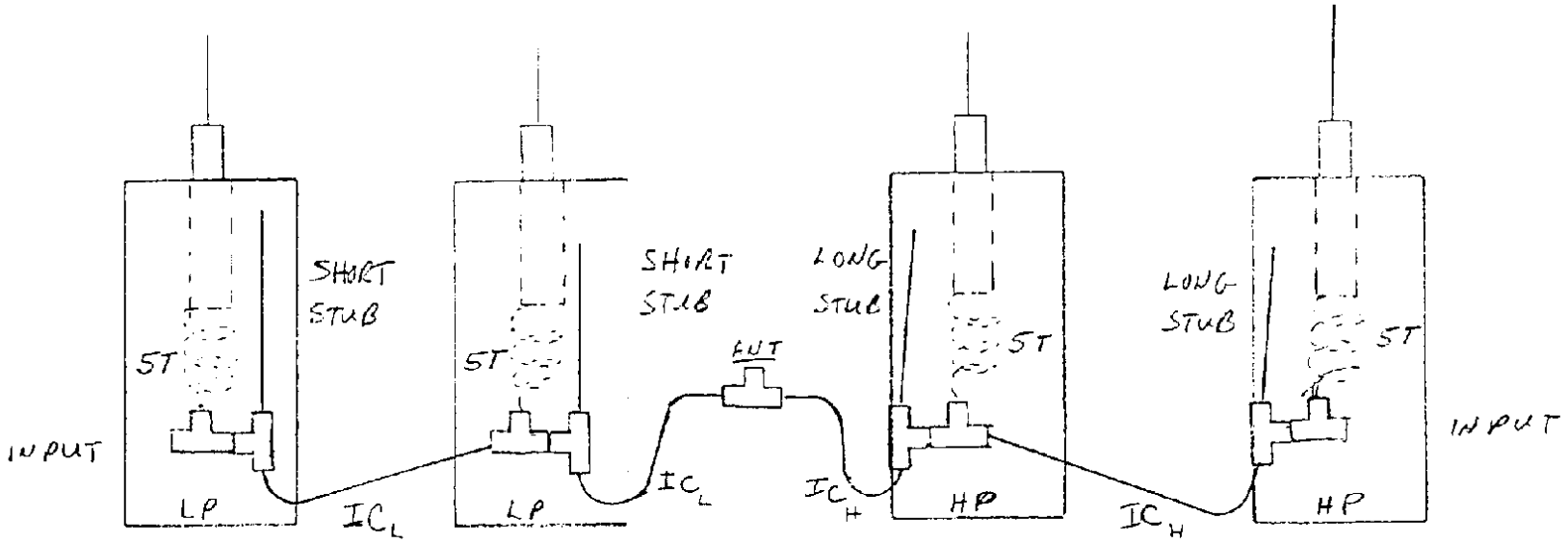


@ 52 MHZ SHORT STUB = 13 1/2"

IC_L = 34 1/2

@ 53MHZ LONG STUB = 23 1/2

IC_H = 35 1/2

MODIFICATION OF R110, 104, or 101 TO 6 MTRS (50-54 MHz)

A) FOR EACH CAVITY DO THE FOLLOWING

1) REMOVE RIVETS THAT HOLD END CAP IN PLACE (QTY 3)
2) REMOVE END CAP - TAP LIGHTLY WITH MALLET ON ONE SIDE OF CAP UNTIL IT TILTS OUT, THEN REMOVE
3) LOOSEN + REMOVE THE 2 SCREWS THAT HOLD THE COIL TO THE CAVITY
4) PULL COIL AND STATIONARY CENTER CONDUCTOR ASSEMBLY OUT OF CAVITY
5) APPLY SHORTING STRAP OR REMOVE COIL ACCORDING TO SUPPLIED INFORMATION. (CHOICE IS MODIFIERS PREFERENCE)
6) PULL TUNING ROD ALL THE WAY OUT OF THE UNIT. THIS WILL REMOVE THE TUNING PLUNGER FROM THE CENTER CONDUCTOR, ALLOWING MUCH EASIER RE-INSTALLATION OF THE STATIONARY & COIL ASSEMBLY.
7) REINSTALL THE STATIONARY-COIL ASSEMBLY - BE SURE THE INSULATOR GOES OVER THE CENTER CONDUCTOR
8) RE-INSTALL THE 2 SCREWS THAT HOLD THE COIL IN PLACE
9) RE-INSTALL THE END CAP
10) RE INSTALL RIVETS OR SHEET METAL SCREWS TO HOLD THE END CAP IN PLACE.

B) RE-TUNE EACH CAVITY AS APPROPRIATE PER THE RETUNING INSTRUCTIONS

C) SELECT THE PROPER LENGTH INTERCONNECT CABLES FROM THE LISTING ENCLUDED.

