WIRELESS SET CANADIAN No. 52

SECOND TO FOURTH ECHELON WORK

Mechanical Adjustments and Replacements

Meter adjustments

1. To adjust the meter circuit so that the reading in the PA PL position of the meter switch is accurate:

(a) When the set is turned off, the meter needle should be at zero. If not, reset to zero by means of the small screw on the front of the meter.

(b) Connect a meter known to be accurate in series with the −1200 V. lead and PL2A and turn the METER SW to SENDER.

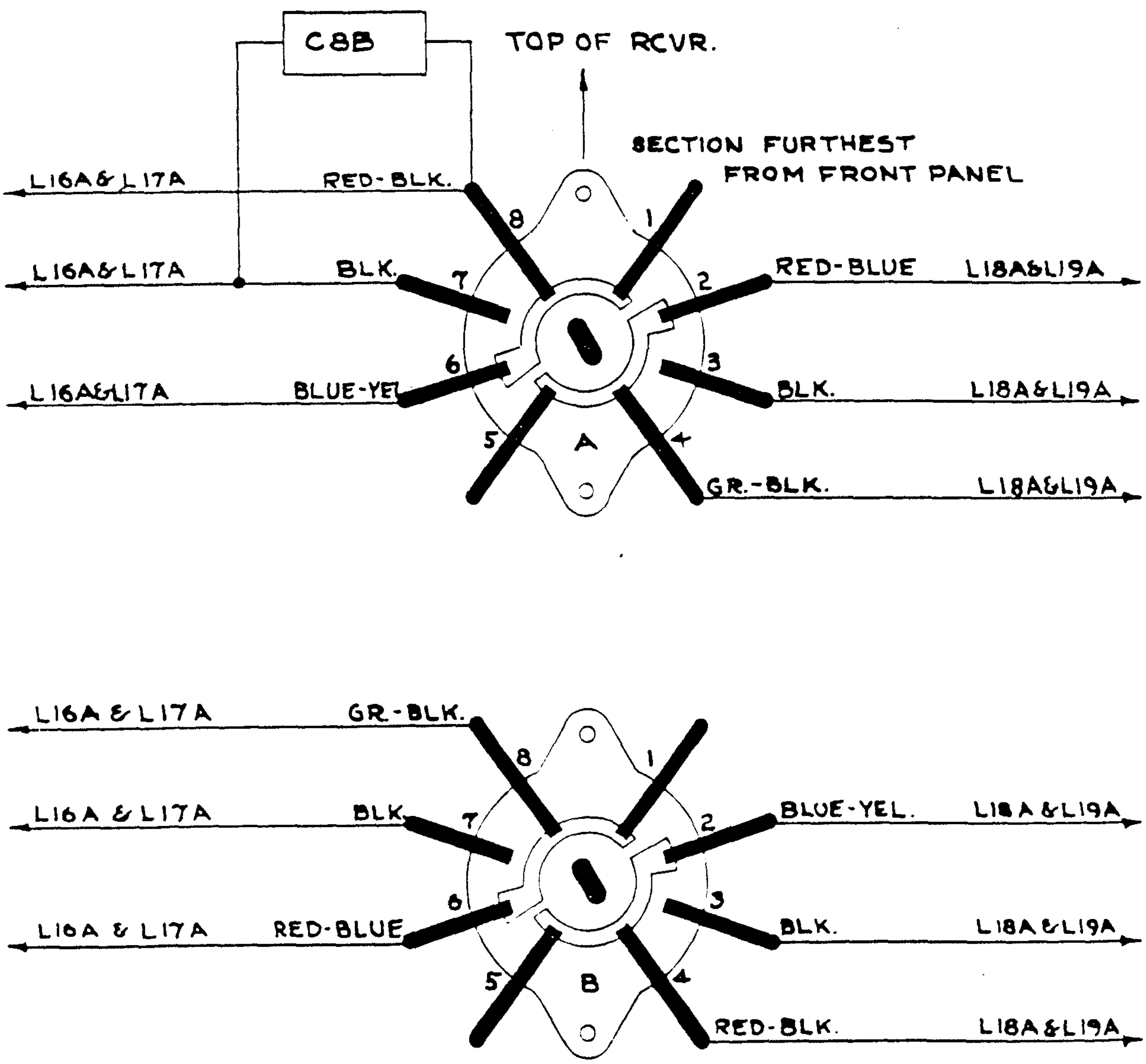
(c) Adjust sender to give a PA PL reading of 200 mA. on external meter.

(d) Adjust R14A, on the receiver chassis near the gang condenser, till the receiver meter reads the same as the external meter.

Switch connections

2. Connections to various switches are shown in Figs. 1-8 inclusive. If one wafer of a multi-section switch is defective, it may be removed separately. To remove S23A, it is necessary to first remove the buffer unit as detailed in EMER Tels FZ 523, Issue 1.

