213	CAPACITOR: Same as C-114	Avc bypass						JAN-C-25	C-214	1						
C-214 AB	CAPACITOR, fixed: paper dielectric; JAN type #CP53B4FF104V	B plus relay (A section) B plus by-pass (B section)	CP53B4 FF-104V	N16-C-53204-4100 (3DA 100-987)				JAN-C-25	C-214	1						
C-215	CAPACITOR, fixed: electrolytic dielectric JAN type #CE63B200J	V-111 cathode filter	CE63B-200J	N16-C-19713-8751 (3DB20-117)				JAN-C-62	C-215, C-216	2						
C-216	CAPACITOR: Same as C-215	Negative voltage filter														
C-217	CAPACITOR; fixed: electroytic dielectric JAN type #CE52F350R	Power supply filter	CE52F-350R	N16-C-21944-3540 (3DB35-3)				JAN-C-62	C-217	1						
C-218	CAPACITOR: Same as C-114	V-114 screen isolation														
C-219	CAPACITOR: Same as C-114	V-114 plate isolation														
C-220	CAPACITOR, fixed: ceramic dielectric; JAN type #CC30CK040C (p/o Z-114)	Variable i-f top coupling	CC30CK-040C	N16-C-15560-5855 (3D9004-25)				JAN-C-20A	C-220	1						
C-221	CAPACITOR: Same as C-111 (p/o Z-114)	Variable i-f top coupling														

PARTS								SPARE PARTS				
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C-222	Not used												
C-223	CAPACITOR, fixed: electrolytic dielectric JAN type #CE63B080P	B plus isolation	CE63B-080P	N16-C-19542-3282 (3DB8-222)		JAN-C-62	C-223	1					
C-224	CAPACITOR, variable: air dielectric; single sect, plate meshing type; 7-100 mmf; SLC characteristic; 0.015" air gap; 1-19/32" lg excluding shaft x 15/16" wd x 1-7/32" h, .250" diam shaft x 27/32" lg; ext shaft adj; 27 plates; 180 deg clockwise rotation; steatite insulation; solder lug term; two #4-40 NC-2 mtg holes on front, 21/32" c to c	Calibrate adjustment		N16-C-60692-9641 (3D9100 V-85)	Hammerlund to Collins Rad spec #922 0153 00	922 0153 00	C-224, C-230	2					6
C-225	Not used												
C-226	CAPACITOR: Same as C-113	V-111 voltage divider											
C-227	CAPACITOR: Same as C-114	I-f output											
C-228	CAPACITOR: Same as C-114	I-f output											
C-229	Not used												

C-230	CAPACITOR: Same as C-224	Antenna trimmer														
C-231	CAPACITOR; fixed: ceramic dielectric; JAN type #CC30UJ101J	Band 9 antenna coupling	CC30UJ-101J	N16-C-17077-1226 (3D9100-230)			JAN-C-20A	C-231, C-233	2							
C-232	CAPACITOR, fixed: ceramic dielectric; JAN type #CC30CK240J	Band 16-30 antenna coupling	CC30CK-240J	N16-C-16177-6532 (3D9024-56)			JAN-C-20A	C-232	1							
C-233	CAPACITOR: Same as C-231	Band 1 antenna coupling														
C-234	CAPACITOR, fixed: ceramic dielectric; JAN type #CC30UK510J	Band 2 antenna coupling	CC30UK-510J	N16-C-16597-1562 (3D9051-68)			JAN-C-20A	C-234	1							
C-235	CAPACITOR: Same as C-153	Band 3 antenna coupling														
C-236	CAPACITOR, fixed: ceramic dielectric; JAN type #CC30CK220J	Band 7 antenna coupling	CC30CK-220J	N16-C-16145-6530 (3D9022-57)			JAN-C-20A	C-236	1							
C-237	CAPACITOR: Same as C-173	Band 9 antenna coupling														

PARTS								SPARE PARTS				
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C-238	CAPACITOR, fixed: ceramic dielectric; JAN type #CC30CK050D	Band 16-30 antenna coupling	CC-30CK-050D	N16-C-15628-1344 (3D900 5-121)		JAN-C-20A	C-238	1					
	RECTIFIER												
CR-101	RECTIFIER, metallic: selenium; input 12.5 v AC, 1 to 5000 cycles, single ph; output 6.28 v DC, 64 ma max, full wave; cylindrical, 11/16" lg x 1/2" diam; one #6-32 NC-2 mtg stud 3/8" lg; four wire lead term; p/o Army-Navy Radio Receiver R-388/URR (p/o Z-112)	Meter M-101 recitifier		N17-R-50980-7301 (3H470 2)	Conant Elec, type M-2	353 3000 00	CR-101	1			1		
	ELECTRICAL PARTS												
E-001	SHIELD, tube: steel, cad pl w/ chromate dip (Iridite); cylindrical, open top; bayonet mtg; 0.810" ID x 1-3/4" lg inside; spring inside; (p/o Z-101)	Tube shield for V-001		N16-S-34557-8348 (2Z830 4.303)	Collins Rad part/dwg #505 2132 001	505 2132 001	E-001, E-002, E-109, E-110, E-111, E-112, E-113, E-114, E-115, E-116	10					

E-002	SHIELD: Same as E-001 (p/o Z-101)	Tube shield for V-002												
E-003	CORE, adjustable tuning for osc coil L-001; follower arm and core screwed onto lead screw and held in place by load nut w/ spring; powdered iron core, SS lead screw; 5.106" lg x 1.172" wd x 1.297" h o/a; shaft mtd (p/o Z-101, within sealed enclosure) Listed for reference only.	Adjustable tuning core for L-001		N16-C-600701-167 (2Z32 62-84)	Collins Rad part/ dwg #505 0409 003	505 0409 003	E-003	1						
E-004	INSULATOR, feedthru: round; glass insulation, electro-tin CRS disc; 51/64" lg; 1500 v term wire to gnd; disc .296" diam, insulator .182" diam, .062" diam wire w/ tab attached to insulator at ea end w/ .090" diam hole in ea (p/o Z-101, within sealed enclosure) Listed for reference only	Part of Z-101		N17-I-59417-6588 (2G290-43)	Fusite Corp catalog #106-FP	306 0060 00	E-004, E-005	2						
E-005	INSULATOR: Same as E-004, (p/o Z-101, within sealed enclosure)	Part of Z-101												
E-006	CLIP: angular gnd spring; gnds lead screw shaft; beryllium copper, ternary pl (copper, tin and zinc); 0.0159" thk, 49/64" lg x 5/32" wd x 1/4" h o/a; one beryllium copper cont; two 0.096" diam mtg holes spaced 0.250" c to c	Gnds lead screw shaft		N17-C-805485-131 (2Z2712.321)	Collins Rad part/dwg #505 9472 001	505 9472 001	E-006	1						

PARTS								NO. USED IN EQUIPMENT	SPARE PARTS				
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SYMBOL DESIG.	NAME OF PART AND DESCRIPTION	FUNCTION	JAN AND (NAVY TYPE) NO.	STANDARD NAVY & (SIGNAL CORPS) STOCK NO.	MFGR. AND MFGR'S. DESIGNATION	CONTRACTOR DRAWING & PART NO.	ALL SYMBOL DESIG. INVOLVED		ITEM NUMBER	BOX	QUAN.	BOX	QUAN.
E-101	BOARD, terminal: general purpose; 3 brass solder lug term, 3 cad pl steel screws; term 7/16" between centers; bakelite board; 2-1/8" lg x 5/8" wd x 11/16" h o/a, two 0.136" diam mtg holes	K-101 terminal board		*N17-B-77586-3917 (3Z770-3.44)	Cinch to Collins Rad spec #306 0158 00	306 0158 00	E-101, E-102	2					
E-102	BOARD: Same as E-101	Audio output terminal board											
E-103	INSULATOR, standoff: round post shape; natural bakelite; 0.750" lg; 3/8" OD, tapped #6-32 NC-2 x 1/2" d ea end	p/o Audio meter board assembly		*N17-I-69158-6701 (3G350-119)	Collins Rad part/dwg #500 8923 001	500 8923 001	E-103	1					
E-104	SHIELD, tube: CRS, cad pl w/ chromate dip (Iridite); cylindrical; bayonet mtg; 0.950" ID x 1-15/16" lg inside SS spring inside	Tube shield for V-110		N16-S-34576-6507 (2Z83-04.304)	Collins Rad part/dwg #505 2130 001	505 2130 001	E-104, E-105, E-106	3					
E-105	SHIELD: Same as E-104	Tube shield for V-111											
E-106	SHIELD: Same as E-104	Tube shield for V-112											

E-107	SHIELD; tube: steel, cad pl w/ Chromate dip (Iridite); cylindrical open top; bayonet mtg; 0.810" ID x 1-3/8" lg inside; spring inside	Tube shield for V-101		N16-S-34520-3868 (2Z83 04.305)	Collins Rad part/dwg #505 2131 001	505 2131 001	E-107, E-108	2	
E-108	SHIELD: Same as E-107	Tube shield for V-102							
E-109	SHIELD: Same as E-001	Tube shield for V-103							
E-110	SHIELD: Same as E-001	Tube shield for V-104							
E-111	SHIELD: Same as E-001	Tube shield for V-105							
E-112	SHIELD: Same as E-001	Tube shield for V-106							
E-113	SHIELD: Same as E-001	Tube shield for V-107							
E-114	SHIELD: Same as E-001	Tube shield for V-108							
E-115	SHIELD: Same as E-001	Tube shield for V-109							
E-116	SHIELD: Same as E-001	Tube shield for V-114							

*Not furnished as a maintenance part. If failure occurs, do not request replacement unless the item cannot be repaired or fabricated.

PARTS								NO. USED IN EQUIPMENT	SPARE PARTS				
										EQUIPMENT		STOCK	
SYMBOL DESIG.	NAME OF PART AND DESCRIPTION	FUNCTION	JAN AND (NAVY TYPE) NO.	STANDARD NAVY & (SIGNAL CORPS) STOCK NO.	MFGR. AND MFGR'S. DESIG-NATION	CONTRACTOR DRAWING & PART NO.	ALL SYMBOL DESIG. INVOLVED		ITEM NUMBER	BOX	QUAN.	BOX	QUAN.
E-117	SHIELD, tube: brass; cylindrical; bayonet mtg; 13/16" ID x 2-1/4" lg inside; w/ ventilating slots	Tube shield for V-113		*N16-S-39607-8711 (2Z8304.237)	Cinch to Collins Rad spec #141 0137 00	141 0137 00	E-117, E-173	2					
E-118	TERMINAL, stud: molded melamine body, terminal brass, tin dipped, insert, brass, cad pl; round post shaped; 9/16" lg o/a; 3/8" lg less term, 1/4" diam; #4-40 NC-2 tapped 3/16" d one end, slotted solder lug other end	Mounting for R-102		N17-T-28228-3181 (3Z1210 1-9.3)	Whitso Inc. type #103-A-2	306 0091 00	E-118, E-119, E-120, E-121, E-122, E-123, E-124, E-125, E-126, E-127, E-128, E-129, E-130, E-131, E-132, E-133, E-134, E-135, E-136	19					
E-119	TERMINAL: Same as E-118	Mounting for C-111											

E-120	TERMINAL: Same as E-118	Mounting for R-102
E-121	TERMINAL: Same as E-118	Mounting for R-106
E-122	TERMINAL: Same as E-118	Mounting for R-106
E-123	TERMINAL: Same as E-118	Mounting for R-122
E-124	TERMINAL: Same as E-118	Mounting for R-122
E-125	TERMINAL: Same as E-118	Tie point for coaxial shield grounded (lead from C-224)
E-126	TERMINAL: Same as E-118	Mounting for R-119
E-127	TERMINAL: Same as E-118	Mounting for C-173
E-128	TERMINAL: Same as E-118	Mounting for C-136
E-129	TERMINAL: Same as E-118	Mounting for L-125, C-168

*Not furnished as a maintenance part. If failure occurs, do not request replacement unless the item cannot be repaired or fabricated.

PARTS									SPARE PARTS				
										EQUIPMENT		STOCK	
SYMBOL DESIG.	NAME OF PART AND DESCRIPTION	FUNCTION	JAN AND (NAVY TYPE) NO.	STANDARD NAVY & (SIGNAL CORPS) STOCK NO.	MFGR. AND MFGR'S. DESIG-NATION	CONTRACTOR DRAWING & PART NO.	ALL SYMBOL DESIG. INVOLVED	NO. USED IN EQUIPMENT	ITEM NUMBER	BOX	QUAN.	BOX	QUAN.
E-130	TERMINAL: Same as E-118	Mounting for R-157											
E-131	TERMINAL: Same as E-118	Mounting for R-160, R-161, R-162, C-219											
E-132	TERMINAL: Same as E-118	Mounting for R-147, C-226											
E-133	TERMINAL: Same as E-118	Mounting for R-167, C-208											
E-134	TERMINAL: Same as E-118	Mounting for R-144, R-171											
E-135	TERMINAL: Same as E-118	Mounting for R-150, R-152											
E-136	TERMINAL: Same as E-118	Mounting for R-152, R-153											

E-137 thru E-141	Not used											
E-142	CORE, adjustable tuning: u/w coil for permeability tuning; p/o Army-Navy Receiver R-388/URR; c/o core and #8-32 slotted stud (soldered assem); ceramag core, rust proofed, cad pl brass stud; irregular shape; 4-9/16" lg o/a, 0.255" diam core; slides into coil form;	u/w L-101		N16-C-600701-143 (2Z3262-44)	Collins Rad part/dwg #504 3000 001	504 3000 001	E-142, E-143	2		1		8
E-143	CORE: Same as E-142	u/w L-110										
E-144	CORE; adjustable tuning: u/w coil for permeability tuning; p/o Army-Navy Radio Receiver R-388/URR; c/o core and #8-32 slotted stud (soldered assem); powdered iron core, cad pl brass stud; irregular shape; 3-7/16" lg x 0.25" diam core; slides into coil form	u/w L-102		N16-C-600701-142 (2Z3262-45)	Collins Rad part/dwg #504 3002 001	504 3002 001	E-144, E-145, E-146, E-147, E-148	5		1		10
E-145	CORE: Same as E-144	u/w L-103										
E-146	CORE: Same as E-144	u/w L-114										
E-147	CORE: Same as E-144	u/w L-116										
E-148	CORE: Same as E-144	u/w L-118										
E-149	CORE, adjustable tuning: u/w coil for permeability tuning; p/o Army-Navy Radio Receiver R-388/URR; c/o core and #8-32 slotted stud (soldered assem); powdered iron (Cont.)	u/w L-104		N16-C-600701-141 (2Z3262-46)	Collins Rad part/dwg #504 3003 001	504 3003 001	E-149, E-150, E-151, E-152 E-153,	9		1		12

PARTS								NO. USED IN EQUIPMENT	SPARE PARTS				
										EQUIPMENT		STOCK	
SYMBOL DESIG.	NAME OF PART AND DESCRIPTION	FUNCTION	JAN AND (NAVY TYPE) NO.	STANDARD NAVY & (SIGNAL CORPS) STOCK NO.	MFGR. AND MFGR'S. DESIG-NATION	CONTRACTOR DRAWING & PART NO.	ALL SYMBOL DESIG. INVOLVED		ITEM NUMBER	BOX	QUAN.	BOX	QUAN.
E-149	(Cont.) core, cad pl brass stud; irregular shape; 3-13/16" lg o/a x 0.256" diam core; slides into coil form						E-154, E-155, E-156, E-157						
E-150	CORE: Same as E-149	u/w L-105											
E-151	CORE: Same as E-149	u/w L-106											
E-152	CORE: Same as E-149	u/w L-107											
E-153	CORE: Same as E-149	u/w L-108											
E-154	CORE: Same as E-149	u/w L-109											
E-155	CORE: Same as E-149	u/w L-111											
E-156	CORE: Same as E-149	u/w L-112											
E-157	CORE: Same as E-149	u/w L-113											
E-158	KNOB: round; black phenolic; for 1/4" diam shaft; two #8-32 tapped holes for set screws; indicator mark filled white; 1-1/8" diam x 13/16" lg o/a; 11/16" d shaft hole; 1-1/2" diam skirt	Selectivity (crystal filter)		N16-K-700350-449 (2Z582 2-485)	Harry Davies Mold catalog #4104F	281 0004 00	E-158, E-159, E-160, E-161, E-162, E-163, E-164	7					

E-159	KNOB: Same as E-158	Phasing (crystal filter)											
E-160	KNOB: Same as E-158	Bfo OFF-ON											
E-161	KNOB: Same as E-158	Bfo pitch											
E-162	KNOB: Same as E-158	Calibrate OFF-ON											
E-163	KNOB: Same as E-158	Avc OFF-ON											
E-164	KNOB: Same as E-158	Limiter OUT-IN											
E-165	KNOB: round; black phenolic; for .253" diam shaft; two #8-32 tapped holes for set screws; 1-3/4" diam skirt; 1-3/8" diam x 7/8" lg o/a; brass; 23/32" d shaft hole; indicator mark filled white.	OFF stand-by ON		N16-K-700374-895 (2Z58 22-715)	Harry Davies Mold to Collins Rad spec #281 0007 00	281 0007 00	E-165, E-166, E-167	3					
E-166	KNOB: Same as E-165	R-f gain											
E-167	KNOB: Same as E-165	Audio gain											
E-168	KNOB: round, tapered; black phenolic; for 1/4" diam shaft; one #8-32 tapped hole for set screw; 11/16" diam x 13/32" lg o/a; 11/32" d shaft hole; surface knurled	Control		N16-K-700271-547 (2Z582 1-4)	Harry Davies Mold Catalog #1450	281 0050 00	E-168	1					

PARTS									SPARE PARTS				
										EQUIPMENT		STOCK	
SYMBOL DESIG.	NAME OF PART AND DESCRIPTION	FUNCTION	JAN AND (NAVY TYPE) NO.	STANDARD NAVY & (SIGNAL CORPS) STOCK NO.	MFGR. AND MFGR'S. DESIG-NATION	CONTRACTOR DRAWING & PART NO.	ALL SYMBOL DESIG. INVOLVED	NO. USED IN EQUIPMENT	ITEM NUMBER	BOX	QUAN.	BOX	QUAN.
E-169	KNOB: round; black phenolic; for 1/4" diam shaft; two #8-32 tapped holes for set screws; indicator mark (not filled); 2-3/8" diam x 1-1/32" lg o/a; 3/4" d shaft hole; 3" diam skirt	Band change		N16-K-700439-401 (2Z5822-484)	Harry Davies Mold catalog #4109-F	281 0012 00	E-169, E-170	2					
E-170	KNOB: Same as E-169	Kilocycle tuning											
E-171	KNOB: round, w/ pointer; black phenolic; for 1/4" diam shaft; one #8-32 NC-2 set screw; 27/32" lg x 11/16" wd x 13/32" h; 11/32" d shaft hole	Control		N16-K-700271-542 (2Z582 2-365)	Harry Davies Mold catalog #1400	281 0069 00	E-171	1					
E-172	CORE, adjustable tuning: coil tuner; p/o Army-Navy Radio Receiver R-388/URR; powdered iron core w/ brass cad pl stud; freq max 12 mc; 1.187" lg x .242" diam; fits inside coil	p/o Coil assembly, filter		N16-C-600701-168 (2Z32 62-61)	Aladdin Collins Rad spec #288 1062 00	288 1062 00	E-172	1			1		5
E-173	SHIELD: Same as E-117	Tube shield for V-116											

E-174	TUNER, RF: slug rack assembly; c/o front and rear panels, 3 slug table assemblies, 6 rack spring, 4 gear loading spring, retainer ring, 6 brass, heart shaped cams, 3 cam shafts, 2 SS stationary gears, 2 SS loaded gears, 4 brass gears; 9" lg x 3-7/32" wd x 6-1/2" d approx o/a; mtd by two #6-32 spade bolts located on bottom of panel 5-7/8" c to c (incl O-111, O-112, O-114, O-115, O-116, O-117, O-119, O-120, O-121, O-122, O-123, O-124)	Slug rack assembly		*N16-D-901161-142 (2Z111529)	Collins Rad part/dwg #504 5635 004	504 5635 004	E-174	1			
	FUSE										
F-101	FUSE, cartridge: not tp type; 1.5 amp; 250 v; one time glass body; ferrule term; non-indicating; 1-1/4" lg x 1/4" diam 1/4" lg x 1/4" diam term	Circuit protection		N17-F-16320-100 (3Z2601.43)	Littelfuse type 3AG, #13101.5	264 0007 00	F-101	2		4	
	HARDWARE										
H-001 (qty 1)	NUT, hexagon: brass, nickel pl; #4-40 NC-2; 3/32" thk; width across flats 1/4"; double cham (p/o Z-101) Listed for reference only	Secures TB-001 to XV-001/XV-002		N43-N-4743-545 (6L3104-40.4)	Pheoll Mfg. Co (Comm.)	313 0051 00	H-001, H-122	38			

*Not furnished as a maintenance part. If failure occurs, do not request replacement unless the item cannot be repaired or fabricated.

PARTS								NO. USED IN EQUIPMENT	SPARE PARTS				
										EQUIPMENT		STOCK	
SYMBOL DESIG.	NAME OF PART AND DESCRIPTION	FUNCTION	JAN AND (NAVY TYPE) NO.	STANDARD NAVY & (SIGNAL CORPS) STOCK NO.	MFGR. AND MFGR'S. DESIG-NATION	CONTRACTOR DRAWING & PART NO.	ALL SYMBOL DESIG. INVOLVED		ITEM NUMBER	BOX	QUAN.	BOX	QUAN.
H-002	NUT, lock: special for powdered iron core; brass, cad pl; #6-32 inside thd; 1/8" thk; round; slot, .034" wd x .040" d across top of nut (p/o Z-101, within sealed enclosure) Listed for reference only	Locks core adjustment in trimmer coil		N17-N-88745-2001 (6L340 6-32-3)	Bell Telephone Lab #ES-690318 -6	330 0039 00	H-002	1					
H-003 (qty 3)	SCREW, machine: Phillips drive; recessed pan head, unfinished, cold headed; brass, nickel pl; #4-40 NC-2; 5/16" lg; threaded to head; head .219" diam x .080" thk (p/o Z-101, within sealed enclosure) Listed for reference only	Mount L-001 on A-003		N43-S-57800-1950 (6L644 0-5.9 PH)	Pheoll Mfg. Co. (Comm.)	343 0286 00	H-003, H-138	21					
H-004	SCREW, machine: Phillips drive; FH, unfinished, cold headed; steel, cad pl; #4-40 NC-2; 1/4" lg; threaded to head; .225" diam x .067" thk head (p/o Z-101) Listed for reference only	Used with H-001		N43-S-68598-4670 (6L644 0-4.47 SPH)	Pheoll Mfg. Co. (Comm.)	342 0276 00	H-004	1					
H-005	SCREW, machine: Phillips drive; recessed pan head, unfinished, cold headed; brass, nickel pl; #4-40 NC-2; 1/8" lg; threaded to head; head .219" diam x .080" thk (p/o Z-101) Listed for reference only	Secures E-006 to A-005		N43-S-57800-1735 (6L6440-2.20PH)	Pheoll Mfg. Co. (Comm.)	343 0283 00	H-005	1					

H-006 (qty 5)	SCREW, machine: Phillips drive, recessed pan head, unfinished, cold headed; brass, nickel pl; #4-40 NC-2; 3/16" lg; threaded to head; head .219" diam x .080" thk (H-006 qty 2 p/o Z-101, within sealed enclosure) Listed for reference only	(2) Secure H-018 standoff supports to A-001 (2) Secure A-005 to TB-001 (1) Secure 0.-007 to A-001		N43-S-6975-275 (6L6440-3.9 PH)	Pheoll Mfg. Co. (Comm.)	343 0284 00	H-006, H-136	27					
H-007	SCREW, machine: Phillips drive; recessed pan head, unfinished, cold headed; steel, cad pl; #4-40 NC-2; 3/16" lg; threaded to head; (p/o Z-101, within sealed enclosure) Listed for reference only	Secure A-004 to A-003		N43-S-6975-295 (6L6440-4.9 PH)	Pheoll Mfg. Co. (Comm.)	343 0416 00	H-007	3					
H-008 (qty 2)	SCREW, machine: phillips drive; recessed pan head, unfinished, cold headed; steel, cad pl; #6-32 NC-2; 3/16" lg; threaded to head; .270" thk x .097" diam head (p/o Z-101) Listed for reference only	Secure XV-001/ XV-002 to A-003		N43-S-68597-7575 (6L6632-3.8 SPH)	Pheoll Mfg. Co (Comm.	343 0487 00	H-008	2					
H-009	WASHER, lock: cad pl; steel; csk, 7/32" OD, .016" thk; shakeproof type, tw ext teeth; for #4 screw (p/o Z-101) Listed for reference only	Used with H-001		N43-W-6801-410 (6L72504)	Shake-proof #1504	373 0051 00	H-009	1					
H-010 (qty 9)	WASHER, lock: cad pl; phosphor bronze; round 9/32" OD, .018" thk; shakeproof type, tw ext teeth; for #4 screw (H-010 qty 2 p/o Z-101, within sealed enclosure) Listed for reference only	Used with H-001, H-006, H-007		N43-W-5740-2790 (6L72804-3)	Shake-proof #1804-0(	373 7010 00	H-010, H-151	131					

TABLE 8-4 COMBINED PARTS AND SPARE PARTS LIST

MAJOR ASSEMBLY: RECEIVER R-388/URR

PARTS									SPARE PARTS				
										EQUIPMENT		STOCK	
SYMBOL DESIG.	NAME OF PART AND DESCRIPTION	FUNCTION	JAN AND (NAVY TYPE) NO.	STANDARD NAVY & (SIGNAL CORPS) STOCK NO.	MFGR. AND MFGR'S. DESIG-NATION	CONTRACTOR DRAWING & PART NO.	ALL SYMBOL DESIG. INVOLVED	NO. USED IN EQUIPMENT	ITEM NUMBER	BOX	QUAN.	BOX	QUAN.
H-011	PLUG, machine thread: SS type 303; hex; 1/4" hex x .285" thk x .144" ID drilled hole; threaded 1/4"-28 NF-2 for mtg (p/o Z-101, within sealed enclosure)	Cap seal for L-002 trimmer adjustment		*N17-P-60940-5501 (6Z7598-12)	Collins Rad part/dwg #504 6540 001	504 6540 001	H-011	1					
H-012 (qty 1)	SCREW, machine: Phillips drive; recessed pan head, unfinished, cold headed; brass, nickel pl; #6-32 NC-2; 1/4" lg; threaded to head; head .270" diam x .097" thk (p/o Z-101) Listed for reference only	Secures A-005 to H-019		N43-S-6975-525 (6L6632-4.9PH)	Pheoll Mfg. Co. (Comm.)	343 0328 00	H-012, H-142	16					
H-013	SCREW, machine: Phillips drive; recessed pan head, unfinished, cold headed; brass, nickel pl; #2-56 NC-2; 3/16" lg; threaded to head; head .167" diam x .062" thk (p/o Z-101, within sealed enclosure) Listed for reference only	Secures O-007 to A-003		N43-S-6975-75 (6L6256-3.9 PH)	Pheoll Mfg. Co. (Comm.)	343 0298 00	H-013	1					
H-014	WASHER, lock: phosphor bronze, cad pl; round, 3/16" OD, 0.012" thk; shakeproof type; tw int teeth; for #2 screw (p/o Z-101, within sealed enclosure) Listed for reference only	Used with H-013		N43-W-5741-7616 (6L72902-2)	Shake-proof catalog #1902-00	373 3120 00	H-014	1					

H-015 (qty 3)	WASHER, lock: cad pl phosphor bronze; round, 5/16" OD, .018" thk; shakeproof type, tw int teeth; for #6 screw (p/o Z-101) Listed for reference only	Used with H-012, H-008	N43-W-5740-2895 (6L72806)	Shake-proof catalog #1806-00	373 7020 00	H-015, H-152	49	
H-016	WASHER, flat: brass; round, .190" ID x 3/8" OD x .005" thk (p/o Z-101, within sealed enclosure)	Set loading on O-004	N43-W-2988-67 (6L50103-27)	Collins Rad part/dwg #502 1146 002	502 1146 002	H-016	2	
H-017	Not used							
H-018	POST, spacing: 17S-74 aluminum, bright dip finish; hex; 3.468" lg o/a x 1/4" hex; threaded #6-32 NC-2 one end and tapped #4-40 NC-2, 5/32" d one end for mtg (p/o Z-101, within sealed enclosure	Space support A-001 to A-003	N17-P-70038-6984 (2Z9259-228)	Collins Rad part/dwg #504 6538 001	504 6538 001	H-018	2	
H-019	POST, spacing: brass; hex; 1.124" lg o/a x 1/4" hex; thread #6-32 NC-2 one end and tapped #6-32 NC-2 other end for mtg (p/o Z-101)	Space mounts A-005 to A-003	N17-P-69723-6191 (2Z7259-236)	Collins Rad part/dwg #505 2047 001	505 2047 001	H-019	1	
H-101	POINTER, indicator: sliding; brass, painted red; irregular shape; 1-1/4" lg from top of rail, 15/16" wd at bottom, .018" thk; .046" wd slot for sliding on rail	Indicator on mega-cycle drum	*N16-P-500001-145 (2Z7258.94)	J.H.Winn type Die #1899	281 0051 00	H-101	1	

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PARTS								SPARE PARTS				
									EQUIPMENT		STOCK	
SYMBOL DESIG.	NAME OF PART AND DESCRIPTION	FUNCTION	JAN AND (NAVY TYPE) NO.	STANDARD NAVY & (SIGNAL CORPS) STOCK NO.	MFGR. AND MFGR'S. DESIG-NATION	CONTRACTOR DRAWING & PART NO.	ALL SYMBOL DESIG. INVOLVED	NO. USED IN EQUIPMENT	ITEM NUMBER	BOX	QUAN.	BOX	QUAN.
H-102	CLAMP: cable; aluminum; one bolt employed, .171" diam hole, .203" diam hole; 15/16" lg x 11/16" wd; 1/4" cable; ins w/ flame resistant plastic	Clamp for coax cable		*N17-C-781117-301 (2Z2642.688)	Tinnerman Prod type #3044-1	139 0004 00	H-102	2					
H-103	CLAMP: cable; aluminum; anodized; 1 bolt employed, 11/64" diam hole; 1-1/8" lg x 11/16" wd x 11/16" h; accom 1/2" diam cable	Mounts I-104		*N17-C-781521-126 (2Z2642.689)	Tinnerman Prod type #C3044A-4-92	139 4500 00	H-103	1					
H-104	GROMMET: black Dupont nylon; fits "D" shaped hole .625" to .687" diam; .688" lg, groove wd .127", hole diam variable according to wire used	Clamp for panel cable		N17-B-801935-500 (6Z4865-1)	Heyman Mfg. Co. #SR-6P	150 0050 00	H-104	1					
H-105	GROMMET: syn rubber or neoprene; fits 5/16" diam hole; hole diam 3/16", 1/16" wd groove, 3/16" wd x 7/16" diam o/a; temp range minus 10°C to plus 80°C	Prevents abrasion		N16-G-900096-385 (6Z4895	Atlan India Rub #2286	201 0001 00	H-105	1					
H-106	GROMMET: syn rubber or neoprene; fits 7/16" diam hole; 1/4" diam hole, 1/16" wd groove, 3/16" wd x 5/8" diam o/a;	Prevents abrasion		N16-G-900133-235 (2Z8495.5)	Atlan India Rub #97	201 0002 00	H-106	3					

H-107	GROMMET: syn rubber or neoprene fits 7/8" diam hole; 5/8" diam hole, 1/16" wd groove, 3/8" wd x 1-5/16" diam o/a	Prevents abrasion		N17-G-900264-876 (6Z4910 Q-6)	Atlan India Rub (AN931-10-14)	201 0008 00	H-107	1				
H-108	GROMMET: syn rubber or neoprene; fits 13/16" diam hole; 9/16" diam hole, 3/16" wd groove, 7/16" wd x 1-1/16" diam o/a	Prevents abrasion		N16-G-900246-325 (6Z4856-53)	Atlan India Rub #2512	201 0043 00	H-108	1				
H-109	GROMMET: syn rubber or neoprene; fits 1/4" diam hole; hole diam 1/8", 1/16" wd groove, 3/16" wd x 11/32" diam o/a; 45 to 65 durometer reading	Prevents abrasion		N16-G-900077-256 (6Z49 14)	Lavelle catalog #901	201 1040 00	H-109	3				
H-110	WASHER, flat: corprene (DC-111) matl, plain finish; round 9/64" ID, 9/32" OD, 1/32" thk; fp Listed for reference only	For mounting XY-111		*N16-W-180001-166 (6L5400 2-17)	Armstrong Cork (Comm.)	302 0017 00	H-110	4				
H-111	WASHER, flat: #1 India mica; round, 9/32" ID, 5/8" OD, .050" thk; Listed for reference only	For component mounting		*N17-I-77233-1821 (3G385-72)	Wm. Brand (Comm.)	302 2200 00	H-111	6				
H-112	WASHER, flat: #1 India mica; round, 3/16" ID, 7/16" OD, .007"/.025" thk, Listed for reference only	For component mounting		*N16-W-180001-165 (6L52 403)	Mica Insulator Co. (Comm.)	302 2300 00	H-112	12				

*Not furnished as a maintenance part. If failure occurs, do not request replacement unless the item cannot be repaired or fabricated.

