

**OVER-THE-HORIZON RADIO SYSTEMS**  
**ITTL 12A-1 OVER-THE-HORIZON RADIO SYSTEM**  
**POWER AMPLIFIER, NUS 3296**  
**KLYSTRON REPLACEMENT**

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**1. GENERAL**

**1.01** This section provides the procedures for installing a new replacement klystron in the NUS 3296 power amplifier. When a previously used klystron is to be installed, only Charts 1 and 4 need be performed.

**1.02** Each klystron tube is manufactured as ordered. The manufacturer has indicated delivery 30 days after receipt of the order.

**1.03** When a new tube is received, it should be examined immediately for evidence of mechanical damage. Breakage in shipping is the responsibility of the carrier. Claims against the carrier must be made promptly.

**1.04** If no mechanical damage is evident, a complete electrical and operational test should be made as soon as practicable observing all recommendations for handling, tuning, and operating the klystron amplifier. The tube should then be operated under its intended conditions.

**1.05** To assure continued good condition, spare tubes should be placed in operation on a 3-month interval basis. Spare tubes and structures shall be protected from dust, corrosive atmosphere, and mechanical damage.

**1.06** Two spare tubes and two magnetic structures are usually provided at a transmitter site. One tube is installed in its structure, tuned and ready to be substituted for the tube used in each transmitter.

**1.07** The guaranteed life of the tube is one year or 1000 hours of cathode life, whichever occurs first. Should a klystron be returned to the manufacturer because of an engineering complaint, the tube should be accompanied by the data sheet

for the tube and any other information that may be helpful in analyzing the cause of failure.

## 2. PROCEDURES

### CHART 1

#### REMOVAL OF MAGNETIC STRUCTURE FROM AMPLIFIER

| STEP | PROCEDURE  |
|------|--|
| 1    | On the amplifier, operate the BEAM VOLTAGE and MASTER switches to the OFF position. After 2 minutes, operate the MAIN switch on the power vault to the OFF position.   |
| 2    | Open the bypass valve in the heat exchanger to reduce the pressure to 20 PSI. This should prevent overflow of the coolant in the storage tank.   |
| 3    | Close blue-handled valve 1 and open red-handled valves 2, 3, and 4.  |
| 4    | Operate the heat exchanger pump for 10 minutes; then close red-handled valves 2, 3, and 4.   |
|      | <i>Note:</i> Valve 1 shall be kept closed until a new tube is installed and connected.   |
| 5    | Starting at the front bottom of the cabinet, remove the two 3-1/8 inch output line elbows. Break the connections at the top of the short piece of each elbow.  |
|      | <i>Note:</i> The wide flange is the movable one. It is not necessary to break the elbows apart in the horizontal portion.  |
| 6    | Disconnect the two quick-disconnect water fittings at the bottom of the collector.   |
| 7    | Disconnect the NO. 5 water load from the NO. 5 secondary at the junction of the horizontal extension and the right angle section. The short horizontal section should then be removed and the insulated connector assemblies retained with this section. |
| 8    | Disconnect the NO. 4 water load from the NO. 4 secondary at the junction of the horizontal extension and the right angle section. The horizontal section should be removed.  |
|      | <i>Note:</i> The horizontal section is a 1-5/8 inch to 7/8 inch adapter.   |
| 9    | Disconnect the NO. 3 load from the NO. 3 secondary. The connection is through an RG8/U cable. Remove the 7/8 inch to type N adapter.   |
| 10   | Disconnect the NO. 2 load from the NO. 2 secondary and remove the 7/8 inch to type N adapter.  |
| 11   | Disconnect the input cable from the NO. 1 primary and remove the associated adapter.   |

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**CHART 1 (Cont)**


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| STEP | PROCEDURE   |
|------|---|
| 12   | Disconnect the dc connections from the magnet coils by releasing the locking mechanism and removing the plug.   |
| 13   | Remove the klystron socket by lifting it straight up.   |
| 14   | Starting at the bottom at the back, remove the hose from the lower drift tube water connection by opening the quick-disconnect fitting.   |
| 15   | Remove the air hose from the output box.  |
| 16   | Disconnect the RF attenuator from the overvoltage protection loop on the NO. 5 cavity.  |
| 17   | Disconnect the NO. 1 load from the NO. 1 secondary cavity and remove the 7/8 inch to type N adapter.  |
| 18   | Open the quick-disconnect fitting and disconnect the water hose from the upper drift tube connection.   |
| 19   | Verify that all connections between the cabinet and the magnetic structure have been removed so that nothing prevents the magnetic structure from being rolled out of the cabinet.  |
| 20   | Roll the dolly up to the amplifier cabinet and secure the dolly hooks to the pins on the cabinet rails.   |
| 21   | Loosen the vertical and horizontal bolts on the front of the magnetic structure far enough to permit the two brackets to be raised. Raise the brackets so that the vertical bolts clear the rails; then retighten the horizontal bolts fingertight. |
| 22   | Roll the magnetic structure out onto the dolly. Immediately release the front brackets and tighten the vertical bolts down into the dolly.  |

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**CHART 2**
**REMOVAL OF KLYSTRON FROM THE MAGNETIC STRUCTURE**


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| STEP | PROCEDURE |
|------|-----------|
|------|-----------|

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*Caution: The magnet coils are heavy and must be handled by two people when being removed or replaced. The ceramic sections of the klystron are fragile. Carrying, lifting, or positioning the tube requires two people so that damage to the tube may be avoided.*

## CHART 2 (Cont)

| STEP | PROCEDURE  |
|------|--|
| 1    | Starting at the output cavity, remove the primary-secondary coupler assembly by removing the two nuts on the top of the assembly. Remove the two screws on the right side that hold the internal fixed capacitor to the output box. See Fig. 1.  |
| 2    | Loosen the strap that clamps the output load coupler. Remove the three nuts, lockwashers, and flatwashers that secure the load coupler and remove the load coupler.  |
| 3    | Loosen the hose clamp and slide it off the outer conductor.  |
| 4    | Remove the air hose connector by removing the four nuts.   |
| 5    | Remove the four socket-head screws from the top and bottom klystron fingerholders.   |
| 6    | Release the latch on the front of the cavity and remove the two cavity sections.   |
| 7    | Loosen the two nuts that clamp the right half of the NO. 5 cavity to the secondary.  |
| 8    | Remove the four socket-head screws from the top and bottom klystron contact fingerholders and remove the two halves of the box, making certain that the secondary coaxial cavity stays with the left half of the cavity assembly.  |
| 9    | Remove the remaining cavities in the same manner.<br><br><i>Note:</i> It will be necessary to lower body coil NO. 1 to permit removal of cavity assembly NO. 1. The 7/8 inch to type N adapter on the NO. 1 cavity must be removed. Do not remove the secondary load coupler from the NO. 1 cavity. The primary coaxial cavity should remain with the left half of the assembly. |
| 10   | Drain the klystron completely by applying low pressure compressed air to the drain ports.  |
| 11   | Remove all interconnecting copper tubing. Tag all pieces for identification.   |
| 12   | Remove the large nuts at the outer corners. Remove the prefocus coils by removing all the thumb screws and nuts above and below the top coil plate and above the bottom coil plate. Disconnect the A and B coil plugs.   |
| 13   | Disconnect the three body coil electrical plugs: P38AD, P39AD, and P40AD.  |
| 14   | Loosen the two front bolts that support body NO. 3 (lowest) magnet coil and lift the coil off the supports. Turn the supports to one side. Because of its weight, use two people to lower the coil to the bottom plate, making certain that the wiring plug is not damaged.  |
| 15   | Lower body NO. 2 and body NO. 1 coils in the same manner.  |
| 16   | Remove the crescent-shaped plates that hold the neck of the klystron in place.   |