REAR VIEW OF S1A IN FLAT POSITION



T FZ 524 / 1-1

FIG. 1—S1A CONNECTIONS

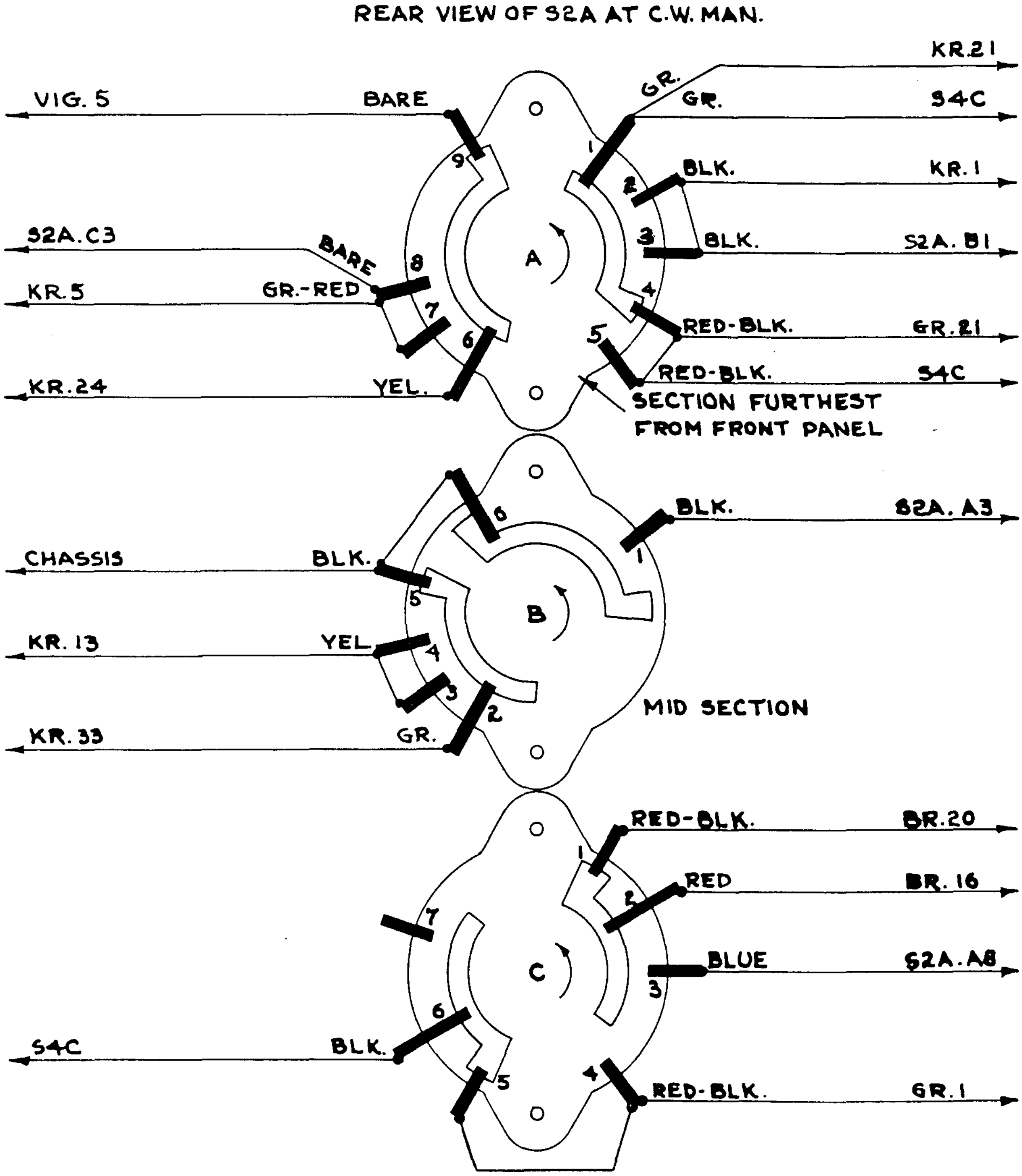


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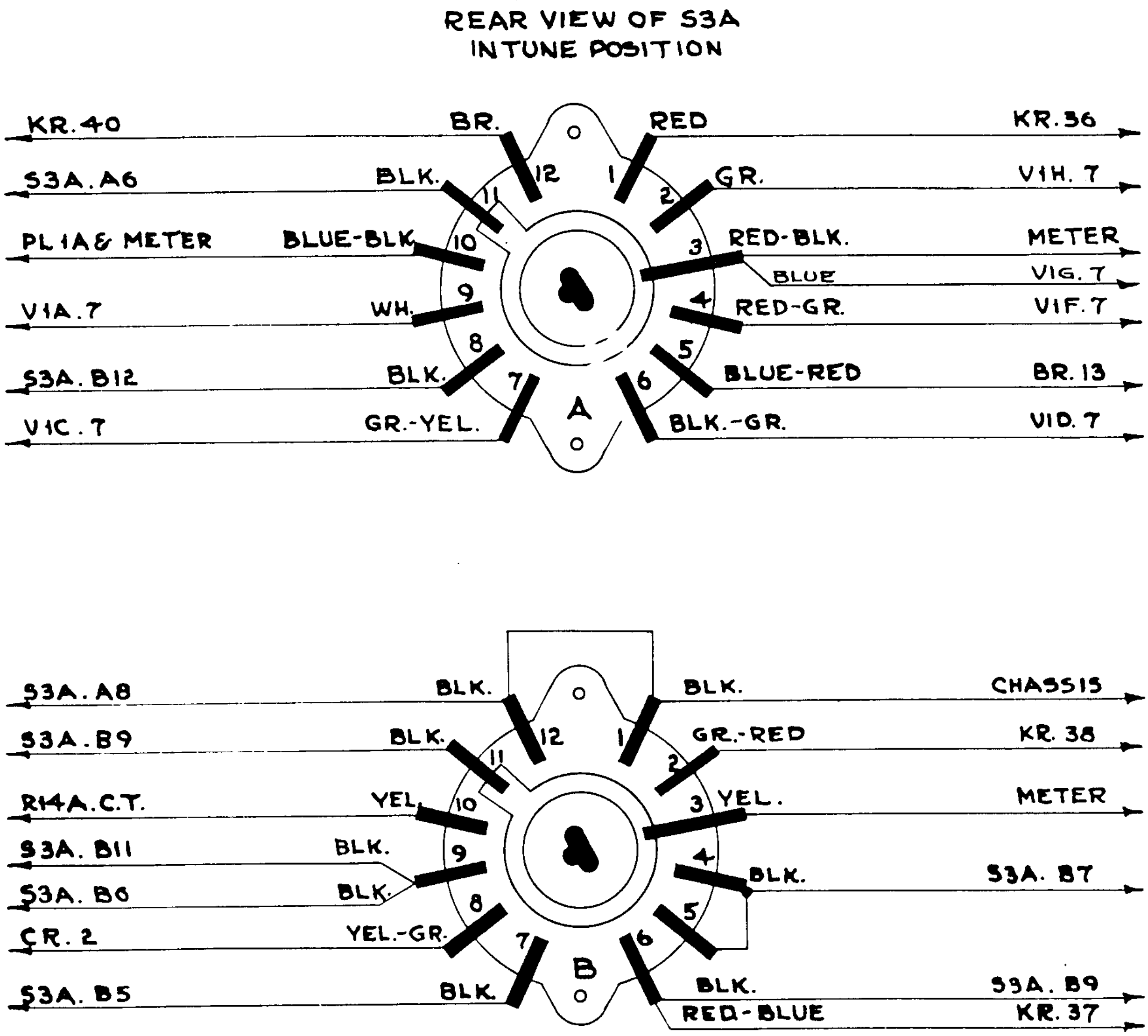
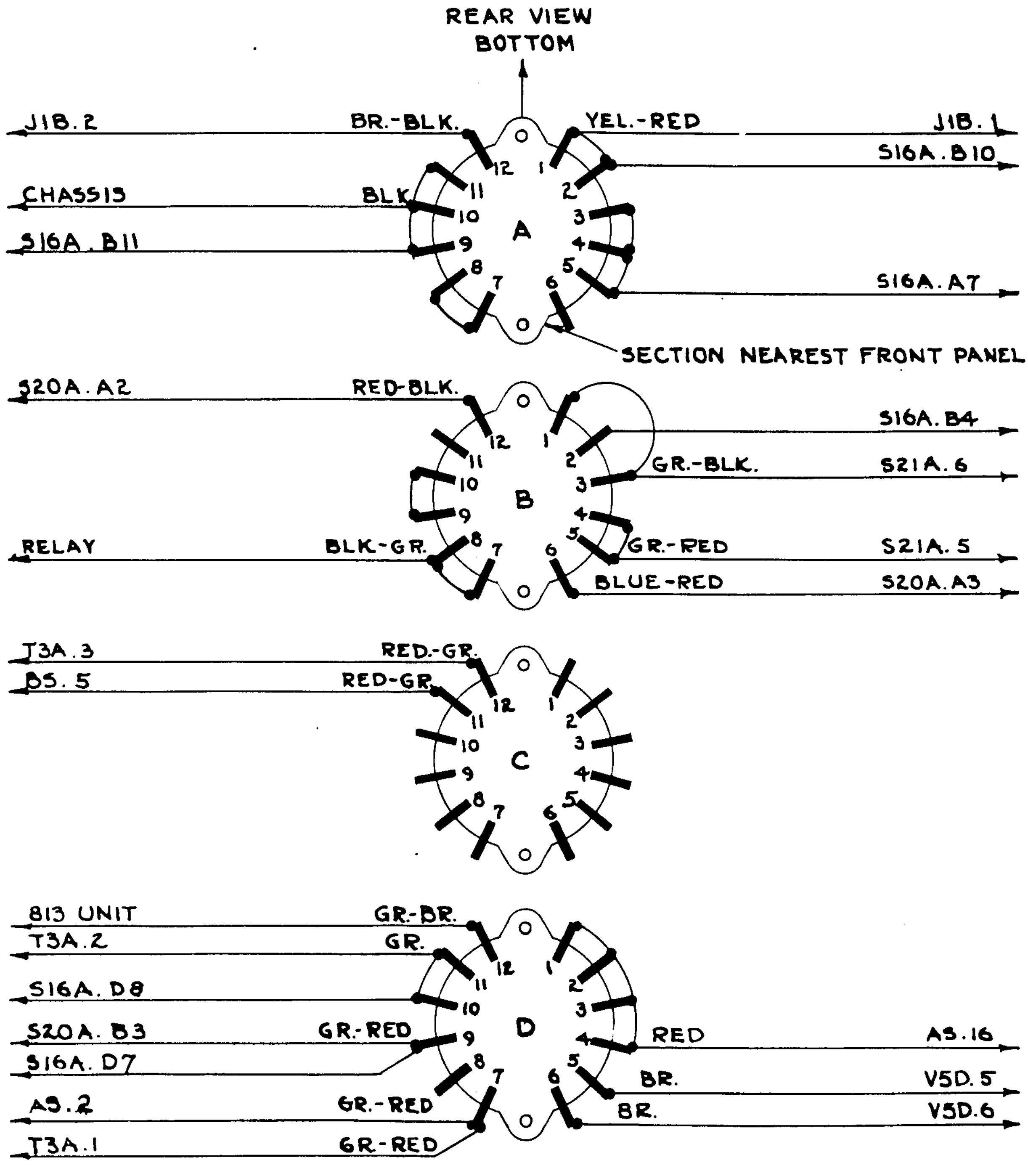
Fig. 2—S2A Connections