D) INSTALL THE INTERCONNECTS AS PER THE INTERCONNECTING INSTRUCTIONS

E) FINAL TUNE AS PER RETUNING INSTRUCTIONS.

C)

MHz	IC CABLE LENGTH (CUT LENGTH OF CABLE WITHOUT CONNECTORS)	
51.0	36.4"	
51.5	36.0"	SELECT LENGTH CLOSEST TO OPERATING
52.0	35.6"	FREQ. + INSTALL CONNECTORS ON THAT
52.5	35.2"	CABLE.
53.0	34.7"	
53.5	34.3"	
54.0	33.8"	

SINCLAIR RADIO LABORATORIES INCORPORATED
675 Ensminger Road
Tonawanda, New York 14150

General Description

The duplexer is made up of four, six or eight reject type cavities, depending on the model. Half of the cavities reject the high duplex frequency and pass the low and are interconnected by one-quarterwave cable (RG-213/U). The other half of the cavities reject the low duplex frequency and pass the high. They are also interconnected with one-quarterwave cables. The two halves are connected to the antenna junction with one-quarterwave cables to form the duplexer.

The cavity used in the duplexers is a six inch diameter aluminum shell with a semihelical center resonator. Tuning the cavity is accomplished by a sliding tuning plunger which is locked in position by a 10-32 x ¾" Allen Hex Set Screw. The reject notch is adjusted by tuning the cavity tuning rod. The pass band is positioned by using an open circuited stub on the cavity input, and determined at the factory on order.

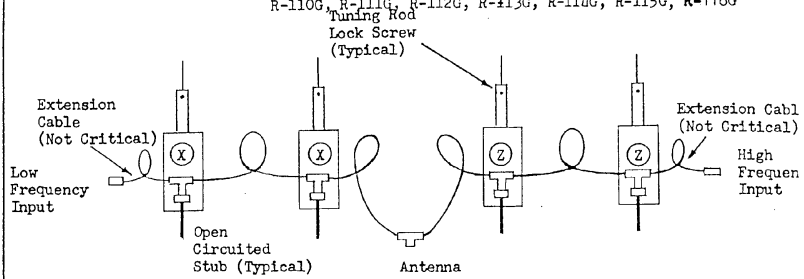
The frequency band of 30 to 50 MHz is divided into three tuning segments because of mechanical limitations of the cavity design. The three sub-bands are 30-37 MHz, 37-43 MHz and 43-50 MHz. Models from one sub-band cannot be tuned to work in another sub-band without extensive factory reworking. The frequency band of 66 to 88 MHz is divided into two sub-bands, 66-77 MHz and 77-88 MHz. The frequency band of 25-30 MHz is covered by one cavity. The table below lists the duplexer models giving the number of cavities, tuning range, minimum duplex frequency separation, and electrical specifications.

MODEL	TUNING RANGE (MHz)	MINIMUM FREQ. SEPARATION (MHz)	NUMBER of CAVITIES	MAX. INSERTION LOSS (db)	MINIMUM ISOLATION (db)	POWER WATTS
R101 R-101G	30-37	0.3	8	1.6	95	350
R-102G	37-43	0.3	8	1.6	95	350
R-103G	43-50	0.3	8	1.6	95	350
R104 R-104G	30-37	0.5	6	1.6	80	350
R-105G	37-43	0.5	6	1.6	80	350
R-106G	43-50	0.5	6	1.6	80	350
R-107G	30-37	0.5	4	1.0	65	350
R-108G	37-43	0.5	4	1.0	65	350
R-109G	43-50	0.5	4	1.0	65	350
R110 R-110G	30-37	1.0	4	1.0	70	350
R-111G	37-43	1.0	4	1.0	70	350
R-112G	43-50	1.0	4	1.0	70	350
R-113G	30-37	1.0	4	1.0	70	350
R-114G	37-43	1.0	4	1.0	70	350
R-115G	43-50	1.0	4	1.0	70	350
R-1C01G	66-77	1.0	4	1.0	65	350
R-1C02G	77-88	1.0	4	1.0	65	350
R-1A01G	25-30	2.0	4	1.0	60	350
R-116G	30-37 split 37-43	1.0	4	1.0	70	350

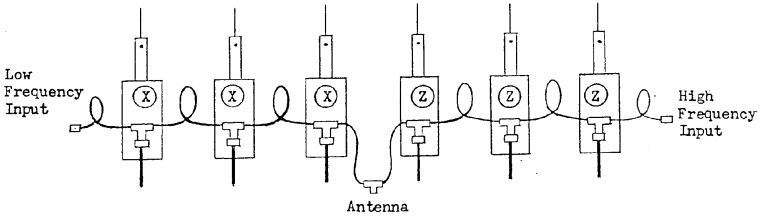
Wiring Diagrams

(X) Cavities Reject High Duplex Frequency and Pass Low
(Z) Cavities Reject Low Duplex Frequency and Pass High