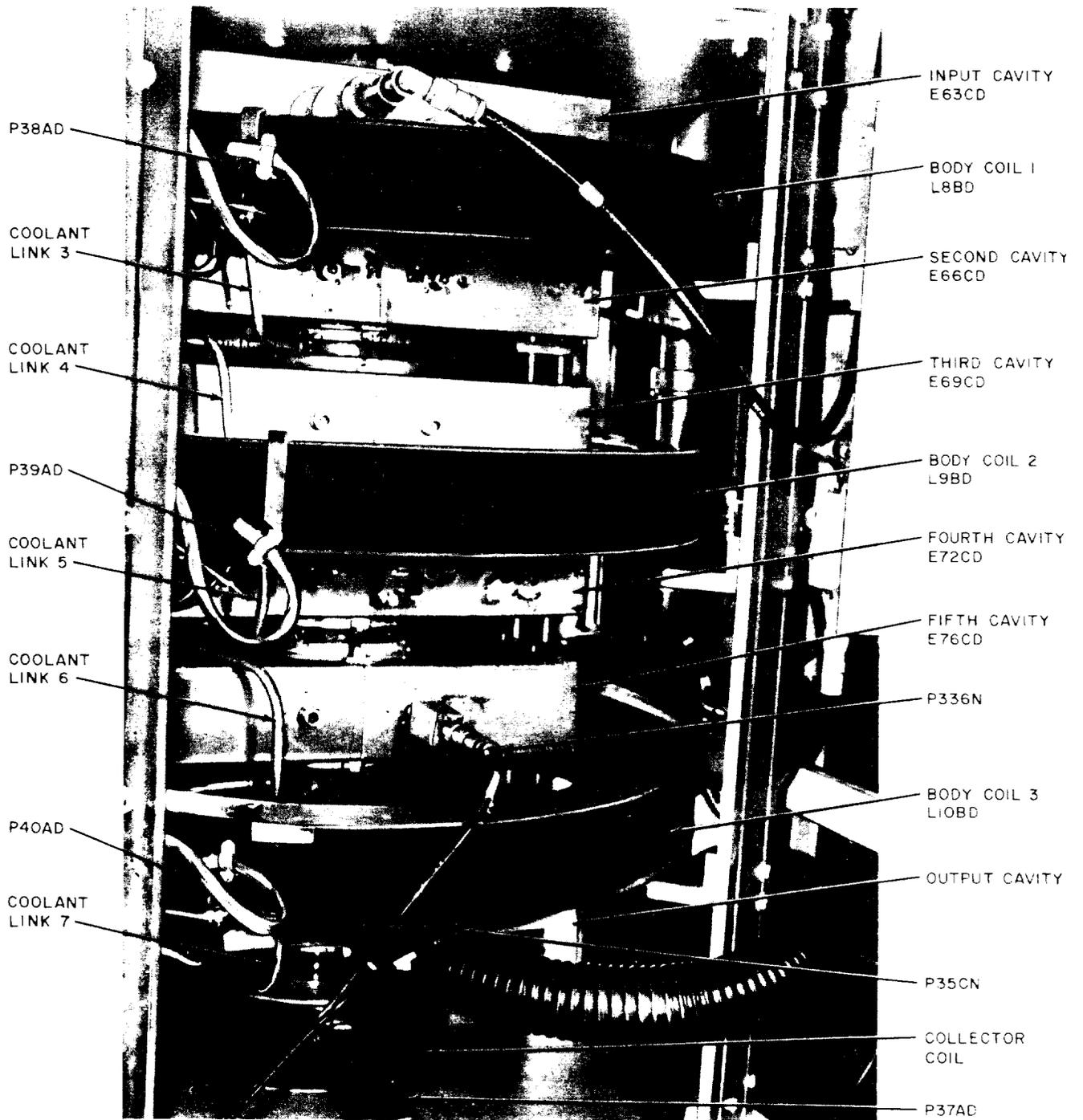


Fig. 1—Magnetic Structure in Cabinet—Rear View

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**CHART 2 (Cont)**


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| STEP | PROCEDURE   |
|------|---|
| 17   | Remove the top access plate section.<br><br><i>Caution: The klystron tube weighs approximately 60 pounds. The klystron should be handled by two people whenever it is removed from its crate, or is being installed or removed from its magnetic structure assembly. The ceramic segments between adjoining sections of the tube are fragile. Shock or excessive stress caused by improper handling may break the seals of the tube. Lifting, carrying, and positioning of the tube inside its magnetic structure should be done slowly and without jarring or abrupt changes in direction. Support should be maintained at or near the collector at all times. Avoid finger contact with the ceramic windows. When the tube is not in its magnetic structure, it must be stored only in its shipping cradle.</i> |
| 18   | Carefully remove the klystron, first rotating it 90 degrees so that the drift tube water connections are toward the front. Tilt the klystron slightly back so that any coolant trapped in the tube will not spill.  |
| 19   | Grasping the lower drift tube sections and the neck section, lift the klystron out of the structure. Keep the klystron in a vertical position until the collector can be supported.   |
| 20   | Drain any remaining coolant from the klystron and place the klystron in the shipping cradle. Place sealing plugs over all orifices.   |

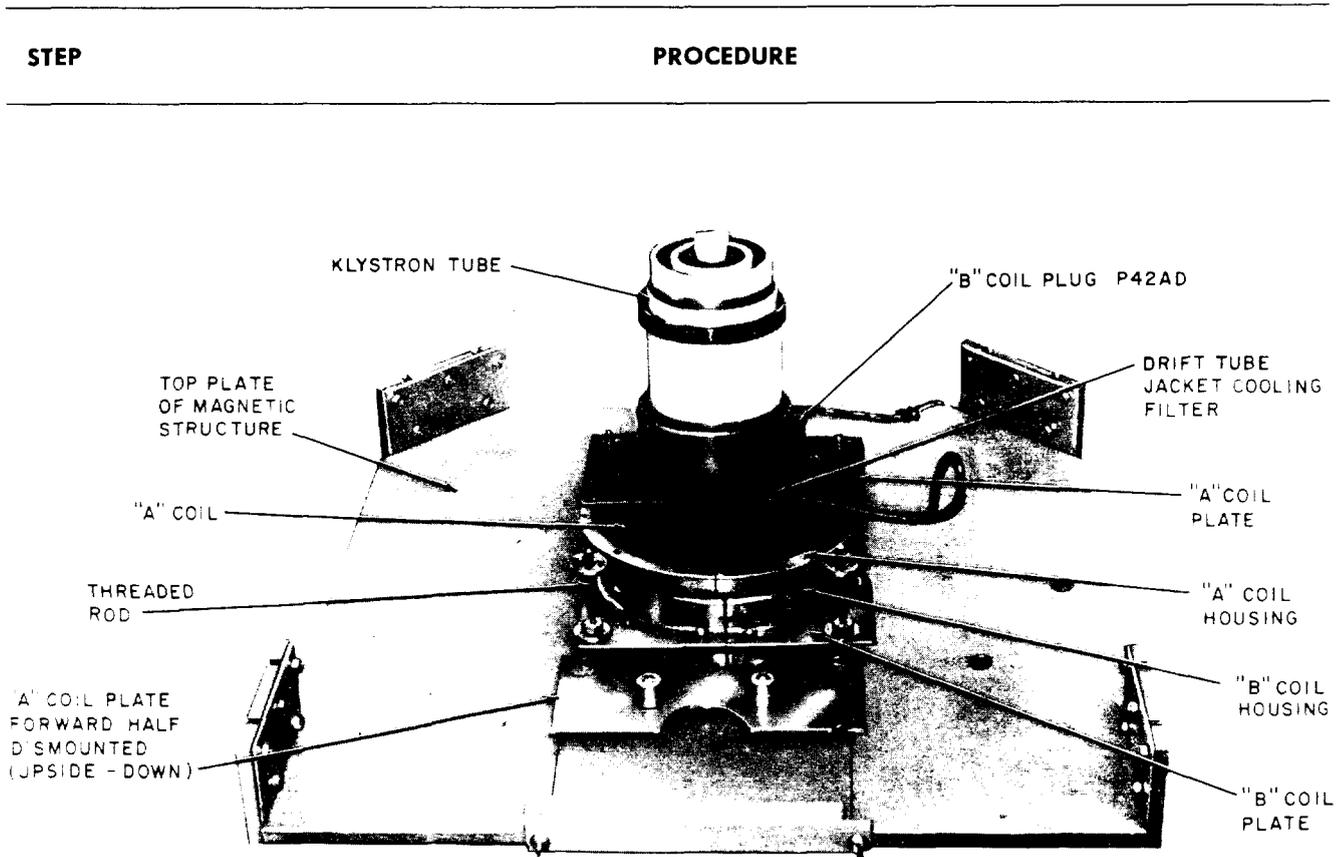
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**CHART 3**
**INSTALLATION OF KLYSTRON TUBE IN MAGNETIC STRUCTURE (FIG. 1, 2, 3, AND 4)**


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| STEP | PROCEDURE   |
|------|---|
| 1    | Observing the <b>Caution</b> in Chart 2, lower the klystron tube carefully into place, collector end downward, with the mounting flange resting snugly in the top of the mounting collar inside the collector coil. Orient the tube so that the coolant fittings face the right side of the magnetic structure.<br><br><i>Note:</i> The side of the magnetic structure that includes the name plate and access plate is referred to as the front. |
| 2    | Replace the 2-piece collar and access plate into the top plate.   |
| 3    | Loosen the screws that clamp the swinging arms on the body coil hangers so that the arms may be swung into position.  |

## CHART 3 (Cont)



**Fig. 2—Prefocus Coil Breakdown Detail—Step 1**

- 4 Using two people, lift each of the body coils off the bottom plate and install them in their hangers. Lock the body coil hanger supports with the bolt provided. Each coil should be positioned so that the power jack is nearest the right rear magnetic structure support.
- 5 Connect plugs P38AD, P39AD, and P40AD to their appropriate power jacks.
- 6 Dismantle the prefocus coil assembly shown in Fig. 2 and 3.
- 7 Assemble the two halves of the B coil plate, one to the front and one to the rear, on top of the mounting studs. Make sure that the plate has its full set of twelve binding head screws driven from beneath for the attachment of the coil housing. Hold the plate from above with a flat washer and hex nut on each rod, leaving the nut loose enough for free lateral movement of the coil housing.
- 8 Slip the B coil, with the top side up, over the upper end of the klystron tube. Position the coil on top of the coil plate keeping the leads to the rear. Clamp the housing to the plate using the binding head screws and thumb nuts provided.