PARTS								SPARE PARTS				
									EQUIPMENT		STOCK	
SYMBOL DESIG.	NAME OF PART AND DESCRIPTION	FUNCTION	JAN AND (NAVY TYPE) NO.	STANDARD NAVY & (SIGNAL CORPS) STOCK NO.	MFGR. AND MFGR'S. DESIG-NATION	CONTRACTOR DRAWING & PART NO.	ALL SYMBOL DESIG. INVOLVED	NO. USED IN EQUIPMENT	ITEM NUMBER	BOX	QUAN.	BOX	QUAN.
H-113	BUTTON, plug: brass; nickel pl; for 3/8" diam hole .050" to .062" thk; 1/2" diam x 15/64" thk	Cover holes		N42-B-29981-9000 (2Z1480 .86)	United Carr #48186	308 0051 00	H-113	2					
H-114	BUTTON, plug: brass, nickel pl; fits 1/2" diam hole; 41/64" diam x 1/16" d, 7/32" lg prongs	Cover holes		N42-B-29981-5050 (2Z1480 .70)	United Car #50652	308 1000 00	H-114	1					
H-115	WASHER, flat: brass, nickel pl; round, .125" ID, .312" OD, .028" thk Listed for reference only	For compo-nent mounting		N43-W-3045-40 (6L5011 2-13)	Wrought Washer (Comm.)	310 0054 00	H-115	3					
H-116	WASHER, flat: brass; nickel pl; round, 0.147" ID, 0.375" OD, 0.032" thk Listed for reference only	For com-ponent mounting		N43-W-3045-57 (6L5011 2-20N)	Wrought Washer (Comm.)	310 0056 00	H-116	6					
H-117	WASHER, flat: brass, nickel pl; round, .172" ID, .437" OD, .036" thk Listed for reference only	For mounting final assembly		N43-W-3045-93 (6L5011 2-31)	Wrought Washer (Comm.)	310 0058 00	H-117	1					

H-118	WASHER, spring: phosphor bronze, cad pl; round 17/64" ID, 1/2" OD, .010" thk Listed for reference only	Tension in main dial shaft		N43-W-3175-2550 (6L53014-4C)	Wrought Washer (Comm.)	310 4714 00	H-118	2						
H-119	WASHER, flat: brass, cad pl; round 7/32" ID x 1/2" OD x .0641" thk Listed for reference only	Securing parts		N43-W-3170-5105 (6L50113-40)	Wrought Washer (Comm.)	310 6221 00	H-119	1						
H-120	STUD: brass, cad pl; 3/8" lg; entire portion threaded #6-32 AS-2 Listed for reference only	For mounting parts		N43-B-30001-2605 (2Z8634-67)	Pheoll Mfg. Co. (Comm.)	312 3010 00	H-120	3						
H-121	NUT, hexagon: SS, plain finish; #6-32 thd; .098" thk o/a; .250" wd across flats; .275" min wd across corners, double cham Listed for reference only	For mounting parts		N43-N-5805-9750 (6L3606-32-4-1)	Central Screw (Comm)	313 0045 00	H-121	1						
H-122 (qty 37)	NUT: Same as H-001	Securing parts												
H-123	NUT, hexagon: brass, nickel pl; #6-32 NC-2, .114" thk; 5/16" wd across flats; double cham Listed for reference only	Securing parts		N43-N-5996 (6L3106-32-5.1)	Pheoll Mfg. Co. (Comm.)	313 0053 00	H-123	61						

PARTS								SPARE PARTS				
									EQUIPMENT		STOCK	
SYMBOL DESIG.	NAME OF PART AND DESCRIPTION	FUNCTION	JAN AND (NAVY TYPE) NO.	STANDARD NAVY & (SIGNAL CORPS) STOCK NO.	MFGR. AND MFGR'S. DESIG-NATION	CONTRACTOR DRAWING & PART NO.	ALL SYMBOL DESIG. INVOLVED	NO. USED IN EQUIPMENT	ITEM NUMBER	BOX	QUAN.	BOX	QUAN.
H-124	NUT, hexagon: steel, cad pl; #10-32 NF-2 1/8" thk; wd across flats 3/8"; double cham Listed for reference only	Securing parts		N43-N-5524-68 (6L36 10-32-6.2)	Pheoll Mfg. Co. (Comm.)	313 0121 00	H-124	5					
H-125 (qty 2)	SCREW, set: Bristo multiple spline drive; multiple spline headless; hardened steel, cad pl; #6-40 NF-2 thd; 1/8" lg; cup point Listed for reference only	Attaches collar O-136		N43-S-17344-8560 (6L185 06-2.90 C2)	Bristolco (Comm.)	328 0002 00	H-125, O-1270A	7					
H-126	NUT, lock: elastic stop nut; brass, cad pl, cham corners on brg surface; #6-32 NC-2, hex, #2 fit; 11/64" thk; 5/16" across flats, .361" OD	Mounting parts		N43-N-9639-7150 (6L3656 -32-5)	Esna catalog #92M-62	333 0062 00	H-126	3					
H-127	NUT, thumb: brass, nickel pl; #6-32 NC-2; 11/32" h o/a; 21/32" wd across wings; Listed for reference only	Secure top dust cover, Y-111 clamp and V-115 clamp		N43-N-110714-120 (6L3306 -32-10)	Pheoll Mfg. Co. (Comm.)	334 0040 00	H-127	5					

H-128	NUT, hexagon: brass, nickel pl; 3/8"-32 NEF-2; 3/32" thk; 1/2" wd across flats; double cham Listed for reference only	Mounting parts		N43-N-4820-122 (6L3506-32-8.1A)	P.R. Mallory (Comm.)	334 4060 00	H-128	1					
H-129	SCREW, set: multiple spline drive; headless; normal hardness steel, cad pl; #6-40 thd; 1/8" lg oval point; four flutes Listed for reference only	Securing parts		N43-S-17692-2105 (6L18506-2.83)	Bristolco (Comm.)	335 0008 00	H-129	10					
H-130	SCREW, set: multiple spline drive; headless; alloy steel, cad pl; #8-32; 3/16" lg; oval point; alloy steel is heat treated Listed for reference only	Secures knobs and couplers		N43-S-17687-196 (6L7958-3.83)	Bristolco (Comm.)	335 0011 00	H-130	30					
H-131	SCREW, set: multiple spline drive; headless; alloy steel, cad pl; #10-32; oval point; 1/4" lg; alloy steel is heat treated Listed for reference only	Secures parts		N43-S-83799-8495 (6L18510-4.90C2)	Bristolco (Comm.)	335 0015 00	H-131	4					
H-132	SCREW, machine: Phillips drive; FH, unfinished, cold headed; SS type 430, black nickel pl; #6-32 NC-2 thd; 1/2" lg; threaded to head; .279" diam head undercut to .138", .083" thk Listed for reference only	Mounting parts		N43-S-73269-2180 (6L6632-8.7BSPH)	Pheoll Mfg. Co. (Comm.)	342 0026 00	H-132	2					
H-133	SCREW, machine: recessed drive; FH; unfinished, cold headed; SS, black nickel pl; #8-32; 1/2" lg; threaded to head Listed for reference only	Mounts front panel to end brackets		N43-S-71703-1340 (6L6832-8.7BSF)	Pheoll Mfg. Co. (Comm.)	342 0038 00	H-133	8					

PARTS									SPARE PARTS				
										EQUIPMENT		STOCK	
SYMBOL DESIG.	NAME OF PART AND DESCRIPTION	FUNCTION	JAN AND (NAVY TYPE) NO.	STANDARD NAVY & (SIGNAL CORPS) STOCK NO.	MFGR. AND MFGR'S. DESIG-NATION	CONTRACTOR DRAWING & PART NO.	ALL SYMBOL DESIG. INVOLVED	NO. USED IN EQUIPMENT	ITEM NUMBER	BOX	QUAN.	BOX	QUAN.
H-134	SCREW, machine: Phillips drive; FH unfinished, cold headed; brass, nickel pl; #4-40 NC-2; 1/2" lg; threaded to head; head .225" diam x .067" thk Listed for reference only	Mounting parts		N43-S-58060-4040 (6L6440 8.7BPH	Pheoll Mfg. Co. (Comm.)	342 0319 00	H-134	2					
H-135	SCREW, machine: Phillips drive; recessed pan head unfinished, cold headed; SS, plain finish; #4-40 NC-2 thd; 5/16" lg; threaded to head; .219" diam x .080" thk head Listed for reference only	Mounting parts		N43-S-71367-4015 (6L64 40-5.8 SPH3)	Pheoll Mfg. Co. (Comm.)	343 0134 00	H-135	19					
H-136 (qty 22)	SCREW: Same as H-006	Mounting parts											
H-137	SCREW, machine: Phillips drive; recessed pan head, unfinished, cold headed; brass, nickel pl; #4-40 NC-2; 1/4" lg; threaded to head; head .219" diam x .080" thk Listed for reference only	Mounting parts		N43-S-6975-295 (6L6440 4.9PH)	Pheoll Mfg. Co. (Comm.)	343 0285 00	H-137	71					
H-138 (qty 18)	SCREW: Same as H-003	Mounting parts											

H-139	SCREW, machine: Phillips drive; recessed pan head, unfinished; brass nickel pl; #4-40 NC-2; 5/8" lg; threaded to head; head .219" diam x .080" thk Listed for reference only	Mounting parts		N43-S-57891-1050 (6L6440-10.20PH)	Pheoll Mfg. Co (Comm.	343 0290 00	H-139	2						
H-140	SCREW, machine: Phillips drive; recessed pan head, unfinished, cold headed; brass, nickel pl; #8-32 NC-2 thd; 1/4" lg; threaded to head; .322" diam x .115" thk head Listed for reference only	Mounting parts		N43-S-57891-1985 (6L6832-4.20 PH)	Pheoll Mfg. Co (Comm.)	343 0307 00	H-140	1						
H-141	SCREW, machine: Phillips drive; recessed pan head, unfinished, cold headed; brass, nickel pl; #8-32 NC-2; 5/16" lg; threaded to head; head .322" diam x .115" thk Listed for reference only	Mounting parts		N43-S-57891-2045 (6L6832-5.20 PH)	Pheoll Mfg. Co. (Comm.)	343 0308 00	H-141	1						
H-142 (qty 15)	SCREW: Same as H-012	Securing parts												
H-143	SCREW, machine: Phillips drive; recessed pan head, unfinished, cold headed; brass, nickel pl; #6-32 NC-2; 5/16" lg; threaded to head; head .270" diam x .097" thk Listed for reference only	Mounting parts		N43-S-57821-1750 (6L6632-5.9 PH)	Pheoll Mfg. Co. (Comm.)	343 0329 00	H-143	9						
H-144	SCREW, machine: Phillips drive; recessed pan head, unfinished, cold headed; brass, nickel pl; #6-32 NC-2; 3/8" lg; threaded to head; head .273" diam x .099" thk Listed for reference only	Mounting parts		N43-S-57821-1760 (6L6632-6.20 PH)	Pheoll Mfg. Co. (Comm.)	343 0330 00	H-144	1						

PARTS								SPARE PARTS				
									EQUIPMENT		STOCK	
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H-145	SCREW, machine: Phillips drive; recessed pan head, unfinished, cold headed; brass, nickel pl; #6-32 NC-2; 1-1/2" lg; threaded to head; head .270" diam x .097" thk Listed for reference only	Mounting parts		N43-S-57891-1790 (6L6632-24.20 PH)	Pheoll Mfg. Co. (Comm.)	343 0339 00	H-145	3					
H-146	SCREW, machine: Phillips drive; recessed pan head, unfinished, cold headed; steel, cad pl; #6-32 NC-2; 1/4" lg; threaded to head; .270" diam x .097" thk head Listed for reference only	Mounting parts		N43-S-11391-6045 (6L6632-4.8SP H1)	Pheoll Mfg. Co. (Comm.)	343 0489 00	H-146	13					
H-147	SCREW, machine: Phillips drive; recessed pan head; unfinished, cold headed; steel, cad pl; #6-32 NC-2; 5/16" lg; threaded to head; head .270" diam x .097" thk Listed for reference only	Mounting parts		N43-S-68597-7580 (6L6632-5.8 SPH1)	Pheoll Mfg. Co. (Comm.)	343 0491 00	H-147	37					
H-148	SCREW, machine: Phillips drive; recessed pan head, unfinished, cold headed; steel, cad pl; #6-32 NC-2; 3/8" lg; threaded to head; head .270" diam x .097" thk Listed for reference only	Mounting parts		N43-S-11391-6060 (6L6632-6.8 SPH)	Pheoll Mfg. Co. (Comm.)	343 0493 00	H-148	2					

H-149	SCREW, machine: Phillips drive; recessed pan head, unfinished, cold headed; cad pl steel; #6-32 NC-2; 1/2" lg; threaded to head; .270" thk x .097" diam head Listed for reference only	Mounting parts		N43-S-11391-6075 (6L6632-8.8SPH)	Pheoll Mfg. Co (Comm.	343 0497 00	H-149	3						
H-150	WASHER, lock: cad pl; phosphor bronze; round 3/8" ID, 11/16" OD, .035" thk; shakeproof type, tw int teeth Listed for reference only	Securing parts		N43-W-5741-5545 (6L72920)	Shake-proof catalog #1920-00	373 3070 00	H-150	1						
H-151 (qty 122)	WASHER: Same as H-010	Securing parts												
H-152 (qty 46)	WASHER: Same as H-015	Securing parts												
H-153	WASHER, lock: type #410 SS; round, 9/32" OD, .018" thk, .112" ID; shakeproof type, tw ext teeth Listed for reference only	Securing parts		N43-W-6812-2501 (6L72604-1)	Shake-proof catalog #1604	373 8010 00	H-153	4						
H-154	WASHER, lock: type #410 SS, round, 5/16" OD, .138" ID, .018" thk; shakeproof type, tw ext teeth Listed for reference only	Securing parts		N43-W-6813-532 (6L72606)	Shake-proof catalog #1606	373 8020 00	H-154	58						
H-155	WASHER, lock: type #410 SS; round, 3/8" OD, 0.164" ID, 0.018" thk; shakeproof type, tw ext teeth Listed for reference only	Securing parts		N43-W-6813-540 (6L72608)	Shake-proof catalog #1608	373 8030 00	H-154	2						

PARTS									SPARE PARTS				
										EQUIPMENT		STOCK	
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H-156	WASHER, lock: SS; round, 13/32" OD, 0.190" ID, 0.021" thk; shake-proof type, tw ext teeth Listed for reference only	Securing parts		N43-W-6813-550 (6L72 610)	Shakeproof catalog #1610	373 8040 00	H-156	6					
H-157 (qty 1)	WASHER, flat: SS; round; .252" ID, 5/8" OD, .032" thk	p/o tension on main tuning shaft		N43-W-7702-745 (6L580 24-47)	Collins Rad part/dwg #500 1081 003	500 1081 003	H-157, O-127G	3					
H-158	POST, spacing: aluminum; cylindrical hex; 1.500" lg x 1/4" across flats; tapped ea end #4-40 NC-2 x 3/8" for mtg;	Spacer standoff		*N17-P-70019-1649 (2Z7259 -231)	Collins Rad part/ dwg #500 2800 001	500 2800 001	H-158	1					
H-159	Not used												
H-160	CLAMP: xtal; aluminum; water lacquer dipped; one 0.156" diam mtg hole; 1-1/4" lg x 1/2" wd x .064" thk less pad; for .093" diam xtal holder; incl 3/8" lg x 3/8" wd x 1/8" thk sponge rubber pad cemented to clamp	Secures 100 kc crystal		*N16-C-301603-351 (2Z2642 .359)	Collins Rad part/dwg #504 5237 001	504 5237 001	H-160	1					

H-161	POST, spacing: brass, cad pl; 1/4 hex x 4-7/32" lg o/a; one 3/8" d tapped #6-32 NC-2 hole one end, 9/16" lg threaded #6-32 NC-2 portion other end	Spacing post		*N17-P-70039-5906 (2Z7259-230)	Collins Rad part/ dwg #505 2112 001	505 2112 001	H-161	1				
H-162	WASHER, flat: brass, cad pl; round, .156" ID x 1/4" OD x .062" thk	Spacer		N43-W-3170-5090 (6L50 112-32)	Collins Rad part/ dwg #505 2129 001	505 2129 001	H-162	4				
H-163	POST, spacing: brass, alloy pl; 1/4" hex x .688" lg; two 1/4" d holes tapped #6-32 NC-2, one ea end	Spacing post		*N17-P-70009-2556 (2Z7259-232)	Collins Rad part/ dwg #504 3488 001	504 3488 001	H-163	3				
H-164	POST, spacing: resistor, anodized aluminum; cylindrical; 2-1/16" lg x .230" OD; two tapped #8-32 NC-2, mtg holes, 5/16" d one ea end	For mounting R-181		*N17-P-70025-8561 (2Z7259-229)	Collins Rad part/ dwg #507 5779 00	507 5779 00	H-164	1				
H-165	POST, spacing: for band sw; cad pl steel; 5/8" lg x 3/16" OD; .130" ID for mtg	Spacing post for band switch		*N16-C-600001-362 (2Z7259-119)	Oak to Collins Rad spec #269 1014 00	269 1014 00	H-165	2				

*Not furnished as a maintenance part. If failure occurs, do not request replacement unless the item cannot be repaired or fabricated.

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										EQUIPMENT		STOCK	
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H-166	SCREW, machine: Phillips drive; recessed pan head, unfinished, cold headed; brass, nickel pl; #4-40 NC-2; 7/16" lg; threaded to head; head .219" diam x .080" thk Listed for reference only	Mounting parts		N43-S-57800-2030 (6L6440-7.9PH)	Pheoll Mfg. Co. (Comm.)	343 0288 00	H-166	1					
H-167	HANDLE: for front panel; SS type #303; 7/16" diam x 8-15/16" lg, ea end bent at 90 deg angle to 1-7/16"; ea end tapped #12-24 NC-2 x 3/8" d and threaded 3/8"-24 NF-2 for mtg	Handles for front panel		*N16-H-150001-351 (6Z5004-1)	Collins Rad part/ dwg #505 2173 003	505 2173 003	H-167	2					
	LAMPS AND DIALS												
I-101	LAMP, incandescent: 6 to 8 v, 0.15 amp; T-3-1/4 bulb; 1-1/8" lg o/a; miniature bayonet base; tungsten filament; operates any position	Dial illumination		N17-L-6297 (2Z5952	G.E. type #47 to Collins Rad spec #262 3240 00	262 3240 00	I-101, I-102, I-103	3			1		
I-102	LAMP: Same as I-101	Dial illumination											
I-103	LAMP: Same as I-101	Dial illumination											

I-104	LAMP, glow: 105-125 v, 1/4 w; T-4-1/2 clear bulb; 1-1/2" lg o/a; double cont; bayonet candelabra base; burn any position	Limits high voltage peaks, antenna circuit		G17-L-6811-25 (2J991)	G.E. type NE-48	262 0238 00	I-104	1		1		
I-105	DIAL: drum; p/o Army-Navy Radio Receiver R-388/URR; c/o drum w/ spring, pulley and hub on one end, drum end and hub on other end, all on shaft; phenolic drum and ends; cylindrical; 9-1/2" lg x 3" diam o/a; shaft mts on bkt at ea end; decalcomania on drum indicating freq, 0.5 mc to 30.5 mc (incl O-110)	Band indicating drum		**F16-D-46408-1010 (2Z37 23-231)	Collins Rad part/ dwg #504 3097 002	504 3097 002	I-105	1				2
I-106	DIAL: vernier dial; c/o dial hub and washer in soldered assem; brass hub, SS washer; circular; 1-1/4" diam x .343" d; mts on 1/4" diam shaft has two #4-48 NF-2 holes at 90 deg for set screws	Vernier dial		**F16-D-46397-9989 (2Z37 23-203)	Collins Rad part/ dwg #504 7812 002	504 7812 002	I-106	1				2

*Not furnished as a maintenance part. If failure occurs, do not request replacement unless the item cannot be repaired or fabricated.

**This unit should not be replaced unless repair is beyond the capacity of the using activity. If replacement is required, the item must be turned in to the activity from which the replacement is received.

PARTS								NO. USED IN EQUIPMENT	SPARE PARTS				
										EQUIPMENT		STOCK	
SYMBOL DESIG.	NAME OF PART AND DESCRIPTION	FUNCTION	JAN AND (NAVY TYPE) NO.	STANDARD NAVY & (SIGNAL CORPS) STOCK NO.	MFGR. AND MFGR'S. DESIG-NATION	CONTRACTOR DRAWING & PART NO.	ALL SYMBOL DESIG. INVOLVED		ITEM NUMBER	BOX	QUAN.	BOX	QUAN.
	JACKS												
J-101	CONNECTOR, receptacle: single round female cont; straight; 1" wd x 1" h x 1-1/16" lg o/a; cylindrical metal body, 5/8"-24 NEF-2 thd; molded phenolic insert; four 1/8" holes on .719" x .719" mtg/c on metal fl	Antenna Coax connector	(-49194)	N17-C-73108-5890 (2Z8799-239)	Amphenol Collins Rad spec #357 9005 00	357 9005 00 (RE-49F-167D)	J-101, J-104	2					
J-102	JACK, telephone: Army-Navy type JJ-033; for 3 cond plug 0.206" diam; 1-8/32" lg x 15/16" diam; cont arrangement J2; incl 3/8"-32 NS-2 mtg bushing 9/32" lg; mts in 3/8" diam hole; w/ non-turn pin at 6 o'clock on 0.281" rad (p/o Z-118)	Speaker jack		N17-J-39435-6234 (2Z5533A)	Mallory catalog #SCA2B	358 1050 00 (JAN-J-641)	J-102	1					
J-103	JACK, telephone: Army-Navy type JJ-034; for 2 cont plug 0.206" diam 1-5/16" lg x 49/64" diam; cont arrangement J1; incl 3/8"-32 NS-2 mtg bushing 9/32" lg; mts in 3/8" diam hole; w/ non-turn pin at 6 o'clock on 0.281" rad (p/o Z-118)	Phone jack		N17-J-39248-4418 (2Z5534)	Mallory catalog #SC1A	358 1040 00 (JAN-J-641)	J-103	1					
J-104	CONNECTOR: Same as J-101	I-f output connector											

	RELAY												
K-101	RELAY, armature: right 1C, left 1C cont arrangement (viewed from mtg end); 3 amp 150 w cont rating palladium .075" min diam x .025" min thk dome shaped cont; single wnd coil, 12 v DC, .016 amp DC max release, .021 amp DC max operating, 135 ohm p/m 10% DC resistance, ins; 6 solder lug term on cont, 2 solder lug on coil; 1-37/64" lg x 1-1/32" wd x 1-5/16" h max; two #4-40 holes located diagonally on .437" x .375" mtg/c; fast acting	Disabling relay		N17-R-64933-4961 (2Z7599A-328)	Clare CP type R	972 1176 00	K-101	1			1		10
	INDUCTORS												
L-001	COIL, RF: oscillator; single winding, single layer wnd; unshielded; 29 turns total, #32 and #28 wire; 1.875" lg x 1.125" diam o/a; form natural phenolic; core not incl; adjustable iron core; .517" diam hole through ctr for mtg; 1 term wnd in notch of collar and soldered, other term wnd around stud in coil base at other end of form, single tap, wires tw together (p/o Z-101, within sealed enclosure) Listed for reference only	Tuning coil		N16-C-72438-7301 (3C1081-50B	Collins Rad part/dwg #505 0407 002	505 0407 002	L-001	1					

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L-002	COIL, RF: oscillator; single wnd, single layer wnd; unshielded; variable inductance, tuning range approx 33 mc to 43 mc w/ 50 mmf shunting capacity; 4 turns approx 29 ga wire; 1/2" o/a diam x 1-3/8" lg less stud; phenolic tubing coil form, powdered iron core; form 3/8" OD x 1-1/8" lg; adj iron core; scdr adj; threaded 1/4"-28 NF-2 for mtg, incl nut; 2 ring term on coil form (p/o Z-101, within sealed enclosure)	Inductive trimmer		N16-C-76215-2410 (3C1081-53E)	Cambridge Term type LS-3	242 0001 00	L-002	1					
L-1	COIL	p/o T-101											
L-1	COIL	p/o T-102											
L-1	COIL	p/o T-103											
L-1	COIL	p/o T-104											
L-1	COIL	p/o T-105											
L-1	COIL	p/o T-106											
L-2	COIL	p/o T-101											
L-2	COIL	p/o T-103											

L-2	COIL	p/o T-104											
L-2	COIL	p/o T-105											
L-101	COIL, RF: plate and grid single wnd, single layer wnd; unshielded; 75 turns #35 E wire; 2-1/2" lg x 1/2" diam o/a; phenolic form for iron core (core not incl); form 2" lg x 0.295" diam; slug tuning; scdr adj; 0.260" diam hole through ctr of form; 2 wire lead term (p/o Z-115) Listed for reference only	Band 1		N16-C-72666-4613 (3C108 4S-43)	Collins part/ dwg #504 3056 001	504 3056 001	L-101, L-110	2					
L-102	COIL, RF: antenna; single layer wnd; unshielded; 48 turns #28 E wire; 2-3/8" lg x .620" diam o/a; phenolic form, powdered iron core (not incl); 2-3/8" lg x .437" diam coil form; adj iron core (not incl); scdr adj; .375" hole in form for mtg; 4 wire lead term; (p/o Z-115) Listed for reference only	Band 2 antenna coil		N16-C-72661-5131 (3C108 4S-65)	Collins Rad part/ dwg #505 2147 002	505 2147 002	L-102	1					
L-103	COIL, RF: antenna; single layer wnd; unshielded; 43 turns #28 E wire; 2-5/8" lg x 0.687" diam o/a; phenolic form, uses iron core (not p/o coil); 2-5/8" lg x 0.437" diam form; adj iron core tuning; scdr adj; mts by hole in form; wire term; polystyrene coated (p/o Z-115) Listed for reference only	Band 3 antenna coil		N16-C-72604-1774 (3C108 4S-64)	Collins Rad part/ dwg #505 2148 002	505 2148 002	L-103	1					

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L-104	COIL, RF: plate and grid; single wnd, single layer wnd; unshielded; 27 turns #28 E wire; 2" lg x 1/2" diam o/a; phenolic form for iron core (core not incl); form 2" lg x 0.295" diam; slug tuning; scdr adj; 0.260" diam hole through ctr of form; two 2" wire lead term (p/o Z-110) Listed for reference only	Bands 4 to 7 mixer primary		N16-C-72418-4673 (3C108 4S-44)	Collins Rad part/dwg #504 3060 001	504 3060 001	L-104, L-107, L-111	3					
L-105	COIL, RF: plate and grid; single wnd, single layer wnd; unshielded; 20 turns #28 E wire; 2" lg x 1/2" diam o/a; phenolic form for iron core (core not incl); form 2" lg x 0.295" diam; slug tuning; scdr adj; 0.260" diam hole through ctr of form; 2 wire lead term (p/o Z-109) Listed for reference only	Bands 8 to 16 mixer primary		N16-C-72292-3385 (3C108 4S-45)	Collins Rad part/dwg #504 3061 001	504 3061 001	L-105, L-108, L-112	3					
L-106	COIL, RF: plate and grid; single wnd, single layer wnd; unshielded; 15 turns #28 E wire 2" lg x 1/2" diam o/a; form 2" lg x 0.295" diam; phenolic form; slug tuning; scdr adj; 0.260" diam hole through ctr of form; 2 wire lead term (p/o Z-108) Listed for reference only	Bands 17 to 30 mixer primary		N16-C-72196-2469 (3C108 4S-46)	Collins Rad part/ dwg #504 3062 001	504 3062 001	L-106, L-109, L-113	3					

L-107	COIL: Same as L-104 (p/o Z-106) Listed for reference only	Band 4 to 7 mixer secondary												
L-108	COIL: Same as L-105 (p/o Z-104) Listed for reference only	Bands 8 to 16 mixer secondary												
L-109	COIL: Same as L-106 (p/o Z-102) Listed for reference only	Bands 17 to 30 mixer secondary												
L-110	COIL: Same as L-101 (p/o Z-116) Listed for reference only	Band 1 mixer												
L-111	COIL: Same as L-104 (p/o L-107) Listed for reference only	Bands 4 to 7 mixer secondary												
L-112	COIL: Same as L-105 (p/o Z-105) Listed for reference only	Bands 8 to 16 mixer secondary												
L-113	COIL: Same as L-106 (p/o Z-103) Listed for reference only	Bands 17 to 30 mixer secondary												
L-114	COIL, IF transformer: replacement coil; phenolic form; 48 turns #28 E wire, single wnd, single layer wnd; cylindrical; 2-3/8" lg x 9/16" diam o/a; 0.260" diam hole through ctr of form (p/o Z-116) Listed for reference only	Band 1, 11.5 to 10.5 mc i-f coil		N16-C-72661-5106 (3C607 B-1)	Collins Rad part/ dwg #504 3064 001	504 3064 001	L-114, L-116	2						