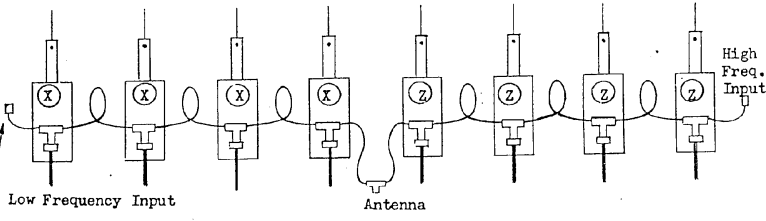
1. Four Cavity Duplexer: R-107G, R-108G, R-109G , R1C01G, R-1C02G, R-1A01G R-110G, R-111G, R-112G, R-113G, R-114G, R-115G, R-116G



2. Six Cavity Duplexer: R-104G, R-105G, R-106G



8. Eight Cavity Duplexer: R-101G, R-102G, R-103G



Tuning Procedure

Important notice: When retuning, please observe the minimum separation from chart for your model. You CANNOT tune the duplexer closer than stated. AND, you CANNOT tune the reject notch outside the sub-band of the duplexer.

A. PROCEDURE FOR PEAKING UP DUPLEXER TO ORIGINAL FREQUENCIES OR TO SOME WHICH ARE LESS THAN APPROXIMATELY 40 KHz DIFFERENT IN SEPARATION FROM ORIGINALS

Since you are not shifting frequencies much, the open circuited stubs will not have to be changed. Tuning the duplexer consists of setting the rejection notches on each cavity in the unit. Minimum equipment requirements are: FM Signal Generator (Measurements Model 560 M or equivalent), Receivers on each of the duplex frequencies (or one which will tune both) and a first limiter monitor meter. (See CI-096 for basic test circuit).

1. Set the signal generator on the high duplex frequency, inject this signal into the low frequency input terminal and detect it at the high frequency terminal. Terminate antenna port with 50 ohms. Tune the rods on the reject high (pass low) cavities, (X) , for minimum signal (attenuate). Adjust the output of the signal generator as necessary to maintain a readable but unsaturated level on the first limiter monitor. The tuning rods are sliding type and are locked in position by a 10-32 HEX socket type Allen Set Screw.

2. Set the generator to the low duplex frequency, inject this signal into the high frequency terminal and detect it at the low frequency terminal. Terminate antenna port with 50 ohms. Tune the rods on the reject low (pass high) cavities (Z) for minimum signal (attenuate). Lock rods in position.

The duplexer is now tuned, measurements can be made by techniques described on Sheet CI-096.

B. PROCEDURE FOR RETUNING DUPLEXER TO A DIFFERENT SEPARATION, GREATER THAN APPROXIMATELY 40 KHz OF ORIGINAL, OR SHIFTING TO ANOTHER SET OF FREQUENCIES IN OPPOSITE END OF SUB-BAND.

In general we advise that the above type of retuning be done at our plant because of the critical length changes in the open circuited stubs which set the pass bands. The techniques used for determing the correct stub length requires equipment which must be able to measure insertion losses of 0.2 to 0.4 db . For those of you who have such equipment available, and would try this procedure the following discussion is offered.

The cavities you have are set for a certain separation in some part of the sub-band. If you are staying in the same part of the sub-band and only changing separation the length of the stubs will change according to the following rule:

A. For reject low cavities (high pass) - the greater the separation the shorter the stub length.

B. For reject high cavities (low pass) - the greater the separation the longer the stub length.

Example:

You have an R-101G working at 31.40 and 31.70. You wish to retune to new frequencies of 31.80& 32.50. The old separation was 300 KHz. The new one is 700 KHz. Therefore, the high pass cavity (rejection) stub will want to be shorter, and the low pass cavity (reject high) will want to be longer.

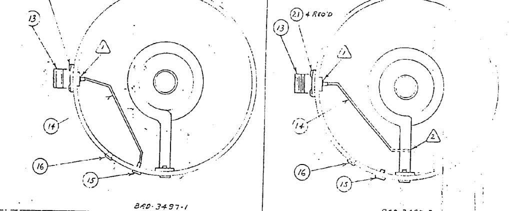
To determine the actual length needed you will be working with one cavity from each side of the duplexer. First tune a reject high cavity to reject your new high frequency, leave the existing stub on. Now go to your low frequency (pass) and read the insertion loss. It should be fairly high 0.5 to 1.5 db. This stub will want to be longer. Either add elbows to lengthen it, or cut a new piece of Rg 213/u or RG 8 A/u about 10" longer than that stub. Put the new stub on and trim it off about ½" at a time, until the insertion loss is minimized (.2-.4db). Now go back to the reject frequency and peak up the notch. Then read the insertion loss at pass frequency again, it should not have changed. You can now cut more stubs for each of the other reject high cavities the same length as the one you just worked out.