## CHART 3 (Cont)

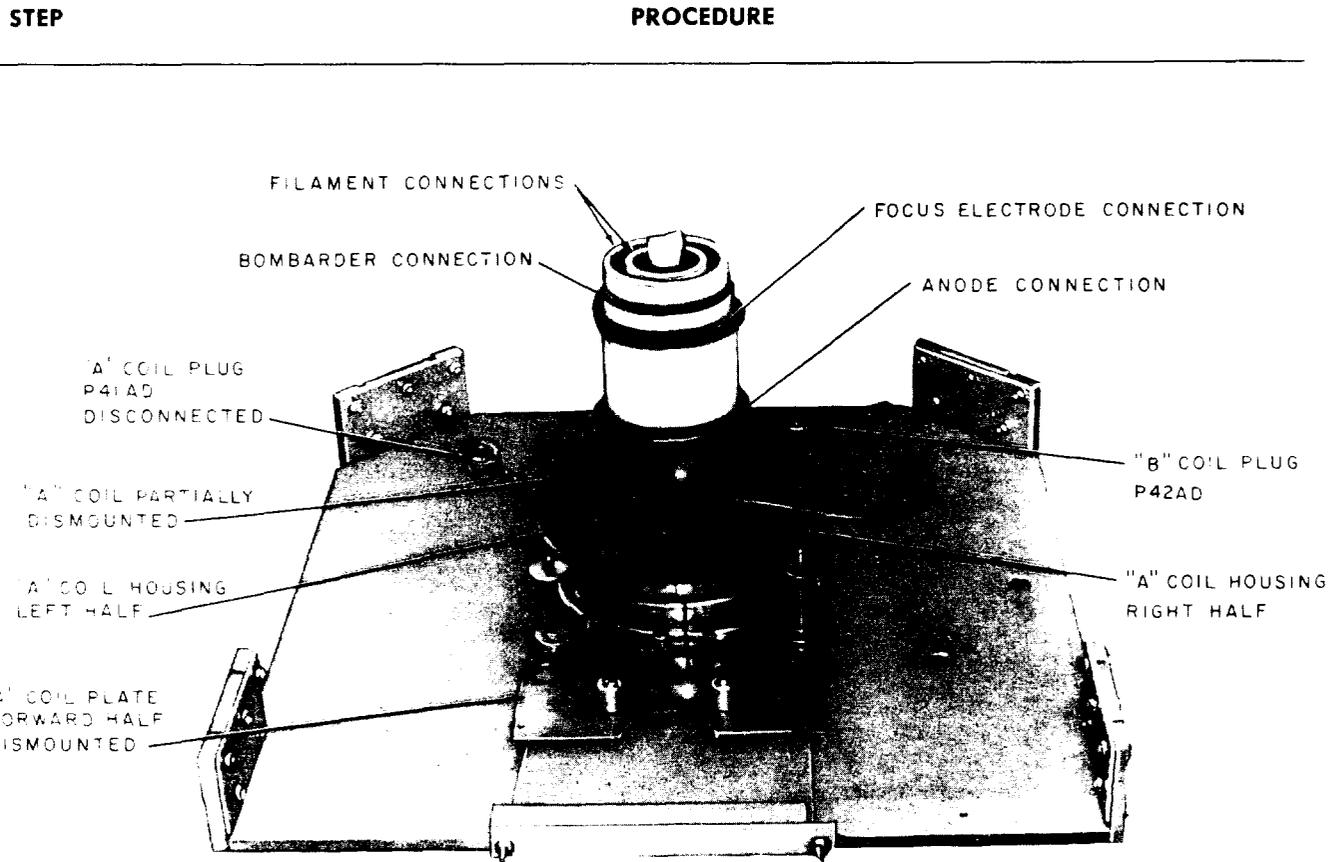
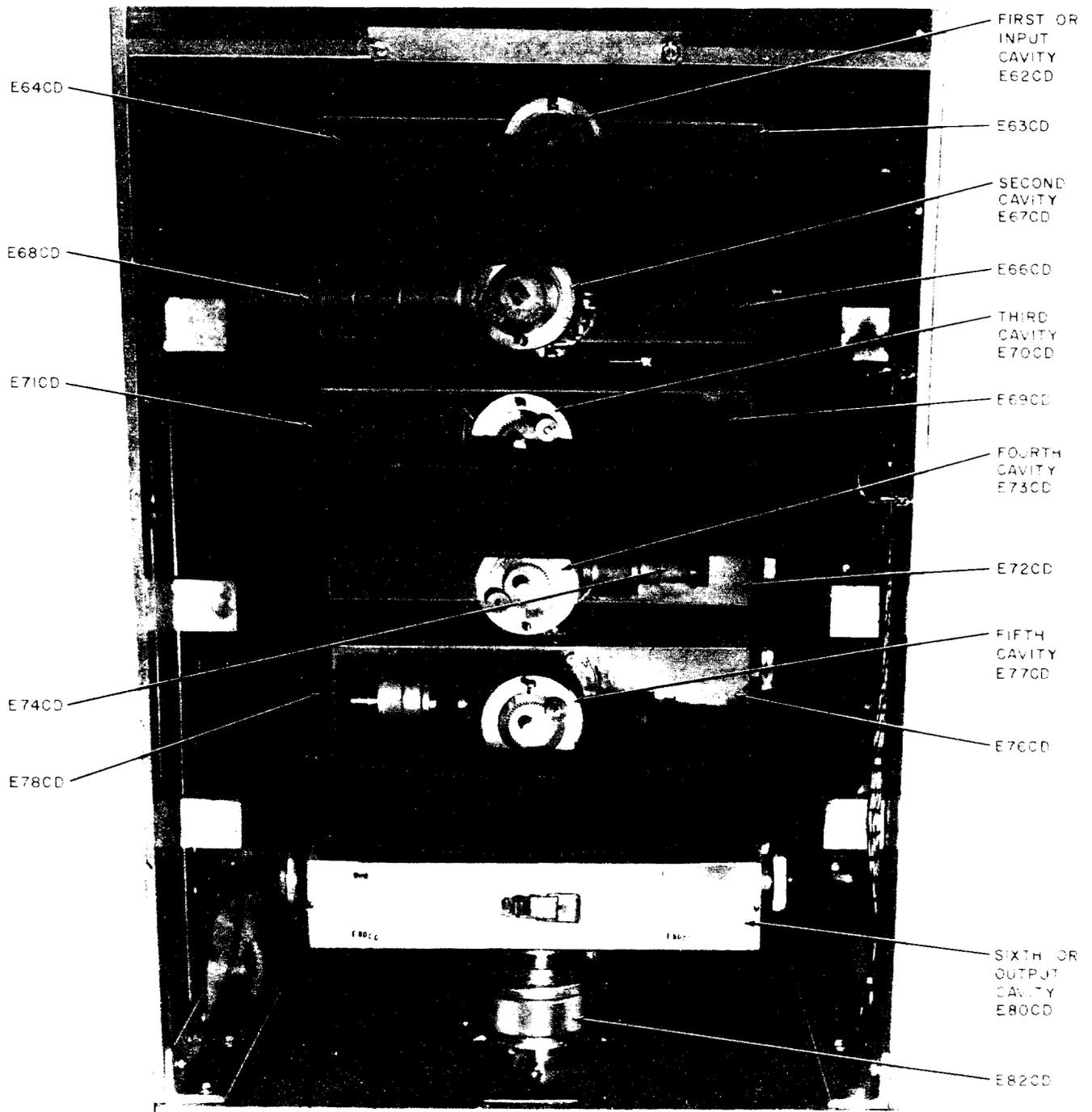


Fig. 3—Prefocus Coil Breakdown Detail—Step 2

**Note:** The two housing halves are notched at the rear to provide an exit for the coil leads.

- 9 With the flanges facing upward, place the two halves of the A coil housing, one half to the left and the other to the right, on top of the B coil housing. Keeping the TOP side up and the leads to the rear, slip the A coil over the upper end of the klystron and into the housing.
- 10 Install hex nuts and flat washers on the four mounting studs. Run the nuts down at least 1 inch. Assemble the two halves of the A coil plate, one to the front and one to the rear, on the threaded rods on top of the A coil housing. Clamp the plate to the housing with the binding head screws and thumb nuts provided.

**Note:** If the position of the coolant fittings on the drift tube jacket makes it impossible to install the A coil plate, loosen the hex nuts that clamp the mounting studs to the top plate, run the studs down 1/2 inch, assemble the A coil plate, and return the studs to their former position.



**Fig. 4—Magnetic Structure RF Component Detail**

- 11 Secure the A coil plate to the mounting studs by installing hex nuts and flat washers above and below the plate. Leave these nuts loose enough to permit lateral movement of the coil housing.
- 12 Connect A and B plugs P41AD and P42AD to their respective jacks, J6AD and J7AD.