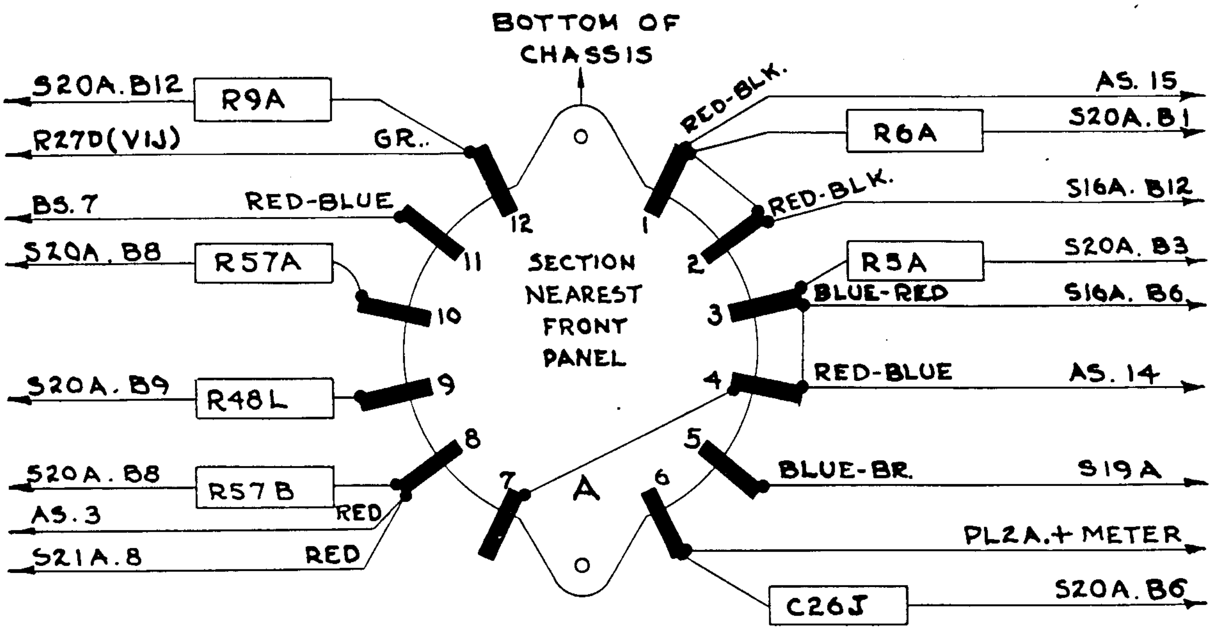
T FZ 524 / 1 - 3

Fig. 3—S3A Connections

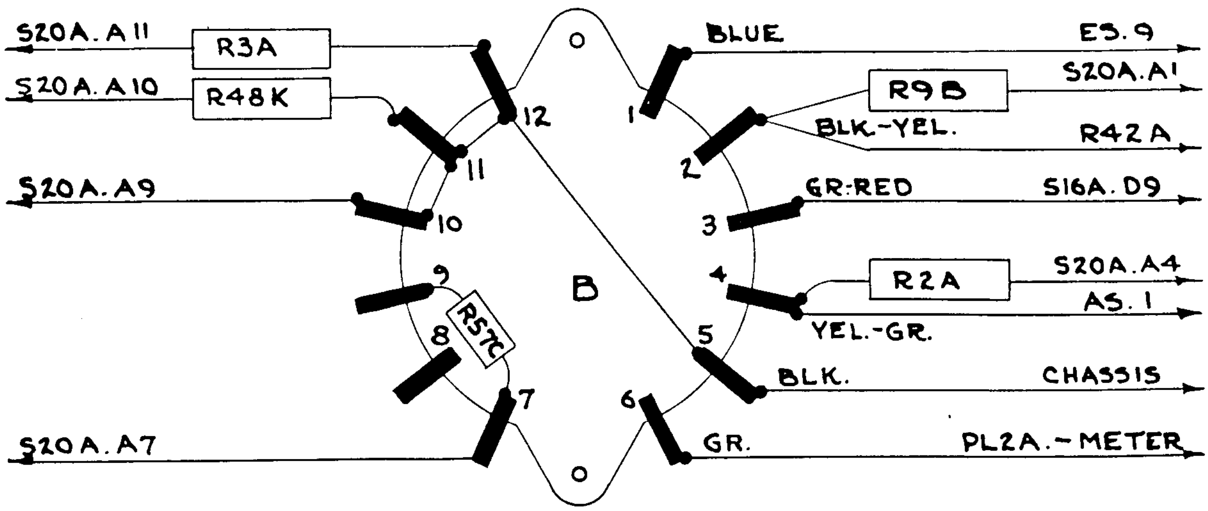


T $\frac{FZ\ 524}{1-4}$

Fig. 4—S16A Connections



REAR VIEW



T FZ 524 / 1-5

FIG. 5—S20A CONNECTIONS

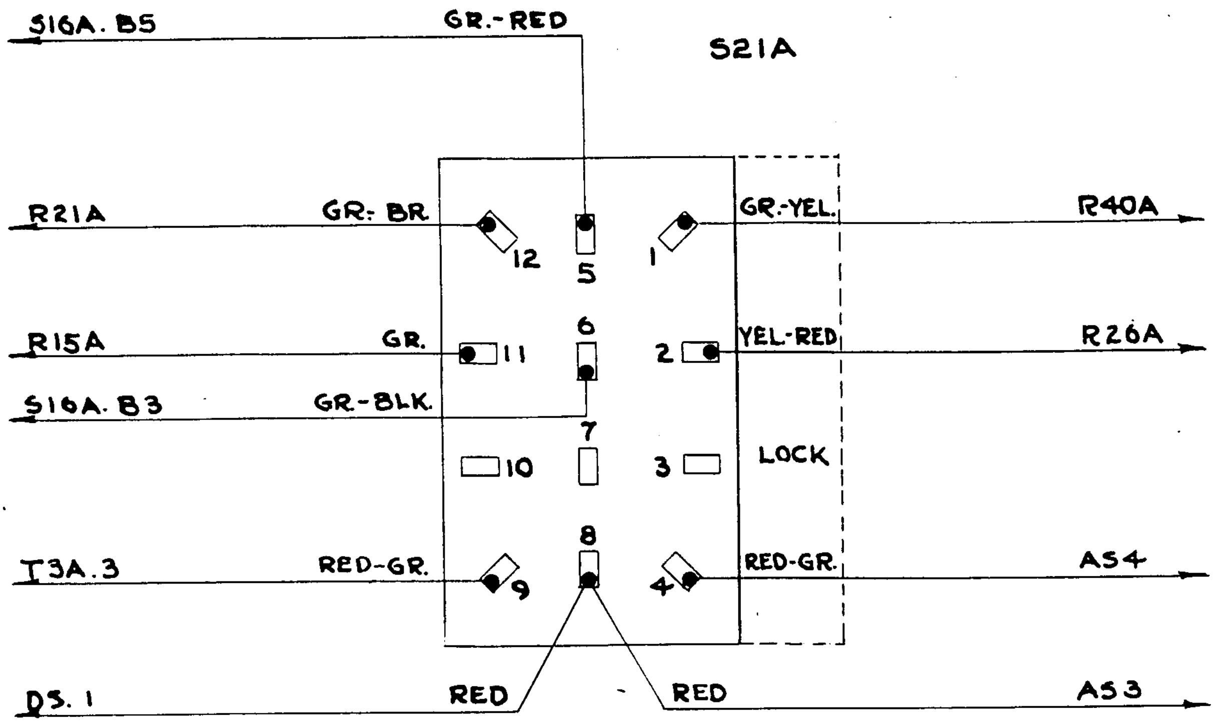


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FIG. 6—S21A CONNECTIONS

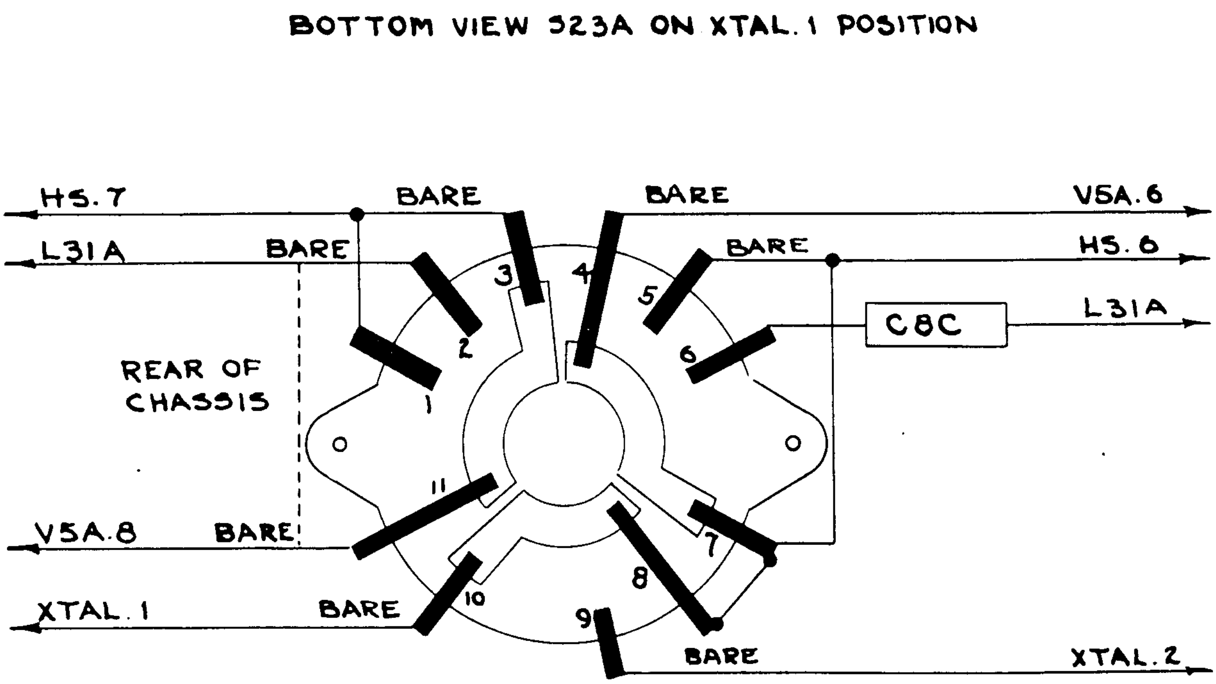

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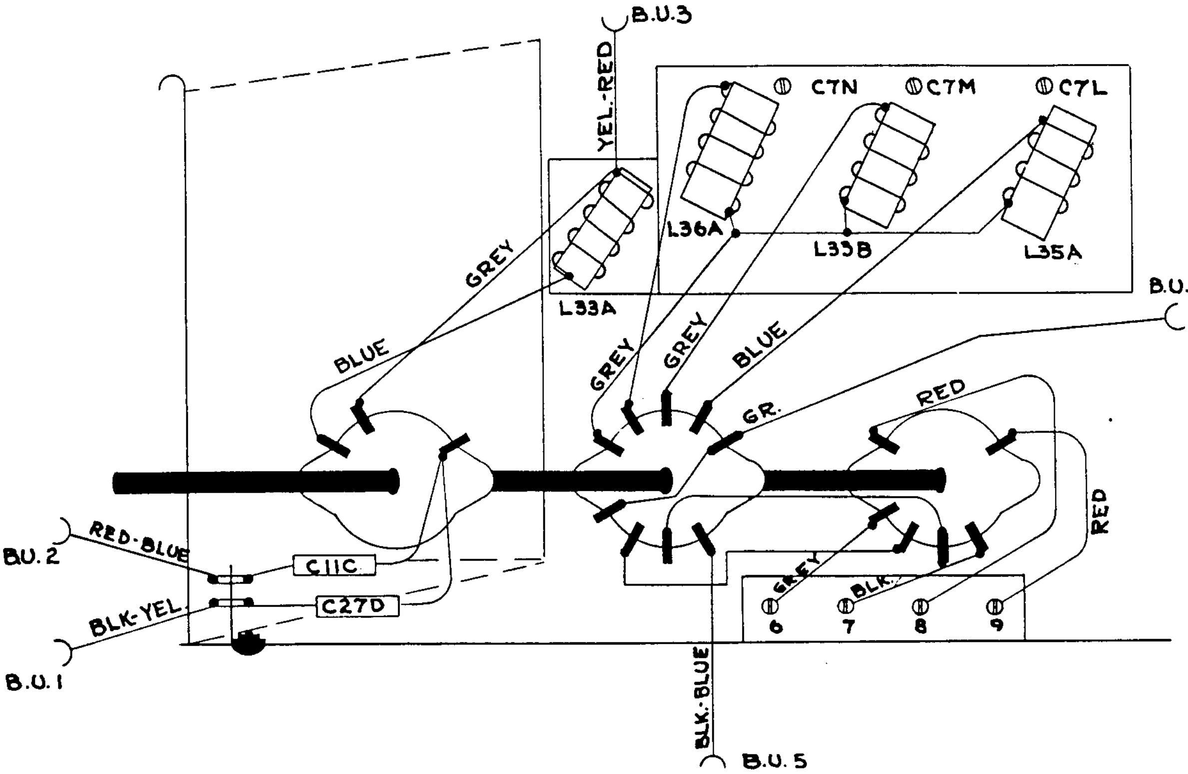
FIG. 7—S23A CONNECTIONS



T FZ 524 / 1-8

FIG. 8—BUFFER UNIT CONNECTIONS

Cleaning crystal

3. A very small particle of dirt may cause the crystal to cease operating or change the frequency. To clean the crystal:

(a) Remove the crystal from the holder and wash crystal and holder plates with warm soap and water.

(b) After washing, immerse the crystal in a clean solution of carbon tetrachloride. Clean holder plates with carbon tetrachloride.

(c) Remove from the solution of carbon tetrachloride, being careful to prevent any dirt or oil from the fingers getting on the crystal. Hold it by the corners, and, if possible, use a rubber glove when handling it.

(d) When the crystal is quite dry, replace in the holder, making sure that no dust is present and that no dirt will get into the crystal holder.

(e) When the crystal and holder are assembled, make sure that the crystal is able to move in the holder. Shake the crystal gently to ascertain if there is any movement.

Dismantling flick mechanism

4. To dismantle a flick mechanism:

(a) Turn the TUNE-SET-FLICK lever to SET and remove the four flick locking screws.

(b) Remove the index brackets by removing the two retaining screws.

(c) Remove screw marked "A" on slow motion drive assembly. (See Fig. 9). The spring and "C" washer may now be removed. The slow motion drive may also be removed by sliding it to the left so that its actuating stud slides out of the slot in the flick operating arm behind the front panel.