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										EQUIPMENT		STOCK	
SYMBOL DESIG.	NAME OF PART AND DESCRIPTION	FUNCTION	JAN AND (NAVY TYPE) NO.	STANDARD NAVY & (SIGNAL CORPS) STOCK NO.	MFGR. AND MFGR'S. DESIG-NATION	CONTRACTOR DRAWING & PART NO.	ALL SYMBOL DESIG. INVOLVED		ITEM NUMBER	BOX	QUAN.	BOX	QUAN.
L-115	COIL, IF transformer: replacement coil; phenolic form, beryllium copper silver pl term rings; 16 turns #28 E wire, single wnd, single layer wnd; cylindrical; 1-1/2" lg x 9/16" diam o/a; 0.260" diam hole through ctr of form (p/o Z-116) Listed for reference only	Band 1, 11.5 to 10.5 mc i-f coil		N16-C-72213-2552 (3C357-48)	Collins Rad part/ dwg #504 3057 001	504 3057 001	L-115	1					
L-116	COIL: Same as L-114 (p/o Z-114) Listed for reference only	Variable i-f plate coil											
L-117	COIL, IF transformer: replacement coil; phenolic form, beryllium copper silver pl term rings; 46 turns #9-41 Litz wire single wnd universal wnd; cylindrical; 1-1/2" lg x 9/16" diam o/a; 0.260" diam hole through ctr of form (p/o Z-114) Listed for reference only	Variable i-f plate coil		N16-C-72646-1315 (3C60 7B-3)	Collins Rad part/dwg #504 3066 001	504 3066 001	L-117, L-119	2					
L-118	COIL, IF transformer: replacement coil; phenolic form, beryllium copper silver pl term rings; 48 turns #28 E wire, single wnd, single layer wnd; cylindrical; 2-3/8" lg x 9/16" diam o/a; 0.264" diam hole through ctr of form (p/o Z-114) Listed for reference only	Variable i-f grid coil		N16-C-72661-5108 (3C607 B-2)	Collins Rad part/ dwg #504 5347 001	504 5347 001	L-118	1					

L-119	COIL: Same as L-117 (p/o Z-114)	Variable i-f grid coil										
L-120	COIL, RF: choke; 3 wnd, universal wnd; unshielded; 500 uh, 112 turns #36 nylon E wire ea wnd; 1/2" lg x 5/16" diam o/a; powdered iron core and form; form 1/2" lg x 1/8" diam; term mtg; two 1-3/8" lg axial wire term (p/o Z-117)	Crystal oscillator cathode choke		N16-C-74129-3676 (3C357-49)	Collins Rad part/dwg #503 4535 001	503 4535 001	L-120	1			1	6
L-121	COIL, RF: oscillator; single wnd, single layer wnd; unshielded; 46 turns #30 double E wire, closely spaced tapped at 13 turns; 3/4" lg x 0.190" diam o/a; bakelite form and core; 3/4" lg x 0.187" diam form; term mtg; two 1-1/2" lg axial wire lead term (p/o Z-117)	Crystal oscillator harmonic selector		N16-C-72645-5881 (3C108 4S-47)	Collins Rad part/dwg #504 3074 001	504 3074 001	L-121	1			1	6
L-122	REACTOR: filter choke; one sect; 3.0 hy, 120 ma; 100 ohm DC resistance; 2500 v RMS test; HS metal case; 2-1/16" wd x 2-7/32" lg x 3-9/32" h; four #6-32 NC-2 mtg inserts on 1-1/4" x 1-3/8" mtg/c; 2 solder lug term 5/16" c to c;	Input choke		N16-R-29022-8981 (3C547-37)	Chi Trans #15231-A	678 0432 00	L-122	1			1	6
L-123	REACTOR: filter choke; one sect; 5 hy, 80 ma; 300 ohm DC resistance; 2500 v RMS test; HS metal case; 1-25/32" wd x 1-7/8" lg x 2-25/32" h; four #6-32 NC-2 mtg inserts on 15/16" x 1-1/16" mtg/c; 2 solder lug term 5/16" c to c	Output choke		N16-R-29087-4241 (3C547-38)	Chi Trans #16227	678 0431 00	L-123	1			1	6

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L-124	FILTER, band supression: rejection freq 4 mc; 1-1/2" lg x 3/4" diam o/a; coil single wnd, single layer wnd, 46 turns #28 wire, phenolic form, air core, capacitor 150 mmf p/m 5%, 500 vdcw; uncased; .260" diam hole through coil form for mtg; 2 wire lead term; impr w/ polystyrene (p/o Z-111, incl C-159)	p/o suprious filter Z-111		N16-F-34000-1056 (3Z189 2-22.3)	Collins Rad part/ dwg #504 6646 002	504 6646 002	L-124	1			1		6
L-125	COIL, RF: grid; three wnd (pie universal); unshielded; 500 mh p/m 10% at 1000 kc; ea wnd 112 turns #36 nylon E wire; 1/2" lg less wire leads; x 3/8" max diam; powdered iron form, Jeffers 45-FE-29 or equal; 1/2" lg x 1/8" diam form; two tinned copper leads approx 1-3/8" lg; color coded green black, brown; fp	Grid choke		N16-C-74129-3935 (3C357-57)	Electrical Re-actance Corp to Collins Rad spec #240 0073 00	240 0073 00	L-125	1			1		6

	METER											
M-101	METER, audio level: DC milliammeter calibrated for db; range 0-1 ma; round, plastic, flush panel mtg case; 2.210" diam barrel, 1.600" d behind panel excluding term, round fl 2.695" diam; 3% accuracy; 46 ohm p/m 10% resistance, 1 ma full scale deflection; calibrated for use on non-magnetic panel; black scale markings; output minus 10 to plus 6 log scale, input 0 to 100 log scale; self contained; three .125" diam mtg holes equidistant on 1.220" rad; two .690" lg studs 1" c to c; ruggedized, HS (p/o Z-118)	Audio level meter		N17-M-22715-3701 (3F3307.5-8)	Marion Elec Instr. to Collins Rad spec #476 9017 00	476 9017 00	M-101	1				
	OR											
M-101	METER, ammeter: DC; 0-1 ma range; round, phenolic or metal, flush panel mtg; 2.210" barrel diam, 1.600" max d behind fl; 2.695" diam fl; p/m 3% accuracy for full scale reading; 46 ohm p/m 10% DC resistance; may be used on magnetic or non-magnetic panel; white background w/ black markings; three 0.125" diam holes equally spaced on 1.220" rad to accom #4-40 NC-2 mtg screws; 2 stud term (p/o Z-118)	Audio level meter		N17-M-22715-3701 (3F3307.5-8)	Burlington Instr. to Collins Rad spec #476 0030 00	476 0030 00	M-101	1				5

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	MISCELLANEOUS												
MS-101	Not used												
MS-102	GLASS: protects panel opening; glass; rectangular; 6.843" lg x 1.125" wd x 0.062" thk o/a; mts on panel (p/o Z-118)	Protection mc drum opening		*N16-G-600001-178 (2ZA13 52-181)	Collins Rad part/dwg #504 3077 001	504 3077 001	MS-102	1					
MS-103	GLASS: protects panel opening; glass; rectangular, w/ 45 deg cut in 2 bottom corners; 3.5" lg x 1.5" wd x 0.062" thk o/a; mts on panel (p/o Z-118)	Protection vernier panel opening		*N16-G-600001-177 (2ZA13 52-180)	Collins Rad part/dwg #504 3078 001	504 3078 001	MS-103	1					
	MECHANICAL PARTS												
O-001	BEARING, ball: single row axial; double shielded; extra light; .5000" OD, .1875" bore, .1969" wd; seven 3/32" balls; WS-429 lubrication; std fit; ABEC-3 tol (p/o Z-101, within sealed enclosure)	Lead screw main ball bearing		N77-B-115-00319-2002 (3H305-23)	ND type #77R3	309 0002 00	O-001	1					

O-002	RING, retainer: for use on .187" diam shaft; steel, cad pl; type #E rings; .335" OD x .145" ID x .025" thk o/a; ring shall be dehydro--genized after pl (p/o Z-101, within sealed enclosure)	Hold lead screw in A-003 to maintain thrust, maintains spring loading on O-004		N142-R-2047-500 (2Z7858-154)	Waldes truarc #5133-18	340 0090 00	O-002, O-008	2	
O-003	RING, retainer: carbon spring steel, cad pl; .575" OD x .010" thk; mts on .375" diam shaft self locking (p/o Z-101, within sealed enclosure)	Secures O-005		N42-R-66010-500 (2Z7855-9)	Waldes #5105-37	340 0174 00	O-003	1	
O-004	BEARING, ball: single row axial; plain; light duty; 0.189" bore, 0.437" OD, 0.185" wd; 9 balls; packed w/ low temp grease; std fit; BEC-1 std tol; separable, one bearing, two thrust rings (p/o Z-101, within sealed enclosure)	Lead screw thrust bearing		N77-B-411-00301-8001 (3H305-212)	Collins Rad part/dwg #500 2122 002	500 2122 002	O-004	1	
O-005	BEARING, sleeve: for lead screw; phenolic; .375" OD x .1250" ID x .156" d body w/ .047" d fl (p/o Z-101, within sealed enclosure)	Lead screw end bearing		N16-B-200661-353 (2Z8552-132)	Collins Rad part/dwg #504 6532 001	504 6532 001	O-005	1	

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O-006	WASHER, cup: copper, alloy pl; cup shaped; .500" OD x .195" ID x .022" thk, .059" free thickness (p/o Z-101 within sealed enclosure)	Loads O-004		N43-W-7508-6650 (6L734 73-2)	Collins Rad part/dwg #504 5634 001	504 6534 001	O-006	1					
O-007	COMPENSATOR: linearity corrector assembly; c/o 2 bkts, 2 end blocks, 1 end spacer, 1 curve spacer, 1 special spacer, 1 adj screw, 1 special washer and 1 spacing post and associated hardware; 3.582" lg x .281" wd x 13/16" h o/a; bkt mtd (p/o Z-101, within sealed enclosure)	Linearity corrector assembly		N16-R-33591-1304 (2C45 65-23A-2)	Collins Rad part/dwg #504 6553 002	504 6553 002	O-007	1					
O-008	RING: Same as O-002 (p/o Z-101, within sealed enclosure)	See O-002											
O-101	COUPLER: consisting of:												
O-101A	HUB: coupler SS, unfinished; round; 1.090" diam x .327" thk o/a; .1880" diam ctr hole mtg for shaft, two #6-40 NF-2 tapped holes at 90 deg and perpendicular to shaft hole	p/o Main oscillator coupler		*N16-H-900073-497 (2Z5180 -35)	Collins Rad part/dwg #505 2150 002	505 2150 002	O-101A	1					

O-101B	SPIDER, coupling: phosphor bronze; cylindrical; 1.090" diam x .157" thk; .250" diam ctr mtg hole;	p/o Main oscillator coupling		N17-C-98611-1094 (2Z3295-167)	Collins Rad part/dwg #505 0361 002	505 0361 002	O-101B	1			1	5
O-101C	HUB: coupler; SS, unfinished; round; 1.090" diam x .327" thk; .250" diam ctr mtg hole for shaft, two #6-40 NF-2 tapped holes at 90 deg and perpendicular to shaft hole	p/o Main oscillator coupler		N16-H-9000 73-897 (2Z5180-36)	Collins Rad part/dwg #505 2151 002	505 2151 002	O-101C	1			1	5
O-102	COUPLING, flexible: for coupling 1/4" and 3/8" diam shafts; bakelite and brass, nickel pl; round; 1.094" diam x 0.672" lg o/a; 1/4" diam shaft hole through ctr w/ four #8-32 set screws	Oscillator switch shaft coupling		N17-C-98372-9751 (2Z3295-148)	Oak type #6431-032	015 0051 00	O-102, O-103	2			1	
O-103	COUPLING: Same as O-102	Antenna switch shaft coupling										
O-104	COUPLING, flexible: for coupling two 1/4" diam shafts; bakelite and brass, nickel pl; round; 1.094" diam x 0.672" lg o/a; 1/4" diam shaft hole through ctr w/ 4 set screws, #8-32	Coupler on BFO shaft extension		N17-C-98378-4007 (2Z3295-152)	Oak to Collins Rad spec #015 0052 00	015 0052 00	O-104, O-105, O-130, O-141	4			1	

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O-105	COUPLING: Same as O-104	Coupler on shaft extension to C-224											
O-106	CAM: variable IF slug rack cam; incl one cam, one hub and one groove pin; brass cam and hub, SS pin; 362 deg required cam surface, high point of cam 1.6735" from ctr; non-circular shape w/ offset ctr; 2" wd x 2-3/4" h x 9/32" thk o/a; two #6-40 NF-2 mtg holes at 90 deg	Variable IF slug rack cam		*N16-C-125001-252 (6C10A-2)	Collins Rad part/dwg #504 3036 001	504 3036 001	O-106, O-118	2					
O-107	SPRING: helical extension type; dial string loading spring; .020" diam spring wire, SS; 11/32" lg x 5/32" diam o/a; 7 turns closely wnd; RH turns; hook term ea end; compression type; term mtg	Dial spring loading		*N17-S-46707-1790 (2Z8877.335)	Collins Rad part/dwg #503 1240 001	503 1240 001	O-107	1					
O-108	Not used												
O-109	COUPLING, rigid: sleeve type; 0.253" diam shaft size ea end; four #8-36 NF-2 set screw mtg holes at 90 deg; 1/2" lg x 1/2" diam o/a; brass;	Coupler between O-134 and S-114		*N17-C-98432-4723 (2Z3273-212)	Collins Rad part/dwg #504 1499 001	504 1499 001	O-109	1					

O-110	SPRING: torsion type; mc drum dial tension spring; 0.047" diam spring wire, SS; 1" lg x 0.874" OD; 13-1/4 turns closely wnd; RH turns; hook term on ea end, one hook bent at 15 deg angle, 1-3/4" lg from ctr of spring, other bent at 90 deg angle 0.875" lg from ctr of spring; squared ends; term mtg; (p/o I-105)	Mc drum dial tension		N17-S-46865-3866 (2Z8877.336)	Collins Rad part/dwg #504 2920 001	504 2920 001	O-110	1			1		10
O-111	SPRING: helical extension type; RF slug rack gear loading; .020" diam spring wire, type #302 SS; 3/8" free lg x 0.130" diam o/a; 6 turns; left hand turns; hook term on ea end, end of hooks open 0.031" from body of spring; compression type; term mtg (p/o E-174)	R-f slug rack gear loading		*N17-S-46706-6010 (2Z8877.334)	Collins Rad part/dwg #504 2951 001	504 2951 001	O-111, O-112, O-113, O-114	4					
O-112	SPRING: Same as O-111 (p/o E-174)	R-f slug rack gear loading										
O-113	SPRING: Same as O-111 (p/o E-174)	R-f slug rack gear loading										
O-114	SPRING: Same as O-111 (p/o E-174)	R-f slug rack gear loading										

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O-115	CAMSHAFT ASSEMBLY: RF slug rack cam assem; incl 2 cams, 2 gears, 1 shaft table, groove pin, 2 heart shaped cams; various materials and finishes; irregular shape; 5-1/8" lg x 3-1/16" diam o/a; bearing mtd (p/o E-174)	Low frequency r-f slug rack cam assembly		N16-C-125041-111 (2Z8203-516)	Collins Rad part/dwg #504 3027 001	504 3027 001	O-115	1					4
O-116	CAMSHAFT ASSEMBLY: RF slug rack cam assem; incl 2 cams, 2 gears, 1 shaft table and groove pin, 2 heart shaped cams; various materials and finishes; irregular shape; 4-15/16" lg x 2-1/2" diam o/a; bearing mtg (p/o E-174)	High frequency r-f slug rack cam assembly		N16-C-125041-110 (2Z8203-515)	Collins Rad part/dwg #504 3029 001	504 3029 001	O-116	1					4
O-117	CAMSHAFT ASSEMBLY: RF slug rack cam assem; incl 2 cams; 2 gears, 1 shaft table, and groove pin, 2 heart shaped cams; various materials and finishes; irregular shape; 4-15/16" lg x 2-1/2" diam o/a; bearing mtd (p/o E-174)	Medium frequency r-f slug rack cam assembly		N16-C-125041-109 (2Z8203-514)	Collins Rad part/dwg #504 3032 001	504 3032 001	O-117	1					4
O-118	CAM: Same as O-106	Variable i-f slug rack cam											

O-119	SPRING: helical extension type; RF slug rack spring; .025" diam spring wire, type #302 SS; 1.262" lg x 0.312" OD; 39 turns; hook term on ea end, one extended from body 0.062" on a 0.046" rad spaced 0.203" c to c from axis of spring, other term 0.0312" OD, end of hook spaced 0.031" from spring; compression type; term mtg (p/o E-174)	R-f slug rack spring		*N17-S-46754-1696 (2Z8877.333)	Collins Rad part/dwg #504 3102 002	504 3102 002	O-119, O-120, O-121, O-122, O-123, O-124	6				
O-120	SPRING: Same as O-119 (p/o E-174)	R-f slug rack spring										
O-121	SPRING: Same as O-119 (p/o E-174)	R-f slug rack spring										
O-122	SPRING: Same as O-119 (p/o E-174)	R-f slug rack spring										
O-123	SPRING: Same as O-119 (p/o E-174)	R-f slug rack spring										
O-124	SPRING: Same as O-119 (p/o E-174)	R-f slug rack spring										

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O-125	SPRING: helical compression; variable IF slug rack spring; 0.025" diam spring wire, type #302 SS; 3-1/2" lg x 0.312" OD o/a; 33 turns; one wire extended 3/8" from ctr on one end; squared ends; term mtg	Variable i-f slug rack spring		*N17-S-46694-7481 (2Z887 7.332)	Collins Rad part/ dwg #504 3109 002	504 3109 002	O-125, O-126	2					
O-126	SPRING: Same as O-125	Variable i-f slug rack spring											
O-127	GEAR ASSEMBLY: tuning and band changing gears; various materials and finishes; irregular shape; 17-1/8" lg x 6" wd x 4" d approx o/a; mts by five 0.175" diam holes irregularly spaced incl the following:	Tuning and band changing gears		N16-G-500001-437 (2Z4875 -412)	Collins Rad part/dwg #505 2189 004	505 2189 004	O-127	1					
O-127A	PLATE, gear: main gear assem; c/o idler gear, bearing and bearing thimble staked to plate; gear w/ 74 teeth 32 pitch, 2.3125" PD; rectangular; 17.125" lg x 6.000" wd x 11/32" h o/a (p/o O-127)	Back gear panel assembly			Collins Rad part/dwg #505 2179 003	505 2179 003	O-127A	1					

O-127A-A	PLATE, mounting: main gear assem; aluminum, chromate dipped; rectangular; 17.125" lg x 6.000" wd x 0.125" thk (p/o O-127)	Rear Support gear assembly			Collins Rad part/dwg #505 2188 004	505 2188 004	O-127A-A	1						
O-127A-B	POST, spacing: for idler gear; SS type #303; undercut to 0.1875" diam; round; 0.305" lg x 0.500" OD; staked in mtg plate (p/o O-127)	Mounts O-127C			Collins Rad part/dwg #504 2966 001	504 2966 001	O-127A-B	1						
O-127A-C	GEAR: spur type; brass; idler; involute tooth form; 74 teeth; 32 pitch, 2.3125" PD; 2-7/16" OD x 0.064" thk face wd; straight face; 0.2505" ID for mtg (p/o O-127)	Drives O-127F for fine tuning			Collins Rad part/dwg #504 2964 001	504 2964 001	O-127A-C	1						
O-127A-D	WASHER, flat: SS type #304; round, 0.191" ID, 5/8" OD, 0.025" thk; (p/o O-127)	Spaces O-127C from O-127A-A			Collins Rad part/dwg #504 2973 001	504 2973 001	O-127A-D, O-127C	2						
O-127A-E	PIN, grooved: type #303 SS; cylindrical; 0.218" lg x 0.068" max diam (p/o O-127)	P/o over-travel coupler system O-1270			Groov-Pin type #1	311 0239 00	O-127A-E	1						

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O-127A -F	BEARING, sleeve: for tuner assem shaft; phosphor bronze oilite; 15/32" OD x 0.250" ID x 0.171" lg o/a, undercut to 0.3585" diam x 0.137" lg (p/o O-127)	Rear bearing for tuner assembly shaft O-127AC-B			Collins Rad part/dwg #507 5612 00	507 5612 00	O-127A-F, O-127 AC-N	2					
O-127A -G	RETAINER, bearing: typs #303 SS; round; 0.500" OD x 0.150" thk o/a; 0.011" thk flange around one end for retaining; 0.357" ID for bearing (p/o O-127)	Retains O-127F			Collins Rad part/dwg #507 5618 00	507 5618 00	O-127A-G, O-127 AC-M	2					
O-127B	GEAR ASSEMBLY: c/o 2 reverse gears silver soldered to pointer pulley shaft; brass gears, SS type #303 shaft; small gear w/ 24 teeth, 32 pitch, 0.750" PD, large gear w/ 48 teeth, 32 pitch, 1.500" PD; 1-7/16" lg x 1-9/16" OD; 0.218" diam shaft for mtg (p/o O-127)	Drives O-127Y and O-127V			Collins Rad part/dwg #504 3111 002	504 3111 002	O-127B	1					
O-127C	WASHER: Same as O-127A-D (p/o O-127)	Spaces O-127B from O-127A-A											

O-127D	WASHER, flat: SS type 302-304; round, 0.190" ID, 0.406" OD x 0.012" thk (p/o O-127)	Spaces O-127B from O-127AC-A and O-127X from O-127Q				Collins Rad part/ dwg #500 2112 002	500 2112 002	O-127D	2								
O-127E	RING, retainer: for use on 0.250" diam shaft; spring steel, cad pl; 0.225" ID x 0.025" thk o/a; 0.41" min clearance diam when ring spread over shaft (p/o O-127)	Retains O-127X in O-127A-A, O-127AB in O-127AC-C O-127AA in O-127AC-A O-127F in O-127A-A				Waldes #5100-25	340 0025 00	O-127E	4								
O-127F	SHAFT ASSEMBLY: c/o driver gear silver soldered to end of shaft; brass gear, SS type #303 shaft; gear w/ 52 teeth, 32 pitch, 1.625" PD; 2.562" lg x 1-23/32" OD; 0.2497" diam shaft for mtg (p/o O-127)	Drives variable i-f rack cam shaft				Collins Rad part/ dwg #504 3014 001	504 3014 001	O-127F	1								
O-127G (qty 2)	WASHER: Same as H-157 (p/o O-127)	Spaces O-127E from O-127A-A and O-127AA from O-127AC-A															

PARTS								SPARE PARTS				
									EQUIPMENT		STOCK	
SYMBOL DESIG.	NAME OF PART AND DESCRIPTION	FUNCTION	JAN AND (NAVY TYPE) NO.	STANDARD NAVY & (SIGNAL CORPS) STOCK NO.	MFGR. AND MFGR'S. DESIG-NATION	CONTRACTOR DRAWING & PART NO.	ALL SYMBOL DESIG. INVOLVED	NO. USED IN EQUIPMENT	ITEM NUMBER	BOX	QUAN.	BOX	QUAN.
O-127H	GEAR: spur type; brass gear, phosphor bronze hub; IF sw; involute tooth form; 48 teeth; 48 pitch, 1.000" PD; 1-1/16" OD x 0.064" thk face wd; straight face; 0.500" diam hub extends 0.250" beyond face of gear on one side and 0.3745" diam hub extends 0.248" beyond other side of gear face; 0.252" diam shaft mtg hole, w/ two #6-40 NF-2 tapped holes spaced at 90 deg (p/o O-127)	Drives rotor shaft for variable i-f switches S-110 and S-111			Collins Rad part/dwg #504 3004 001	504 3004 001	O-127H	1					
O-127J	WASHER, flat: SS type #302-304; round, 0.380" ID, 0.562" OD, 0.014" thk (p/o O-127)	Spaces O-127H from O-127A-A			Collins Rad part/dwg #500 1109 003	500 1109 003	O-127J	2					
O-127K	RING, retainer: used on 0.375" diam shaft w/ one 0.352" diam x 0.028" wd groove; spring steel, cad pl; 0.550" OD, 0.338" ID, 0.026" thk; 2 mtg holes 0.047" diam; 0.68" min clearance required when ring is sprung over 0.375" diam (p/o O-127)	Retains O-127H in O-127A-A			Waldes #NAS-51-37	340 0013 00	O-127K	1					

O-127L	SHAFT ASSEMBLY: c/o pinion gear on end of knob shaft; SS type #303; 0.250" face wd gear w/ 16 teeth, 48 pitch, 0.3333" PD; cylindrical; 2-15/32" lg x 9/16" OD; 0.2495" diam shaft for mtg; shaft flatted to 0.230" for 5/8" on end opposite pinion (p/o O-127)	Mounts O-127M			Collins Rad part/ dwg #504 2956 001	504 2956 001	O-127L	1					
O-127M	GEAR: spur type; brass; knob; involute tooth form; 85 teeth; 32 pitch, 2.656" PD; 2-3/8" OD x 0.125" thk face wd; straight face; 0.500" OD hub extends 0.115" beyond face of gear on one side and 0.261" on other side; 0.2505" diam shaft mtg hole, w/ single #6-40 NF-2 tapped hole (p/o O-127)	Band change drive gear, drives O-127AB and O-127S			Collins Rad part/ dwg #504 3013 001	504 3013 003	O-127M	1					
O-127N	PIN, grooved: SS type #303, plain finish; full length taper; 0.062" diam, 0.068" expanded diam, 3/8" lg; (p/o O-127)	Secures O-127M on O-127L			Groov-pin type #1, 3/8"	311 1122 30	O-127N	1					
O-1270	SHAFT ASSEMBLY: band sw; c/o override disk silver soldered on end of shaft; SS type #304 disk, phosphor bronze shaft; 0.125" thk face wd disk w/ single groove pin pressed on rim; 0.828" lg x 2.000" OD; 0.4995" OD shaft undercut to 0.250" diam for mtg (p/o O-127)	Drives rotor shaft for r-f switches S-101 through S-107			Collins Rad part/ dwg #504 3006 001	504 3006 001	O-1270	1					

TABLE 8-4 COMBINED PARTS AND SPARE PARTS LIST

PARTS								SPARE PARTS				
									EQUIPMENT		STOCK	
SYMBOL DESIG.	NAME OF PART AND DESCRIPTION	FUNCTION	JAN AND (NAVY TYPE) NO.	STANDARD NAVY & (SIGNAL CORPS) STOCK NO.	MFGR. AND MFGR'S. DESIG-NATION	CONTRACTOR DRAWING & PART NO.	ALL SYMBOL DESIG. INVOLVED	NO. USED IN EQUIPMENT	ITEM NUMBER	BOX	QUAN.	BOX	QUAN.
O-127P	BALL, bearing: steel; spherical; 3/16" diam; (p/o O-127)	Detent ball for loading O-127X, provides coupling for O-127Q to O-127O bands 1-16			Norma-Hoff	309 5200 00	O-127P	2					
O-127Q	SHAFT ASSEMBLY: Geneva wheel; c/o override gear silver soldered on shaft; SS type #303 shaft, brass gear; 3 groove pins pressed on face of 0.125" thk face wd spur gear w/ 144 teeth, 48 pitch, 3.000" PD; 1.453" lg x 3-1/16" OD; 0.250" OD shaft for mtg; shaft flatted to 0.187" diam for 1/4" on end opposite gear; (p/o O-127)	Mounts O-127S and O-127AE			Collins Rad part/dwg #504 3012 001	504 3012 001	O-127Q	1					
O-127R	WASHER, flat: SS type #302-304; round, 0.502" ID, 1" OD, 0.025" thk; (p/o O-127)	Loads O-127V against O-127A-A			Collins Rad part/dwg #504 2972 001	504 2972 001	O-127R	1					

O-127S	GEAR: spur type; brass gear and positioner, phosphor bronze hub; Geneva wheel assem, 6 slots spaced at 60 deg located on 0.064" thk positioner wheel; involute tooth form; 33 teeth; 32 pitch, 1.031" PD; 1.437" max rad x 0.250" d o/a; 0.102" thk straight face; 0.500" OD hub; 0.1880" ID for mtg; (p/o O-127)	Drives O-127AA when switching to odd number bands			Collins Rad part/dwg #504 3015 001	504 3015 001	O-127S	1										
O-127T	SPRING: flat type; centering; beryllium copper; 0.015" thk, 2.374" lg x 0.765" wd x 0.187" h o/a; two 0.187" diam mtg holes spaced 2.000" c to c; (p/o O-127)	Spring detent for O-127S			Collins Rad part/dwg #504 2932 001	504 2932 001	O-127T	1										
O-127U	SCREW, machine: Phillips drive; recessed pan head, unfinished, cold headed; SS type #430, plain finish; #6-32 NC-2 thd; 1/8" lg; thd to head; head 0.270" diam x 0.097" thk; (p/o O-127)	Secures O-127T to O-127A-A			Pheoll Mfg. Co. (Comm.)	343 0165 00	O-127U	2										
O-127V	GEAR: spur type; SS type #302-304 gear, phosphor bronze hub; detent assem; involute tooth form; 48 teeth; 32 pitch, 1.500" PD; 1-19/32" OD x 0.064" thk face wd; straight face; 0.4995" OD hub extends 0.154" beyond face of gear; 0.2505" ID for mtg; (p/o O-127)	Drives idler gear O-127A-C			Collins Rad part/dwg #504 3018 001	504 3018 001	O-127V	1										