## CHART 3 (Cont)

| STEP | PROCEDURE  |
|------|--|
| 13   | Remove the plugs from the drift tube coolant jacket fittings and install the eight coolant links.  |
| 14   | To install the input cavity (Fig. 5 and 6), loosen the two hex screws that clamp the right half of the input cavity secondary to the primary. Remove the four Allen head cap screws that clamp the two halves of the cavity secondary together at the upper and lower finger contact flanges. Keeping the cavity primary attached to the left half, draw the two secondary halves apart. |
| 15   | Reassemble the input cavity, right side up, around the input cavity ceramic segment of the klystron, keeping the cavity primary to the front. Because of the location of the drift tube coolant fittings, the right half of the cavity must be installed first, being inserted on the left side of the klystron, and then rotated around the klystron barrel.                            |
| 16   | Connect the 7/8 inch air line to type N adapters, E64CD, E65CD, to the input coupler and the load coupler.   |
| 17   | To install the intermediate cavities, loosen the hex screws that clamp the right half of the second cavity primary to the secondary. Remove the four Allen head cap screws that clamp the two halves of the cavity secondary together at the upper and lower finger-contact flanges. Draw the two primary halves apart keeping the cavity secondary attached to the left half.           |
| 18   | Reassemble the second cavity right side up around the second gap ceramic window on the klystron with the cavity secondary to the front. Connect to the load coupler the 7/8 inch airline to type N adapter, E68CD.   |

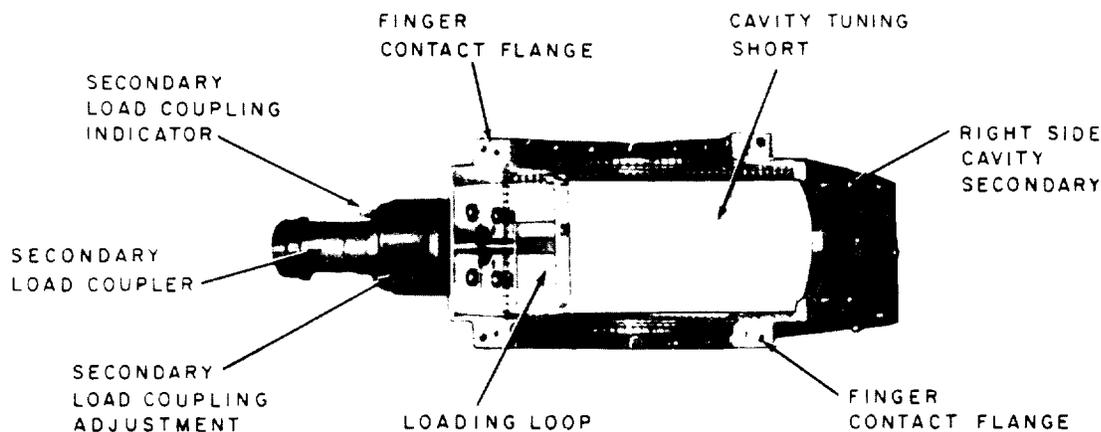


Fig. 5—Input Cavity Secondary Loading—Loop Detail

## CHART 3 (Cont)

| STEP | PROCEDURE |
|------|-----------|
|------|-----------|

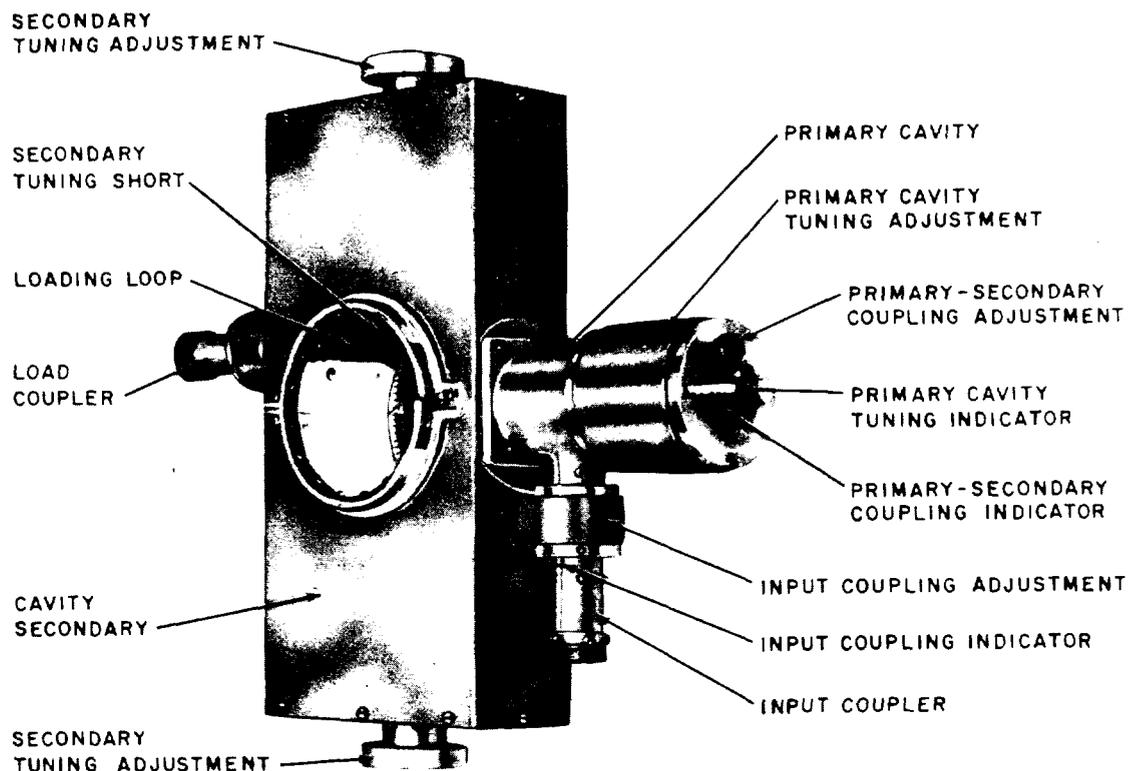


Fig. 6—Input Cavity

- 19 Repeat Steps 17 and 18 for the third, fourth, and fifth cavities and install around their appropriate ceramic windows. Keep in mind that the first, second, third, and fifth load couplers face left while the fourth coupler faces right.
- 20 After the cavity has been assembled, connect the appropriate adapter to the load coupler in accordance with the following:

| CAVITY | ADAPTER                            | COMPONENT SYMBOL |
|--------|------------------------------------|------------------|
| Third  | 7/8-inch airline to type N         | E71CD            |
| Fourth | 7/8-inch to 1-5/8-inch             | E74CD            |
| Fifth  | 1-5/8-inch to 1-5/8-inch extension | E78CD            |

## CHART 3 (Cont)

| STEP | PROCEDURE   |
|------|---|
|      | <i>Note:</i> When installing fourth and fifth cavity adapters E74CD and E78CD, do not install the associated insulated connector assembly between the adapters and loads E92CN and E96CN at this time. The insulated connector assembly would hit the cabinet when the magnetic structure carriage is rolled into the cabinet.  |
| 21   | To install the output cavity (Fig. 7, 8, and 9), remove the lower nut, lockwasher, and flatwasher from each of the three load coupler mounting screws that protrude through the bottom of the magnetic structure bottom plate. Insert the load coupler, probe upwards, through the opening in the bottom plate and secure it loosely on its mounting with the hardware previously removed. Remove the adjustable clamp from the outer conductor flange on the output cavity and slip it over its mating flange on the load coupler. |
| 22   | Remove the four nuts, shake-proof washers, and flatwashers that clamp the blower connection to the rear of the cavity primary and remove this connection. See Fig. 8 and 9.   |
| 23   | Remove the two assembly attachment nuts and washers that clamp the primary-secondary coupling assembly to the top of the output cavity.   |
| 24   | Remove the assembly, and remove the binding head screw (forward) and flathead screw (rear) that clamp the internal fixed capacitor to the top wall of the right half of the cavity secondary.   |
| 25   | Open the cavity latch.  |
| 26   | Using the cavity tee wrench supplied, remove the four Allen head cap screws that clamp the two halves of the cavity together at the upper and lower finger-contact flanges. Draw the two halves apart, keeping the fixed capacitor attached to the left half.   |
| 27   | Reassemble the cavity, right side up, around the output gap ceramic window on the klystron and the load probe on the load coupler with the cavity secondary to the front.   |
| 28   | Close the cavity latch, and replace the four socket-head screws in the finger-contact flanges. Drive the flat-head screw and the binding head screw through the top of the cavity secondary into the internal fixed capacitor.  |

CHART 3 (Cont)