(d) Remove the large centre fixing bolt "B" and washer from the hub of the dial knob.

(e) Loosen the radial grub screw in the side of the dial knob. Remove dial knob and dial.

(f) Remove the two fixing screws from the dial stops.

(g) Remove the TUNE-SET-FLICK lever by removing the hub fixing screw marked "C", loosening the radial grub screw and pulling the lever forward.

(h) Remove the four screws securing the two flat flick arm springs. Remove washers, spacers and flick springs.

(i) Remove the two indicator flaps and spring.

(j) Remove the two operating arms and spring.

(k) Remove the taper pin from the drive mechanism boss. It may be extracted only in one direction due to the taper.

(l) Remove the flick clamping washer, noting position of assembly.

(m) Remove flick disc, noting position of assembly.

(n) Remove radial grub screw securing boss, and remove the boss by pulling it off the condenser shaft. Note position of assembly.

(o) Remove second flick disc and clamping washer, noting position of assembly.

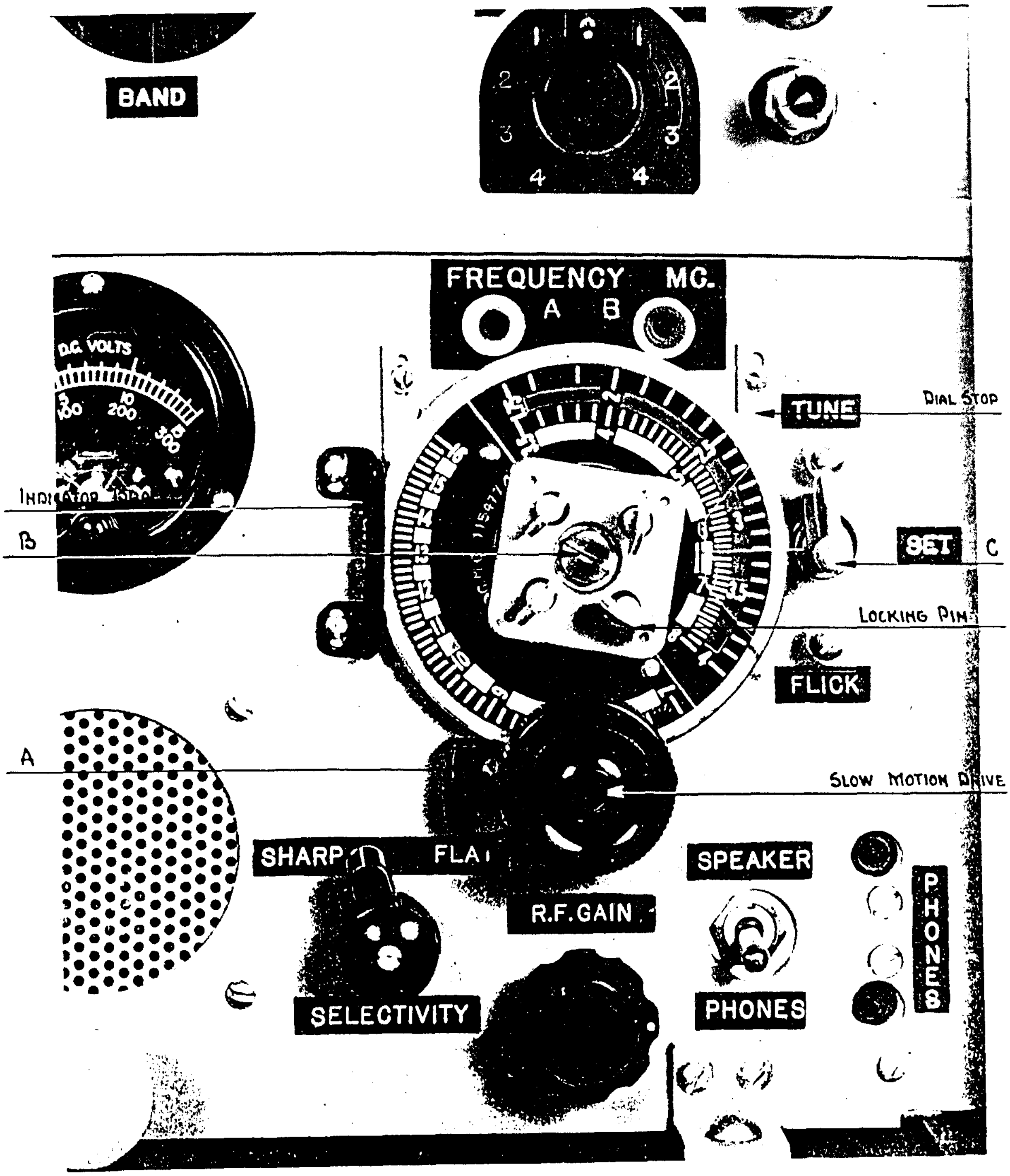


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FIG. 9—FLICK MECHANISM

Alignment and Specification Testing

I.F. alignment

5. Before aligning the receiver, make up an extended connector block assembly as illustrated in Fig. 11. This allows the receiver unit to be removed from the cradle and still remain connected to the power supply.

6. To align the I.F. stages:

(a) Set the receiver controls to the following positions:

R.F. GAIN	—Fully clockwise
A.F. GAIN	—Fully clockwise
MODE OF OPER	—R.T. MAN
NOISE LIMITER	—OUT
C.W. NOTE FILTER	—OUT
HET TONE	—Dots aligned
METER SW	—TUNE
SELECTIVITY	—SHARP
BAND	—1.75–4
FREQ ADJ	—0
FREQUENCY MC	—Fully clockwise
FREQ CHECK	—OFF

(b) Set a signal generator to 420 Kc/s., 30% modulated by a 400 cycle note.

(c) Connect an output meter, adjusted for 100 ohms impedance, across one of the phone jacks.

(d) Remove the shield cap from V1E and feed the output of the signal generator to the grid cap of V1E through a .1 μF. condenser.

(e) Adjust C7J for maximum output and replace shield cap. USE AN INSULATED SCREWDRIVER FOR THE ADJUSTMENT AS THERE IS HIGH POTENTIAL AT THIS POINT.

(f) Remove the shield cap from V1D and feed the signal generator output through a .1 μF. condenser to the grid cap of V1D.

(g) Adjust IN ORDER C7H, C7G, C7F, and C7E for maximum reading on output meter. Repeat and readjust C7J. Replace shield cap on V1D.

(h) Remove the shield cap from V1C and feed the output of the signal generator through a .1 μF. condenser to the grid cap of V1C.

(i) Adjust IN ORDER C7D, C7C, C7B and C7A for maximum reading on the output meter. Repeat and replace shield cap.

(j) With the signal generator connected through a .1 μF. condenser to the grid caps of the following valves in turn, the maximum input for 10 mW. output shall be:

V1E—13,000 μV.
V1D— 275 μV.
V1C— 42 μV.

(k) With the SELECTIVITY switch to FLAT, the increase in output shall not exceed 6 Dbs.

B.F.O. adjustment

7. To adjust the B.F.O.:

(a) Turn the SELECTIVITY switch to SHARP.

(b) Turn the MODE OF OPER switch to C.W. MAN.

(c) Apply an unmodulated signal of 420 Kc/s. to the grid cap of V1C through a .1 μF. condenser.

(d) Adjust C7K to zero beat.

(e) Vary the HET TONE control in either direction. The frequency of the audio note should increase continuously and should be greater than 2000 cycles when the control is in either the extreme clockwise or counterclockwise position.

Checking audio stage

8. To check the audio stage:

(a) Turn the receiver FREQUENCY MC dial to 3.5 Mc/s.

(b) Set the R.F. GAIN and A.F. GAIN controls fully clockwise.