Next do the same tuning procedure on the reject low cavity (high pass). In this case the stub will want to become slightly shorter. First tune to new reject low frequency then read insertion loss with existing stub. Then trim back on stub until insertion loss is minimized. Then repeak reject notch and check insertion loss. You can now cut more stubs the same length for the other reject low cavities.

After cutting and installing new stubs on all cavities in the duplexer, follow the previously outlined procedure for tuning.

When shifting from one end of sub-band to the other, it may require stub length changes even though the separation is the same. The reason for this is that percentage-wise, the .300 MHz or .500 MHz minimum separations are different from one end of the sub-band to the other (an example of this is a .300 MHz separation at 37 MHz is equivalent to a .405 MHz separation at 30 MHz)

△2 TAP POINT TO BE DETERMINED BEFORE ASSEMBLING END CAP. FOR "R" SERIES.
TAP POINT IS SOLDERED 1" FROM GND END FOR "H" SERIES



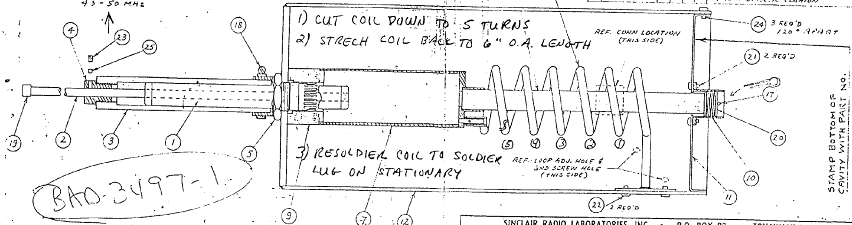
REAR VIEW - CONNECTOR AND LOOP DETAIL

△1 SOLDER CONN. RING BEFORE ASSEMBLING CONN. TO CAVITY.

NEXT ASSEMBLIES	
BAD-3497-1	BAD-3497-2
~~R-103S~~ ~~R-106S~~ R-101G R-104G	~~H-42-~~ ~~R-112G~~ ~~R-115G~~ R-110G

43 - 50 MHz

FN	PART NO.	QUANTITY BAD-3497-1	QUANTITY BAD-3497-2	DESCRIPTION
1	MAD-596	1	1	TUNING PLUNGER
2	241848-14	1	1	TUNING ROD
3	MD-1295	1	1	COMP. BARREL
4	MD-1435	1	1	TUNING ROD GUIDE
5	351017	1	1	FINGER BUSHING
6	MD-1258	1	1	REAR SUPPORT ROD
7	MAD-649	1	1	STAT. CENTER CONDUCTOR
8	MAD-604	1	1	COIL ASS'Y
9	242383		1	INSULATOR
10	MAD-593	1	1	SPRING HOLDER
11	MD-1156	1	1	CAVITY END CAP
12	MAD-594	1	1	CAVITY BODY
13	MD-917	1	1	MOD. UG-58 CONN
14	MD-1494		1	LOOP
	MD-1431	1		LOOP
15	MD-361	1		GND SCREW
	10-32 x 3/8		1	BH.NP. MACH SCREW
16	7306-1/4	1	1	HOLE PLUG
17	1/16 x 1	1	1	SS COTTER PIN
18	#16	1	1	SS HOSE CLAMP
19	5/16	1	1	CLEAR PLASTIC CAP
20	228-11	1	1	SPRING
21	6-32 x 1/4	6	6	BH.NP. MACH SCREW
22	8-32 x 3/8	2	2	" " "
23	10-32 x 1/2	1	1	HX HD CBP SCREW
24	1661-0414	3	3	1/8 POP RIVETS (ADVEL)
25	MD-2032	1	1	NYLON SPACER CUSHION



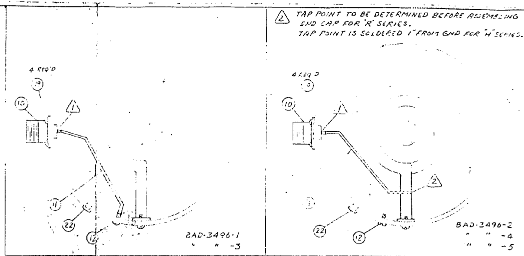
SINCLAIR RADIO LABORATORIES, INC. • P.O. BOX 23 • TONAWANDA, NEW YORK					
DR. FSK / CH	DATE '05/73	TITLE CAVITY ASSEMBLY (43-50 MHz) H & R SERIES FILTERS & DUPLEXERS	DWG. NO. BAD-B-3497(-)	ISSUE 7	ASSY. NO. REN SERIES

TOLERANCES UNLESS OTHERWISE SPECIFIED: 0 — 6" FRACT. ± 1/64 DEC. ± .005 6" — 24" FRACT. ± 1/32 DEC. ± .010

ISSUE	CH. NO.
1	172
3	[illegible]
4	PIN
5	243
6	700 209
7	[illegible]