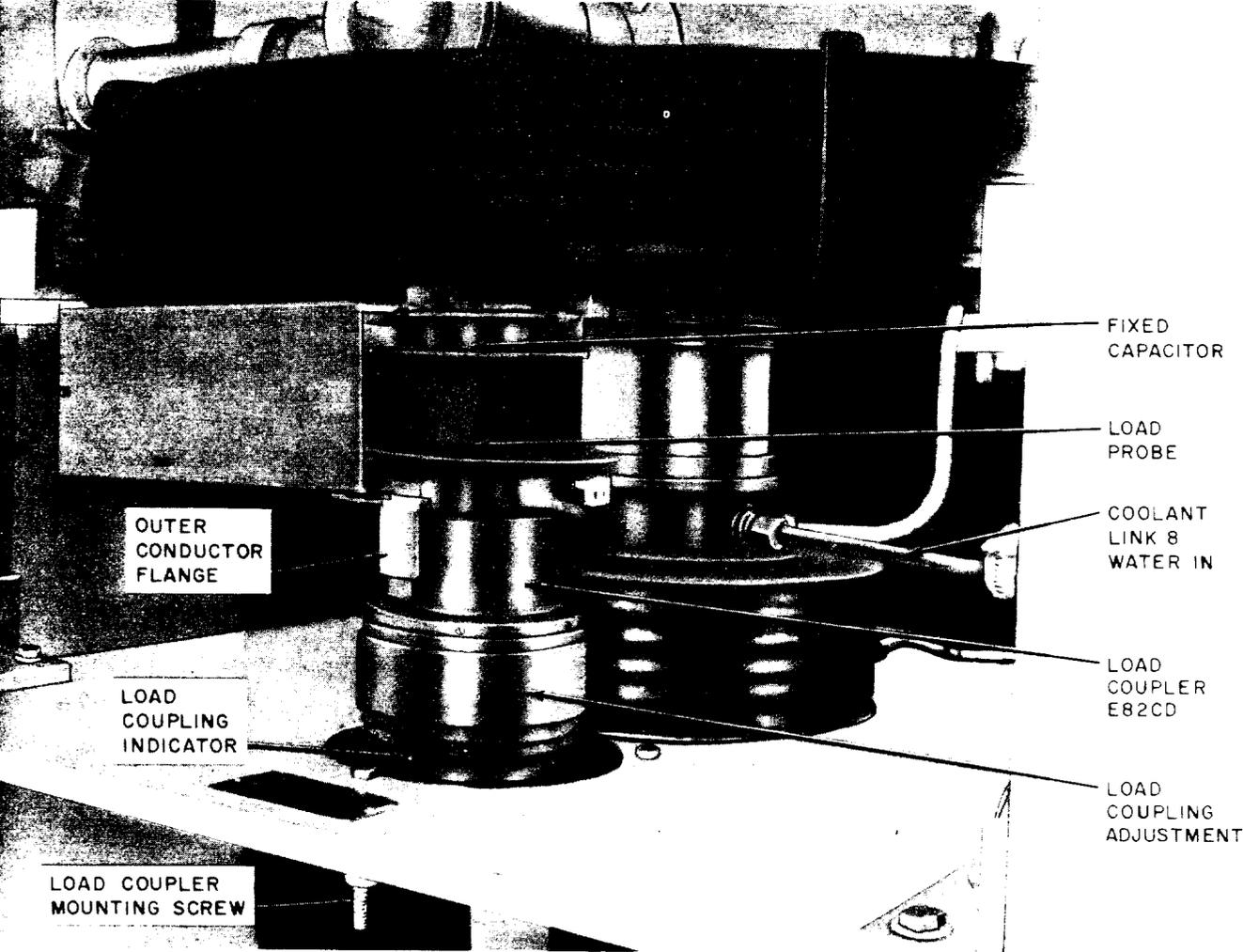
| STEP  | PROCEDURE |
|---|-----------|
|  |           |

Fig. 7—Output Cavity and Gap

CHART 3 (Cont)

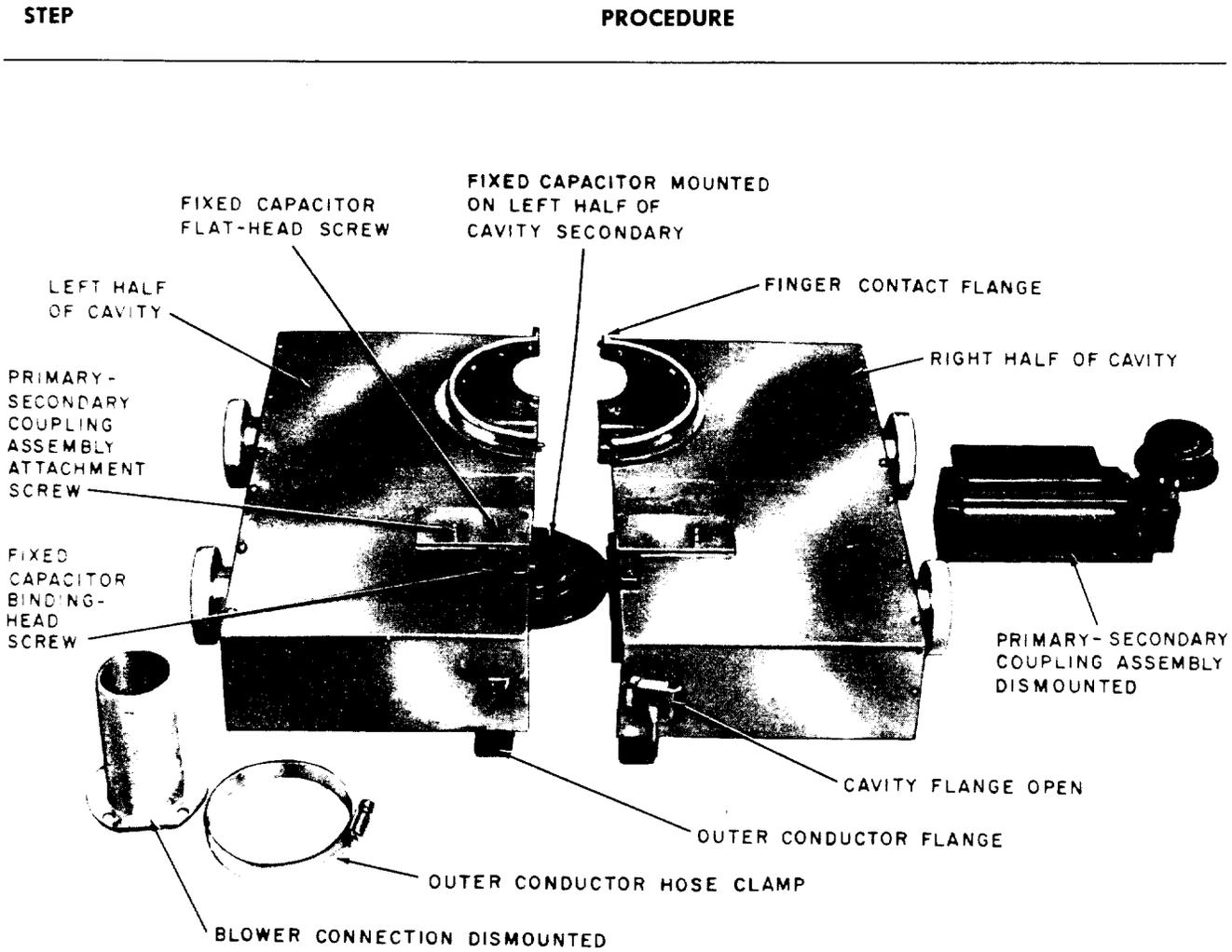


Fig. 8—Output Cavity Disassembled

## CHART 3 (Cont)

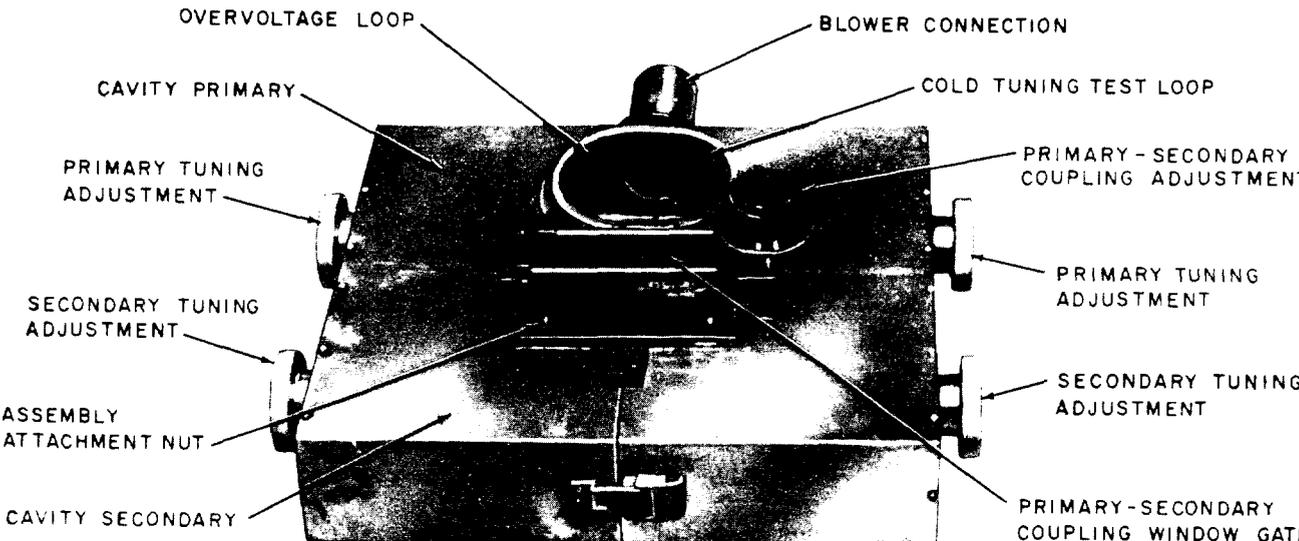
| STEP  | PROCEDURE |
|---|-----------|
|  |           |

Fig. 9—Output Cavity

- 29 Replace the primary-secondary coupling assembly and the blower connection using the appropriate nuts and washers.