(c) Turn the SELECTIVITY switch to FLAT.

(d) Connect an output power meter adjusted for 100 ohms impedance across one of the phone jacks.

(e) Feed the output of an audio oscillator set at 400 cycles through a .1 μF. condenser to the grid cap of V1H.

(f) Connect a vacuum tube voltmeter across the audio oscillator output leads.

(g) Adjust the output of the audio oscillator to obtain an output from the receiver of 10 mW.

(h) Check that input required is not greater than .5 V.

(i) Feed the signal from the audio oscillator to the grid cap of V1G through a .1 μF. condenser.

(j) Adjust input for 10 mW. output and check that input does not exceed .04 V.

R.F. alignment

9. Before aligning the R.F. channel, adjust the receiver FREQUENCY MC dial as follows:

(a) Loosen the set screws in the coupling spring to the shaft of the tuning condenser.

(b) Loosen the screws securing the dial stops behind the dial.

(c) Turn the condenser gang so that the plates are fully meshed.

(d) Set the dial index line so that it is exactly horizontal.

(e) Tighten the screws in the spring coupling on the condenser shaft.

(f) When the dial is rotated through 180° both indicators should again line up with the index line.

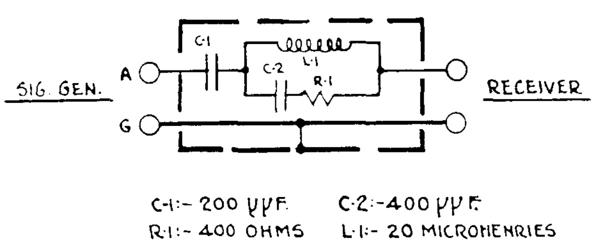
(g) Adjust the stops of the drive mechanism to coincide with the end positions of the gang rotation.

10. To align the R.F. channel:

(a) Set the following controls to the positions shown:

SELECTIVITY	—SHARP
MODE OF OPER	—R.T. MAN
BAND	—1.75–4
FREQUENCY MC	—1.9

(b) Set a signal generator at 1.9 Mc/s., 30% modulated by a 400 cycle note. Feed the signal generator output through the receiver dummy aerial (See Fig. 10), to the receiver aerial post.



T FZ 524 / 1-10 FIG. 10—RECEIVER DUMMY AERIAL

(c) Connect an output power meter set for 100 ohms impedance across one of the phone jacks.

(d) Set trimmers C2A, C2B, C2C, C2D, C2E, C2F, C2G, C2H and C2J to approximately half capacity.

(e) Set slug adjustments L1A, L2A, L3A, L4A, L5A, L7A, L8A and L9A at mid position approximately.

(f) Screw slug adjustment of L6A almost fully in.

(g) Adjust, in order, L7A, L1A and L4A for maximum reading on the output meter.

(h) Turn receiver FREQUENCY MC and signal generator to 3.8 Mc/s.

(i) Adjust, in order, C2C, C2F and C2J for maximum reading on the output meter.

(j) Readjust L7A, L1A and L4A at 1.9 Mc/s. and C2C, C2F and C2J at 3.8 Mc/s. at least twice to improve reading.

(k) Turn BAND switch to 3.5–8 Mc/s. position and turn receiver FREQUENCY MC dial to 3.8 Mc/s.

(l) Adjust L8A, L2A and L5A for maximum reading on output meter.

(m) Set receiver FREQUENCY MC dial and signal generator to 7.6 Mc/s.

(n) Adjust, in order, C2B, C2E and C2H for maximum reading on output meter.

(o) Readjust L8A, L2A and L5A at 3.8 Mc/s. and C2B, C2E and C2H at 7.6 Mc/s. at least twice to improve reading.

(p) Turn BAND switch to 7–16 and set receiver FREQUENCY MC dial and signal generator to 7.6 Mc/s.

(q) Adjust, in order, L9A, L3A and L6A for maximum reading on output meter.

(r) Turn receiver FREQUENCY MC dial and signal generator to 15 Mc/s.

(s) Adjust, in order, C2A, C2D and C2G for maximum reading on output meter.

(t) Readjust L9A, L3A and L6A at 7.6 Mc/s. and C2A, C2D and C2G at 15 Mc/s. at least twice to improve reading.

11. To ensure that the receiver has not been tuned to a harmonic of the signal generator frequency, set the receiver FREQUENCY MC dial to 7.6 Mc/s., and check for the image at 8.44 Mc/s. on the signal generator. Similarly, when the receiver is set to 15 Mc/s., the image will appear at 15.84 Mc/s. on the signal generator.

Crystal calibrator output

12. Check the output of the crystal calibrator as follows:

(a) Set the receiver switches and controls to the following positions:

NOISE LIMITER	—OUT
C.W. NOTE FILTER	—OUT
METER SW	—TUNE
HET TONE	—Dots aligned
SELECTIVITY	—FLAT
A.F. GAIN	—Fully clockwise
R.F. GAIN	—Fully clockwise
SPEAKER-PHONES	—PHONES
BAND	—1.75–4
MODE OF OPER	—C.W. MAN
FREQ CHECK	—As shown

(b) Connect an output meter set to 100 ohms impedance across one of the phone jacks.

(c) With the FREQ CHECK at the following positions and the signal from the crystal calibrator tuned in at 2 Mc/s. on the receiver, the following **average** output meter readings should be obtained, (See Para. 39):

1000—200 mW.
100—150 mW.
10—150 mW.

(d) Check at 16 Mc/s. for better than 10 mW. output.

B.F.O. check

13. Check the operation of the B.F.O. as follows:

(a) Set the following controls to the positions shown:

MODE OF OPER	—R.T. MAN
SELECTIVITY	—FLAT
R.F. GAIN	—Fully clockwise
METER SW	—TUNE
FREQ CHECK	—1000
HET TONE	—Dots aligned

(b) On the 1.75–4 Mc/s. band, sweep the FREQUENCY MC dial slowly from one end of the band to the other. If the B.F.O. is working properly a loud hiss will be heard and there will be considerable deflection of the meter needle at 2, 3 and 4 Mc/s.

Sender alignment

14. Before aligning the sender:

(a) Make up an extended connector block assembly as illustrated in Fig. 11 so that the sender unit may be removed from the cradle and still remain connected to the supply unit and receiver.