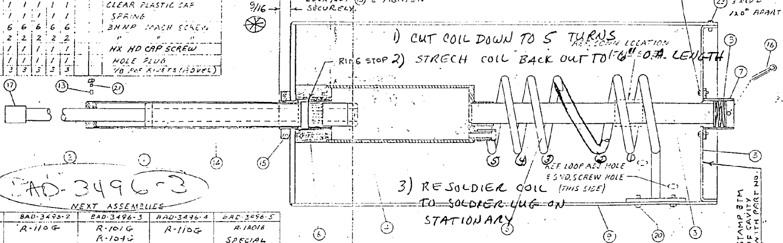
(2) TAP POINT TO BE DETERMINED BEFORE ASSEMBLING END CAP FOR 'R' SERIES.
TAP POINT IS SOLDERED 1" FROM GND FOR 'H' SERIES.

FN	PART NO	QUANTITY					DESCRIPTION
1	MAD-5??	1	1	1	1	1	TUNING PLUNGER
2	MD-1997-14	1	1	1			" ROD
3	MAD-???	1	1		1	1	REAR SUPPORT ROD
4	MAD-649			1	1	1	STATIONARY CENTER COND
5	~~MAD-??2~~	1	1				COIL
	MAD-597			1	1		"
	MAD-?100					1	"
6	242385	1	1	1	1	1	INSULATOR (242385)
7	MHD-5??	1	1	1	1	1	SPRING HOLDER
8	MD-1146	1	1	1	1	1	CAVITY END CAP
9	MAD-594	1	1	1	1	1	" BODY
10	MD-977	1	1	1	1	1	MOD. UG-58 A/U CONN.
11	MD-1494		1		1	1	LOOP
11	MD-1431	1		1			LOOP
12	MD-381	1		1			GND SCREW
12	10-32x3/8		1		1	1	BHNP MACH. SCREW
13	248401	1	1	1	1	1	NYLON SPACER CUSHION (REF 1032)
14	MAD-595-1	1	1	1	1	1	STATIONARY PROBE ASSY.
15	246033	1	1	1	1	1	TUNING PROBE LOCK NUT
16	1/16 x 1"	1	1	1	1	1	SS COTTER PIN
17	9/16	1	1	1	1	1	CLEAR PLASTIC CAP
18	228-11	1	1	1	1	1	SPRING
19	6-32x1/4	6	6	6	6	6	BHNP MACH SCREW
20	8-32x3/8	2	2	2	2	2	" " "
21	10-32x1/2	1	1	1	1	1	HX HD CAP SCREW
22	7306-1/4	1	1	1	1	1	HOLE PLUG
23	1661-0414	3	3	3	3	3	1/8 POP RIVETS (ADVEL)



(1) SOLDER CONN. RING BEFORE ASSEMBLING CONN. TO CAVITY.

ASSEMBLY NOTE:
INSTALL PROBE ASS'Y (14) FROM INSIDE OF CAVITY UNTIL THD'S PROTRUDE 9/16, THEN INSTALL LOCK NUT (15) & TIGHTEN SECURELY.



BAD-3496-3

NEXT ASSEMBLIES

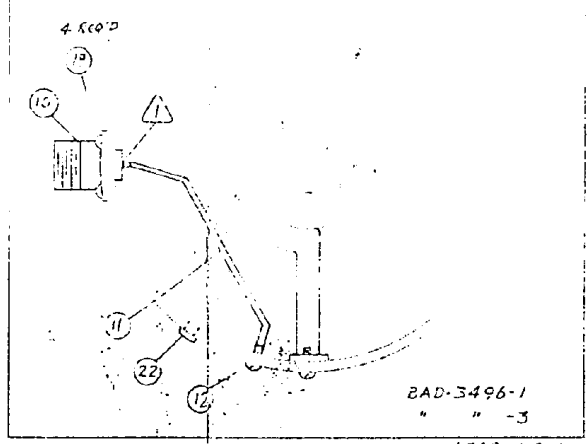
BAD-3496-1	BAD-3496-2	BAD-3496-3	BAD-3496-4	BAD-3496-5
R-101G R-104G	R-110G	R-101G R-104G	R-110G	R-1A01G SPECIAL
30-37 MHZ		37-43 MHZ		25-30 MHZ