## CHART 4

## INSTALLATION OF MAGNETIC STRUCTURE

| STEP | PROCEDURE   |
|------|---|
| 1    | Open the two left-hand doors of the amplifier cabinet.  |
| 2    | With one hand in the klystron neck opening in the top shield, pull the bottom panel of the shield door forward until it clears the sill piece in the shield floor; then swing it upward until the latch on this plate engages with its mating piece on the inside of the front panel. Swing the entire door assembly upward until its latch engages with its mating piece bracketed to the shield wall. |

## CHART 4 (Cont)

| STEP | PROCEDURE   |
|------|---|
| 3    | Raise fifth cavity load E60CN until the bottom of elbow E79CN is 26-3/16 inches from the top of the track that supports the magnetic structure.   |
| 4    | Raise fourth cavity load E60CN until the bottom of elbow E75CN is 30-15/16 inches from the top of the track that supports the magnetic structure.<br><br><i>Note:</i> The loads rest on springs that permit a slight readjustment in height, if necessary, when connections are made to the cavity RF fittings. The clamps that hold the load barrels can be loosened with a short screwdriver. |
| 5    | Roll the magnetic structure on its dolly up to the cabinet. Connect the dolly latch to the latch pins inside the cabinet.   |
| 6    | Remove the hex head bolts, lockwashers, flat washers, and spacers that attach the carriage to the dolly.  |
| 7    | Loosen the L-bracket position bolts. Swing the L-brackets towards the center of the structure and retighten the bolts just enough to hold the L-brackets in position.   |
| 8    | Exercising care to ensure that power plug P1AD and its cable do not hit components inside the cabinet, slowly roll the structure as far back into the cabinet as it will go.  |
| 9    | Loosen the L-bracket position bolts and swing the L-bracket down. Clamp the toes of these brackets to the cabinet rails with the hardware that previously attached the structure to the dolly.  |
| 10   | Tighten the L-bracket position bolts, lift the dolly latch, and roll the dolly away.<br><br><i>Caution: Brace the collector when pulling on wrenches. Strain could damage the klystron.</i>   |
| 11   | Couple the collector connector elbows to the collector water jacket fittings. Do not overtighten the water connections.   |
| 12   | Connect the front quick-disconnect fitting feed, on the floor of the cabinet, to the front jacket connector elbow on the klystron tube.   |
| 13   | Connect the rear quick-disconnect fitting and return to the rear jacket connector elbow.  |
| 14   | Connect the drift tube hose in the cabinet to coolant link 6 on the klystron tube.  |
| 15   | Connect the drift tube return hose in the cabinet to coolant hose 1 on the klystron tube.   |
| 16   | Using the wrenches provided, assemble the U link formed of the two E83CN transmission line elbows to load coupler E82CD and output reflectometer adapter E85CN. Make certain that the appropriate insulated connector assemblies, E99CD and E101CN, are installed in  |

## CHART 4 (Cont)

| STEP | PROCEDURE  |
|------|--|
|      | the opposite ends of the two elbows. Install the turned-back section of the modified-type insulated connector assembly having a turned-back shoulder into the load coupler.  |
| 17   | Position output cavity E80CD and output load coupler E82CD to permit the flanges of the U section to seat properly.  |
| 18   | Push the output load coupler up into the output cavity for a distance sufficient to clear the flange of elbow E83CN.   |
| 19   | Lightly tighten the flange of elbow E84CN with the wrench supplied.  |
| 20   | Rotate the output cavity on the klystron gap, if necessary, to center the output load coupler over the flange of elbow E83CN. Push the output coupler down so as to engage the threads of elbow E83CN and hand tighten. When the U section is properly positioned, use a spanner wrench to firmly tighten the flanges on elbow E84CN. Taking care that the output coupler is pushed down and seats properly in the flange of elbow E83CN, tighten the flange on the elbow with a spanner wrench. |
| 21   | Firmly tighten the strap on the output cavity that clamps the load coupler and tighten the mounting nuts that fasten the output coupler to the magnetic structure.   |
| 22   | Check that fifth cavity load elbow E79CN is level with its matching load coupler adapter E78CD. If not, readjust the load position until the elbow is level with the adapter. It may be necessary to repeat this several times as the collar spring sags when it supports the load unassisted. When level, assemble the load elbow to the load coupler adapter with insulated connector assembly E96CN using the wrenches provided.  |
| 23   | Using insulated connector assembly E92CN, connect the fourth cavity load in the same manner as in Step 22.   |
| 24   | Connect third cavity load cable plug P32CN to the third cavity load coupler adapter E71CD.   |
| 25   | Connect the second cavity load cable plug P30CN to second cavity load coupler adapter E68CD.   |
| 26   | Connect input cavity load cable plug P26CN to input cavity secondary load coupler E65CD. Connect input coupler cable plug P27CN to input coupler adapter E64CD.  |
| 27   | Connect fifth cavity overvoltage cable plug P20CN to crystal E31CN that is connected to fifth cavity overvoltage attenuator E40CN which is then connected to fifth cavity overvoltage loop E115CD. Connect output cavity overvoltage cable plug P21CN to crystal E32CN, which is then connected to output cavity loop E116CD.  |
| 28   | Connect the hose from blower B1AA to the blower connection on the output cavity using the hose clamp provided.   |

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**CHART 4 (Cont)**


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| STEP | PROCEDURE   |
|------|---|
| 29   | Connect power plug P1AD on the magnetic structure to its jack, J1AA, on the center partition of the cabinet. Lock the plug in place by moving the level all the way up.   |
| 30   | Press the klystron socket connection housing carefully, but firmly, down over the upper end of the klystron tube until it can go no farther. To prevent damage to the contact fingers inside, avoid excessive tilt of the housing during installation. Press the latch button on the front of the klystron top shield and lower the door into place, tucking the rear panel under the sill piece in the shield floor. Lock the door and return the key to key transfer box B. |

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**CHART 5****KLYSTRON CAVITY ASSEMBLIES REPAIR**

This chart provides the procedures for disassembling the coaxial cavities from the waveguide cavity assemblies and for the repair and lubrication of cavity components.

---

| STEP   | PROCEDURE   |
|--|---|
| 1  | Remove the klystron cavity assemblies from the magnetic structure in accordance with Chart 2. Each coaxial type cavity assembly is removed from its magnetic structure while still attached to the left half of its associated waveguide type cavity assembly.  |
| <b>A. Disassembling Coaxial Cavity from Waveguide Cavity</b> |   |
| 2  | If it should become necessary to completely separate the primary and secondary elements of the input cavity or one of the intermediate cavities, the primary-secondary coupling loop must first be loosened so that the contact fingers no longer touch the inside surface of the waveguide element.  |
| 3  | To loosen the primary-secondary coupling loop (Fig. 10 and 11), first loosen the two Allen set screws recessed in the primary-secondary coupling indicator gear. Slide the coaxial center conductor about 1/2 inch to clear the coupling loop and lightly tighten one of the set screws. The coaxial resonator may then be removed from the waveguide resonator by sliding the coaxial resonator to the right so as to clear the coupling loop. |

**Caution:** Do not attempt to remove the coaxial resonator from any waveguide resonator without first removing the right-hand side of the waveguide resonator, the side with which the coupling loop does not make contact. The coaxial resonator

## CHART 5 (Cont)

STEP

PROCEDURE

*should not be removed from a waveguide cavity half without first loosening and clearing the coupling loop.*

- 4 To replace a coaxial resonator on the left half of a waveguide resonator, the process is reversed. Making sure that the coupling loop will clear the side wall of the waveguide cavity, slip the coaxial on and center it on the waveguide cavity half.