PARTS								SPARE PARTS				
									EQUIPMENT		STOCK	
SYMBOL DESIG.	NAME OF PART AND DESCRIPTION	FUNCTION	JAN AND (NAVY TYPE) NO.	STANDARD NAVY & (SIGNAL CORPS) STOCK NO.	MFGR. AND MFGR'S. DESIG-NATION	CONTRACTOR DRAWING & PART NO.	ALL SYMBOL DESIG. INVOLVED	NO. USED IN EQUIPMENT	ITEM NUMBER	BOX	QUAN.	BOX	QUAN.
O-127W	WASHER, flat: SS type #304; round, 0.253" ID 5/8" OD, 0.005" thk; (p/o O-127)	Loads O-127R			Collins Rad part/dwg #504 2974 001	504 2974 001	O-127W	1					
O-127X	SHAFT ASSEMBLY: c/o detent index spring and holder and small sun gear attached to differential shaft and secured by 2 rivets; steel spring, SS type #303 shaft; 0.188" thk face wd gear w/ 30 teeth, 48 pitch, 0.625" PD; 1.687" lg x 1-19/64" OD; 0.2495" diam shaft for mtg; (p/o O-127)	Loads O-127P against O-127V			Collins Rad part/dwg #504 3025 001	504 3025 001	O-127X	1					
O-127Y	GEAR ASSEMBLY: c/o large ctr gear and large and small planet gears silver soldered; ctr and large planet gear brass, small planet gear SS type #302-304, phosphor bronze hubs; ctr gear 0.125" thk face wd w/ 85 teeth, 32 pitch, 2.656" PD, large planet gear 0.064" thk face wd w/ 45 teeth, 48 pitch, 0.9375" PD, small planet gear 0.0625" thk face wd w/ 25 teeth, 48 pitch, 0.5208" PD; 2-3/4" OD x 17/32" d; 0.2505" ID for mtg; planetary shaft lubricated w/ AN-O-4 oil (p/o O-127)	Drives O-127AB			Collins Rad part/dwg #504 3020 001	504 3020 001	O-127Y	1					

O-127Z	GEAR ASSEMBLY: c/o large sun drive gear and large sun gear silver soldered; drive gear brass, sun gear and hub SS type #303; drive gear 0.064" thk face wd w/ 72 teeth, 32 pitch, 2.250" PD, sun gear 0.0625" thk face wd w/ 50 teeth, 48 pitch, 1.0416" PD; 2-7/16" OD x 0.242" d; 0.5005" ID for mtg; (p/o O-127)	Drives O-127V for fine tuning			Collins Rad part/dwg #504 3016 001	504 3016 001	O-127Z	1						
O-127 AA	SHAFT ASSEMBLY: crystal switch; c/o drive gear silver soldered to shaft; brass gear, SS type #303 shaft; 0.064" thd face wd gear w/ 99 teeth, 32 pitch, 3.0937" PD; 3-3/16" OD x 1.765" lg; 0.2497" diam shaft for mtg; (p/o O-127)	Drives rotor shaft for crystal switches S-108 and S-109			Collins Rad part/dwg #504 3005 001	504 3005 001	O-127 AA	1						
O-127 AB	GEAR: spur type; brass gear, phosphor bronze hub; idler gear w/ stop pin staked on 1.187" rad of gear face; involute tooth form; 90 teeth; 32 pitch, 2.8125" PD; 2-15/16" OD x 0.064" thk face wd; straight face; 0.500" diam hub extends 0.216" beyond face of gear; 0.2505" ID for mtg; (p/o O-127)	Drives O-127Y on band change, provides mechanical stop with pin on O-127Q			Collins Rad part/dwg #504 3009 001	504 3009 001	O-127AB	1						
O-127 AC	PLATE, gear: front gear assem; c/o pinion gear and knob shaft, drive shaft collar, bearing and bearing thimble staked to plate; gear w/ 15 teeth, 48 pitch, 0.3125" PD; rectangular; 9-1/16" lg x 3-7/8" wd x 2.906" h o/a; (p/o O-127)	Front gear panel assembly			Collins Rad part/dwg #505 2180 003	505 2180 003	O-127AC	1						

PARTS									SPARE PARTS				
										EQUIPMENT		STOCK	
SYMBOL DESIG.	NAME OF PART AND DESCRIPTION	FUNCTION	JAN AND (NAVY TYPE) NO.	STANDARD NAVY & (SIGNAL CORPS) STOCK NO.	MFGR. AND MFGR'S. DESIG-NATION	CONTRACTOR DRAWING & PART NO.	ALL SYMBOL DESIG. INVOLVED	NO. USED IN EQUIPMENT	ITEM NUMBER	BOX	QUAN.	BOX	QUAN.
O-127 AC-A	PLATE, mounting: front gear panel; aluminum, chromate dipped; rectangular; 9-1/16" lg x 3-7/8" wd x 0.125" thk; (p/o O-127)	Front support gear assembly			Collins Rad part/dwg #505 2178 003	505 2178 003	O-127 AC-A	1					
O-127 AC-B	SHAFT ASSEMBLY: c/o pinion gear and knob shaft; SS type #303; 0.188" thk face wd gear w/ 15 teeth, 48 pitch, 0.3125" PD; cylindrical; 2.906" lg x 11/32" OD; 0.249" diam shaft for mtg; both ends of shaft w/ 0.031" x 45 deg chamfer (p/o O-127)	Kilocycle tuning shaft			Collins Rad part/dwg #504 2927 001	504 2927 001	O-127 AC-B	1					
O-127 AC-C	POST, spacing: for idler gear; SS type #303; cyclindrical; 0.593" lg x 0.375" OD; staked in mtg plate; (p/o O-127)	Mounts O-127AB			Collins Rad part/ dwg #504 2969 001	504 2969 001	O-127 AC-C	1					
O-127 AC-D	SCREW, machine: Phillips drive; recessed pan head unfinished, cold headed; SS type #430, plain finish; #2-56 NC-2 thd; 5/16" lg; thd to head; 0.167" diam x 0.062" thk head; (p/o O-127)	Stop pin for O-127AC -G			Pheoll Mfg. Co. (Comm)	343 0125 00	O-127 AC-D	1					

O-127 AC-E	WASHER, flat: brass; round, 0.255" ID, 0.437" OD, 0.010" thk; (p/o O-127)	Spaces O-127AC-B		Collins Rad part/dwg #500 1084 003	500 1084 003	O-127AC -E	2
O-127 AC-F	WASHER, flat: brass; round, 0.252" ID, 0.510" OD, 0.0105" thk; (p/o O-127)	Spaces O-127AC-G		Collins Rad part/dwg #503 0644 001	503 0644 001	O-127AC -F	11
O-127 AC-G	WASHER, flat: SS; round 1/4" ID, 1/2" OD, 1/25" thk; 3/32" x 3/32" projection bent at 90 deg x 1/20"; (p/o O-127)	Provides 10 turn stop for O-127 AC-B		Collins Rad part/dwg #503 0643 001	503 0643 001	O-127AC -G	11
O-127 AC-J	COLLAR, drive shaft; c/o collar w/ two groove pins pressed in face on 0.312" rad at 115 deg; aluminum, chromate dipped; round; 7/8" diam x 0.216" d; 0.253" ID for mtg; (p/o O-127)	Drives O-127AC-G		Collins Rad part/dwg #505 2126 001	505 2126 001	O-127AC -J	1
O-127 AC-K	PIN, grooved: type 1; SS type 303, plain finish; 1/16" x 1/2" full length taper; 0.0625" diam, 0.068" expanded diam, 0.500" lg; (p/o O-127)	Secures O-127AC-J to O-127AC-B		Groov-Pin type #1	311 1123 30	O-127AC -K, O-127AQ	2
O-127 AC-L	WASHER, flat: SS type #304; round, 0.252" ID, 0.500" OD, 0.028" thk; (p/o O-127)	Spaces O-127 AC-B from O-127AC-A		Collins Rad part/dwg #507 5499 00	507 5499 00	O-127AC -L	1

PARTS								SPARE PARTS				
									EQUIPMENT		STOCK	
SYMBOL DESIG.	NAME OF PART AND DESCRIPTION	FUNCTION	JAN AND (NAVY TYPE) NO.	STANDARD NAVY & (SIGNAL CORPS) STOCK NO.	MFGR. AND MFGR'S. DESIG-NATION	CONTRACTOR DRAWING & PART NO.	ALL SYMBOL DESIG. INVOLVED	NO. USED IN EQUIPMENT	ITEM NUMBER	BOX	QUAN.	BOX	QUAN.
O-127 AC-M	RETAINER: Same as O-127A-G (p/o O-127)	Retains O-127AC-N											
O-127 AC-N	BEARING: Same as O-127A-F (p/o O-127)	Front bearing for O-127AC-B											
O-127 AC-P	WASHER, lock: SS type #302, plain finish; round 0.089" ID, 0.133" OD, 0.022" thk; split lock; (p/o O-127)	Secures O-127AC-D			Wrought Washer Mfg. Co. (Comm)	310 0070 00	O-127AC -P	1					
O-127 AC-R	NUT, hexagon: SS, plain finish; #2-56, NC-2 thd; 1/16" thk; wd across flats 3/16"; double chamfered, class 2 fit; (p/o O-127)	Secures O-127AC-D			Central Screw Co. (Comm)	313 0037 00	O-127 AC-R	1					
O-127 AD	GEAR ASSEMBLY: dial drive pulley; c/o drive gear, loading gear and pointer pulley assembled on hub and secured by 3 rivets; SS type #304 gears, CRS cad pl pulley; both gears 0.031" thk face wd w/ 150 teeth, 48 pitch, 3.125" PD, held by two loading springs w/ 25 turns; round; 3-3/16" OD x 0.359" d; 0.1880" diam shaft mtg hole w/ single #6-40 NF-2 tapped hole spaced at 90 deg; (p/o O-127)	Drives megacycle dial pointer			Collins Rad part/dwg #504 5645 002	504 5645 002	O-127AD	1					

O-127 AD-A	HUB: pointer pulley; hub and 0.040" thk face wd spacer plate silver soldered; brass; 1/2" diam hub extends 0.250" beyond face of spacer plate on one side and 0.069" on other side; round; 1.499" OD x 0.359" d o/a; 0.1880" diam shaft mtg hole w/ single #6-40 NF-2 tapped hole spaced at 90 deg, three 0.098" diam holes equally spaced on 0.625" rad located on plate to accom pulley; (p/o O-127)	p/o O-127AD			Collins Rad part/dwg #504 5641 001	504 5641 001	O-127AD -A	1						
O-127 AD-B	GEAR: spur; SS type #304; pointer drive; involute tooth form; 150 teeth; 48 pitch, 3.125" PD; 3-3/16" OD x 0.031" thk face wd; straight face; 0.3755" ID for mtg w/ two 3/4" lg x 1/4" wd slots spaced 2-3/8" c to c on gear face to accom loading springs; (p/o O-127)	p/o O-127AD			Collins Rad part/dwg #504 5644 002	504 5644 002	O-127AD -B	1						
O-127 AD-C	GEAR: spur; SS type #304; loading; involute tooth form; 150 teeth; 48 pitch, 3.125" PD; 3-3/16" OD x 0.031" thk face wd; straight face; 1.5005" ID for mtg w/ two 3/4" lg x 1/4" wd slots spaced 2-3/8" c to c on gear face to accom loading springs; (p/o O-127)	p/o O-127AD			Collins Rad part/dwg #504 5643 002	504 5643 002	O-127AD -C	1						
O-127 AD-D	SPRING: helical extension type; SS type 302 spring wire; 1/2" free length; 25 turns; full loop ea end and in line; (p/o O-127)	p/o O-127AD			Collins Rad part/dwg #504 5642 001	504 5642 001	O-127AD -D	2						

PARTS									SPARE PARTS				
										EQUIPMENT		STOCK	
SYMBOL DESIG.	NAME OF PART AND DESCRIPTION	FUNCTION	JAN AND (NAVY TYPE) NO.	STANDARD NAVY & (SIGNAL CORPS) STOCK NO.	MFGR. AND MFGR'S. DESIG-NATION	CONTRACTOR DRAWING & PART NO.	ALL SYMBOL DESIG. INVOLVED	NO. USED IN EQUIPMENT	ITEM NUMBER	BOX	QUAN.	BOX	QUAN.
O-127 AD-E	PULLEY: dial drive; CRS, tin pl; 2.000" diam x 1/4" thk; 0.375" bore; three 0.098" diam holes equally spaced on 0.625" rad to accom gear assem; (p/o O-127)	p/o O-127AD			Collins Rad part/dwg #504 3023 001	504 3023 001	O-127AD -E	1					
O-127 AD-F	RIVET, tubular: steel, cad pl; round head; 0.088" diam body; 5/32" lg barrel; (p/o O-127)	p/o O-127AD			Rivetco #R-3309-5/32	305 4522 00	O-127AD -F	3					
O-127 AE	PULLEY: drum; brass; 1.250" OD x 0.328" d; 0.1880" diam x 0.328" d bore; 0.204" wd x 0.060" d groove; pulley fixed w/ single #6-40 NF-2 tapped hole to accom set screw; (p/o O-127)	Drives kilocycle dial pointer			Collins Rad part/dwg #504 2954 001	504 2954 001	O-127AE	1					
O-127 AF	POST, spacing: aluminum, chromate dipped; cylindrical; 0.375" diam x 0.813" lg; both ends tapped #8-32 NC-2 x 1/4" d for mtg; (p/o O-127)	Spaces mounting O-127A-A to O-127 AC-A			Collins Rad part/dwg #505 2128 001	505 2128 001	O-127AF	2					
O-127 AG	POST, spacing: aluminum, chromate dipped; undercut to 0.2497" diam for 0.093" both ends; cylindrical; 0.375" OD x 1.000" lg; both ends tapped #6-32 NC-2 x 1/4" d for mtg; (p/o O-127)	Spaces mounting O-127A-A to O-127AC-A			Collins Rad part/dwg #505 2127 001	505 2127 001	O-127AG	2					

O-127 AH	SCREW, machine: Phillips drive; recessed pan head, unfinished, cold headed; SS type #430, plain finish; #8-32 NC-2 thd; 5/16" lg; thd to head; head 0.322" diam x 0.115" thk; (p/o O-127)	Secures O-127AF O-127AC-A and O-127A-A	Pheoll Mfg. Co. (Comm.)	343 0186 00	O-127AH	4	
O-127 AJ	WASHER, flat: SS type #302; round, 0.1875" ID, 0.375" OD, 0.036" thk; (p/o O-127)	Secures O-127AF to O-127AC-A and O-127A-A	Wrought Washer (Comm.)	310 6380 00	O-127AJ	4	
O-127 AK	SCREW, machine: Phillips drive; recessed pan head, unfinished, cold headed; SS type #430 plain finish; #6-32 NC-2; 1/4" lg; thd to head; head 0.270" diam x 0.097" thk; (p/o O-127)	Secures O-127AG to O-127AC-A and O-127A-A	Pheoll Mfg. Co. (Comm.)	343 0167 00	O-127AK	4	
O-127 AL	WASHER, flat: SS, plain finish; round, 0.147" ID, 3/8" OD, 0.031" thk; #6 large; (p/o O-127)	Secures O-127AG to O-127AC-A and O-127A-A	Wrought Washer (Comm.)	310 6360 00	O-127AL	4	
O-127 AM	WASHER, lock: SS type #410; round, 21/64" OD, 0.020" thk; shakeproof type, tw int teeth; for #8 screw; (p/o O-127)	Secures O-127AF to O-127AC-A and O-127A-A	Shake-proof catalog #1708-00	373 0003 00	O-127 AM	4	
O-127 AN	WASHER, lock: SS type #410, plain finish; round, 0.150" ID, 0.285" OD, 0.018" thk; shakeproof type, tw int teeth; to fit #6 machine screw; (p/o O-127)	Secures O-127AG to O-127AC-A and O-127A-A	Shake-proof #1706-00	373 0001 00	O-127AN	6	

PARTS								NO. USED IN EQUIPMENT	SPARE PARTS				
										EQUIPMENT		STOCK	
SYMBOL DESIG.	NAME OF PART AND DESCRIPTION	FUNCTION	JAN AND (NAVY TYPE) NO.	STANDARD NAVY & (SIGNAL CORPS) STOCK NO.	MFGR. AND MFGR'S. DESIG-NATION	CONTRACTOR DRAWING & PART NO.	ALL SYMBOL DESIG. INVOLVED		ITEM NUMBER	BOX	QUAN.	BOX	QUAN.
O-127 AO (qty 5)	SCREW: Same as H-125 (p/o O-127)	Secures O-127AD, O-127H, O-127M and O-127AE											
O-127 AP	WASHER, flat: SS type #302-304; round, 0.250" ID, 0.406" OD, 0.0125" thk; (p/o O-127)	Spaces O-127X against O-127A-R and O-127Y			Collins Rad part/dwg #500 1112 003	500 1112 003	O-127 AP	4					
O-127 AQ	PIN: Same as O-127AC-K	Retains O-127B											
O-127 AR	CABLE, mechanical: plastic covered cable c/o SS core coated w/ nylon, 0.032" OD; seven 0.018" diam strands; 35 lb breaking strength; 8-1/2" lg o/a; terminated on one end w/ loop encl in brass sleeve, 1/4" lg o/a; loop on end stripped of nylon (p/o O-127)	Prevents backlash in gear system		N16-C-10881-1199 (2Z1588-13)	Berkley Fly Co. to Collins Rad spec #432 1011 00	432 1011 00	O-127 AR	2			2		20

O-127 AS	SPRING: Helical; gear box gear loading spring; 0.029" diam spring wire, type 302 SS; 0.574" lg x 0.125" OD o/a; 13-3/4 turns; hook term one ea end; hook term mtg one ea end, end of hook 0.035" from body of spring; temp range plus 75°C to minus 60°C; (p/o O-127)	Loads O-127AR			Collins Rad part/ dwg #502 1158 002	502 1158 002	O-127AS	1			1		10
O-128	COUPLING, rigid: sleeve type; 0.2505" diam shaft size ea end; two #6-40 NF-2 set screw mtg holes; 1" lg x 1/2" diam o/a; SS; (p/o O-139)	p/o I-f drive shaft assembly coupling		*N17-C-98432-4638 (2Z3273-213)	Collins Rad part/dwg #504 4174 001	504 4174 001	O-128	1					
O-129	Not used												
O-130	COUPLING: Same as O-104	Coupler extension shaft to E-174											
O-131	SHAFT: for mtg 6 sw; phenolic, grade LTS-E4; round, w/ 2 flatted sides; 10" lg x 0.375" diam o/a, 0.310" wd at flatted portion	R-f switch shaft		*N16-S-21053-3126 (2Z8204-160)	Collins Rad part/dwg #504 7766 001	504 7766 001	O-131	1					
O-132	SHAFT: for mtg 2 sw; phenolic, grade LTS-E4; round, w/ 2 flatted sides; 3-3/4" lg x 0.375" diam o/a, 0.310" wd at flatted portion	Crystal switch shaft		*N16-S-20995-3338 (2Z8204-161)	Collins Rad part/dwg #504 7765 001	504 7765 001	O-132	1					

*Not furnished as a maintenance part. If failure occurs, do not request replacement unless the item cannot be repaired or fabricated.

PARTS									SPARE PARTS				
										EQUIPMENT		STOCK	
SYMBOL DESIG.	NAME OF PART AND DESCRIPTION	FUNCTION	JAN AND (NAVY TYPE) NO.	STANDARD NAVY & (SIGNAL CORPS) STOCK NO.	MFGR. AND MFGR'S. DESIG-NATION	CONTRACTOR DRAWING & PART NO.	ALL SYMBOL DESIG. INVOLVED	NO. USED IN EQUIPMENT	ITEM NUMBER	BOX	QUAN.	BOX	QUAN.
O-133	SHAFT: crystal phasing; SS type 303; 1.937" lg x .2500" diam o/a	Crystal phasing shaft extension		*N16-S-20914-6129 (2Z8203-701)	Collins Rad part/dwg #505 2110 001	505 2110 001	O-133	1					
O-134	SHAFT: extension; SS; round; 1.375" lg x 0.250" diam; mts in coupling	Crystal filter shaft extension		*N16-S-20897-4382 (2Z8204-162)	Collins Rad part/dwg #504 2917 001	504 2917 001	O-134	1					
O-135	Not used												
O-136	COLLAR, shaft: for tuning knob tension; SS; circular; 1/2" OD x 1/4" ID x .221" thk; two #6-40 NF-2 tapped holes at 90 deg	For tuning knob tension		*N16-C-599931-124 (2Z2935-93)	Collins Rad part/dwg #500 2772 001	500 2772 001	O-136	1					
O-137	SHAFT: extension; steel, cad pl; round; 4-3/4" lg x 1/4" diam; mts in coupling; opposite sides flatted 4-1/8", 0.015" x 45 deg cham both ends	Shaft for switches S-110, S-111		*N16-S-21011-2786 (2Z8204-163)	Collins Rad part/dwg #504 2914 001	504 2914 001	O-137	1					

O-138	SHAFT: extension; SS; round; 7.875" lg x .249" diam; mts in flexible coupling	Bfo pitch adjustment		*N16-S-21038-2216 (2Z8202-68)	Collins Rad part/dwg #504 2918 001	504 2918 001	O-138	1					
O-139	COUPLING, rigid: sleeve type; .2505" diam shaft size ea end; two #6-40 NF-2 set screw mtg holes; 1" lg x 1/2" diam o/a, shaft 8.234" lg extension from coupling; SS (Incl O-128)	p/o I-f drive shaft assembly		*N17-C-98431-8553 (2Z8203-493)	Collins Rad part/dwg #504 4173 001	504 4173 001	O-139	1					
O-140	SHAFT: calibrate; SS type 303; 1-1/8" lg x .250" diam o/a; slotted one end .060" wd	Extension shaft for C-224		*N16-S-20889-4562 (2Z8203-702)	Collins Rad part/dwg #505 2705 001	505 2705 001	O-140	1					
O-141	COUPLING: Same as O-104	Coupler on shaft extension to C-230											
O-142	RECEIVER SUBASSEMBLY: vernier drive assem; staked assem incl 2 retaining ring washers, Collins Rad part/dwg #502 1169 002, 1 vernier shaft, Collins Rad part/dwg #504 3083 001, 2 drive washers, Collins Rad part/dwg #505 1735 001, 2 washers Collins Rad part/dwg #505 1736 001; various materials and finishes; irregular shape; 1-3/32" lg x 0.812" diam o/a; .092" diam shaft for mtg (p/o Z-118)	Vernier drive assembly		N16-R-33591-1303 (2C4180-388-1)	Collins Rad part/dwg #505 1737 002	505 1737 002	O-142	1			1		6

*Not furnished as a maintenance part. If failure occurs, do not request replacement unless the item cannot be repaired or fabricated.

PARTS								NO. USED IN EQUIPMENT	SPARE PARTS				
										EQUIPMENT		STOCK	
SYMBOL DESIG.	NAME OF PART AND DESCRIPTION	FUNCTION	JAN AND (NAVY TYPE) NO.	STANDARD NAVY & (SIGNAL CORPS) STOCK NO.	MFGR. AND MFGR'S. DESIGNATION	CONTRACTOR DRAWING & PART NO.	ALL SYMBOL DESIG. INVOLVED		ITEM NUMBER	BOX	QUAN.	BOX	QUAN.
O-143	DELETED See O-127AS												
O-144	PULLEY: dial drive; CRS, tin pl; circular; 5/8" diam x .193" thk; .127" diam hole (p/o A-120)	Dial drive pulley, small		N16-P-850001-135 (6Z7678-3)	Ucinite catalog #99400	281 0020 00	O-144, O-162	2					
O-145	PULLEY: dial drive; CRS, tin pl; circular; 2.125" diam x 1/4" thk; .375" diam hole	Dial drive pulley, large		N16-P-850001-134 (6Z7678-2)	Gray Stamping & Mfg. Co. catalog #SP3-20	281 0052 00	O-145	1					
O-146	COUPLING, flexible: for 1/4" diam shafts; steel, cad pl and isolantite; irregular shape; 1-1/4" wd x 1-1/4" h x 23/32" d; mts on two 1/4" diam shafts, has two #6-32 Fil H set screws	Crystal phasing coupler		N17-C-98378-4532 (2Z3295-121)	Cardwell type A	015 3030 00	O-146	1					
O-147	SPRING: loop type; for slug table assem; SS wire .030" diam unfinished; .229" lg x .225" wd x .030" thk; does not mount; compression type (p/o A-112)	Locking spring for slug table assemblies		*N17-S-46799-6826 (2Z8877.614)	Collins Rad part/dwg #502 6005 002	502 6005 002	O-147, O-148, O-149, O-150, O-151, O-152, O-153, O-154,	13					

							O-155, O-156, O-157, O-158, O-159						
O-148	SPRING: Same as O-147 (p/o A-112)	Locking spring for slug table assemblies											
O-149	SPRING: Same as O-147 (p/o A-112)	Locking spring for slug table assemblies											
O-150	SPRING: Same as O-147 (p/o A-112)	Locking spring for slug table assemblies											
O-151	SPRING: Same as O-147 (p/o A-112)	Locking spring for slug table assemblies											
O-152	SPRING: Same as O-147 (p/o A-112)	Locking spring for slug table assemblies											
O-153	SPRING: Same as O-147 (p/o A-112)	Locking spring for slug table assemblies											

*Not furnished as a maintenance part. If failure occurs, do not request replacement unless the item cannot be repaired or fabriacted

TABLE 8-4 COMBINED PARTS AND SPARE PARTS LIST

PARTS								SPARE PARTS				
									EQUIPMENT		STOCK	
SYMBOL DESIG.	NAME OF PART AND DESCRIPTION	FUNCTION	JAN AND (NAVY TYPE) NO.	STANDARD NAVY & (SIGNAL CORPS) STOCK NO.	MFGR. AND MFGR'S. DESIG-NATION	CONTRACTOR DRAWING & PART NO.	ALL SYMBOL DESIG. INVOLVED	NO. USED IN EQUIPMENT	ITEM NUMBER	BOX	QUAN.	BOX	QUAN.
O-154	SPRING: Same as O-147	Locking spring for slug table assemblies											
O-155	SPRING: Same as O-147	Locking spring for slug table assemblies											
O-156	SPRING: Same as O-147	Locking spring for slug table assemblies											
O-157	SPRING: Same as O-147	Locking spring for slug table assemblies											
O-158	SPRING: Same as O-147	Locking spring for slug table assemblies											

O-159	SPRING: Same as O-147	Locking spring for slug table assemblies											
O-160	DELETED See O-127P												
O-161	DELETED See O-127P												
O-162	PULLEY: Same as O-144 (p/o A-120)	Dial drive pulley small											
O-163	CABLE, mechanical: SS, nylon coated; 7 strands; .015" diam; 20 pound breaking strength; 1-1/2" oz per 100 ft	Dial cable		*N22-C-1840 (2Z8877.406)	Berkley Fly Co. to Collins Rad spec #432 1009 00	432 1009 00	O-163	6 ft.					
	OR												
O-163 A	CABLE, mechanical: plastic covered cable c/o SS core coated w/ nylon, 0.032" OD; 7 strands; 10 lb breaking strength; dial cable; 19-25/32" lg o/a; terminated on one end w/ loop encl in brass sleeve, 3/8" lg o/a; loop on end stripped of nylon coating	Dial cable		N16-C-10881-1156 (2Z1588-16)	Berkley Fly Co. to Collins Rad spec #432 1014 00	432 1014 00	O-163A	1					

*Not furnished as a maintenance part. If failure occurs, do not request replacement unless the item cannot be repaired or fabricated.