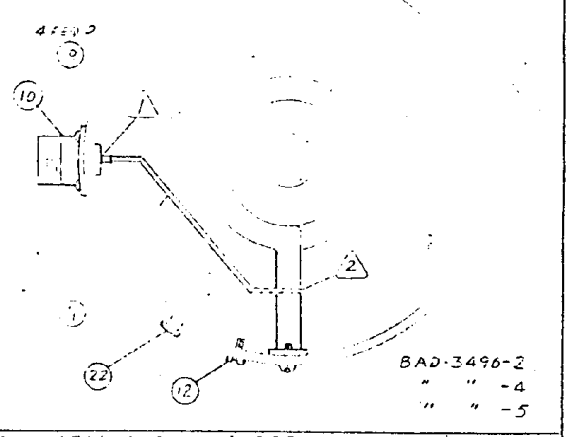
TOLERANCES UNLESS OTHERWISE SPECIFIED: 0 — 6" FRACT. ± 1/64 DEC. ± .005 6" — 24" FRACT. ± 1/32 DEC. ± .010

SINCLAIR RADIO LABORATORIES, INC. • P.O. BOX 23 • TONAWANDA, NEW YORK				
DR. C. LEWIS CH. C.R.	DATE 11-30-73 1/73	TITLE CAVITY ASSEMBLY (25 TO 43 MHZ) HFR SERIES FILTERS & DUPLEXERS	DWG. NO. BAD-3496-( )	ISSUE F

TOLERANCES UNLESS OTHERWISE SPECIFIED: — 0 — 6" FRACT. ± 1/64 DEC. ± .005 6" — 24" FRACT. ± 1/32 DEC. ± .010

CH	PART NO	QUANTITY					DESCRIPTION
OK 1	MAD-[illegible]	1	1	1			TUNING PLUNGER
OK 2	MD-1997-14	1	1	1			" ROD
OK 3	MAD-[illegible]	1	1		1	1	REAR SUPPORT ROD
OK 4	MAD-[illegible]			1	1	1	STATIONARY CENTER CORE
5	~~MAD-[illegible]~~	1	1				COIL
OK 6	MAE-[illegible]			1	1		"
	MAE-[illegible]					1	"
OK 7	242386	1	1	1	1	1	INSULATOR (242388)
OK 8	MHD-[illegible]	1	1	1	1	1	SPRING HOLDER
OK 9	MD-1146	1	1	1	1	1	CAVITY END CAP
10	MAD-[illegible]	1	1	1	1	1	" BODY
OK 10	MD-[illegible]	1	1	1	1	1	MOD. UG-58 A/U CONN.
OK 11	MD-1494		1		1	1	LOOP
OK 11	MD-1431	1		1			LOOP
OK 12	MD-381	1		1			GND SCREW
12	10-32 x 3/8		1		1	1	BHNP MACH. SCREW
OK 13	248401	1	1	1	1	1	NYLON SPACER CUSHION (REF 2033)
OK 14	MAD-595-1	1	1	1	1	1	STATIONARY PROBE ASSY.
OK 15	246033	1	1	1	1	1	TUNING PROBE LOCK NUT
16	1/16 x 1"	1	1	1	1	1	SS COTTER PIN
17	DE/16	1	1	1	1	1	CLEAR PLASTIC CAP
18	228-11	1	1	1	1	1	SPRING
19	6-32 x 1/4	6	6	6	6	6	BHNP MACH SCREW
20	8-32 x 3/8	2	2	2	2	2	" " "
21	10-32 x 1/2	1	1	1	1	1	HX HD CAP SCREW
22	7306-1/4	1	1	1	1	1	HOLE PLUG
23	1661-0414	3	3	3	3	3	1/8 POP RIVETS (ABOVE)