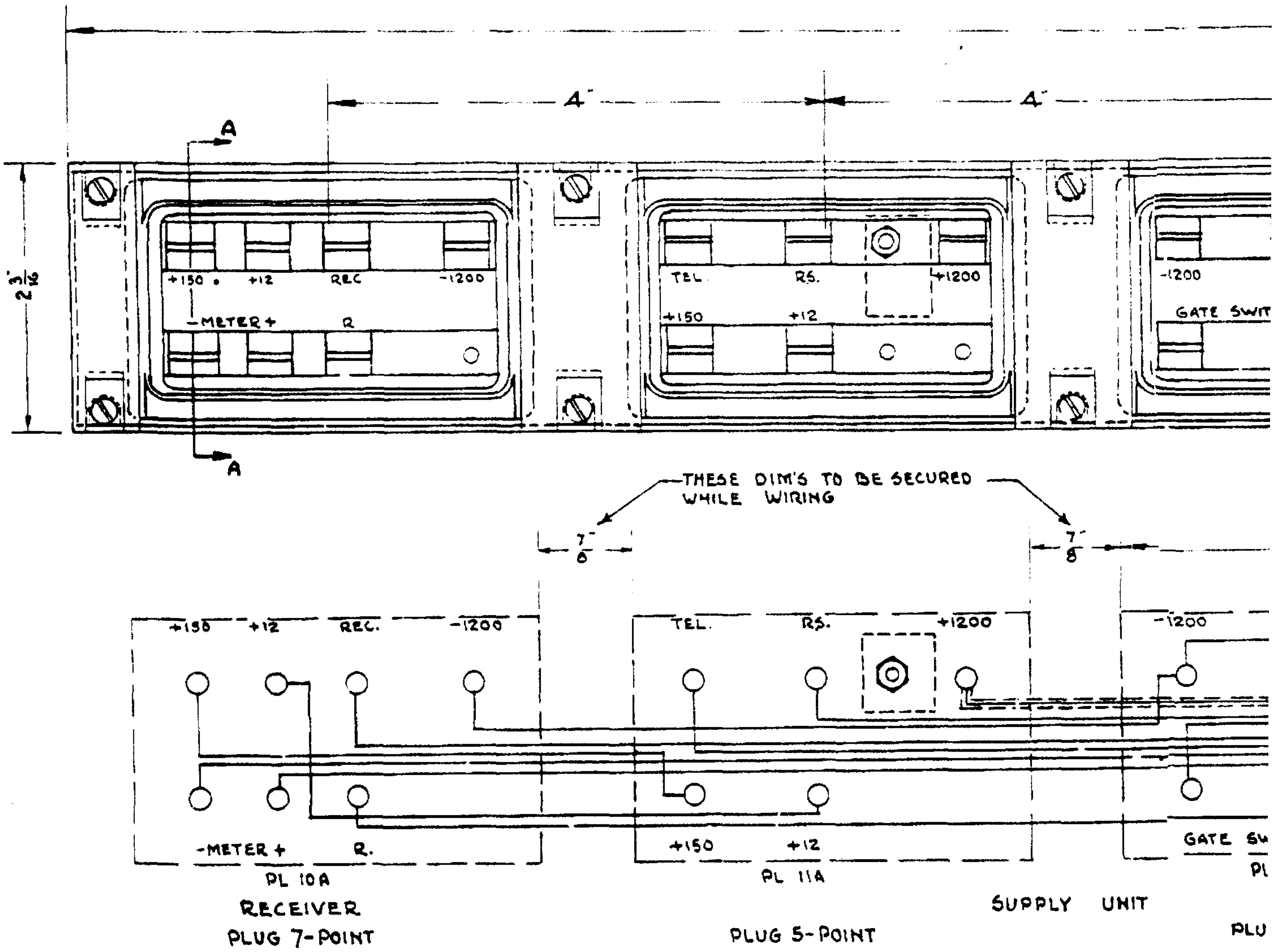

4"
4"
A
A
2 3/16"
+150
+12
REC
-1200
-METER +
R
TEL.
RS.
+1200
+150
+12
-1200
GATE SWIT
THESE DIM'S TO BE SECURED WHILE WIRING
7/8"
7/8"
+150
+12
REC.
-1200
-METER +
R.
PL 10A
RECEIVER
PLUG 7-POINT
TEL.
RS.
+1200
+150
+12
PL 11A
PLUG 5-POINT
SUPPLY UNIT
-1200
GATE SW
PL
PLU

FIG. 11–CON

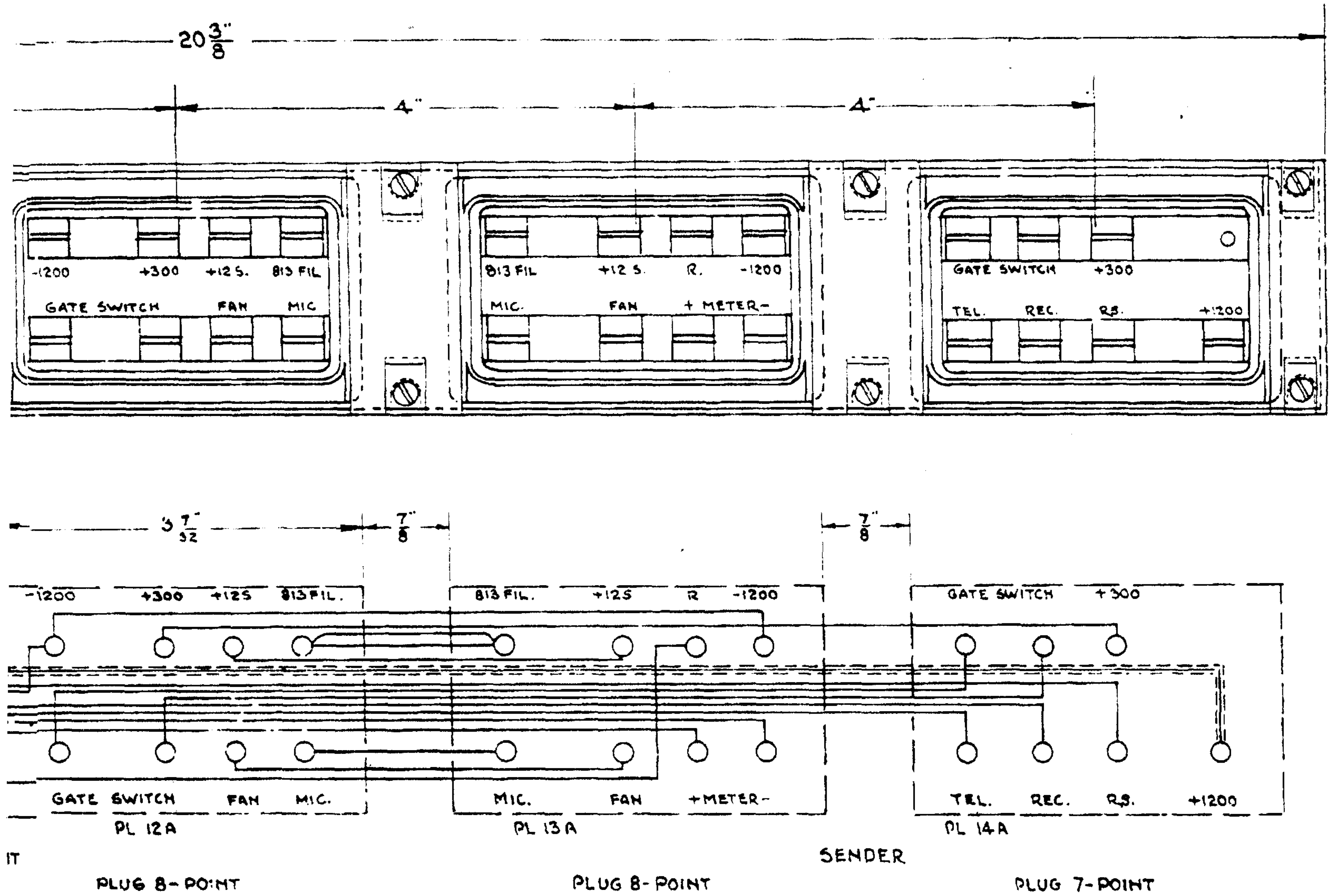
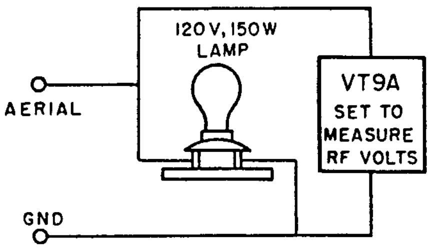


FIG. 11–CONNECTOR BLOCK ASSEMBLY

Supersedes Issue 1 of pages 17 to 22 which have been amended.

(b) Provide good bonding between units.

(c) Connect the dummy aerial shown in Fig 12 to the sender aerial post.



DUMMY AERIAL FOR MEDIUM AND HIGH POWER. WATTMETER RF ME5005/U WILL BE USED FOR LOW POWER.

Fig 12 - Sender Dummy Aerials

(d) Check calibration of the sender FREQUENCY MC dial (See para 9).