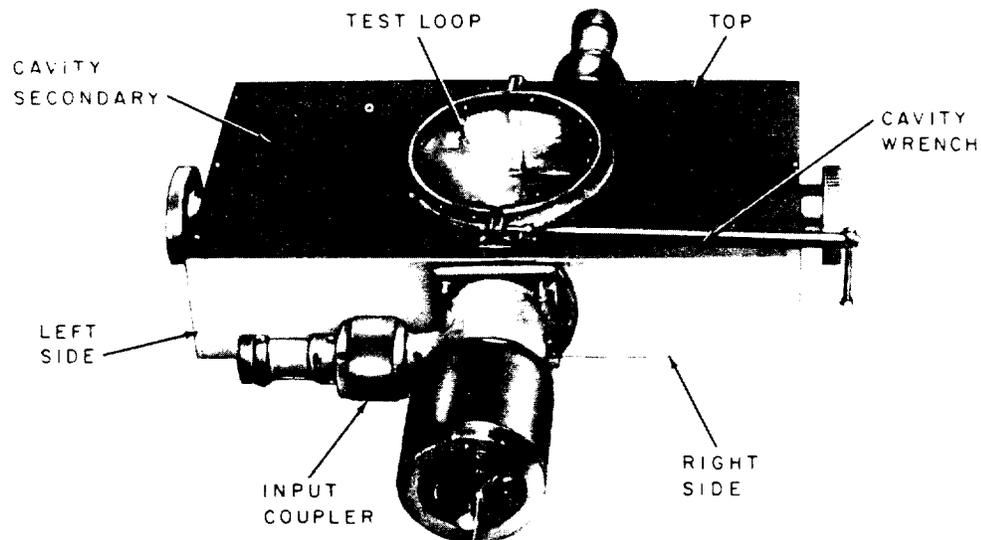


Fig. 10—Input Cavity Disassembled

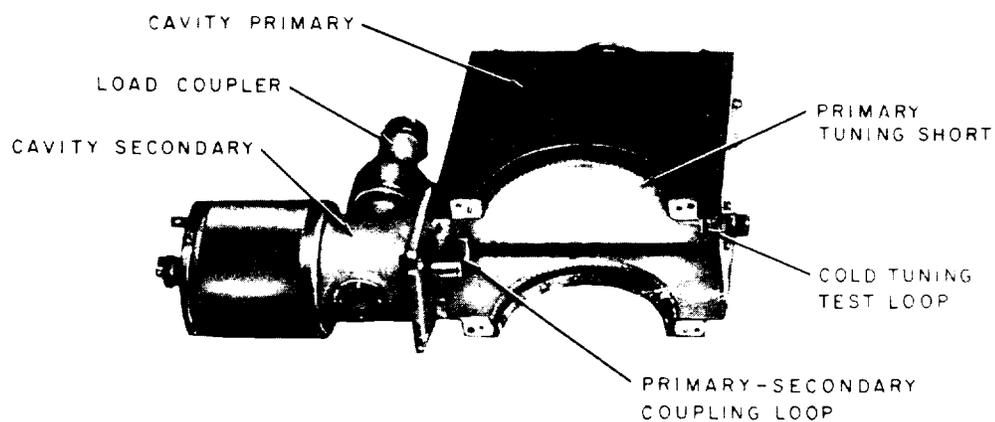


Fig. 11—Cavity Breakdown Coupling—Loop Detail

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**CHART 5 (Cont)**

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| STEP | PROCEDURE  |
|------|--|
| 5    | After tightening the hex nuts, the coupling loop can be brought into contact with the cavity wall.   |
| 6    | The loop fingers should be compressed about 1/32 of an inch by holding the indicator gear and center conductor together and pressing on the loop end of the center conductor.  |
| 7    | Hold the indicator gear against the maximum stop position of the driving pinion; then, tighten the set screws when the loop is oriented to the position shown in Fig. 11.  |
| 8    | Before reassembling the right-hand side of the waveguide cavity, rotate the loop driving pinion against the stop limits to check that the finger compression is sufficient for the finger set to slide properly and that the finger set does not run off the edge of the sidewall. A small amount of Lubriplate should be used under the sliding finger set. |

**B. Sliding Coaxial Short Replacement**

- 9 After the coaxial cavity has been separated from the waveguide cavity as described in Part A, slide the center conductor and loop out past the teflon spacer. This permits the removal of the primary-secondary coupling indicator gear.
- 10 Noting the position of the coupling indicator driving pinion mounting plate with respect to the load coupler arm, unscrew the four recessed fillister head screws that hold the aluminum end bearing to the drive pinion mounting plate.
- 11 Remove the mounting plate and the end bearing.
- 12 Keeping the secondary tuning adjustment barrel centered to prevent jamming, carefully unthread and remove the barrel from the sliding short drive screw.
- 13 Remove the two slotted-head brass drive pins that are recessed below the threads of the drive screw.
- 14 The drive pins thread into the sliding short through slots in the cavity housing. Note the position of the drive pin screw holes when the drive pins are removed; then remove the sliding short.
- 15 If inspection of the contact fingers on the sliding short shows burning or loss of contact pressure, a new coaxial short should be installed. Note that the fingers of the shorting ring should deflect about .020 inch when inserted in the coaxial housing. To reassemble, reverse the procedure in Steps 9 through 14.

**Note 1:** Make certain that the brass drive pins are recessed below the root of the threads on the drive screw and that the orientation of the drive screw, as shown by the tuning indicator rod, is correct for the cavity.

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**CHART 5 (Cont)**


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**STEP****PROCEDURE**

**Note 2:** Maintain a clearance of .015 inch between the adjustment barrel and the end bearings.

**Note 3:** The coupling indicator must be engaged with the coupling loop driving pinion so that the 0 engraved on the indicator gear lines up with the index mark on the pinion mounting plate when the pinion gear is against the counterclockwise limit stop. This should be done after the center conductor has been inserted into the teflon end bearing and the sliding short, taking care to slide the rod through the inner set of fingers of the sliding short without strain. The center conductor rod should be permitted to slide just flush of the outside face of the pinion mounting plate before locating the indicator gear. The rod may then be pushed through the gear hub.

**C. Replacing Mycalex Driving Pins in Input and Intermediate Cavity Load Couplers (Fig. 12 and 13)**

- 16 Remove the four 4-40 fillister head screws that hold the aluminum end bearing to the coupler housing. Slide the end bearing on the housing until it touches the 6/32 binding head screws.
- 17 Unthread the coupling adjustment nut until the adjustment drive screw is exposed.
- 18 Make certain that the holes in the center conductor and its teflon reinforcing bushing line up with the holes in the adjustment drive screw.
- 19 Remove the broken Mycalex drive pin by pushing against the pin with a wooden or plastic dowel that can pass through the holes in the drive screw and the center conductor.

**Caution:** *The center conductor is made of thin-walled copper. Excessive pressure can cause bending or deformation during removal or installation of the pin. Apply no force greater than 20 lbs for 7/8 inch couplers or 25 lbs for the 1-5/8 inch coupler.*

- 20 Making certain that the holes line up in accordance with Step 18, install a new pin and, exerting a steady pressure of not greater than 20 lbs for the 7/8-inch coupler or 25 lbs for the 1-5/8 inch coupler, press into position. Center the pin so that the ends are below the root of the threads on the drive screw.
- 21 Thread the adjustment nut barrel on the drive screw and refasten the end bearing. Allow approximately .015-inch clearance between the adjustment barrel and the bearings.

**D. Replacement of Mycalex Driving Pin in Output Load Coupler (Fig. 14)**

- 22 Remove the primary-secondary coupling assembly by removing the two nuts on the top of the assembly and the two screws on the right side that hold the internal fixed capacitor to the output cavity.
- 23 Loosen the hose clamp and slide it off the outer conductor.