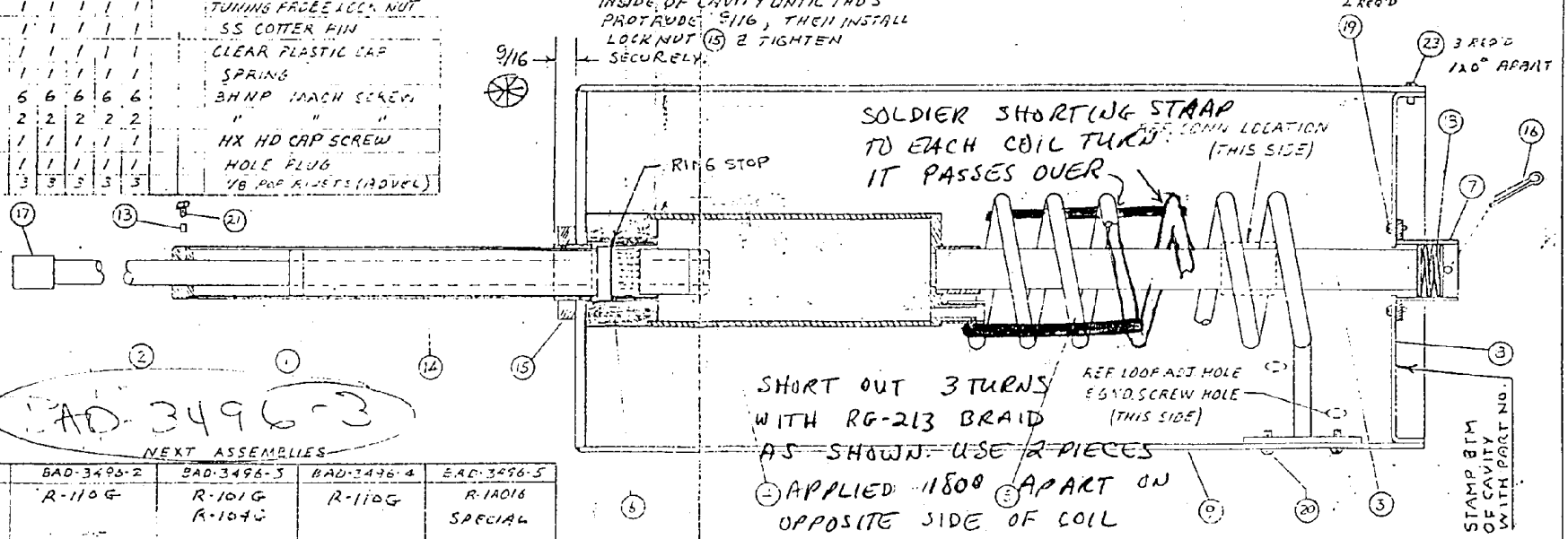


REAR VIEW - CONNECTOR AND LOOP DETAIL

(2) TAP POINT TO BE DETERMINED BEFORE ASSEMBLING END CAP FOR "R" SERIES.
TAP POINT IS SOLDERED 1" FROM GND FOR "H" SERIES.

ASSEMBLY NOTE:
INSTALL PROBE ASS'Y (14) FROM INSIDE OF CAVITY UNTIL THD'S PROTRUDE 9/16, THEN INSTALL LOCK NUT (15) & TIGHTEN SECURELY.

(1) SOLDER CONN RING BEFORE ASSEMBLING CONN. TO CAVITY



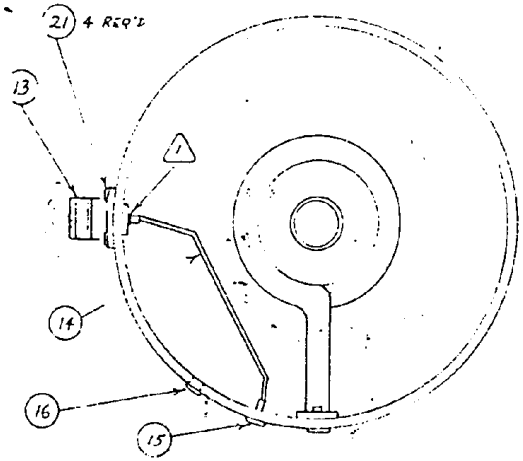
BAD-3496-3

NEXT ASSEMBLIES

BAD-3496-1	BAD-3496-2	BAD-3496-3	BAD-3496-4	BAD-3496-5
R-101G R-104G	R-110G	R-101G R-104G	R-110G	R-1A016 SPECIAL
30-37 MHZ		37-43 MHZ		25-30 MHZ

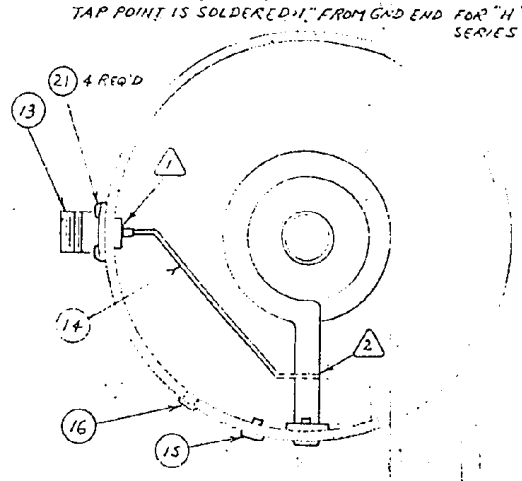
SINCLAIR RADIO LABORATORIES, INC. • P.O. BOX 23 • TONAWANDA, NEW YORK

DR.	DATE	TITLE	DWG. NO.	ISSUE
C. LEWIS	11-30-73	CAVITY ASSEMBLY (25 TO 43 MHZ) HFR SERIES FILTERS DIPLEXERS	BAD-3496-( )	7
CH.	12/3			



BAD-3497-1

2 TAP POINT TO BE DETERMINED BEFORE ASSEMBLING END CAP. FOR "R" SERIES. TAP POINT IS SOLDERED 1" FROM GND END FOR "H" SERIES