PARTS								SPARE PARTS				
									EQUIPMENT		STOCK	
SYMBOL DESIG.	NAME OF PART AND DESCRIPTION	FUNCTION	JAN AND (NAVY TYPE) NO.	STANDARD NAVY & (SIGNAL CORPS) STOCK NO.	MFGR. AND MFGR'S. DESIG-NATION	CONTRACTOR DRAWING & PART NO.	ALL SYMBOL DESIG. INVOLVED	NO. USED IN EQUIPMENT	ITEM NUMBER	BOX	QUAN.	BOX	QUAN.
	AND												
O-163 B	CABLE, mechanical: plastic covered cable c/o SS core coated w/ nylon, 0.032" OD; 7 strands; 10 lb breaking strength; dial cable; 36-5/8" lg o/a; terminated on one end w/ loop encl in brass sleeve, 3/8" lg o/a; loop on end stripped of nylon coating	Dial cable		N16-C-10881-1166 (2Z158 8-14)	Berkley Fly Co. to Collins Rad spec #432 1015 00	432 1015 00	O-163B	1					
O-164	DELETED See O-127AD-D												
O-165	DELETED See O-127AD-D												
	CONNECTOR												
P-101	CONNECTOR, plug: 2 parallel blade male cont; straight 1.156" lg less cont x 1.531" diam; 10 amp 250 v, 15 amp 125 v; cylindrical armored body; .296" to .562" diam cable opening; incl cable clamp	A-c plug		N17-C-71426-2729 (6Z1727	Hubbell part #7057	368 0040 00	P-101	1					

RESISTORS

R-001	RESISTOR, fixed: comp; JAN type #RC20BF334K (p/o Z-101)	Grid leak resistor	RC20BF-334K	N16-R-50759-811 (3RC20BF334K)	JAN-R-11	R-001 R-108	2	
R-002	RESISTOR, fixed: comp; JAN type #RC20BF102K (p/o Z-101)	Plate load resistor	RC20BF-102K	N16-R-49922-811 (3RC20BF102K)	JAN-R-11	R-002, R-179	2	
R-003	RESISTOR, fixed: comp; JAN type #RC30BF273K (p/o Z-101)	Voltage dropping resistor	RC30BF-273K	N16-R-50400 231 (3RC30BF273K)	JAN-R-11	R-003	1	
R-004	RESISTOR, fixed: comp; JAN type #RC20BF152K (p/o Z-101)	Decoupling resistor	RC20BF-152K	N16-R-49967-811 (3RC20BF152K)	JAN-R-11	R-004	1	
R-005	RESISTOR, fixed: comp; JAN type #RC20BF154K (p/o Z-101)	Grid leak resistor	RC20BF-154K	N16-R-50678-811 (3RC20BF154K)	JAN-R-11	R-005	1	
R-006	RESISTOR, fixed: comp; JAN type #RC30BF103K (p/o Z-101)	Plate load resistor	RC30BF-103K	N16-R-50283-231 (3RC30BF103K)	JAN-R-11	R-006, R-105	2	

PARTS								SPARE PARTS				
									EQUIPMENT		STOCK	
SYMBOL DESIG.	NAME OF PART AND DESCRIPTION	FUNCTION	JAN AND (NAVY TYPE) NO.	STANDARD NAVY & (SIGNAL CORPS) STOCK NO.	MFGR. AND MFGR'S. DESIG-NATION	CONTRACTOR DRAWING & PART NO.	ALL SYMBOL DESIG. INVOLVED	NO. USED IN EQUIPMENT	ITEM NUMBER	BOX	QUAN.	BOX	QUAN.
R-007	RESISTOR, fixed: comp; JAN type #RC20BF393K (p/o Z-101)	Screen dropping resistor	RC20BF-393K	N16-R-50444-811 (3RC20 BF393K)		JAN-R-11	R-007	1					
R-1	RESISTOR	p/o T-106											
R-101	RESISTOR, fixed: comp; JAN type #RC20BF105K	V-101 r-f grid return	RC20BF-105K	N16-R-50975-811 (3RC20 BF105K)		JAN-R-11	R-101	1					
R-102	RESISTOR, fixed: comp; JAN type #RC20BF104K	V-101 avc isolation	RC20BF-104K	N16-R-50633-811 (3RC20 BF104K)		JAN-R-11	R-102, R-112, R-115, R-120, R-123, R-130, R-145, R-157, R-167, R-178	10					
R-103	Not used												

R-104	RESISTOR, fixed: comp; JAN type #RC20BF333K	V-101 screen isolation	RC20BF-333K	N16-R-50417-811 (3RC20 BF333K)			JAN-R-11	R-104, R-114, R-151, R-161	4							
R-105	RESISTOR: Same as R-006	V-101 band 1 plate														
R-106	RESISTOR, fixed: comp; JAN type #RC20BF682K	V-101 plate isolation	RC20BF-682K	N16-R-50201-811 (3RC20 BF682K)			JAN-R-11	R-106	1							
R-107	RESISTOR, fixed: comp; JAN type #RC20BF471K	V-102 cathode	RC20BF-471K	N16-R-49769-811 (3RC20 BF471K)			JAN-R-11	R-107, R-111, R-127	3							
R-108	RESISTOR: Same as R-001	V-102 injection grid														
R-109	RESISTOR, fixed: comp; JAN type #RC30BF473K (p/o Z-116)	V-102 screen dropping	RC30BF-473K	N16-R-50481-231 (3RC30 BF473K)			JAN-R-11	R-109	1							
R-110	RESISTOR, fixed: comp; JAN type #RC20BF222K (p/o Z-116) (Cont.)	V-102 plate isolation	RC20BF-222K	N16-R-50012-811 (3RC20 BF222K			JAN-R-11	R-110, R-116, R-124, R-129, R-135, R-138,	9							

PARTS								SPARE PARTS				
									EQUIPMENT		STOCK	
SYMBOL DESIG.	NAME OF PART AND DESCRIPTION	FUNCTION	JAN AND (NAVY TYPE) NO.	STANDARD NAVY & (SIGNAL CORPS) STOCK NO.	MFGR. AND MFGR'S. DESIG-NATION	CONTRACTOR DRAWING & PART NO.	ALL SYMBOL DESIG. INVOLVED	NO. USED IN EQUIPMENT	ITEM NUMBER	BOX	QUAN.	BOX	QUAN.
R-110	(Cont.)						R-162, R-168, R-180						
R-111	RESISTOR: Same as R-107	V-103 cathode											
R-112	RESISTOR: Same as R-102	V-103 in-jection grid											
R-113	RESISTOR, fixed: comp; JAN type #RC30BF333K (p/o Z-116)	V-103 screen	RC30BF-333K	N16-R-50418-231 (3RC30 BF333K)		JAN-R-11	R-113, R-128	2					
R-114	RESISTOR: Same as R-104 (p/o Z-Z-117)	V-105 screen											
R-115	RESISTOR: Same as R-102 (p/o Z-117)	V-105 grid leak											
R-116	RESISTOR: Same as R-110 (p/o Z-117)	V-105 band 2-12 plate											
R-117	RESISTOR, fixed: comp; JAN type #RC20BF473K (p/o Z-117)	V-105 band 14-30 isolation	RC20BF-473K	N16-R-50480-811 (3RC20 BF473K)		JAN-R-11	R-117, R-134, R-137, R-141, R-146	5					

R-118	RESISTOR, fixed: comp; JAN type #RC20BF684K	100 kc oscillator grid	RC20BF-684K	N16-R-50894-811 (3RC20 BF684K)		JAN-R-11	R-118	1				
R-119	RESISTOR, fixed: comp; JAN type #RC20BF472K	100 kc oscillator unit	RC20BF-472K	N16-R-50129-811 (3RC20 BF472K)		JAN-R-11	R-119, R-132	2				
R-120	RESISTOR: Same as R-102	100 kc oscillator screen										
R-121	RESISTOR, fixed: comp; JAN type #RC20BF224K	100 kc oscillator plate	RC20BF-224K	N16-R-50714-811 (3RC20 BF224K)		JAN-R-11	R-121, R-156, R-158, R-159, R-177	5				
R-122	RESISTOR, fixed: comp; JAN type #RC20BF103K	100 kc oscillator isolation	RC20BF-103K	N16-R-50282-811 (3RC20 BF103K)		JAN-R-11	R-122, R-133, R-136, R-139	4				
R-123	RESISTOR: Same as R-102	V-106 grid										
R-124	RESISTOR: Same as R-110 (p/o Z-114)	Variable i-f plate isolation										

PARTS								SPARE PARTS				
									EQUIPMENT		STOCK	
SYMBOL DESIG.	NAME OF PART AND DESCRIPTION	FUNCTION	JAN AND (NAVY TYPE) NO.	STANDARD NAVY & (SIGNAL CORPS) STOCK NO.	MFGR. AND MFGR'S. DESIG-NATION	CONTRACTOR DRAWING & PART NO.	ALL SYMBOL DESIG. INVOLVED	NO. USED IN EQUIPMENT	ITEM NUMBER	BOX	QUAN.	BOX	QUAN.
R-125	RESISTOR, fixed: comp; JAN type #RC20BF474K	T-102 shunt	RC20BF-474K	N16-R-50822-811 (3RC20 BF474K)		JAN-R-11	R-125, R-144, R-152, R-153, R-172	5					
R-126	RESISTOR, fixed: comp; JAN type #RC20BF273K	V-107 screen bleeder	RC20BF-273K	N16-R-50399-811 (3RC20 BF273K)		JAN-R-11	R-126	1					
R-127	RESISTOR: Same as R-107 (p/o Z-114)	V-106 cathode											
R-128	RESISTOR: Same as R-113 (p/o Z-114)	V-106 screw											
R-129	RESISTOR: Same as R-110	V-106 plate isolation											
R-130	RESISTOR: Same as R-102 (p/o Z-113)	Crystal filter selectivity											
R-131	RESISTOR, fixed: comp; JAN type #RC20BF223K (p/o Z-113)	Crystal filter selectivity	RC20BF-223K	N16-R-50372-811 (3RC20 BF223K)		JAN-R-11	R-131	1					

R-132	RESISTOR: Same as R-119 (p/o Z-113)	Crystal filter selectivity													
R-133	RESISTOR: Same as R-122	V-107 avc isolation													
R-134	RESISTOR: Same as R-109	V-107 screen													
R-135	RESISTOR: Same as R-110	V-107 plate isolation													
R-136	RESISTOR: Same as R-122	V-108 avc isolation													
R-137	RESISTOR: Same as R-109	V-108 screen													
R-138	RESISTOR: Same as R-110	V-108 plate isolation													
R-139	RESISTOR: Same as R-122	V-109 avc isolation													
R-140	RESISTOR, variable: comp; 100 ohm p/m 20%; 2 w min at 70°C; 3 term; metal case 1-3/32" diam x 19/32" d, closed case; round slotted shaft, metal, .250" diam x 5/8" lg from mtg surface; linear taper (A per appendix B); ins cont arm, w/o off position; normal torque, 3/8" lg x 3/8"-32 NEF-2, non-turn device located on 17/32" rad at 9 o'clock	Meter zero control		N16-R-87023-9738 (3Z710-66)	AB type J	380 0120 00	R-140	1							
R-141	RESISTOR: Same as R-109	V-109 screen													

PARTS								SPARE PARTS				
									EQUIPMENT		STOCK	
SYMBOL DESIG.	NAME OF PART AND DESCRIPTION	FUNCTION	JAN AND (NAVY TYPE) NO.	STANDARD NAVY & (SIGNAL CORPS) STOCK NO.	MFGR. AND MFGR'S. DESIG-NATION	CONTRACTOR DRAWING & PART NO.	ALL SYMBOL DESIG. INVOLVED	NO. USED IN EQUIPMENT	ITEM NUMBER	BOX	QUAN.	BOX	QUAN.
R-142	RESISTOR, fixed: comp; JAN type #RC30BF222K	V-109 plate isolation	RC30BF-222K	N16-R-50013-231 (3RC30 BF222K)		JAN-R-11	R-142	1					
R-143	RESISTOR, fixed: comp; JAN type #RC20BF100K	V-112 filter	RC20BF-100K	N16-R-49238-811 (3RC20 BF100K)		JAN-R-11	R-143	1					
R-144	RESISTOR: Same as R-125	Avc filter											
R-145	RESISTOR: Same as R-102	Avc rectifier load											
R-146	RESISTOR: Same as R-109 (p/o Z-118)	V-111 plate lead (avc)											
R-147	RESISTOR, fixed: comp; JAN type #RC20BF273J	Bias bleeder	RC20BF-273J	N16-R-50398-431 (3RC20 BF273J)		JAN-R-11	R-147, R-169	2					

R-148	RESISTOR, variable: comp; 10,000 ohm p/m 20%; 2 w min at 70°C; 3 term; metal case 1-3/32" diam x 19/32" d, closed case; round shaft, metal, .250" diam x 1" lg from mtg surface; linear taper (A per appendix B); ins cont arm, w/o off position; normal torque, 3/8" lg x 3/8" - 32 NEF-2, non-turn device located on 17/32" rad at 9 o'clock (p/o Z-118)	R-F gain control		N16-R-87682-5242 (3Z7410-210)	AB type J	380 0118 00	R-148	1						
R-149	RESISTOR; fixed: comp; JAN type #RC20BF821K	Minimum bias	RC20BF-821K	N16-R-49876-431 (3RC20BF821J)		JAN-R-11	R-149	1						
R-150	RESISTOR, fixed: comp; JAN type #RC20BF683K	Diode load (top)	RC20BF-683K	N16-R-50552-811 (3RC20BF683K)		JAN-R-11	R-150	1						
R-151	RESISTOR: Same as R-104	Diode load (bottom)												
R-152	RESISTOR: Same as R-125	Noise limiter filter												
R-153	RESISTOR: Same as R-125	Noise limiter load												

PARTS								SPARE PARTS				
									EQUIPMENT		STOCK	
SYMBOL DESIG.	NAME OF PART AND DESCRIPTION	FUNCTION	JAN AND (NAVY TYPE) NO.	STANDARD NAVY & (SIGNAL CORPS) STOCK NO.	MFGR. AND MFGR'S. DESIG-NATION	CONTRACTOR DRAWING & PART NO.	ALL SYMBOL DESIG. INVOLVED	NO. USED IN EQUIPMENT	ITEM NUMBER	BOX	QUAN.	BOX	QUAN.
R-154	RESISTOR, variable: comp; 500,000 ohm p/m 20%; 2 w min at 70°C; 3 term; metal case 1-3/32" diam x 19/32" d, closed case; round shaft, metal, .250" diam x 1" lg from mtg surface; 10% clockwise log taper; ins cont arm, w/o off position; normal torque, 3/8" lg x 3/8"-32 NEF-2, non-turn device located on 17/32" rad at 9 o'clock (p/o Z-118)	Audio gain control		N16-R-88182-5359 (3Z74 98-50. 183)	AB type J	380 0119 00	R-154	1					
R-155	RESISTOR, fixed: comp; JAN type #RC20BF332K	V-112 cathode 8	RC20BF-332K	N16-R-50066-811 (3RC20 BF332K)		JAN-R-11	R-155	1					
R-156	RESISTOR: Same as R-121	V-112 plate 6											
R-157	RESISTOR: Same as R-102	V-113 grid leak											
R-158	RESISTOR: Same as R-121	T-103 primary shunt											

R-159	RESISTOR: Same as R-121	T-103 secondary shunt											
R-160	RESISTOR, fixed: comp; JAN type #RC30BF104K	V-114 Bfo screen	RC30BF-104K	N16-R-50634-231 (3RC30 BF104K)			JAN-R-11	R-160	1				
R-161	RESISTOR: Same as R-104	V-114 bfo plate											
R-162	RESISTOR: Same as R-110	V-114 bfo isolation											
R-163	RESISTOR; fixed: comp; JAN type #RC20BF161J	Meter M-101 series resistance	RC20BF-161J	N16-R-49633-431 (3RC20 BF161J)			JAN-R-11	R-163	1				
R-164	RESISTOR, fixed: WW; JAN type #RW30F121	Negative voltage resistance	RW30F 121	N16-R-65698-1686 (3RW18 921)			JAN-R-26	R-164, R-166	2				
R-165	RESISTOR, fixed: WW; JAN type #RW30F311	Negative voltage resistance	RW30F 311	N16-R-65806-3459 (3RW21 327)			JAN-R-26	R-165	1				
R-166	RESISTOR: Same as R-164	Negative voltage resistance											

PARTS								SPARE PARTS				
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SYMBOL DESIG.	NAME OF PART AND DESCRIPTION	FUNCTION	JAN AND (NAVY TYPE) NO.	STANDARD NAVY & (SIGNAL CORPS) STOCK NO.	MFGR. AND MFGR'S. DESIG-NATION	CONTRACTOR DRAWING & PART NO.	ALL SYMBOL DESIG. INVOLVED	NO. USED IN EQUIPMENT	ITEM NUMBER	BOX	QUAN.	BOX	QUAN.
R-167	RESISTOR: Same as R-102	V-111 avc feedback											
R-168	RESISTOR: Same as R-110	Bias filter											
R-169	RESISTOR: Same as R-147	V-108 screen bleeder											
R-170	RESISTOR, fixed: comp; JAN type #RC20BF101K	Meter M-101 load	RC20BF-101K	N16-R-49580-811 (3RC20BF101K)		JAN-R-11	R-170	1					
R-171	RESISTOR, fixed: comp; JAN type #RC20BF124K	V-111 avc feed back	RC20BF-124K	N16-R-50651-811 (3RC20BF124K)		JAN-R-11	R-171	1					
R-172	RESISTOR: Same as R-125	Static drain											
R-173	RESISTOR, fixed: comp; JAN type #RC42BF182J (p/o Z-112)	Audio meter series	RC42BF-182J	N16-R-49985-126 (3RC42BF182J)		JAN-R-11	R-173	1					

R-174	RESISTOR, fixed: comp; JAN type #RC42BF102K	B plus isolation	RC42BF-102K	N16-R-49923-531 (3RC42 BF102K)	JAN-R-11	R-174		1	
R-175	Not used								
R-176	Not used								
R-177	RESISTOR: Same as R-121	V-111 grid voltage divider							
R-178	RESISTOR: Same as R-102	V-111 grid voltage divider							
R-179	RESISTOR: Same as R-002	V-111 cathode load							
R-180	RESISTOR: Same as R-110	V-111 plate							
R-181	RESISTOR; fixed: WW; JAN type #RW32F402	V-116 plate load	RW32F402	N16-R-66214-5516 (3RW27 907)		JAN-R-26	R-181	1	
R-182	RESISTOR, fixed: comp; JAN type #RC20BF221K (p/o Z-112)	M-101 rectifier loading	RC20BF-221K	N16-R-49661-811 (3RC20 BF221K)		JAN-R-11	R-182	1	

PARTS								NO. USED IN EQUIPMENT	SPARE PARTS				
										EQUIPMENT		STOCK	
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	SWITCHES												
S-101	SWITCH SECTION, rotary: 1 circuit, 1 pole, 17 throws; phenolic insulation, spring brass silver pl clips, hard brass silver pl blades; irregular shape; 2-15/16" lg x 1-31/32" wd x 1/16" thk o/a; 2 holes to pass #5 screw 2" c to c, ctr hole 0.377" lg x 0.312" wd for shaft mtg	Antenna coil selecting		N17-S-91745-1018 (3Z990 3E-10. 15)	Oak to Collins Rad spec #269 1271 00	269 1271 00	S-101, S-102, S-106, S-107, S-109	5			1		20
S-102	SWITCH SECTION: Same as S-101	R-f coil selecting											
S-103	SWITCH SECTION, rotary: 18 position (p/o rotary sw); phenolic insulation, spring brass silver pl clips, hard brass silver pl blades; irregular shape; 2-5/16" lg x 1-31/32" wd x 1/16" thk o/a; 2 holes to pass #5 screw 2" c to c, ctr hole 0.377" lg x 0.312" wd for shaft mtg	R-f amplifier plate coil selecting		N17-S-91737-1003 (3Z9903 E-10. 12)	Oak to Collins Rad spec #269 1273 00	269 1273 00	S-103, S-104, S-105	3			1		15

S-104	SWITCH SECTION: Same as S-103	Mixer grid coil selecting											
S-105	SWITCH SECTION: Same as S-103	Mixer plate circuit selecting											
S-106	SWITCH SECTION: Same as S-101	Mixer plate circuit selecting											
S-107	SWITCH SECTION: Same as S-101	Crystal oscillator harmonic selecting											
S-108	SWITCH SECTION, rotary: 2 circuit, 2 pole, 15 throws; phenolic insulation, spring brass silver pl clips, hard brass silver pl blades; irregular shape; 2-5/16" lg x 1-31/32" wd x 1/16" thk o/a; 2 holes to pass #5 screw 2" c to c, ctr hole 0.377" lg x 0.312" wd for shaft mtg (p/o Z-117)	Crystal selecting		N17-S-91817-1001 (3Z990 3E-10. 13)	Oak to Collins Rad spec #269 1272 00	269 1272 00	S-108	1			1		6
S-109	SWITCH SECTION: Same as S-101 (p/o Z-117)	Variable i-f selecting											
S-110	SWITCH SECTION, rotary: 12 position (p/o rotary sw); phenolic insulation, spring brass silver pl clips, hard brass silver pl blades; irregular shape; 1-7/8" lg x 1-5/8" wd x 1/16" thk o/a; 2 holes to pass #5 screw 1.562" c to c, ctr hole .250" lg x 0.1875" wd for shaft mtg	Variable i-f selecting		N17-S-91625-1003 (3Z990 3E-10. 14)	Oak to Collins Rad spec #269 1270 00	269 1270 00	S-110, S-111	2			1		10

PARTS									SPARE PARTS				
										EQUIPMENT		STOCK	
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S-111	SWITCH SECTION: Same as S-110	Variable i-f selecting											
S-112	SWITCH, rotary: 2 pole 2 position; one sect; silver pl spring brass clips; phenolic body; 1-33/64" h x 27/32" wd x 1/4" lg; shorting type cont; lug term; shaft 15/16" lg x 1/4" diam, 3/8"-32 NEF-2 x 3/8" lg bushing; flatted surface 1/2" from end of shaft (p/o Z-118)	Bfo ON-OFF		N17-S-59231-1101 (3Z9825-50.2)	Oak type #22	259 0380 00	S-112, S-115, S-116, S-118	4			1		15
S-113	SWITCH, rotary: 2 pole 3 position; one sect; silver pl spring brass clips; phenolic body; 5/8" lg x 1-17/32" h x 1-3/8" wd body; shorting type cont; lug term; shaft 1" lg x 1/4" diam, 3/8"-32 NEF-2 x 3/8" lg bushing (p/o Z-118)	Receiver ON-Standby-OFF		N17-S-61164-9410 (3Z9825-58.1198)	Centralab type #10C	259 0381 00	S-113	1			1		6
S-114	SWITCH, rotary: 1 pole 5 position; one sect; silver pl spring brass clips, silver pl brass rotor blades; phenolic insulation; 5/8" lg x 1-17/32" h x 1-3/8" wd body; shorting type cont; lug term; shaft 1-5/16" lg x 1/4" diam 3/8"-32 NS-2 x 3/8" lg bushing (p/o Z-113)	Selectivity switch		N17-S-60264-2291 (3Z9825-50.1)	Oak type #50	259 0379 00	S-114	1			1		6

S-115	SWITCH: Same as S-112 (p/o Z-118)	Avc ON-OFF											
S-116	SWITCH: Same as S-112 (p/o Z-118)	Noise limiter IN-OUT											
S-117	SWITCH, toggle: DPDT; JAN type #ST52R (p/o Z-118)	Meter switch	ST52R	N17-S-73956-7205 (3Z98 63-52R)		JAN-S-23	S-117	1					
S-118	SWITCH: Same as S-112 (p/o Z-118)	Calibrate ON-OFF											
	TRANSFORMERS												
T-101	TRANSFORMER, IF: 490 to 510 kc; xtal filter transformer; shielded; 1-7/16" lg x 1-7/16" wd x 2-5/8" h less term and mtg; iron core; tuned pri and secd; adj iron core tuning; 2 mtg studs on bottom located diagonally 1.312" c to c; 6 solder lug term on bottom (p/o Z-113)	Crystal filter input		N17-T-67651-6348 (2Z96 29-390)	Aladdin to Collins Rad spec #278 0093 00	278 0093 00	T-101	1			1		6
T-102	FILTER, bandpass: 490 kc to 510 kc min range (shunted by 65 mmf); 1-7/16" lg x 1-7/16" wd x 3-9/16" max h o/a; 270,000 ohm parallel impedance; rectangular metal case; two 3/8" studs on bottom diagonally located, 1.312" c to c; 2 solder lug term on top, 2 solder lug term on bottom; fp, core adj from top or bottom (p/o Z-113)	Crystal filter output		N16-F-32676-3110 (2Z4376 -110)	Aladdin to Collins Rad spec #278 0092 00	278 0092 00	T-102	1			1		6

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T-103	TRANSFORMER, IF: 500 kc; IF; shielded; 2" lg x 1-7/16" d x 3-1/2" h o/a; powdered iron core; tuned pri and secd; adj iron core tuning; two #4-40 NC-2 x 9/32" lg mtg studs 13/16" c to c, two #6-32 NC-2 spade bolts 5/16" lg, 1-5/16" c to c; six solder lug term in two rows 1-9/16" c to c on bottom	First i-f transformer		N17-T-67651-6436 (2Z9641.328)	Aladdin to Collins Rad spec #278 0090 00	278 0090 00	T-103, T-104, T-105	3			1		15
T-104	TRANSFORMER: Same as T-103	Second i-f transformer											
T-105	TRANSFORMER: Same as T-103	Third i-f transformer											
T-106	OSCILLATOR SUBASSEMBLY: BFO; incl 5 capacitors, (1) 1600 mmf mica, (1) 5-50 mmf var air, (2) 50 mmf ceramic, 1 is selected from a group for temperature compensating, (1) 100 mmf ceramic or silver mica, (1) resistor 100, 000 ohm and (1) coil w/ 81 turns #9-41 litz wire tapped at 31 turns; aluminum, iridite finish shield can; 480 kc to 520 kc freq range; rectangular; 2" lg x 1-7/16" wd x 4" h exluding term and mtg	Bfo		N16-C-76503-4001 (2C2798-17)	Std Coil Prod to Collins Rad spec #278 0091 00	278 0091 00	T-106	1			1		6

	attachments; two #4-40 NC-2 x 5/16" lg mtg studs diagonally spaced on 13/16" x 29/32" mtg/c, two #6-32 NC-2 spade bolts diagonally spaced on 1-5/16" x 1" mtg/c located on bottom of shield can (incl C-4.1 thru C-4.7)												
T-107	TRANSFORMER, AF: line type; pri 5000 ohm impedance, 1500 v test, secd 600 ohm impedance, 1500 v test tapped at 4 ohm; HS metal case; iron core; 1-7/8" lg x 1-3/4" wd x 3" h; 3 w operating level; turns ration 2.89:1; freq response, 100 cps p/m 3 db, 300 cps p/m 1 db, 1000 cps zero, 2500 cps p/m 1 db; 5000 cps p/m 3 db; five solder lug term 7/16" c to c; four #6-32 x 3/8" h studs on 1-5/16" x 1-1/16" mtg/c	Audio output transformer		N17-T-62668-9384 (2Z96 37.138)	Chi Trans #16229	677 0430 00	T-107	1			1		6
T-108	TRANSFORMER, power: fil and plate; input 115 v 60 cyc, single ph; 3 output wnd; secd #1, 5 v, 2 amp, secd #2, 6.3 v, 5 amp, secd #3, 700 v CT, .090 amp; impr w/ varnish, Irvington #100 and #9878 Potting compound X-118 Biwax; HS metal case; 3-15/16" lg x 4-3/4" wd excluding term; 11 solder lug ceramic bushing term on bottom; four #10-24 x 9/16" h studs	Power transformer		N17-T-74148-5001 (2Z9613 .719)	Chi Trans to Collins Rad spec #672 0429 00	672 0429 00	T-108	1			1		8

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	TERMINAL BOARDS												
TB-001	BOARD, terminal: general purpose; 3 brass solder lug term; term 3/8" between centers; phenolic board; 1-1/8" lg x 3/8" wd x 1/16" thk o/a; one 5/164" diam mtg hole in ctr of gnd lug (p/o Z-101)	Tie points		*N17-B-77533-8530 (3Z770-3.48)	Cinch to Collins Rad spec #306 0168 00	306 0168 00	TB-001, TB-101, TB-103	3					
TB-101	BOARD: Same as TB-001	Mounting for R-174											
TB-102	BOARD, terminal: general purpose; 3 brass solder lug term; term 3/8" between centers; phenolic board; 1-1/8" lg x 3/8" wd x 1/16" thk o/a; one .140" diam mtg hole in ctr of gnd lug	Mounting for R-133, C-186		*N17-B-77583-8548 (3Z770-3.49)	Cinch to Collins Rad spec #306 0001 00	306 0001 00	TB-102, TB-104, TB-106, TB-110, TB-111	5					
TB-103	BOARD: Same as TB-001	Mounting for R-129, C-189											
TB-104	BOARD: Same as TB-102	Mounting for R-134, R-135, R-126, R-170											

TB-105	BOARD, terminal: general purpose; 2 solder lug term, brass cad pl; term 3/8" between centers; phenolic board; 5/8" lg x 1/2" wd x 23/32" h; one .140" diam mtg hole	Mounting for R-136		*N17-B-77532-6280 (3Z770-2.102)	Cinch to Collins Rad spec #306 0006 00	306 0006 00	TB-105, TB-107, TB-109, TB-112	4				
TB-106	BOARD: Same as TB-102	Mounting for R-137, R-138, R-169										
TB-107	BOARD: Same as TB-105	Mounting for R-139, C-213										
TB-108	BOARD; terminal: general purpose; 2 brass solder lug term; term 3/8" between centers; phenolic board; 5/8" lg x 3/8" wd x 1/16" thk o/a; one .140" diam mtg hole in ctr of gnd lug	Mounting for R-163		*N17-B-77532-6294 (3Z770-2.79)	Cinch to Collins Rad part #306 0002 00	306 0002 00	TB-108	1				
TB-109	BOARD: Same as TB-105	Mounting for R-141										
TB-110	BOARD: Same as TB-102	Mounting, for R-149, R-147										
TB-111	BOARD: Same as TB-102	Tie point for tube heater circuits, Tie point for J-102 ground										

*Not furnished as a maintenance part. If failure occurs, do not request replacement unless the item cannot be repaired or fabricated.