## CHART 5 (Cont)

STEP

PROCEDURE

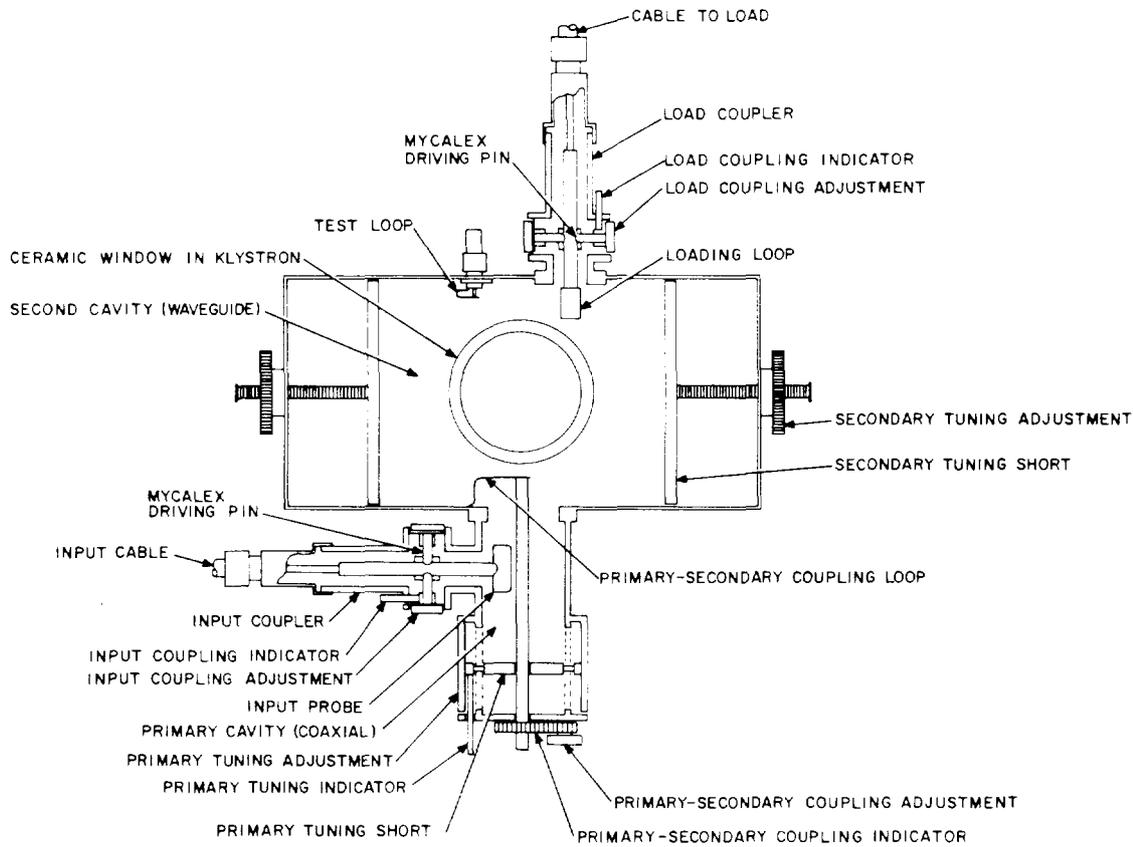


Fig. 12—Input Cavity Assembly

- 24 Remove the air hose connector by removing the four nuts.
- 25 Remove the four socket-head screws from the top and bottom klystron finger holders.
- 26 Release the latch on the front of the cavity and remove the two cavity sections.
- 27 Remove the six 4-40 fillister head screws fastening the top aluminum end bearing of the adjustment nut barrel to the housing.
- 28 Slide the bearing up and unthread the adjustment nut barrel off the adjustment drive screw.
- 29 Unthread the coupling adjustment nut until the drive screw is exposed.

## CHART 5 (Cont)

## STEP

## PROCEDURE

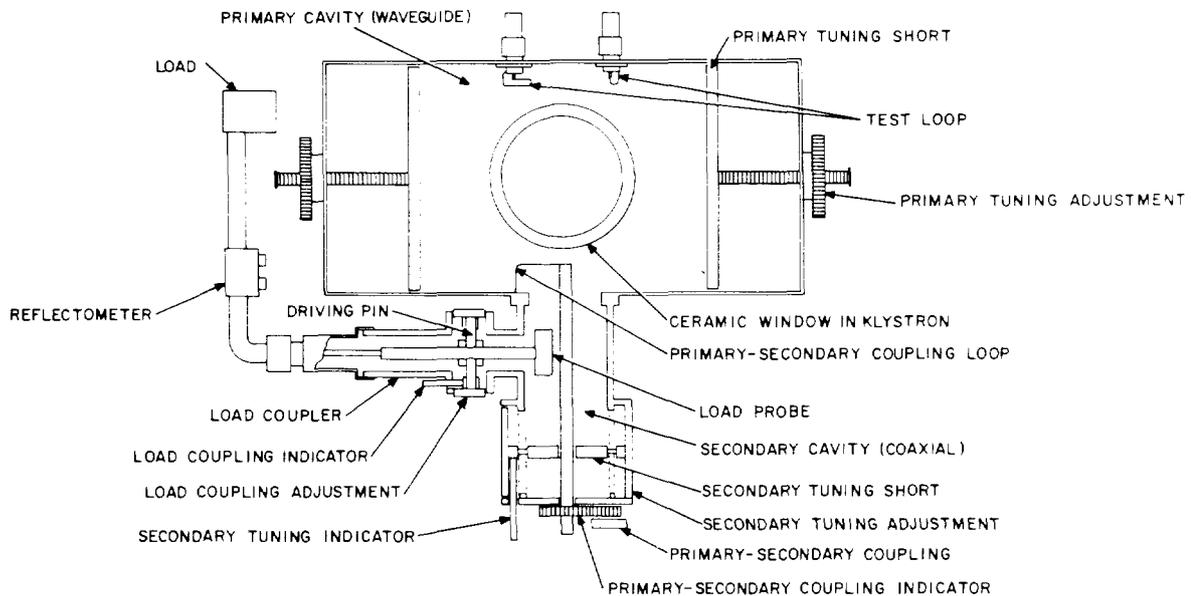


Fig. 13—Intermediate Cavity Assembly

- 30 Make certain that the holes in the center conductor and its teflon reinforcing bushings line up with the holes in the adjustment drive screw.
- 31 Remove the broken Mycalex drive pin by pushing against the pin with a wooden or plastic dowel that can pass through the holes in the drive screw and the center conductor.

**Caution:** *The center conductor is made of thin-walled copper. Excessive pressure can cause bending or deformation during removal or installation of the pin. Apply no force greater than 30 lbs on the pin.*

- 32 Making certain that the holes line up in accordance with Step 30, install a new pin and, exerting a steady pressure of not more than 30 lbs, center the pin so that the ends are below the root of the threads on the drive screw.
- 33 Thread the adjustment nut barrel on the drive and refasten the aluminum end bearing. Allow a clearance of approximately .015-inch between the bearing and the barrel.
- 34 Reassemble the output cavity by reversing the procedures in Steps 21 through 27.

## CHART 5 (Cont)

STEP

PROCEDURE

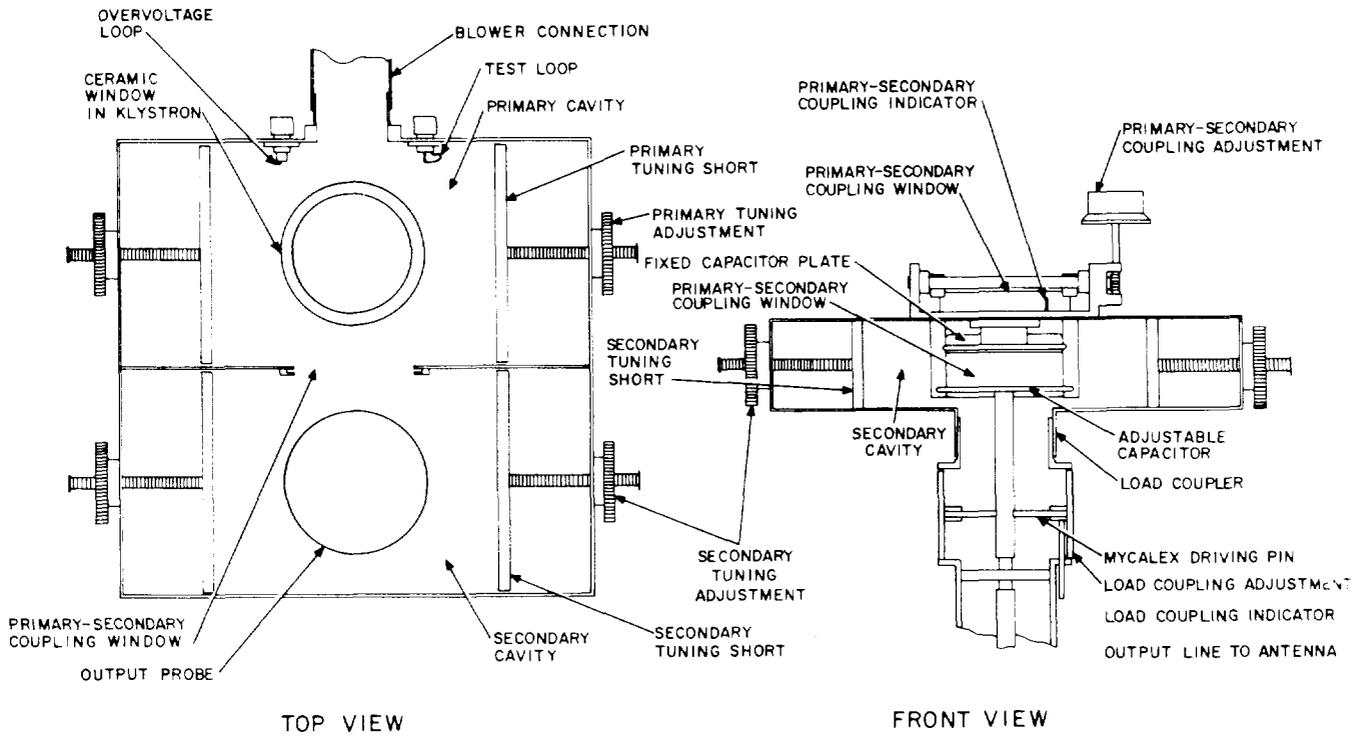


Fig. 14—Output Cavity Assembly

**E. Lubrication of RF Components**

**Caution:** Do not lubricate any of the threaded portions of the controls.

- 35 Every 2 years, lubricate the aluminum end bearing surfaces by removing the screws that fasten the end bearing, sliding the bearing and barrel slightly to expose the bearing surfaces, and applying lubricant.
- 36 Apply Lubriplate NO. 105 to the contact finger set on the sliding short.