BAD-3497-2

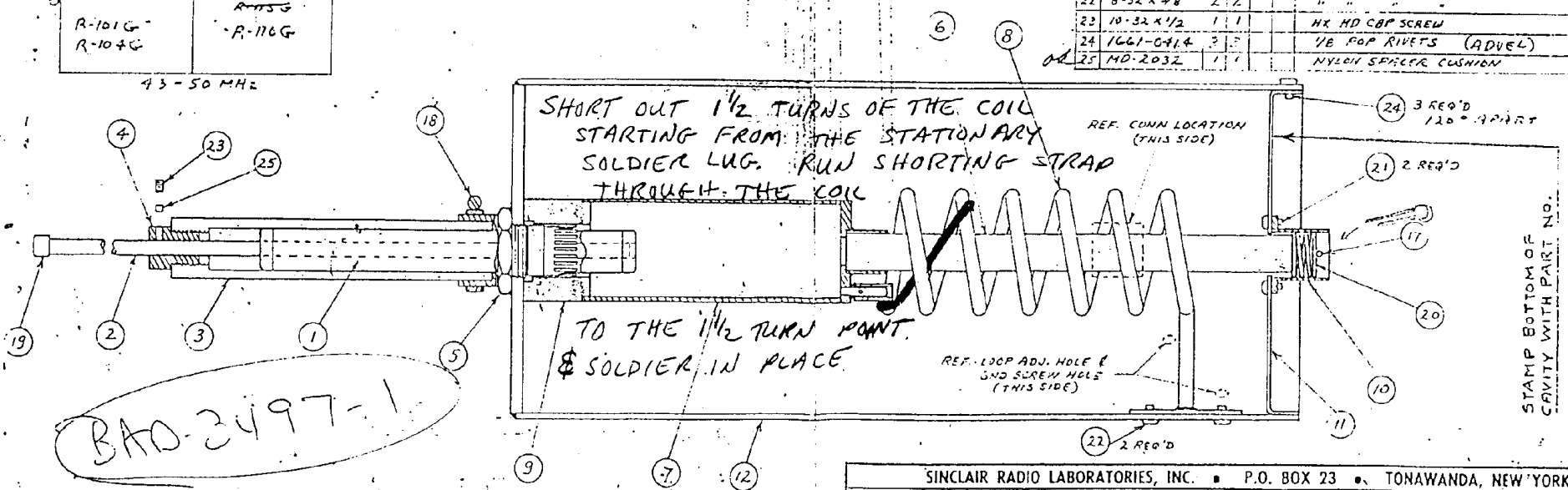
REAR VIEW - CONNECTOR AND LOOP DETAIL

NEXT ASSEMBLIES	
BAD-3497-1	BAD-3497-2
~~R-103G~~	~~H-82-~~
~~R-106G~~	~~R-112G~~
	~~R-115G~~
R-101G	R-116G
R-104G	

43 - 50 MHz

1 SOLDER CONN. RING BEFORE ASSEMBLING CONN. TO CAVITY.

FN	PART NO.	BAD-3497-1	BAD-3497-2	GND 3497-2	DESCRIPTION
1	MAD-596	1	1		TUNING PLUNGER
2	241848-14	1	1		TUNING ROD
3	MD-1295	1	1		COMP. BARREL
4	MD-1435	1	1		TUNING ROD GUIDE
5	351017	1	1		FINGER BUSHING
6	MD-1258	1	1		REAR SURFACE ROD
7	MAD-649	1	1		STAT. CENTER CONDUCTOR
8	MAD-604	1	1		COIL ASSY
9	242388		1		INSULATOR
10	MAD-593	1	1		SPRING HOLDER
11	MD-1146		1		CAVITY END CAP
12	MAD-594	1	1		CAVITY BODY
13	MD-817	1	1		MOD. UG-58A/U CONN
14	MD-1494		1		LOOP
	MD-1431	1			LOOP
15	MD-381	1			GND SCREW
	10-32 X 3/8		1		BN. HD. MACH SCREW
16	7306-V4	1	1		HOLE PLUG
17	1/16 X 1	1	1		SS COTTER PIN
18	#16	1	1		SS HOSE CLAMP
19	5/16	1	1		CLEAR PLASTIC CAP
20	228-11	1	1		SPRING
21	6-32 X 1/4	6	6		BN. HD. MACH SCREW
22	8-32 X 3/8	2	2		" " " "
23	10-32 X 1/2	1	1		HX. HD CAP SCREW
24	1CG1-041.4	3	3		1/8 POP RIVETS (ADUEL)
25	MD-2032	1	1		NYLON SPACER CUSHION



SINCLAIR RADIO LABORATORIES, INC. • P.O. BOX 23 • TONAWANDA, NEW YORK					
DR. F&K	DATE 10/15/73	TITLE CAVITY ASSEMBLY (43-50 MHz) H & R SERIES FILTERS & DUPLEXERS	DWG. NO. BAD-B-3497(-)	ISSUE 7
CH.				

DEC. ± .010 6" — 24" FRACT. ± 1/32 DEC. ± .005 FRACT. ± 1/64 U — 0