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TB-112	BOARD: Same as TB-105	Mounting for C-207											
TB-113	BOARD, terminal: p/o audio meter board assem; six solder lug term; spaced in 2 rows 3/4" apart on 1/4" x 3/4" mtg/c; phenolic board; 1-1/4" lg x 1" wd x 3/32" thk; one .140" diam mtg hole (p/o Z-112)	Mounting for CR-101, R-182, R-173		*N17-B-77734-2105 (3Z770-6.132)	Collins Rad part/dwg #504 4995 001	504 4995 001	TB-113	1					
	TUBES												
V-001	TUBE, electron: JAN-6BA6; pent (p/o Z-101)	Variable frequency oscillator	JAN-6BA6	N16-T-56211 (2J6BA6)		JAN-1A	V-001, V-002, V-104, V-107, V-108, V-109, V-114	7			3		
V-002	TUBE: Same as V-001 (p/o Z-101)	Variable frequency oscillator											
V-101	TUBE, electron: JAN-6AK5; pent (p/o Z-101)	R-f amplifier	JAN-6AK5	N16-T-56191 (2J6AK5)		JAN-1A	V-101, V-105	2			1		

V-102	TUBE, electron: JAN-6BE6; pent (p/o Z-101)	First mixer	JAN-6BE6	N16-T-56211-50 (2J6 BE6)		JAN-1A	V-102, V-103, V-106	3		1	
V-103	TUBE: Same as V-102	Third mixer									
V-104	TUBE: Same as V-001	Crystal calibrator									
V-105	TUBE: Same as V-101	Crystal oscillator									
V-106	TUBE: Same as V-102	Second mixer									
V-107	TUBE: Same as V-001	First i-f									
V-108	TUBE: Same as V-001	Second i-f									
V-109	TUBE: Same as V-001	Third i-f									
V-110	TUBE, electron: JAN-12AX7; twin triode	Detector and avc rectifier	JAN-12AX7	N16-T-58241-60 (2J12 AX7)		JAN-1A	V-110, V-112	2		1	
V-111	TUBE: electron: JAN-12AU7; twin triode	Avc amplifier	JAN-12AU7	N16-T-58241 (2J12 AU7)		JAN-1A	V-111	1		1	

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V-112	TUBE: Same as V-110	Noise limiter first audio											
V-113	TUBE, electron: JAN-6AQ5; beam power amplr	Audio output	JAN-6AQ5	N16-T-56198 (2J6 AQ5)		JAN-1A	V-113	1			1		
V-114	TUBE: Same as V-001	Bfo											
V-115	TUBE, electron: JAN-5V4G; rectifier	Power supply rectifier	JAN-5V4G	N16-T-55474 (2J5V 4G)		JAN-1A	V-115	1			1		
V-116	TUBE, electron: JAN-OA2; v rectifier	Voltage regulator	JAN-OA2	N16-T-52001 (2JOA2)		JAN-1A	V-116	1			1		
	CABLE AND WIRE												
W-101	CABLE, RF: RG-58/U; coaxial; 53.5 ohm impedance, 29 mmf/ft; 1,900 v RMS; #20 AWG solid plain copper wire; .195" OD, single braid of #36 AWG tinned copper wire, jacket of syn resin outer	R-f trans-mission line	RG-58/U	N15-C-12201-50 (1F425-58)		JAN-C-17	W-101	4.5'					

	cond; solid type A dielectric 0.116" diam; 0.195" OD, jacket of syn resin													
W-102	Not used													
W-103	SPRING: nylon; fp; 45 lb breaking strength; approx 3660 feet per lb; 8 oz spools, approx 1830 feet per spool; lacing	Cable lacing		N21-C-210-5525 (6Z8571-3)	Belding-Corticelli type Nymo, catalog #N-350	435 1011 00	W-103	25'						
W-104	WIRE, electrical: ins; #22 AWG cond; SD copper, tinned; stranded, seven #30 AWG strands; thermoplastic ins, extruded nylon jacket; 1000 v working; color coded white w/ brown tracer; fp	Hookup		N15-W-2535-1620 (1B822.90)	Surprenant Elec catalog #R-730N-A10	439 1152 00	W-104	12'						
W-105	WIRE, electrical: ins; #22 AWG cond; SD copper, tinned; stranded, seven #30 AWG strands; thermo plastic ins; extruded nylon jacket; 1000 v working; fp; color coded white w/ blue tracer	Hookup		N15-W-2535-1615 (1B822.94)	Surprenant Elec catalog #R-730NA10	439 1156 00	W-105	12'						
W-106	WIRE, electrical: ins; #22 AWG cond; SD copper, tinned; stranded, 7 #30 AWG strands; thermoplastic ins; extruded nylon jacket; 1000 v working; fp; color coded white w/ 1st tracer black, 2nd tracer green	Hookup		N15-W-2535-1609 (1B822.95)	Surprenant Elec catalog #R-730N-A10	439 1159 00	W-106	1'						

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W-107	WIRE, electrical: ins; #22 AWG cond; SD copper, tinned; stranded, seven #30 AWG strands; thermo-plastic ins, extruded nylon jacket; 1000 v working; fp; color coded white w/ 1st tracer orange, 2nd tracer green	Hookup		N15-W-2535-1637 (1B822 . 98)	Surpre-nant Elec catalog #R-730N -A10	439 1168 00	W-107	12'					
W-108	WIRE, electrical: ins; #22 AWG cond; SD copper wire, stranded, seven #30 AWG strands; thermoplastic ins, extruded nylon jacket; 1000 v working; fp; color coded white w/ 1st tracer green, 2nd tracer blue	Hookup		N15-W-2535-1631 (1B822 . 96)	Surpre-nant Elec catalog #R-730N -A10	439 1170 00	W-108	12'					
W-109	WIRE, electrical: ins; #18 AWG cond; SD copper, tinned; stranded, seven #26 AWG strands; thermo-plastic ins, extruded nylon jacket; 1000 v working; fp; color coded white	Hookup		N15-W-2535-1585 (1B818 . 164)	Surpre-nant Elec catalog #R-726N -A10	439 1350 00	W-109	5'					
W-110	WIRE, electrical: ins; #18 AWG cond; SD copper, tinned; stranded, seven #26 AWG strands; thermo-plastic ins, extruded nylon jacket; 1000 v working; fp, color coded white w/ black tracer	Hookup		N15-W-2535-1586 (1B818 . 165)	Surpre-nant Elec catalog #R-726N -A10	439 1351 00	W-110	10'					

W-111	WIRE, electrical: ins; #22 AWG cond; SD copper, tinned; stranded, seven #30 AWG strands; thermoplastic ins, extruded nylon jacket; 1000 w working; fp; color coded white	Hookup		N15-W-2535-1605 (1B822.87)	Surprenant Elec catalog #RC-730N	439 7031 00	W-111	15'						
W-112	WIRE, electrical: ins; #22 AWG cond; SD copper, tinned; stranded, seven #30 AWG strands; thermoplastic ins, extruded nylon jacket; 1000 v working; fp; color coded white w/ black tracer	Hookup		N15-W-2535-1606 (1B822.84)	Surprenant Elec catalog #RC-730N	439 7032 00	W-112	20'						
W-113	WIRE, electrical: ins; #22 AWG cond; SD copper, tinned; stranded seven #30 AWG strands; thermoplastic ins, extruded nylon jacket; 1000 v working; fp; color coded white w/ brown tracer	Hookup		N15-W-2535-1620 (1B822.90)	Surprenant Elec catalog #RC-730N	439 7033 00	W-113	5'						
W-114	WIRE, electrical: ins; #22 AWG cond; SD copper, tinned; stranded seven #30 AWG strands; thermoplastic ins, extruded nylon jacket; 1000 v working; fp; color coded white w/ red tracer	Hookup		N15-W-2535-1640 (1B822.91)	Surprenant Elec catalog #RC-730N	439 7034 00	W-114	15'						
W-115	WIRE, electrical: ins; #22 AWG cond; SD copper, tinned; stranded seven #30 AWG strands; thermoplastic ins, extruded nylon jacket; 1000 v working; color coded white w/ orange tracer; fp	Hookup		N15-W-2535-1635 (1B822.92)	Surprenant Elec catalog #RC-730N	439 7035 00	W-115	15'						

PARTS								SPARE PARTS				
									EQUIPMENT		STOCK	
SYMBOL DESIG.	NAME OF PART AND DESCRIPTION	FUNCTION	JAN AND (NAVY TYPE) NO.	STANDARD NAVY & (SIGNAL CORPS) STOCK NO.	MFGR. AND MFGR'S. DESIG-NATION	CONTRACTOR DRAWING & PART NO.	ALL SYMBOL DESIG. INVOLVED	NO. USED IN EQUIPMENT	ITEM NUMBER	BOX	QUAN.	BOX	QUAN.
W-116	WIRE, electrical: ins; #22 AWG cond; SD copper, tinned; stranded, seven #30 AWG strands; thermo-plastic ins; extruded nylon jacket; 1000 v working; fp; color coded white w/ green tracer	Hookup		N15-W-2535-1630 (1B822 .93)	Surpre-nant Elec catalog #RC-730N	439 7036 00	W-116	15'					
W-117	WIRE, electrical: ins; #22 AWG cond; SD copper, tinned; stranded seven #30 AWG strands; thermo-plastic ins; extruded nylon jacket; 1000 v working; fp; color coded white w/ blue tracer	Hookup		N15-W-2535-1615 (1B822 .94)	Surpre-nant Elec catalog #RC-730N	439 7037 00	W-117	5'					
W-118	WIRE, electrical: ins; #22 AWG cond; SD copper, tinned; stranded, seven #30 AWG strands; thermo-plastic ins, extruded nylon jacket; 1000 v working; fp; color coded white w/ 1st tracer black, 2nd tracer red	Hookup		N15-W-2535-1612 (1B822 .100)	Surpre-nant Elec catalog #RC-730N	439 7038 00	W-118	10'					
W-119	WIRE, electrical: ins; #22 AWG cond; SD copper, tinned; stranded, seven #30 AWG strands; thermo-plastic ins, extruded nylon jacket; 1000 v working; fp; color coded white w/ 1st tracer black, 2nd tracer orange	Hookup		N15-W-2535-1610 (1B822 .97)	Surpre-nant Elec catalog #RC-730N	439 7039 00	W-119	10'					

W-120	WIRE, electrical: ins; #22 AWG cond; SD copper, tinned; stranded, seven #30 AWG strands; thermoplastic ins, extruded nylon jacket; 1000 v working; fp; color coded white w/ 1st tracer black, 2nd tracer green	Hookup		N15-W-2535-1609 (1B822.95)	Surprenant Elec catalog #RC-730N	439 7040 00	W-120	10'						
W-121	WIRE, electrical: ins; #22 AWG cond; SD copper tinned; stranded, seven #30 AWG strands; thermoplastic ins, extruded nylon jacket; 1000 v working; fp; color coded white w/ 1st tracer brown, 2nd tracer red	Hookup		N15-W-2535-1626 (1B822.85)	Surprenant Elec catalog #RC-730N	439 7042 00	W-121	20'						
W-122	WIRE, electrical: ins; #22 AWG cond; SD copper, tinned; stranded, seven #30 AWG strands; thermoplastic ins, extruded nylon jacket; 1000 v working; fp; color coded white w/ 1st tracer brown 2nd tracer orange	Hookup		N15-W-2535-1624 (1B822.86)	Surprenant Elec catalog #RC-730N	439 7043 00	W-122	15'						
W-123	WIRE, electrical: ins; #22 AWG cond; SD copper tinned; stranded, seven #30 AWG strands; thermoplastic ins, extruded nylon jacket; 1000 v working; fp; color coded white w/ 1st tracer brown, 2nd tracer green	Hookup		N15-W-2535-1623 (1B822.89)	Surprenant Elec catalog #RC-730N	439 7044 00	W-123	15'						
W-124	WIRE, electrical: ins; #22 AWG cond; SD copper tinned; stranded, seven #30 AWG strands; thermoplastic ins, extruded nylon jacket; 1000 v working; fp; color coded white w/ 1st tracer brown, 2 tracer blue	Hookup		N15-W-2535-1622 (1B822.88)	Surprenant Elec catalog #RC-730N	439 7045 00	W-124	15'						

PARTS								SPARE PARTS				
									EQUIPMENT		STOCK	
SYMBOL DESIG.	NAME OF PART AND DESCRIPTION	FUNCTION	JAN AND (NAVY TYPE) NO.	STANDARD NAVY & (SIGNAL CORPS) STOCK NO.	MFGR. AND MFGR'S. DESIG-NATION	CONTRACTOR DRAWING & PART NO.	ALL SYMBOL DESIG. INVOLVED	NO. USED IN EQUIPMENT	ITEM NUMBER	BOX	QUAN.	BOX	QUAN.
W-125	WIRE, electrical: ins; #22 AWG cond; SD copper tinned; stranded, seven #30 AWG strands; thermo-plastic ins, extruded nylon jacket; 1000 v working; fp; color coded white w/ 1st tracer red, 2nd tracer orange	Hookup		N15-W-2535-1643 (1B822 . 101)	Surpre-nant Elec catalog #RC-730N	439 7046 00	W-125	10'					
W-126	WIRE, electrical: ins; #22 AWG cond; SD copper tinned; stranded, seven #30 AWG strands; thermo-plastic ins, extruded nylon jacket; 1000 v working; fp; color coded white w/ 1st tracer red, 2nd tracer green	Hookup		N15-W-2535-1642 (1B822 . 103)	Surpre-nant Elec catalog #RC-730N	439 7047 00	W-126	10'					
W-127	WIRE, electrical: ins; #22 AWG cond; SD copper, tinned; stranded seven #30 AWG strands; thermo-plastic ins, extruded nylon jacket; 1000 v working; fp; color coded white w/ 1st tracer red, 2nd tracer blue	Hookup		N15-W 2535-1641 (1B822 . 102)	Surpre-nant Elec catalog #RC-730N	439 7048 00	W-127	10'					

W-128	WIRE, electrical: ins; #22 AWG cond; SD copper, tinned; stranded, seven #30 AWG strands; thermoplastic ins, extruded nylon jacket; 1000 v working; fp; color coded white w/ 1st tracer orange, 2nd tracer green	Hookup		N15-W-2535-1637 (1B822.98)	Surprenant Elec catalog #RC-730N	439 7049 00	W-128	5'						
W-129	WIRE, electrical: ins; #22 AWG cond; SD copper tinned; stranded, seven #30 AWG strands; thermoplastic ins, extruded nylon jacket; 1000 v working; fp; color coded white w/ 1st tracer orange, 2nd tracer blue	Hookup		N15-W-2535-1636 (1B822.99)	Surprenant Elec catalog #RC-730N	439 7050 00	W-129	10'						
W-130	WIRE, electrical: ins; #22 AWG cond; SD copper tinned; stranded, seven #30 AWG strands; thermo-plastic ins, extruded nylon jacket; 1000 v working; fp; color coded white w/ 1st tracer green, 2nd tracer blue	Hookup		N15-W-2535-1631 (1B822.96)	Surprenant Elec catalog #RC-730N	439 7051 00	W-130	5'						
W-131	CABLE, special purpose: shielded hookup; #22 AWG cond; seven #30 AWG strands; thermoplastic ins, color coded white; 1000 v working; extruded nylon jacket, 95% min coverage c/o 16 carries 3 wires per carrier, 24 picks per inch, #36 AWG tinned copper wire; max operating temp 105°C	Hookup		N15-C-2926-8554 (1B3022-1.2)	Surprenant Elec catalog #IS-RC-730N	439 7906 00	W-131	6'						

PARTS								NO. USED IN EQUIPMENT	SPARE PARTS				
										EQUIPMENT		STOCK	
SYMBOL DESIG.	NAME OF PART AND DESCRIPTION	FUNCTION	JAN AND (NAVY TYPE) NO.	STANDARD NAVY & (SIGNAL CORPS) STOCK NO.	MFGR. AND MFGR'S. DESIG-NATION	CONTRACTOR DRAWING & PART NO.	ALL SYMBOL DESIG. INVOLVED		ITEM NUMBER	BOX	QUAN.	BOX	QUAN.
W-132	CABLE, special purpose: shielded hookup; #22 AWG cond; seven strands #30 AWG; thermoplastic ins, color coded white w/ black tracer; 1000 v working; extruded nylon jacket, 95% min coverage c/o 16 carriers, 3 wires per carrier, 24 picks per inch, #36 AWG tinned copper wire; max operating temp 105°C	Hookup		N15-C-2926-8559 (1B3022-1.8)	Surpre-nant Elec catalog #IS-RC-730N	439 7907 00	W-132	8'					
W-133	CABLE, special purpose: shielded hookup; #22 AWG cond; seven strands #30 AWG; thermoplastic ins, color coded white w/ orange tracer; 1000 v working; extruded nylon jacket, 95% min coverage, c/o 16 carriers, 3 wires per carrier, 24 picks per inch, #36 AWG tinned copper wire; max operating temp 105°C	Hookup		N15-C-2926-8594 (1B3022-1.9)	Surpre-nant Elec catalog #IS-RC-730N	439 7910 00	W-133	8'					
W-134	CABLE, special purpose: shielded hookup; #22 AWG cond; seven strands #30 AWG; thermoplastic ins, color coded white w/ green tracer; 1000 v working; extruded nylon jacket, 95% min coverage c/o 16 carriers 3 wires per	Hookup		N15-C-2926-8574 (1B3022-1.7)	Supre-nant Elec catalog #IS-RC-730N	439 7911 00	W-134	8'					

	carrier, 24 picks per inch, #36 AWG tinned copper wire; max operating temp 105°C									
W-135	CABLE, power: two #18 AWG stranded cond (41 strands #34 AWG bare copper wire); 300 vacw	Power input	Under-writers type SJ	N15-C-31025-5650 (1B3018-2.44)		424 0022 00	W-135	6.5'		
W-136	INSULATION, flexible sleeving: black; fiberglas; 0.102" ID, #10 size; 7000 v; extra flexible, non-fraying, max operating temp 150°C	Insulation		N17-I-43981-3504 (3G2210-4.2)	Bentley Harris type #649	152 1367 00	W-136	1.1'		
W-137	INSULATION, flexible sleeve: black; fiberglas; .162" ID, #6 size; 7000 v; extra flexible, non-fraying high temp; Bently Harris type #649	Insulation		N17-I-43958-2172 (3G2206-4.1)	Bentley Harris type #649	152 1375 00	W-137	.4'		
	SOCKETS									
XF-101	HOLDER, fuse: extractor post; for one 3AG cartridge fuse; bakelite and copper; 15 amp 250 v; 2-17/64" lg x 11/16" diam o/a; 1/2"-24 NS-2 bushing mtg; two solder lug term	Holds fuse F-101		N17-F-74267-5075 (3Z2878-1.4)	Buss type HKS	265 1003 00	XF-101	1		
XI-101	LAMPHOLDER: miniature bayonet; cad pl steel; 1-3/8" lg x 7/16" wd x 15/16" thk o/a; clip mtg; one piece construction; clip located on bottom at 90 deg	Holder for I-101		N17-L-51626-4919 (2Z5883-353)	Micarta Fab. to Collins Rad spec #262 0240 00	262 0240 00	XI-101, XI-102	2		

PARTS									SPARE PARTS				
										EQUIPMENT		STOCK	
SYMBOL DESIG.	NAME OF PART AND DESCRIPTION	FUNCTION	JAN AND (NAVY TYPE) NO.	STANDARD NAVY & (SIGNAL CORPS) STOCK NO.	MFGR. AND MFGR'S. DESIG-NATION	CONTRACTOR DRAWING & PART NO.	ALL SYMBOL DESIG. INVOLVED	NO. USED IN EQUIPMENT	ITEM NUMBER	BOX	QUAN.	BOX	QUAN.
XI-102	LAMPHOLDER: Same as XI-101	Holder for I-102											
XI-103	LAMPHOLDER: miniature bayonet; cad pl steel; 31/32" lg x 25/32" diam o/a; spring mtg; one piece construction	Holder for I-103		N17-L-51622-7034 (2Z588 2-84)	Ucinite Corp. to Collins Rad spec #262 0239 00	262 0239 00	XI-103	1			1		6
XV-001/ XV-002	SOCKET ASSEMBLY, tube: c/o two JAN type #TS102P01 sockets riveted to bkt Collins Rad part/dwg #505 9478 003; bkt cad pl steel, sockets w/ round plastic body, copper base, silver pl cont; 7 cont miniature ea; rectangular bkt; 2.500" lg x .968" wd x 1-13/16" h o/a; two .144" diam holes in top of bkt for mtg; ea socket marked w/ JAN type number (p/o Z-101)	Socket for V-001 and V-002		*N16-S-68071-9864 (2Z880 0A-4)	Collins Rad part/dwg #505 9477 002	505 9477 002	XV-001/ XV-002	1					
XV-101	SOCKET, tube: seven cont miniature; JAN type #TS102P01; one piece saddle mtg; two 1/8" diam mtg holes 7/8" c to c; round plastic body .800" diam x 25/32" lg less term and mtg; copper base,	Socket for V-101	TS102P01	N16-S-62603-6699 (2Z8677 .171)		JAN-S-28A	XV-101, XV-102, XV-103, XV-104, XV-105, XV-106,	12					

	non-magnetic alloy, silver pl cont; marked w/ JAN number; w/ metal shock shield and ctr shield .043"ID						XV-107, XV-108, XV-109, XV-113, XV-114, XV-116						
XV-102	SOCKET: Same as XV-101	Socket for V-102											
XV-103	SOCKET: Same as XV-101	Socket for V-103											
XV-104	SOCKET: Same as XV-101	Socket for V-104											
XV-105	SOCKET: Same as XV-101	Socket for V-105											
XV-106	SOCKET: Same as XV-101	Socket for V-106											
XV-107	SOCKET: Same as XV-101	Socket for V-107											
XV-108	SOCKET: Same as XV-101	Socket for V-108											
XV-109	SOCKET: Same as XV-101	Socket for V-109											
XV-110	SOCKET; tube: 9 cont miniature; JAN type #TS103P01; one piece saddle mtg; two 1/8" diam mtg holes 1-1/8" c to c; round plastic body .940" diam x 25/32" lg less term and mtg; copper base, non-magnetic (Cont.)	Socket for V-110	TS103P01	N16-S-64063-6713 (2Z8679 .30)		JAN-S-28A	XV-110, XV-111, XV-112	3					

PARTS								SPARE PARTS				
									EQUIPMENT		STOCK	
SYMBOL DESIG.	NAME OF PART AND DESCRIPTION	FUNCTION	JAN AND (NAVY TYPE) NO.	STANDARD NAVY & (SIGNAL CORPS) STOCK NO.	MFGR. AND MFGR'S. DESIG-NATION	CONTRACTOR DRAWING & PART NO.	ALL SYMBOL DESIG. INVOLVED	NO. USED IN EQUIPMENT	ITEM NUMBER	BOX	QUAN.	BOX	QUAN.
XV-110	(Cont.) alloy, silver pl cont; marked w/ JAN number; w/ metal shock shield and ctr shield .043" ID												
XV-111	SOCKET: Same as XV-110	Socket for V-111											
XV-112	SOCKET: Same as XV-110	Socket for V-112											
XV-113	SOCKET: Same as XV-101	Socket for V-113											
XV-114	SOCKET: Same as XV-101	Socket for V-114											
XV-115	SOCKET; tube: octal; JAN type #TSB8T101; under chassis saddle mtg; two .156" diam mtg holes 1-1/2" c to c; round mica filled phenolic body 1-7/64" diam x 5/8" lg less term and mtg; copper base, non-magnetic alloy silver pl cont; marked w/ JAN number; w/ metal shock shield	Socket for V-115	TSB8T101	N16-S-63451-1901 (2Z867 0.33)		JAN-S-28A	XV-115	1					

XV-116	SOCKET: Same as XV-101	Socket for V-116											
XY-101	SOCKET ASSEMBLY, crystal: for 10 xtal; c/o 1 bottom xtal board, 1 top xtal board, 20 cont; phenolic board, phosphor bronze cont; 3-7/8" lg x 7/8" wd x 5/16" thk less cont; two 0.140" diam mtg holes 2" c to c (p/o Z-117)	Sockets for crystal Y-101 through Y-110		N16-S-55061-6569 (2Z8636-23)	Collins Rad part/dwg #504 5009 001	504 5009 001	XY-101	1			1		6
XY-102 thru XY-110	Not used												
XY-111	SOCKET, crystal: steatite; irregular shape; 1-3/8" lg x 7/16" wd x 0.470" thk less term, 2 term 3/8" lg, 0.500" c to c; two 1/8" diam mtg holes 1-3/32" c to c	Socket for crystal Y-111		N16-S-54423-5553 (2Z8761-64)	Millen to Collins Rad spec #292 0055 00	292 0055 00	XY-111	1					
	CRYSTALS												
Y-101	CRYSTAL UNIT, quartz: single xtal plate, holder HC-6/U; 10,666.67 kc; minus 55°C to plus 90°C temp rise; 2 pins on bottom spaced .486" c to c, solid pins .050" diam x .243" lg, 2 pins only, oval metal body .750" lg x .345" wd x .788" h	Crystal - Bands 29, 30		N16-C-97443-1050 (2X209-10666.67)	Std Piezo (MIL-C-3098) type CR-18/U	291 8134 00	Y-101	1					

MODEL: AN/URR-23A **TABLE 8-4 COMBINED PARTS AND SPARE PARTS LIST** **MAJOR ASSEMBLY: RECEIVER R-388/URR**

PARTS								NO. USED IN EQUIPMENT	SPARE PARTS				
										EQUIPMENT		STOCK	
SYMBOL DESIG.	NAME OF PART AND DESCRIPTION	FUNCTION	JAN AND (NAVY TYPE) NO.	STANDARD NAVY & (SIGNAL CORPS) STOCK NO.	MFGR. AND MFGR'S. DESIG-NATION	CONTRACTOR DRAWING & PART NO.	ALL SYMBOL DESIG. INVOLVED		ITEM NUMBER	BOX	QUAN.	BOX	QUAN.
Y-102	CRYSTAL UNIT, quartz: single xtal plate, holder HC-6/U; 13,000.000 kc; minus 55°C to plus 90°C temp rise; 2 pins on bottom spaced .486" c to c, solid pins .050" diam x .243" lg, 2 pin only, oval metal body .750" lg x .345" wd x .788" h	Crystal - Bands 23, 24		N16-C-97600-1150 (2X209-13000)	Std Piezo (MIL-C-3098) type CR-18/U	291 8102 00	Y-102	1					
Y-103	CRYSTAL UNIT, quartz: single xtal plate, holder HC-6/U; 11,000.00 kc; minus 55°C to plus 90°C temp rise; 2 pins on bottom spaced .486" c to c, solid pins .050" diam x .243" lg, 2 pins only, oval metal body .750" lg x .345" wd x .788" h	Crystal - Bands 19, 20		N16-C-97466-1150 (2X209-11000)	Std Piezo (MIL-C-3098) type CR-18/U	291 8114 00	Y-103	1					
Y-104	CRYSTAL UNIT, quartz: single xtal plate, holder HC-6/U; 9,000.00 kc; minus 55°C to plus 90°C temp rise; 2 pins on bottom spaced .486" c to c, solid pins .050" diam x .243" lg, 2 pins only, oval metal body .750" lg x .345" wd x .788" h, no air gap adj	Crystal - Bands 15, 16		N16-C-97333-1150 (2X209-9000)	Std Piezo (MIL-C-3098) type CR-18/U	291 8083 00	Y-104	1					

Y-105	CRYSTAL UNIT, quartz: single xtal plate, holder HC-6/U; 14,000.00 kc; minus 55°C to plus 90°C temp rise; 2 pins on bottom spaced .486" c to c, solid pins .050" diam x .243" lg, 2 pins only, oval metal body .750" lg x .345" wd x .788" h	Crystal - Bands 11, 12, 25, 26		N16-C-97656-1150 (2X209-14000)	Std Piezo (MIL-C-3098) type CR-18/U	291 8135 00	Y-105	1						
Y-106	CRYSTAL UNIT, quartz: single xtal plate, holder HC-6/U; 12,000.00 kc; minus 55°C to plus 90°C temp rise; 2 pins on bottom spaced .486" c to c, solid pins .050" diam x .243" lg, 2 pins only, oval metal body .750" lg x .345" wd x .788" h	Crystal - Bands 9, 10, 21, 22		N16-C-97533-1150 (2X209-12000)	Std Piezo MIL-C-3098) type CR-18/U	291 8117 00	Y-106	1						
Y-107	CRYSTAL UNIT, quartz: single xtal plate, holder HC-6/U; 10,000.00 kc; minus 55° C to plus 90°C temp rise; 2 pins on bottom spaced .486" c to c, solid pins .050" diam x .243" lg, 2 pins only, oval metal body 9.750" lg x .345" wd x .788" h	Crystal - Bands 7, 8, 17, 18, 27, 28		N16-C-97400-1175 (2X209-10000)	Std Piezo (MIL-C-3098) type CR-18/U	291 8133 00	Y-107	1						
Y-108	CRYSTAL UNIT, quartz: single xtal plate, holder HC-6/U; 8,000.00 kc; minus 55°C to plus 90°C temp rise; 2 pins on bottom spaced .486" c to c, solid pins .050" diam x .243" lg, 2 pins only; oval metal body .750" lg x .345" wd x .788" h	Crystal Bands 5, 6		N16-C-97266-1150 (2X209-8000)	Std Piezo (MIL-C-3098) type CR-18/U	291 8113 00	Y-108	1						

PARTS									SPARE PARTS				
										EQUIPMENT		STOCK	
SYMBOL DESIG.	NAME OF PART AND DESCRIPTION	FUNCTION	JAN AND (NAVY TYPE) NO.	STANDARD NAVY & (SIGNAL CORPS) STOCK NO.	MFGR. AND MFGR'S. DESIG-NATION	CONTRACTOR DRAWING & PART NO.	ALL SYMBOL DESIG. INVOLVED	NO. USED IN EQUIPMENT	ITEM NUMBER	BOX	QUAN.	BOX	QUAN.
Y-109	CRYSTAL UNIT, quartz: single xtal plate, holder HC-6/U; 6,000.00 kc; minus 55°C to plus 90°C temp rise; 2 pins on bottom spaced .486" c to c, solid pins .050" diam x .243" lg, 2 pins only, oval metal body 9.750" lg x .345" wd x .788" h	Crystal Bands 3, 4		N16-C-97133-3950 (2X209-6000)	Std Piezo (MIL-C-3098) type CR-18/U	291 8132 00	Y-109	1					
Y-110	CRYSTAL UNIT, quartz: single xtal plate, holder HC-6/U; 4,000.00 kc; minus 55°C to plus 90°C temp rise; 2 pins on bottom spaced .486" c to c, solid pins .050" diam x .243" lg, 2 pins only, oval metal body .750" lg x .345" wd x .788" h	Crystal - Bands 1, 2		N16-C-97000-1001 (2X209-4000)	Std Piezo (MIL-C-3098) type CR-18/U	291 8131 00	Y-110	1					
Y-111	CRYSTAL UNIT, quartz: single xtal plate; 100 kc nom; 0°C to plus 70°C temp range; 2 pins on bottom spaced .486" c to c, solid pins .093" diam x 15/32" lg, 2 pins only, cylindrical body 1-1/8" diam x 2-1/4" h	Calibration crystal		N16-C-96176-9051 (2X226-100)	J Knights type H-9	291 5954 00	Y-111	1					
Y-112	CYRSTAL UNIT, quartz: single xtal plate; 500 kc p/m 500 cyc; 0°C to plus 40°C temp range; 2 pins on bottom spaced .486" c to c, solid pins .030" diam x 1" lg, 2 pins only	Filter crystal		N16-C-96450-1326 (2X225-500)	J Knights type 1F-17W	291 5175 00	Y-112	1					

	oval body 3/4" lg x 3/8" wd x 19/32" h less term, marked 500 kc (p/o Z-113)											
	SUBASSEMBLIES											
Z-101	OSCILLATOR, RF: 2.0 to 3.0 mc; approx .001 w output; 5-1/2" lg x 2-5/8" wd x 2-7/8" h approx; integral coil; receives power from main rect unit; mts on front panel by three #6-32 NC-2 tapped holes on 1.75" x 1.468" mtg/c HS (incl all parts in 001-099 symbol series) complete with JAN tubes	Variable frequency oscillator		**N16-0-55045-3176 (2C272 2-6)	Collins Rad part/dwg #505 0411 014	505 0411 014	Z-101	1		1		5
Z-102	RECEIVER SUBASSEMBLY: RF tuning; c/o capacitor and coil mtg on board; irregular shape; 1-3/8" lg x 1" wd x 2" h o/a; two .140" diam mtg holes on opposite corners 1-1/8" x 3/4" mtg/c (incl C-124, L-109)	R-f tuning, bands 16 to 30		N16-C-76379-5609 (2S5508 -23-5)	Collins Rad part/dwg #504 5023 002	504 5023 002	Z-102, Z-103	2		1		10
Z-103	RECEIVER SUBASSEMBLY: Same as Z-102 (incl C-132, L-113)	R-f tuning bands 16 to 30		*								

**This unit should not be replaced unless repair is beyond the capacity of the using activity. If replacement is required, the item must be turned in to the activity from which the replacement is received.

*For replacement use N16-C-76379-5609

PARTS								SPARE PARTS				
									EQUIPMENT		STOCK	
SYMBOL DESIG.	NAME OF PART AND DESCRIPTION	FUNCTION	JAN AND (NAVY TYPE) NO.	STANDARD NAVY & (SIGNAL CORPS) STOCK NO.	MFGR. AND MFGR'S. DESIG-NATION	CONTRACTOR DRAWING & PART NO.	ALL SYMBOL DESIG. INVOLVED	NO. USED IN EQUIPMENT	ITEM NUMBER	BOX	QUAN.	BOX	QUAN.
Z-104	RECEIVER SUBASSEMBLY: RF tuning; c/o two capacitors and one coil mtd on board; irregular shape; 1-3/8" lg x 1" wd x 2" h o/a; two .140" diam mtg holes on opposite corners of 1-1/8" x 3/4" mtg/c (incl C-122, C-123, L-108)	R-f tuning, bands 8 to 15		N16-C-76417-4595 (2Z5508-23-2)	Collins Rad part/dwg #504 5022 002	504 5022 002	Z-104, Z-105	2			1		10
Z-105	RECEIVER SUBASSEMBLY: Same as Z-104 (incl C-129, C-130, L-112)	R-f tuning, bands 8 to 15		**									
Z-106	RECEIVER SUBASSEMBLY: RF tuning; c/o two capacitors and one coil mtd on board; irregular shape; 1-3/8" lg x 1" wd x 2" h o/a; two .140" diam mtg holes on opposite corners of 1-1/8" x 3/4" mtg/c; (incl C-120, C-121, L-107)	R-f tuning bands 4 to 7		N16-C-76433-6676 (2S5508-23-1)	Collins Rad part/dwg #504 5021 002	504 5021 002	Z-106, Z-107	2			1		10
Z-107	RECEIVER SUBASSEMBLY: Same as Z-106 (incl C-127, C-128, L-111)	R-f tuning, bands 4 to 7		**									
Z-108	RECEIVER SUBASSEMBLY: for tuning on antenna bands 16 to 30; c/o coil and term mtd on board; coil single wnd, single layer wnd, 15 turns #28 E wire; 2 solder lug	For tuning on antenna bands 16 to 30		N16-C-72196-2479 (3C108 4S-84)	Collins Rad part/dwg #505 2153 002	505 2153 002	Z-108	1			1		6

	term; 2" h x 1-3/8" lg x 1" wd o/a; two .140" diam mtg holes on opposite corners of 1-1/8" x 3/4" mtg/c (incl L-106)											
Z-109	RECEIVER SUBASSEMBLY: for tuning on antenna bands 8 to 15; c/o 2 capacitors and one coil mtd on board; capacitors, 20 mmf p/m 5% 500 vdcw, 5-25 mmf p/m 5% 350 vdcw; coil single wnd, single layer wnd; 20 turns #28 E wire; 2" h x 1-3/8" lg x 1" wd o/a; two .140" diam mtg holes on opposite corners of 1-1/8" x 3/4" mtg/c (incl C-109, C-110, L-105)	For tuning on antenna bands 8 to 15		N16-R-33591-1307 (2C4180-3885)	Collins Rad part/dwg #505 2155 002	505 2155 002	Z-109	1			1		6
Z-110	RECEIVER SUBASSEMBLY: for tuning on antenna bands 4 to 7; incl one coil, one fixed capacitor, one variable capacitor mtd in board; various materials and finishes; irregular shape; 1-3/8" lg x 1" wd x 2" h o/a; two 0.140" diam mtg holes diagonally located on 1-1/8" x 3/4" mtg/c (incl C-107, C-108, L-104)	Tuning on antenna bands 4 to 7		N16-R-33591-1308 (2C4180-388-4)	Collins Rad part/dwg #505 2154 002	505 2154 002	Z-110	1			1		6
Z-111	RECEIVER SUBASSEMBLY: spurious filter; c/o capacitor and RF coil w/ tuning slug, holder and mtg bkt; coil, single wnd, single layer wnd, 46 turns #48 wire; phenolic form powdered iron core capacitor, 150 mmf p/m 5%, 500 vdcw; #6-32 x (Cont.)	Spurious filter		*N16-R-33591-1306 (3C1084S-85)	Collins Rad part/dwg #505 2157 002	505 2157 002	Z-111	1					
				**Not furnished as maintenance part. If failure occurs, do not request replacement unless the item cannot be repaired or fabricated.									
				**For replacement use N16-C-76 33-6676									

PARTS								SPARE PARTS				
									EQUIPMENT		STOCK	
SYMBOL DESIG.	NAME OF PART AND DESCRIPTION	FUNCTION	JAN AND (NAVY TYPE) NO.	STANDARD NAVY & (SIGNAL CORPS) STOCK NO.	MFGR. AND MFGR'S. DESIG-NATION	CONTRACTOR DRAWING & PART NO.	ALL SYMBOL DESIG. INVOLVED	NO. USED IN EQUIPMENT	ITEM NUMBER	BOX	QUAN.	BOX	QUAN.
Z-111	(Cont.) 3/4" lg stud on core; 2-1/4" h x 5/8" wd x 1-3/8" th o/a; coil attached to end of right angle mtg bkt by holder through .417" diam hole (incl A-127, L-124)												
Z-112	RECEIVER SUBASSEMBLY: audio level meter; c/o rectifier and 2 resistors mtd on board; rectifier, 30 ma peak; resistors, 220 ohm p/m 10%, 1/2 w, 1800 ohm p/m 5%, 2 w, phenolic board; 1-1/4" lg x 1" wd x 1-29/64" h o/a; #6-32 tap 1/2" d hole in standoff for mtg (incl CR-101, R-173, R-182, TB-113)	Audio level meter		*N16-R-33591-1227 (2S550 8-23-6)	Collins Rad part/dwg #504 5015 002	504 5015 002	Z-112	1					
Z-113	FILTER, bandpass: position 0, 10 kc; position 1, 3 kc; position 2, 2 kc; position 3, 1 kc; position 4, 0.2 kc band width; 3-13/32" lg x 2-3/8" wd x 4-25/32" h o/a; input impedance high-mixer plate, output impedance high-IF grid, varies w/ band width: rectangular metal can; mts by four #4-40 tapped holes and single #6-32 x 5/16" lg spade bolt; 4 solder lug term located on	Bandpass		*N16-F-32676-3001 (3Z1892 -22.9)	Collins Rad part/dwg #505 2174 003	505 2174 003	Z-113	1					

	bottom; incl one rotary sw, one IF transformer, one band pass filter, one quartz crystal, three resistors 4700, 22,000 and 100,000 ohm, one 10 mmf ceramic capacitor and one 3.5-27 mmf variable capacitor (incl C-187, C-188, R-130, R-131, R-132, S-114, T-101, T-102, Y-112)											
Z-114	RECEIVER SUBASSEMBLY: variable, IF coil assem; c/o 13 capacitors 3 resistors, and 4 coils mtd on board; 4 capacitors, 8 to 50 mmf, 350 vdcw, two capacitors 180 mmf, two capacitors 300 mmf p/m 2% 500 vdcw, three capacitors 10,000 mmf 350 vdcw, one capacitor 4.0 mmf, one capacitor 2.0 mmf p/m 1/4 mmf 500 vdcw; resistors, 2200 ohm, 470 ohm, 33,000 ohm p/m 10%, 1/2 w; four variable IF coils; 3.250" lg x 2" wd x 2-25/64" d o/a; 4 mtg holes .140" diam on 1.750" x 1.875" mtg/c; capacitors and resistors wax dipped, coils varnished (incl C-174 thru C-183, C-185, C-220, C-221, R-124, R-127, R-128, L-116, L-117, L-118, L-119)	Variable i-f coil assembly		N16-R-33591-1230 (2S5508-23-11)	Collins Rad part/ dwg #504 5030 003	504 5030 003	Z-114	1		1		6

*Not furnished as a maintenance part. If failure occurs, do not request replacement unless the item cannot be repaired or fabricated.

TABLE 8-4 COMBINED PARTS AND SPARE PARTS LIST

PARTS								SPARE PARTS				
									EQUIPMENT		STOCK	
SYMBOL DESIG.	NAME OF PART AND DESCRIPTION	FUNCTION	JAN AND (NAVY TYPE) NO.	STANDARD NAVY & (SIGNAL CORPS) STOCK NO.	MFGR. AND MFGR'S. DESIG-NATION	CONTRACTOR DRAWING & PART NO.	ALL SYMBOL DESIG. INVOLVED	NO. USED IN EQUIPMENT	ITEM NUMBER	BOX	QUAN.	BOX	QUAN.
Z-115	RECEIVER SUBASSEMBLY: for tuning bands 1 to 3; incl 3 coils, 3 fixed capacitors, 3 variable capacitors mtd on board; various materials and finishes; irregular shape; 2-5/8" lg x 2" wd x 2-1/2" h o/a; four .140" diam mtg holes on .875" x 1.750" mtg/c (incl L-101, L-102, L-103, C-101, C-102, C-103, C-104, C-105, C-106)	Tuning antenna bands 1 to 3		N16-R-33591-1310 (2C4180-388-2)	Collins Rad part/dwg #505 2176 003	505 2176 003	Z-115	1			1		6
Z-116	RECEIVER SUBASSEMBLY: RF coil assem; c/o 3 coil, 3 resistors and 8 capacitors mtd on board; capacitors, two 8-50 mmf, four 10,000 mmf 350 vdcw, one 20 mmf p/m 5%, one 910 mmf p/m 1%, 500 vdcw; resistors, 47,000 ohm, 2200 ohm, 33,000 ohm p/m 10% 1/2 w, qty of one ea; 3 variable tuning coils; 2.750" lg x 2" wd x 2" d o/a; 4 mtg holes .140" diam located on 1.250" x 1.750" mtg/c; capacitors and resisotrs wax dipped, coils varnished (incl C-118, C-119, C-135, C-137, C C-138, C-139, C-140, C-142, L-110, L-114, L-115, R-109, R-110, R-113)	R-f coil assembly		N16-R-33591-1232 (2S5508-23-9)	Collins Rad part/dwg #504 5029 003	504 5029 003	Z-116	1			1		6

Z-117	OSCILLATOR, RF: output freq range 6 to 32 mc; crystal controlled; approx .001 w output; 3-7/8" lg x 2-3/4" wd x 2-1/8" h approx o/a; integral coil; receives power from main rectifier unit; 2 mtg studs located on bottom 2" c to c (incl C-144 thru C-158, C-161 thru C-167, L-120, L-121, R-114 thru R-117, S-108, S-109, XY-101)	Hfo plate circuit		N16-O-55081-5751 (2C2711-5)	Collins Rad part/dwg #504 5032 004	504 5032 004	Z-117	1			1		6
Z-118	RECEIVER SUBASSEMBLY: front panel w/ components attached; c/o capacitor, phone jack, speaker jack, meter, drum glass, vernier glass, 3 resistors, 6 switches, capacitor, 10,000 mmf guaranteed min tol, 350 vdcw; meter, 0-1 ma; resistors, 10,000 ohm p/m 20%, 2 w, 500,000 ohm p/m 20%, 2 w, 47,000 ohm p/m 10%, 1/2 w; phone jack, speaker jack, five 2 ckt rotary switches, 1 DPDT toggle; rectangular panel; 19" lg x 10-15/32" wd x 2" d o/a; 4 open end slots 1/4" wd x 3/8" lg on ea side for mtg (incl C-209, J-102, J-103, M-101, MS-102, MS-103, R-146, R-148, R-154, S-112, S-113, S-115, S-116, S-117, S-118)	Front panel with components attached		*N16-R-33591-1309 (2Z905 3A-32)	Collins Rad part/dwg #505 2184 004	505 2184 004	Z-118	1					

*Not furnished as a maintenance part. If failure occurs, do not request replacement unless the item cannot be repaired or fabricated.

PARTS									SPARE PARTS				
										EQUIPMENT		STOCK	
SYMBOL DESIG.	NAME OF PART AND DESCRIPTION	FUNCTION	JAN AND (NAVY TYPE) NO.	STANDARD NAVY & (SIGNAL CORPS) STOCK NO.	MFGR. AND MFGR'S. DESIG-NATION	CONTRACTOR DRAWING & PART NO.	ALL SYMBOL DESIG. INVOLVED	NO. USED IN EQUIPMENT	ITEM NUMBER	BOX	QUAN.	BOX	QUAN.
	SPEAKER												
	SPEAKER, dynamic: Army-Navy LS-199/U; 10" diam cone; PM field; input 8 w normal; voice coil impedance 6-8 ohm; 10-1/8" OD x 4-13/32" d, speaker only; mts in cabinet by eight oblong holes spaced 45 deg apart on 4.831" rad; incl speaker screen; baffle board, style strip w/ retainer, 4 rubber feet and 4 ft double cond cable, steel cabinet 15" lg x 10-9/16" h x 8-7/8" d			**F-17-91368-1323 (6C42--199)	Collins Rad part/dwg #505 5950 001	505 5950 001		1					
A-125	CABINET; for LS-199/U Speaker; CRS, gray wrinkle finish; empty; 15" lg x 10-9/16" h x 8-7/8" d; incl speaker screen w/ baffle board, style strip w/ retainer 4 rubber feet and 4 ft double cond cable (incl A-133, A-134, A-135, A-136)			N17-C-48012-2351 (2Z1578-42)	Collins Rad part/dwg #505 5949 003	505 5949 003		1					
A-133	BUMPER: black rubber; round; 3/4" diam x 9/16" h o/a; recessed, 3/8" ID for 1/4" to 3/16" ID for mtg (p/o A-125)	Mounting for speaker cabinet A-125		*N17-B-775001-240 (6Z16 50-25)	Lavelle Rub #75-7R	200 5300 00	A-133, A-134, A-135, A-136	4					

A-134	BUMPER: Same as A-133 (p/o A-125)	Mounting for Speaker cabinet A-125							
A-135	BUMPER: Same as A-133 (p/o A-125)	Mounting for Speaker cabinet S-125							
A-136	BUMPER: Same as A-133 (p/o A-125)	Mounting for Speaker cabinet A-125							
LS-101	SPEAKER, dynamic: 10" diam cone; PM field; input 8 w normal; voice coil impedance 6-8 ohm; 10-1/8" OD x 4-13/32" d; mts in cabinet by eight oblong holes, spaced 45 deg apart on 4.851" rad			N17-L-91362-2173 (6C35-27)	Jensrad model #P10-T, stock #ST-119	271 0076 00	LS-101	1	
	OR								
LS-101	SPEAKER, dynamic: 10" diam cone; PM field; input 8 w normal; voice coil impedance 6-8 ohm; 10-1/8" OD x 3-13/16" d; speaker mts in cabinet by eight oblong holes, spaced 45 deg apart on 4.851" rad			N17-L-91368-1220 (6C43-187)	Jensrad model 10J11	271 0197 00	LS-101	1	

**This unit should not be replaced unless repair is beyond the capacity of the using activity. If replacement is required, the item must be turned in to the activity from which the replacement is received

*Not furnished as a maintenance part. If failure occurs, do not request replacement unless the item cannot be repaired or fabricated.

PARTS								SPARE PARTS				
									EQUIPMENT		STOCK	
SYMBOL DESIG.	NAME OF PART AND DESCRIPTION	FUNCTION	JAN AND (NAVY TYPE) NO.	STANDARD NAVY & (SIGNAL CORPS) STOCK NO.	MFGR. AND MFGR'S. DESIG-NATION	CONTRACTOR DRAWING & PART NO.	ALL SYMBOL DESIG. INVOLVED	NO. USED IN EQUIPMENT	ITEM NUMBER	BOX	QUAN.	BOX	QUAN.
	SPECIAL TOOLS												
	WRENCH: Bristo set screw; for #8 Bristo set screw; 1-31/32" lg x 45/64" at 90 deg; hardened steel; 90 deg; #8 Bristo set screw	For #8 Bristo set screw		N41-W-2460-10 (6R55 231)	Bristolco type #8	024 0019 00		1					
	WRENCH: Bristo set screw; for #4 Bristo set screws; 1-9/16" lg x 3/8" wd x .060" OD; hardened steel; 90 deg; for #4 Bristo set screw	For #4 Bristo set screw		N41-W-2459-915 (6RK55 232)	Bristolco type #4	024 2900 00		1					
	SCREWDRIVER: Phillips; one blade 3-1/4" lg, other blade 1" lg; 3-1/4" lg o/a; .188" diam round shank, #1 Phillips head both ends	Screwdriver (Phillips head)		N41-S-99500-1 (6R154 90.1)	Vaco type #1	024 3000 00		1					
	WRENCH: Bristo set screw; for #10 Bristo set screw; 2-3/32" lg x 3/4" at 90 deg; hardened steel; 90 deg; #10 Bristo set screw	For #10 Bristo set screw		N41-W-2460-15 (6RK552 30-10)	Bristolco type #10	024 9710 00		1					
	WRENCH: Bristo set screw; for #6 Bristo set screw; 1-27/32" lg x 21/32" at 90 deg; hardened steel; 90 deg; #6 Bristo set screw	For #6 Bristo set screw		N41-W-2460-5 (6R552 30-3)	Bristolco type #6	024 9730 00		1					

	TOOL, alignment: natural phenolic, LTS-M3; 6-3/4" lg x 1/2" diam o/a; 3/8" lg scdr tip tapered to 1/32" at tip; has phenolic grip	Alignment tool		N16-T-751527-651 (6Q335-2)	Collins Rad part/ dwg #505 2115 001	505 2115 001		1						
	TOOL, alignment: natural phenolic, LTS-M3; 5-13/16" lg x .315" diam o/a; 1-1/2" lg scdr tip tapered to 1/32" at tip w/ 1/16" d x 5/32" wd notch in tip, opposite end has flat insert 5/16" lg w/ 1/16" d x 5/32" wd notch in end	Alignment tool		N16-T-751502-151 (6Q335-1)	Collins Rad part/ dwg #505 2119 001	505 2119 001		1						
	BOX, Metal							1						

TABLE 8-5 CROSS REFERENCE PARTS LIST

JAN (OR AWS) DESIGNATION	KEY SYMBOL	JAN (OR AWS) DESIGNATION	KEY SYMBOL
CC30CK010C	C-116	RC20BF104K	R-102
CC30CK020C	C-111	RC20BF105K	R-101
CC30CK040C	C-220	RC20BF124K	R-171
CC30CK050D	C-238	RC20BF152K	R-004
CC30CK1R5C	C-133	RC20BF154K	R-005
CC30CK100F	C-173	RC20BF161J	R-163
CC30CK150J	C-151	RC20BF221K	R-182
CC30CK200J	C-004	RC20BF222K	R-110
CC30CK220J	C-236	RC20BF223K	R-131
CC30CK240J	C-232	RC20BF224K	R-121
CC30CK360J	C-153	RC20BF273J	R-147
CC30CK470J	C-155	RC20BF273K	R-126
CC30RH510J	C-007	RC20BF332K	R-155
CC30UJ101J	C-231	RC20BF333K	R-104
CC30UK510J	C-234	RC20BF334K	R-001
CC30UK680J	C-157	RC20BF393K	R-007
CE52F350R	C-217	RC20BF471K	R-107
CE63B080P	C-223	RC20BF472K	R-119
CE63B200J	C-215	RC20BF473K	R-117
CM35B682K	C-212	RC20BF474K	R-125
CP53B4FF104V	C-214	RC20BF682K	R-106
CP54B4FF104V	C-198AB	RC20BF683K	R-150
CP54B5FF104V	C-205ABC	RC20BF684K	R-118
JAN-OA2	V-116	RC20BF821K	R-149
JAN-5V4G	V-115	RC30BF103K	R-006
JAN-6AK5	V-101	RC30BF104K	R-160
JAN-6AQ5	V-113	RC30BF222K	R-142
JAN-6BA6	V-001	RC30BF273K	R-003
JAN-6BE6	V-102	RC30BF333K	R-113
JAN-12AU7	V-111	RC30BF473K	R-109
JAN-12AX7	V-110	RC42BE102K	R-174
RC20BF100K	R-143	RC42BE182J	R-173
RC20BF101K	R-170	RG-58/U	W-101
RC20BF102K	R-002	RW30F121	R-164
RC20BF103K	R-122	RW30F311	R-165

JAN (OR AWS) DESIGNATION	KEY SYMBOL
RW32F4021	R-181
ST52R	S-117
TSB8T101	XV-115
TS102P01	XV-101
TS103P01	XV-110

NAVY TYPE	KEY SYMBOL
-49194	J-101

STANDARD NAVY STOCK NO.	KEY SYMBOL
F16-C-10635-4951	A-123
F16-D-46397-9989	I-106
F16-D-46408-1010	I-105
F16-O-55045-3176	Z-101
F16-R-32112-6619	R-388/URR
F16-R-38281-9206	AN/URR-23A
F17-L-91368-1323	LS-199/U
G17-L-6811-25	I-104
N15-C-12201-50	W-101
N15-C-2926-8554	W-131
N15-C-2926-8559	W-132
N15-C-2926-8574	W-134
N15-C-2926-8594	W-133
N15-C-31025-5650	W-135
N15-W-2535-1585	W-109
N15-W-2535-1586	W-110
N15-W-2535-1605	W-111
N15-W-2535-1606	W-112
N15-W-2535-1609	W-106
N15-W-2535-1609	W-120

STANDARD NAVY STOCK NO.	KEY SYMBOL
N15-W-2535-1610	W-119
N15-W-2535-1612	W-118
N15-W-2535-1615	W-105
N15-W-2535-1615	W-117
N15-W-2535-1620	W-104
N15-W-2535-1620	W-113
N15-W-2535-1622	W-124
N15-W-2535-1623	W-123
N15-W-2535-1624	W-122
N15-W-2535-1626	W-121
N15-W-2535-1630	W-116
N15-W-2535-1631	W-108
N15-W-2535-1631	W-130
N15-W-2535-1635	W-115
N15-W-2535-1636	W-129
N15-W-2535-1637	W-107
N15-W-2535-1637	W-128
N15-W-2535-1640	W-114
N15-W-2535-1641	W-127
N15-W-2535-1642	W-126
N15-W-2535-1643	W-125
N16-B-200661-353	O-005
N16-B-669881-185	N-101
N16-B-750001-385	A-110
N16-B-750001-728	A-121
N16-B-750001-729	A-101
N16-B-750001-746	A-102
N16-B-750001-943	A-127
N16-B-750001-944	A-128
N16-C-10881-1199	O-127AR
N16-C-10881-1156	O-163A
N16-C-10881-1166	O-163B
N16-C-125001-252	O-106
N16-C-125041-109	O-117
N16-C-125041-110	O-116

TABLE 8-5 CROSS REFERENCE PARTS LIST (cont'd)

STANDARD NAVY STOCK NO.	KEY SYMBOL	STANDARD NAVY STOCK NO.	KEY SYMBOL	STANDARD NAVY STOCK NO.	KEY SYMBOL	STANDARD NAVY STOCK NO.	KEY SYMBOL
N16-C-125041-111	O-115	N16-C-16597-1562	C-234	N16-C-60692-9641	C-224	N16-C-97466-1150	Y-103
N16-C-15368-5855	C-116	N16-C-16789-1562	C-157	N16-C-62233-1001	C-188	N16-C-97533-1150	Y-106
N16-C-15400-5842	C-133	N16-C-17077-1226	C-231	N16-C-63934-2551	C-167	N16-C-97600-1150	Y-102
N16-C-15432-5844	C-111	N16-C-18250-4238	G-001	N16-C-64039-6960	C-110	N16-C-97656-1150	Y-105
N16-C-15560-5855	C-220	N16-C-18919-1251	C-009	N16-C-64172-4565	C-102	N16-D-402301-122	A-118
N16-C-15628-1344	C-238	N16-C-19111-1025	C-114	N16-C-650001-655	A-002	N16-D-901161-142	E-174
N16-C-15920-8853	C-002	N16-C-19542-3282	C-223	N16-C-650001-863	A-116	N16-F-32676-3001	Z-113
N16-C-15921-6262	C-173	N16-C-19713-8751	C-215	N16-C-66401-1012	C-4	N16-F-32676-3110	T-102
N16-C-15923-4258	C-002	N16-C-21944-3540	C-217	N16-C-68730-6941	A-117	N16-F-34000-1056	L-124
N16-C-15924-3401	C-002	N16-C-26732-9444	C-109	N16-C-72196-2469	L-106	N16-G-500001-437	O-127
N16-C-15924-7558	C-002	N16-C-28130-9720	C-123	N16-C-72196-2479	Z-108	N16-G-600001-177	MS-103
N16-C-15925-2220	C-002	N16-C-28553-1046	C-113	N16-C-72213-2552	L-115	N16-G-600001-178	MS-102
N16-C-15925-2360	C-002	N16-C-28816-8015	C-107	N16-C-72292-3385	L-105	N16-G-900077-256	H-109
N16-C-15925-2480	C-002	N16-C-28975-1458	C-145	N16-C-72418-4673	L-104	N16-G-900096-385	H-105
N16-C-15925-2642	C-002	N16-C-29128-2301	C-175	N16-C-72438-7301	L-001	N16-G-900133-235	H-106
N16-C-15925-2811	C-002	N16-C-29260-1376	C-161	N16-C-72604-1774	L-103	N16-G-900246-325	H-108
N16-C-15925-2911	C-002	N16-C-29365-5775	C-105	N16-C-72645-5881	L-121	N16-H-150001-351	H-167
N16-C-15925-3011	C-002	N16-C-29655-7383	C-177	N16-C-72646-1315	L-117	N16-H-900073-497	O-101A
N16-C-15925-3111	C-002	N16-C-29708-5101	C-202	N16-C-72661-5106	L-114	N16-H-900073-897	O-101C
N16-C-15925-3211	C-002	N16-C-29996-2750	C-103	N16-C-72661-5108	L-118	N16-K-700271-542	E-171
N16-C-15953-6532	C-206	N16-C-301603-351	H-160	N16-C-72661-5131	L-102	N16-K-700271-547	E-168
N16-C-15985-7401	C-151	N16-C-30737-1412	C-101	N16-C-72666-4613	L-101	N16-K-700350-449	E-158
N16-C-16081-6531	C-004	N16-C-30921-1810	C-118	N16-C-74129-3676	L-120	N16-K-700374-895	E-165
N16-C-16145-6530	C-236	N16-C-33068-5823	C-212	N16-C-74129-3935	L-125	N16-K-700439-401	E-169
N16-C-16177-6532	C-232	N16-C-42730-1277	C-005	N16-C-76215-2410	L-002	N16-M-60911-4161	A-122
N16-C-16369-7401	C-153	N16-C-53204-4100	C-214AB	N16-C-76379-5609	Z-102	N16-O-55081-5751	Z-117
N16-C-16529-6533	C-155	N16-C-53204-4121	C-198AB	N16-C-76417-4595	Z-104	N16-O-66001-2501	A-003
N16-C-16556-6594	C-5	N16-C-54460-4463	C-205ABC	N16-C-76433-6676	Z-106	N16-P-400321-111	A-126
N16-C-16556-9314	C-5	N16-C-599931-124	O-136	N16-C-76503-4001	T-106	N16-P-400861-127	A-001
N16-C-16557-1694	C-5	N16-C-600001-362	H-165	N16-C-96176-9051	Y-111	N16-P-401041-132	A-113
N16-C-16557-2771	C-5	N16-C-600701-141	E-149	N16-C-96450-1326	Y-112	N16-P-402241-110	A-106
N16-C-16557-2801	C-5	N16-C-600701-142	E-144	N16-C-97000-1001	Y-110	N16-P-402241-140	A-114
N16-C-16557-2825	C-5	N16-C-600701-143	E-142	N16-C-97133-3950	Y-109	N16-P-402241-141	A-104
N16-C-16557-2851	C-5	N16-C-600701-167	E-003	N16-C-97266-1150	Y-108	N16-P-402241-142	A-115
N16-C-16595-5927	C-007	N16-C-600701-168	E-172	N16-C-97333-1150	Y-104	N16-P-402241-143	A-105
				N16-C-97400-1175	Y-107	N16-P-402301-123	A-103
				N16-C-97443-1050	Y-101	N16-P-404101-327	A-005
						N16-P-500001-145	H-101

TABLE 8-5 CROSS REFERENCE PARTS LIST (cont'd)

STANDARD NAVY STOCK NO.	KEY SYMBOL	STANDARD NAVY STOCK NO.	KEY SYMBOL	STANDARD NAVY STOCK NO.	KEY SYMBOL	STANDARD NAVY STOCK NO.	KEY SYMBOL
N16-P-850001-134	O-145	N16-R-50398-431	R-147	N16-S-34607-8711	E-117	N17-C-945002-166	A-004
N16-P-850001-135	O-144	N16-R-50399-811	R-126	N16-S-54423-5553	XY-111	N17-C-98372-9751	O-102
N16-P-850501-110	A-120	N16-R-50400-231	R-003	N16-S-55061-6569	XY-101	N17-C-98378-4007	O-104
N16-R-29022-8981	L-122	N16-R-50417-811	R-104	N16-S-62603-6699	XV-101	N17-C-98378-4532	O-146
N16-R-29087-4241	L-123	N16-R-50418-231	R-113	N16-S-63451-1901	XV-115	N17-C-98431-8553	O-139
N16-R-33591-1227	Z-112	N16-R-50444-811	R-007	N16-S-64063-6713	XV-110	N17-C-98432-4638	O-128
N16-R-33591-1230	Z-114	N16-R-50480-811	R-117	N16-S-68071-9864	XV-001/	N17-C-98432-4723	O-109
N16-R-33591-1232	Z-116	N16-R-50481-231	R-109		XV-002	N17-C-98611-1094	O-101B
N16-R-33591-1303	O-142	N16-R-5552-811	R-150	N16-T-52001	V-116	N17-F-16320-100	F-101
N16-R-33591-1304	O-007	N16-R-50633-811	R-102	N16-T-55474	V-115	N17-F-74267-5075	XF-101
N16-R-33591-1306	Z-111	N16-R-50634-231	R-160	N16-T-56191	V-101	N17-G-900264-876	H-107
N16-R-33591-1307	Z-109	N16-R-50651-811	R-171	N16-T-56198	V-113	N17-I-43958-2172	W-137
N16-R-33591-1308	Z-110	N16-R-50678-811	R-005	N16-T-56211	V-001	N17-I-43981-3504	W-136
N16-R-33591-1309	Z-118	N16-R-50714-811	R-121	N16-T-56211-50	V-102	N17-I-59417-6588	E-004
N16-R-33591-1310	Z-115	N16-R-50759-811	R-001	N16-T-58241	V-111	N17-I-69158-6701	E-103
N16-R-400096-659	A-112	N16-R-50822-811	R-125	N16-T-58241-60	V-110	N17-I-77233-1821	H-111
N16-R-49238-811	R-143	N16-R-50894-811	R-118	N16-T-751502-151	TOOL	N17-J-39248-4418	J-103
N16-R-49580-811	R-170	N16-R-50975-811	R-101	N16-T-751527-651	TOOL	N17-J-39435-6234	J-102
N16-R-49633-431	R-163	N16-R-65698-1686	R-164	N16-W-180001-165	H-112	N17-L-51622-7034	XI-103
N16-R-49661-811	R-182	N16-R-65806-3459	R-165	N16-W-180001-166	H-110	N17-L-51626-4919	XI-101
N16-R-49769-811	R-107	N16-R-66214-5516	R-181	N17-B-775001-240	A-133	N17-L-6297	I-101
N16-R-49876-431	R-149	N16-R-87023-9738	R-140	N17-B-775001-241	A-129	N17-L-91362-2173	LS-101
N16-R-49922-811	R-002	N16-R-87682-5242	R-148	N17-B-77532-6280	TB-105	N17-L-91368-1220	LS-101ALT
N16-R-49923-531	R-174	N16-R-88182-5359	R-154	N17-B-77532-6294	TB-108	N17-M-22715-3701	M-101
N16-R-49967-811	R-004	N16-S-20889-4562	O-140	N17-B-77533-8530	TB-001	N17-N-88745-2001	H-002
N16-R-49985-126	R-173	N16-S-20897-4382	O-134	N17-B-77583-8548	TB-102	N17-P-60940-5501	H-011
N16-R-50012-811	R-110	N16-S-20914-6129	O-133	N17-B-77586-3917	E-101	N17-P-69723-6191	H-019
N16-R-50013-231	R-142	N16-S-20995-3338	O-132	N17-B-77734-2105	TB-113	N17-P-70009-2556	H-163
N16-R-50066-811	R-155	N16-S-21011-2786	O-137	N17-B-801935-500	H-104	N17-P-70019-1649	H-158
N16-R-501081-124	A-124	N16-S-21038-2216	O-138	N17-C-48012-2351	A-125	N17-P-70025-8561	H-164
N16-R-50129-811	R-119	N16-S-21053-3126	O-131	N17-C-71426-2729	P-101	N17-P-70038-6984	H-018
N16-R-50201-811	R-106	N16-S-33261-1004	A-119	N17-C-73108-5890	J-101	N17-P-70039-5906	H-161
N16-R-50282-811	R-122	N16-S-34520-3868	E-107	N17-C-781117-301	H-102	N17-R-50980-7301	CR-101
N16-R-50283-231	R-006	N16-S-34557-8348	E-001	N17-C-781521-126	H-103	N17-R-64933-4961	K-101
N16-R-50372-811	R-131	N16-S-34576-6507	E-104	N17-C-805485-131	E-006	N17-S-46694-7481	O-125

TABLE 8-5 CROSS REFERENCE PARTS LIST (cont'd)

STANDARD NAVY STOCK NO.	KEY SYMBOL	STANDARD NAVY STOCK NO.	KEY SYMBOL	STANDARD NAVY STOCK NO.	KEY SYMBOL	SIG C STOCK NO.	KEY SYMBOL
N17-S-46706-6010	O-111	N43-N-5524-68	H-124	N43-W-3170-5090	H-162	1B822.85	W-121
N17-S-46707-1790	O-107	N43-N-5805-9750	H-121	N43-W-3170-5105	H-119	1B822.86	W-122
N17-S-46718-6001	O-143	N43-N-5996	H-123	N43-W-3175-2550	H-118	1B822.87	W-111
N17-S-46740-5501	O-164	N43-N-9639-7150	H-126	N43-W-5740-2790	H-010	1B822.88	W-124
N17-S-46754-1696	O-119	N43-S-11391-6045	H-146	N43-W-5740-2895	H-015	1B822.89	W-123
N17-S-46799-6826	O-147	N43-S-11391-6060	H-148	N43-W-5741-5545	H-150	1B822.90	W-113
N17-S-46865-3866	O-110	N43-S-11391-6075	H-149	N43-W-5741-7616	H-014	1B822.90	W-104
N17-S-59231-1101	S-112	N43-S-17344-8560	H-125	N43-W-6801-410	H-009	1B822.91	W-114
N17-S-60264-2291	S-114	N43-S-17687-196	H-130	N43-W-6812-2501	H-153	1B822.92	W-115
N17-S-61164-9410	S-113	N43-S-17692-2105	H-129	N43-W-6813-532	H-154	1B822.93	W-116
N17-S-73956-7205	S-117	N43-S-57800-1735	H-005	N43-W-6813-540	H-155	1B822.94	W-117
N17-S-91625-1003	S-110	N43-S-57800-1950	H-003	N43-W-6813-550	H-156	1B822.94	W-105
N17-S-91737-1003	S-103	N43-S-57800-2030	H-166	N43-W-7508-6650	O-006	1B822.95	W-106
N17-S-91745-1018	S-101	N43-S-57821-1760	H-144	N43-W-7702-745	H-157	1B822.95	W-120
N17-S-91817-1001	S-108	N43-S-57891-1050	H-139	N77-B-115-	O-001	1B822.96	W-108
N17-T-28228-3181	E-118	N43-S-57921-1750	H-143	00319-2002		1B822.96	W-130
N17-T-62668-9384	T-107	N43-S-57891-1790	H-145	N77-B-411-	O-004	1B822.97	W-119
N17-T-67651-6348	T-101	N43-S-57891-1985	H-140	00301-8001		1B822.98	W-107
N17-T-67651-6436	T-103	N43-S-57891-2045	H-141	N77-B-999-	O-160	1B822.98	W-128
N17-T-74148-5001	T-108	N43-S-58060-4040	H-134	56012-0200		1B822.99	W-129
N21-C-210-5525	W-103	N43-S-68597-7575	H-008			1B822.101	W-125
N22-C-1840	O-163	N43-S-68597-7580	H-147			1B822.102	W-127
N41-W-2459-915	TOOL	N43-S-68598-4670	H-004			1B822.103	W-126
N41-W-2460-5	TOOL	N43-S-6975-275	H-006			1F425-58	W-101
N41-W-2460-10	TOOL	N43-S-6975-295	H-007	SIG C STOCK NO.	KEY SYMBOL	2C2711-5	Z-117
N41-W-2460-15	TOOL	N43-S-6975-525	H-012			2C2722-6	Z-101
N41-S-99500-1	TOOL	N43-S-6975-75	H-013	1B3018-2.44	W-135	2C2798-17	T-106
N42-B-29981-5050	H-114	N43-S-71367-4015	H-135	1B3022-1.2	W-131	2C4180-388	R-388/URR
N42-B-29981-9000	H-113	N43-S-71703-1340	H-133	1B3022-1.7	W-134	2C4180-388-1	O-142
N42-R-2047-500	O-002	N43-S-73269-2180	H-132	1B3022-1.8	W-132	2C4180-388-2	Z-115
N42-R-66010-500	O-003	N43-S-83799-8495	H-131	1B3022-1.9	W-133	2C4180-388-4	Z-110
N43-B-30001-2605	H-120	N43-W-2988-67	H-016	1B818.164	W-109	2C4180-388-5	Z-109
N43-N-10714-120	H-127	N43-W-3045-40	H-115	1B818.165	W-110	2C4565-23A	AN/URR-23A
N43-N-4743-545	H-001	N43-W-3045-57	H-116	1B822.100	W-118	2C4565-23A-1	A-003
N43-N-4820-122	H-128	N43-W-3045-93	H-117	1B822.84	W-112	2C4565-23A-2	O-007

TABLE 8-5 CROSS REFERENCE PARTS LIST (cont'd)

SIG C STOCK NO.	KEY SYMBOL	SIG C STOCK NO.	KEY SYMBOL	SIG C STOCK NO.	KEY SYMBOL	SIG C STOCK NO.	KEY SYMBOL
2G290-43	E-004	2Z1244-275	A-101	2Z4875-412	O-127	2Z7858-154	O-002
2JOA2	V-116	2Z1244-276	A-121	2Z5180-35	O-101A	2Z8202-68	O-138
2J12AU7	V-111	2Z1244-280	A-102	2Z5180-36	O-101C	2Z8203-493	O-139
2J12AX7	V-110	2Z1480.70	H-114	2Z5533A	J-102	2Z8203-514	O-117
2J5V4G	V-115	2Z1480.86	H-113	2Z5534	J-103	2Z8203-515	O-116
2J6BA6	V-001	2Z1588-13	O-127AR	2Z5821-4	E-168	2Z8203-516	O-115
2J6AK5	V-101	2Z1588-14	O-163B	2Z5822-365	E-171	2Z8203-701	O-133
2J6AQ5	V-113	2Z1588-16	O-163A	2Z5822-484	E-169	2Z8203-702	O-140
2J6BE6	V-102	2Z1578-43	A-123	2Z5822-485	E-158	2Z8204-160	O-131
2J991	I-104	2Z1589-42	A-125	2Z5822-715	E-165	2Z8204-161	O-132
2S5508-23-1	Z-106	2Z2490-35	A-117	2Z5882-84	XI-103	2Z8204-162	O-134
2S5508-23-11	Z-114	2Z2642.359	H-160	2Z5883-353	XI-101	2Z8204-163	O-137
2S5508-23-13	A-120	2Z2642.688	H-102	2Z5952	I-101	2Z8304.237	E-117
2S5508-23-2	Z-104	2Z2642.689	H-103	2Z6820.278	A-112	2Z8304.303	E-001
2S5508-23-5	Z-102	2Z2712.321	E-006	2Z6820.498	A-122	2Z8304.304	E-104
2S5508-23-6	Z-112	2Z2935-93	O-136	2Z7090.234	A-118	2Z8304.305	E-107
2S5508-23-9	Z-116	2Z3262-44	E-142	2Z7090.235	A-115	2Z8495.5	H-106
2X209-10000	Y-107	2Z3262-45	E-144	2Z7090.236	A-114	2Z8552-132	O-005
2X209-10666.67	Y-101	2Z3262-46	E-149	2Z7090.237	A-113	2Z8634-67	H-120
2X209-11000	Y-103	2Z3262-61	E-172	2Z7090.238	A-104	2Z8636-23	XY-101
2X209-12000	Y-106	2Z3262-84	E-003	2Z7090.239	A-103	2Z8670.33	XV-115
2X209-13000	Y-102	2Z3273-212	O-109	2Z7090.240	A-005	2Z8677.171	XV-101
2X209-14000	Y-105	2Z3273-213	O-128	2Z7090.241	A-001	2Z8679.30	XV-110
2X209-4000	Y-110	2Z3295-121	O-146	2Z7090.347	A-126	2Z8761-64	XY-111
2X209-6000	Y-109	2Z3295-148	O-102	2Z7093-264	A-106	2Z8799-239	J-101
2X209-8000	Y-108	2Z3295-152	O-104	2Z7258.94	H-101	2Z8800A-4	XV-001/
2X209-9000	Y-104	2Z3351-461	A-105	2Z7259-119	H-165		XV-002
2X225-500	Y-112	2Z3351-462	A-004	2Z7259-229	H-164	2Z8877.332	O-125
2X226-100	Y-111	2Z3351-463	A-119	2Z7259-230	H-161	2Z8877.333	O-119
2ZA1352-180	MS-103	2Z3351-469	A-002	2Z7259-231	H-158	2Z8877.334	O-111
2ZA1352-181	MS-102	2Z3351-541	A-116	2Z7259-232	H-163	2Z8877.335	O-107
2Z11152-9	E-174	2Z3723-203	I-106	2Z7259-236	H-019	2Z8877.336	O-110
2Z1239.365	A-127	2Z3295-167	O-101B	2Z7599A-328	K-101	2Z8877.406	O-163
2Z1239.366	A-128	2Z3723-231	I-105	2Z7780-208	A-124	2Z8877.614	O-147
2Z1244-98	A-110	2Z4376-110	T-102	2Z7855-9	O-003	2Z8877.615	O-143

TABLE 8-5 CROSS REFERENCE PARTS LIST (cont'd)

SIG C STOCK NO.	KEY SYMBOL	SIG C STOCK NO.	KEY SYMBOL	SIG C STOCK NO.	KEY SYMBOL	SIG C STOCK NO.	KEY SYMBOL
2Z8877.811	O-164	3DE50-4	C-4	3D9050-169	C-5	3RC20BF103K	R-122
2Z9053A-32	Z-118	3D9001-29	C-116	3D9050-170	C-5	3RC20BF104K	R-102
2Z9259-228	H-018	3D9001E5-11	C-133	3D9050-171	C-5	3RC20BF105K	R-101
2Z9613.719	T-108	3D9002-27	C-111	3D9050V-117	C-102	3RC20BF124K	R-171
2Z9629-390	T-101	3D9004-25	C-220	3D9051-61	C-007	3RC20BF152K	R-004
2Z9637.138	T-107	3D9005-121	C-238	3D9051-68	C-234	3RC20BF154K	R-005
2Z9641.328	T-103	3D9010-169	C-002	3D9068-27	C-157	3RC20BF161J	R-163
3C1081-50B	L-001	3D9010-170	C-002	3D9075-51	C-123	3RC20BF221K	R-182
3C1081-53E	L-002	3D9010-172	C-002	3D9100-230	C-231	3RC20BF222K	R-110
3C1084S-43	L-101	3D9010-173	C-002	3D9100-294	C-113	3RC20BF223K	R-131
3C1084S-44	L-104	3D9010-174	C-002	3D9100V-85	C-224	3RC20BF224K	R-121
3C1084S-45	L-105	3D9010-180	C-173	3D9130-23	C-107	3RC20BF273J	R-147
3C1084S-46	L-106	3D9010-186	C-002	3D9150-92	C-145	3RC20BF273K	R-126
3C1084S-47	L-121	3D9010-187	C-002	3D9180-38	C-175	3RC20BF332K	R-155
3C1084S-64	L-103	3D9010-202	C-002	3D9200-109	C-161	3RC20BF333K	R-104
3C1084S-65	L-102	3D9010-203	C-002	3D9300-69	C-177	3RC20BF334K	R-001
3C1084S-84	Z-108	3D9010-204	C-002	3D9330-27	C-202	3RC20BF393K	R-007
3C1084S-85	Z-111	3D9010-205	C-002	3D9430-5	C-103	3RC20BF471K	R-107
3C357-48	L-115	3D9010-206	C-002	3D9540-2	G-001	3RC20BF472K	R-119
3C357-49	L-120	3D9010-217	C-002	3D9820-14	C-101	3RC20BF473K	R-117
3C357-57	L-125	3D9012-72	C-206	3D9910-3	C-118	3RC20BF474K	R-125
3C547-37	L-122	3D9012V-25	C-167	3D9920-34	C-105	3RC20BF682K	R-106
3C547-38	L-123	3D9015-133	C-151	3F3307.5-8	M-101	3RC20BF821J	R-149
3C607B-1	L-114	3D9020-63	C-004	3G2206-4.1	W-137	3RC20BF683K	R-150
3C607B-2	L-118	3D9020-77	C-109	3G2210-4.2	W-136	3RC20BF684K	R-118
3C607B-3	L-117	3D9022-57	C-236	3G350-119	E-103	3RC30BF103K	R-006
3DA10-472	C-005	3D9024-56	C-232	3G385-72	H-111	3RC30BF104K	R-160
3DA10-527	C-114	3D9025V-93	C-110	3H227-2	O-160	3RC30BF222K	R-142
3DA100-1111	C-198AB	3D9027V-6	C-188	3H305-212	O-004	3RC30BF273K	R-003
3DA100-804	C-205ABC	3D9036-14	C-153	3H305-23	O-001	3RC30BF333K	R-113
3DA100-987	C-214AB	3D9047-38	C-155	3H4702	CR-101	3RC30BF473K	R-109
3DA3-152	C-009	3D9050-159	C-5	3K3568221	C-212	3RC42BF102K	R-174
3DB20-117	C-215	3D9050-160	C-5	3RC20BF100K	R-143	3RC42BF182J	R-173
3DB35-3	C-217	3D9050-161	C-5	3RC20BF101K	R-170	3RW18921	R-164
3DB8-222	C-223	3D9050-168	C-5	3RC20BF102K	R-002	3RW21327	R-165

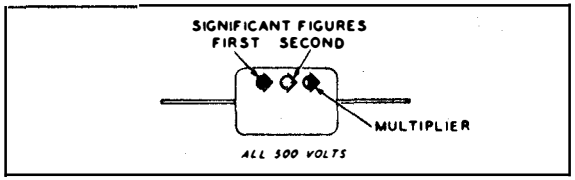
TABLE 8-5 CROSS REFERENCE PARTS LIST (cont'd)

SIG C STOCK NO.	KEY SYMBOL	SIG C STOCK NO.	KEY SYMBOL	SIG C STOCK NO.	KEY SYMBOL	SIG C STOCK NO.	KEY SYMBOL
3RW27907	R-181	6L3506-32-8.1A	H-128	6L6832-5.20PH	H-141		
3Z12101-9.3	E-118	6L3606-32-4-1	H-121	6L6832-8.7BSF	H-133		
3Z1892-22.3	L-124	6L3610-32-6.2	H-124	6L72504	H-009		
3Z1892-22.9	Z-113	6L3656-32-5	H-126	6L72604-1	H-153		
3Z2601.43	F-101	6L50103-27	H-016	6L72606	H-154		
3Z2878-1.4	XF-101	6L50112-13	H-115	6L72608	H-155		
3Z7100-66	R-140	6L50112-20N	H-116	6L72610	H-156		
3Z7410-210	R-148	6L50112-31	H-117	6L72804-3	H-010		
3Z7498-50.183	R-154	6L50112-32	H-162	6L72806	H-015		
3Z770-2.102	TB-105	6L50113-40	H-119	6L72902-2	H-014		
3Z770-2.79	TB-108	6L52403	H-112	6L72920	H-150		
3Z770-3.44	E-101	6L53014-4C	H-118	6L73473-2	O-006		
3Z770-3.48	TB-001	6L54002-17	H-110	6L7958-3.83	H-130		
3Z770-3.49	TB-102	6L58024-47	H-157	6Q335-1	TOOL		
3Z770-6.132	TB-113	6L6256-3.9PH	H-013	6Q335-2	TOOL		
3Z9825-50.1	S-114	6L6440-10.20PH	H-139	6RK55230-10	TOOL		
3Z9825-50.2	S-112	6L6440-2.20PH	H-005	6RK55232	TOOL		
3Z9825-58.198	S-113	6L6440-3.9PH	H-006	6R15490.1	TOOL		
3Z9863-54R	S-117	6L6440-4.47SPH	H-004	6R55230-3	TOOL		
3Z9903E-10.12	S-103	6L6440-4.9PH	H-007	6R55231	TOOL		
3Z9903E-10.13	S-108	6L6440-5.8SPH3	H-135	6Z1650-24	A-129		
3Z9903E-10.14	S-110	6L6440-5.9PH	H-003	6Z1650-25	A-133		
3Z9903E-10.15	S-101	6L6440-7.9PH	H-166	6Z1727	P-101		
6C10A-2	O-106	6L6440-8.7BPH	H-134	6Z4856-53	H-108		
6C35-27	LS-101	6L6632-24.20PH	H-145	6Z4865-1	H-104		
6C42-199	LS-199/U	6L6632-3.8SPH	H-008	6Z4895	H-105		
6C43-187	LS-101-ALT	6L6632-4.8SPH1	H-146	6Z4910Q-6	H-107		
6D13202-23A	N-101	6L6632-4.9PH	H-012	6Z4914	H-109		
6L18506-2.83	H-129	6L6632-5.8SPH1	H-147	6Z5004-1	H-167		
6L18506-2.90C2	H-125	6L6632-5.9PH	H-143	6Z7598-12	H-011		
6L18510-4.90C2	H-131	6L6632-6.20PH	H-144	6Z7678-2	O-145		
6L3104-40.4	H-001	6L6632-6.8SPH	H-148	6Z7678-3	O-144		
6L3106-32-5.1	H-123	6L6632-8.7BSPH	H-132	6Z8571-3	W-103		
6L3306-32-10	H-127	6L6632-8.8SPH	H-149				
6L3406-32-3	H-002	6L6832-4.20PH	H-140				

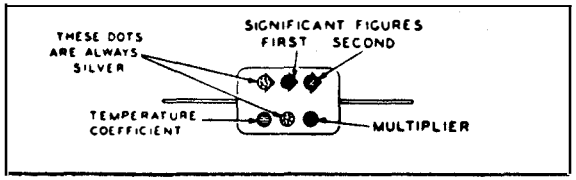
TABLE 8-6 APPLICABLE COLOR CODES AND MISCELLANEOUS DATA

CAPACITOR COLOR CODES

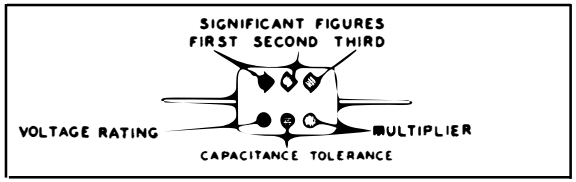
RMA 3-DOT COLOR CODE FOR MICA-DIELECTRIC CAPACITORS



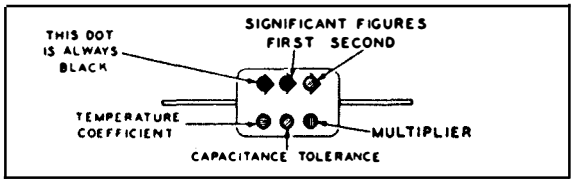
JAN 6-DOT COLOR CODE FOR PAPER-DIELECTRIC CAPACITORS



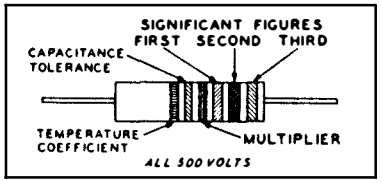
RMA 6-DOT COLOR CODE FOR MICA-DIELECTRIC CAPACITORS



JAN 6-DOT COLOR CODE FOR MICA-DIELECTRIC CAPACITORS

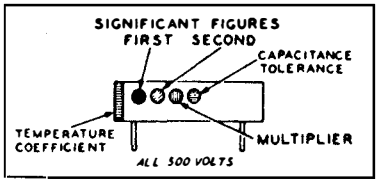


RMA COLOR CODE FOR TUBULAR CERAMIC-DIELECTRIC CAPACITORS

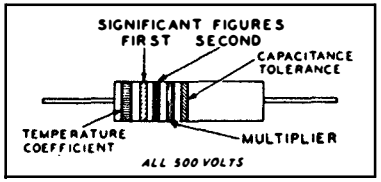


JAN COLOR CODE FOR FIXED CERAMIC-DIELECTRIC CAPACITORS

RADIAL TYPE NON-INSULATED



AXIAL TYPE INSULATED



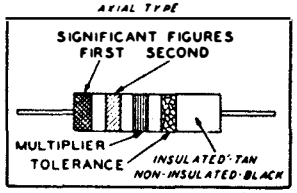
RMA: RADIO MANUFACTURERS ASSOCIATION
JAN: JOINT ARMY-NAVY

RESISTORS		CAPACITORS						
				MULTIPLIER				
TOLERANCE	MULTIPLIER	SIGNIFICANT FIGURE	COLOR	RMA MICA AND CERAMIC-DIELECTRIC	JAN MICA AND PAPER-DIELECTRIC	JAN CERAMIC DIELECTRIC	VOLTAGE RATING	TEMPERATURE COEFFICIENT
	1	0	BLACK	1	1	1		A
	10	1	BROWN	10	10	10	100	B
	100	2	RED	100	100	100	200	C
	1000	3	ORANGE	1,000	1000	1000	300	D
	10,000	4	YELLOW	10,000			400	E
	100,000	5	GREEN	100,000			500	F
	1,000,000	6	BLUE	1,000,000			600	G
	10,000,000	7	VIOLET	10,000,000			700	
	100,000,000	8	GRAY	100,000,000		001	800	
	1,000,000,000	9	WHITE	1,000,000,000		0.1	900	
5	0.1		GOLD	0.1	0.1		1000	
10	0.01		SILVER	0.01	0.01		2000	
20			NO COLOR				500	

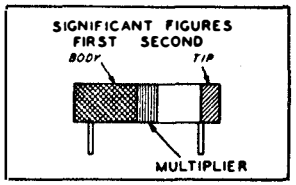
RESISTOR COLOR CODES

RMA COLOR CODE FOR FIXED COMPOSITION RESISTORS

AXIAL TYPE

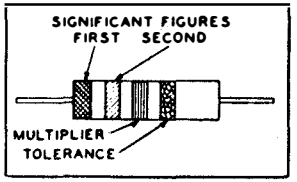


RADIAL TYPE



JAN COLOR CODE FOR FIXED COMPOSITION RESISTORS

AXIAL TYPE INSULATED



RADIAL TYPE NON-INSULATED

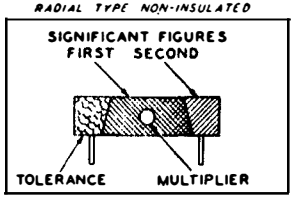


TABLE 8-6 (Cont'd) HOOK-UP WIRE COLOR CODE

1. SCOPE.

The Standard Hook-up Wire Code is a means of designating, by a code group, the characteristics of Collins Radio Company Hook-up wire. This code group is similar to the type designations used in most of the Joint Army-Navy Specifications, and performs the same function.

2. DESIGNATION.

The code designations are made up of letter designating the type of wire, size of wire, and whether shielded or unshielded, followed by numerals designating the body color and colors of tracers. Some examples are shown below.

Unshielded Wire, JAN Type WL, #22 AWG, White with Red and Green Tracers

C	A	9	25
Type of Wire	Size of Wire	Color of Body	Colors of Tracers

Shielded Wire, JAN Type WL, #22 AWG, White with Red and Green Tracers

C	A	S	9	25
Type of Wire	Size of Wire	Shielded	Color of Body	Colors of Tracers

3. TYPE AND SIZE OF WIRE.

The type and size of wire are designated on the practical wiring diagrams in accordance with the system presented in the following table:

TYPE OF WIRE CODE			SIZE OF WIRE CODE	
LETTER	TYPE OF WIRE	FAMILY USUALLY FOUND IN	SIZE	LETTER
A	AN-J-C-48 Wire	440 (Plain) 443 (Shielded)	#22AWG	A
B	Busbar Round Tinned Copper	421	#20AWG	B
C	JAN TYPE WL (600 volts)	439	#18AWG	C
D	Miniature JAN Wire (Prodelin)	439-7000 Series	#16AWG	D
E			#14AWG	E
F	Extra-Flexible Varnished Cambric	423	#12AWG	F
G	General Electric Deltabeston	447	#10AWG	G
H	Type RH Rubber Covered	423 0169 00	#8AWG	H
J			#6AWG	J
K	Neon Sign Cable (15,000 volts)	423 0004 00	#4AWG	K
L			#2AWG	L
M			#1AWG	M
N	Single Conductor Stranded (Not Rubber)	422	#0AWG	N
P	Single Conductor Stranded (Rubber Covered)	423	#00AWG	P
Q		423	#000AWG	Q
R	JAN Type SRIR (1000 volts)	439	#0000AWG	R
T				
V	JAN Type SRHV (2500 volts)	439		V
W				W
X				X
Y				Y
Z				Z

4. SHIELDING.

When shielded wire is used the shielding in designated by inserting the letter S between the given alphabetical portion of the code and the numerical portion of the code, as shown in paragraph 2.

5. COLOR CODE.

Standard RMA and JAN-C-76 color code numerals are used in the code designating the body color and the color of tracers on the cover of insulated wire. This code is as follows:

0	Black	5	Green
2	Red	6	Blue
3	Orange	9	White

Other basic colors have been omitted due to the confusion arising in tracing wires of similar colors in cramped quarters.

The following is a list of the standard colors of wire used. Certain tracer combinations have been omitted for clarification.

Body Color	First Tracer	Second Tracer	Color Code Numerals
Black			0
Red			2
Orange			3
Green			5
Blue			6
White			9
White	Black		90
White	Red		92
White	Orange		93
White	Green		95
White	Blue		96
White			
Green	Black		50
Green	White		59
Orange	Black		30
Orange	Green		35
Orange	White		39
Red	Black		20
Red	Orange		23
Red	Green		25
Red	White		29
Black	Red		02
Black	Orange		03
Black	Green		05
Black	White		09
Black			
White	Black	Red	902
White	Black	Orange	903
White	Black	Green	905
White			
White	Red	Orange	923
White	Red	Green	925
White	Red	Blue	926
White	Orange	Green	935

TABLE 8-7 LIST OF MANUFACTURERS

ABBREVIATIONS	PREFIX	NAME	ADDRESS
Aladdin	CAI	Aladdin Radio Industries, Inc.	501 West 35th Street Chicago, Illinois
AB	CBZ	Allen - Bradley Co.	118 West Greenfield Ave. Milwaukee, Wisconsin
Amphenol	CPH	American Phenolic Corp.	1830 South Fifty Fourth Ave. Chicago, Illinois
Belding- Corticelli		Belding - Corticelli	119 W. 40th St. New York 18, N. Y.
Bentley Harris Mfg. Co.		Bentley Harris Mfg. Co.	Conshohocken, Pennsylvania
Berkley Fly Co.		Berkley Fly Co.	Spirit Lake, Iowa
Bristolco	CTB	Bristol Co.	117 Bristol Road Waterbury, Connecticut
Buss	CFA	Bussman Mfg. Co.	2538 West University Street St. Louis, Missouri
Cabridge Therm	CAMQ	Cambridge Thermionic Corp.	445 Concord Ave. Cambridge, Massachusetts
Cardwell	CBK	Cardwell, Allen D., Mfg. Co.	97 Whiting Street Plainville, Connecticut
Centralab	CBN	Central Radio Laboratory, Div. of Globe Union	900 E. Keefe Ave. Milwaukee, Wisconsin
Chi. Trans	CTR	Chicago Transformer Corp.	3501 Addison St. Chicago, Illinois
Cinch	CMG	Cinch Mfg. Co.	2339 W. Van Buren St. Chicago, Illinois
Clare CP	CRY	Clare, C.P., Co.	4719 Sunnipide Ave. Chicago, Illinois
Conant	CAZO	Conant Electrical Labs.	6500 "O" St. Lincoln, Nebr.
Collins Rad	COL	Collins Radio Co.	855 35th Street N.E. Cedar Rapids, Iowa
Harry Davies Mold		Davies, Harry, Molding Co.	Chicago, Illinois
Electrical Reactance Corp.	CASU	Electrical Reactance Corp.	Franklinville, N. Y.
Electro Motive	CMF	Electro-Motive Mfg. Co.	Willimantic, Conn.
Eric	CER	Erie Resistor Corp.	644 W. 12th St. Eric, Pa.

TABLE 8-7 LIST OF MANUFACTURERS (Cont'd)

ABBREVIATIONS	PREFIX	NAME	ADDRESS
G. E.	CG	General Electric Co.	1 River Road Schenectady 5, N. Y.
Gray Stamping and Mfg. Co.		Gray Stamping and Mfg. Co.	Plano, Illinois
Hammarlund	CHC	Hammarlund Mfg. Co.	460 W. 34th St. New York, N. Y.
Herlec	CBMR	Herlec Mfg. Co.	422 No. 5th St. Milwaukee 3, Wis.
Hubbell	CHU	Hubbel, Harvy, Inc.	447 Concord Ave. Bridgeport, Conn.
Jeffers Electronics	CAUZ	Jeffers Electronics Co.	DuBois, Pa.
Jensrad	CJS	Jensen Radio Mfg. Co.	6601 So. Laramic Ave. Chicago, Ill.
Johnson E. F.	CEJ	E. F. Johnson Co.	Waseca, Minnesota
J. Knights	CADI	Knight, James	Sandwitch, Ill.
Littelfuse	CLF	Littelfuse, Inc.	4765 Ravenswood Ave. Chicago 40, Ill.
Mallory	CMA	Mallory, P. R., Co., Inc.	1941 Thomas Street Indianapolis, Ind.
Marion Elec Instr.	CMY	Marion Elec. Instrument Co.	(Stork Street Gate) Manchester, N. H.
Micarta Fab.		Micarta Fabrication, Inc.	Chicago, Ill.
Millen	CJA	Millen, James, Mfg. Co. Inc.	150 Exchange St. Malden, Mass.
ND		New Departure Div., G. M. Corp.	Bristol, Conn.
Norma-Hoff		Norma - Hoffman Bearings Corp.	Stamford, Conn.
Oak	COC	Oak Mfg. Co.	1200 N. Clybourne Ave. Chicago, Ill.
Sprague	CSF	Sprague Electric Co.	N. Adams, Mass.
Std Coil Prod	CADH	Standard Piezp Company	126 Cedar Street Carlisle, Pa.
Surprenant		Surprenant Electrical Insulation Co.	Boston 10, Mass.
Ucinite		Ucinite Co.	Newtonville, Mass.
Vaco		Vaco Products Co.	Chicago 11, Ill.
Waldes		Waldes Koh-I-Noor, Inc.	Long Island City 1, N. Y.
Whitso, Inc.		Whitso, Inc.	Chicago 47, Ill.

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