15. Alignment of the sender is carried out as follows:

(a) Set the following controls to the positions shown:

BAND	--1.75-4
MOD OF OPERATION	--R.T.
FREQUENCY MC	--2 Mc/s. (Both sender and receiver dials)
NET--OFF	--NET
SENDER HEATERS--OFF	--SENDER HEATERS
SPEAKER-PHONES	--SPEAKER
SEND-REC	--REC

(b) Adjust L31A to obtain zero beat.

(c) Turn both FREQUENCY MC dials to 4 Mc/s.

(d) Move C6A to approximately half capacity and adjust C6B for zero beat.

(e) Turn BAND switch to 3.5-8 position and METER SWITCH to V5A, V5B GR.

(f) Adjust L33A for maximum meter reading.

(g) Turn both FREQUENCY MC dials to 8 Mc/s.

(h) Adjust C6C for maximum meter reading.

(i) Repeat (e)-(h) inclusive several times to increase meter reading.

(j) Set BAND switch to 7-16 position and METER SWITCH to V5C GR.

(k) Adjust L36A for maximum meter reading.

(l) Turn both FREQUENCY MC dials to 16 Mc/s.

(m) Adjust C7N for maximum meter reading.

(n) Repeat (j)-(m) inclusive to better meter reading.

(o) Turn the BAND switch to 1.75-4 position, METER SWITCH to PA GR, and SEND-REC switch to SEND. TAKE GREAT CARE AS THERE IS DANGEROUS VOLTAGE PRESENT.

(p) Load the sender to the dummy aerial at 2 Mc/s, adjusting L35A for maximum meter reading.

(q) Load the sender to the dummy aerial at 4 Mc/s, adjusting C7L for maximum meter reading.

(r) Repeat (o)-(q) inclusive several times for best result.

(s) With BAND switch at 3.5-8 position, load the sender to the dummy aerial at 4 Mc/s, adjusting L33B for maximum output.

(t) Load the sender at 8 Mc/s, adjusting C7M for maximum output.

(u) Repeat (s) and (t) at least twice to improve output.

(v) The calibration of the sender FREQUENCY MC dial should be within 1% of the frequency; the P.A. TUNE and I.P.A. 7-16 dials, within 5% of the frequency.

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R.F. output

16. Check RF output as indicated by the dummy aerial (see specifications, para 40).

Sidetone

17. To check sidetone output, connect an output meter set for 100 ohms impedance across one of the phone jacks. With set on SEND R/T, the minimum sidetone output should be:

HIGH--15 mW.
MED-- 5 mW.
LOW--2.5 mW.

Modulation

18. Check the modulation of the sender as follows:

(a) Connect an audio oscillator set to 400 cycles to the microphone input of the sender through the attenuating network illustrated in Fig 13.

(b) Adjust the output of the audio oscillator to give a reading of 1.33 V. on the voltmeter. The input to the sender will be .04 V.

(c) Connect an output meter adjusted for 100 ohms impedance across one of the phone jacks.

(d) Check for 1 mW on output meter on R/T, for 3 mW output on M.C.W. and C.W.

19. To check modulation of the sender using an oscilloscope:

(a) With the set OFF, couple an oscilloscope very loosely to the aerial lead. HEAVY INSULATION SHOULD SEPARATE THE TWO LEADS.

(b) Carry out steps (a) and (b) of para 18.

(c) Check for 75% modulation on the oscilloscope (See Fig 14).

(d) Turn the audio oscillator to 200 cycles.

(e) Adjust the attenuator control for 75% modulation. The input volts should not be greater than 5.4.

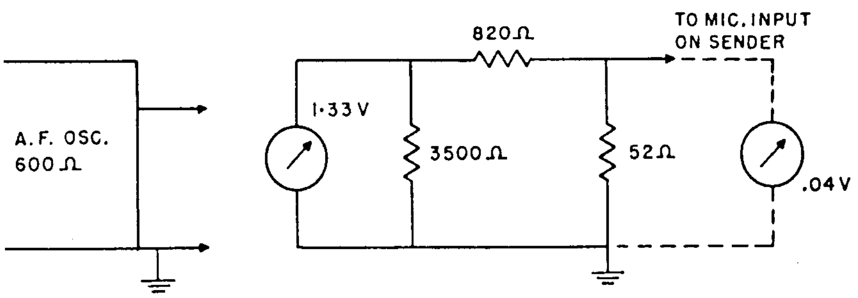


Fig 13 - Attenuating Network

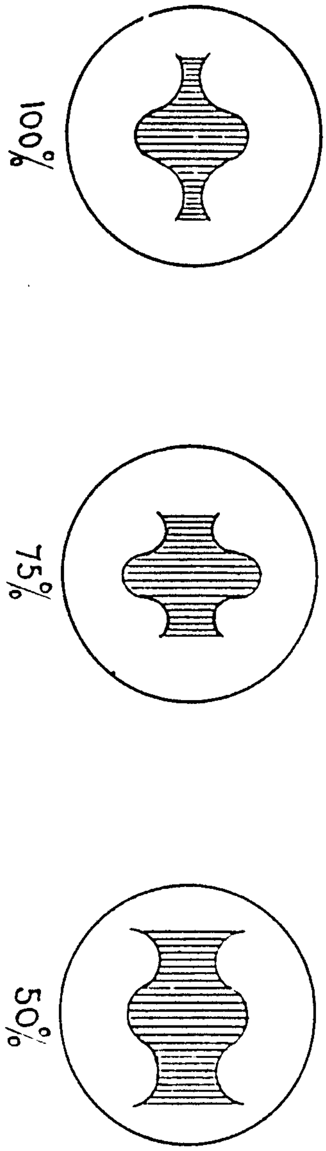


Fig 14 - Modulation Patterns

Specifications

20. The specification figures laid down in the following paragraphs depend on the tests being made under the following conditions:

(a) The input voltage shall be 12.5 V. measured at the terminals of the supply unit.

(b) Receiver measurements shall be made at a signal to noise power ratio of 10:1 and an output of 10 mW.

(c) If a modulated signal is required, the modulation frequency shall be 400 cycles, 30% modulated.

(d) The receiver output circuits shall be terminated in a 100 ohm, non-inductive resistor.

(e) All audio test voltages shall be measured at the source with an impedance matching network connected between the source and the set.

(f) For all receiver measurements, the H. F. circuits in the sender shall be adjusted exactly as for normal operation of the sender at the receiver frequency.

(g) All tests shall be performed with the complete equipment properly mounted in the carrier.

21. The battery drain at 12.5 V. input shall not be greater than the values shown in Table 1.

Table 1 - Battery Drain In Amperes

Conditions	Battery Drain (Amps.)		
	LOW power	MED power	HIGH power
SEND M.C.W.	30	33	45
SEND C.W. (Key down)	30	35	60
SEND C.W. (Key up)	25	25	25
RECEIVE (Calibrator OFF)		3.5	

22. Dial calibration tests shall be made at 2 and 4 Mc/s. on the 1.75-4 band, at 4 and 8 Mc/s. on the 3.5-8 band, and at 8 and 16 Mc/s. on the 7-16 band. Both receiver and sender FREQUENCY MC dials shall be accurate within 1.0%. The I. P. A. 7-16 dial and the P. A. TUNE dial shall be accurate within 5.0%.

23. When the aerial tuning coil reaches the stop at the minimum inductance end, the counter must read 000 ± 0001.

24. The frequency shift when operating the flick mechanism shall not exceed .037%. The maximum frequency shift due to the operation of the flick lever from SET to FLICK shall not exceed .01%.

25. The netting error at the middle of each band will not be greater than .02% on all bands.

26. The time which elapses between pressing the pressel switch and the sender going on the air shall be less than 2 seconds. The time which elapses between releasing the pressel switch and the receiver commencing to operate shall be less than 1 second.

27. The receiver sensitivity shall be better than 5 uV. on R/T and better than 2 uV. on C. W. for an output of 10 mW. (SELECTIVITY switch at FLAT, A. F. GAIN and R. F. GAIN fully clockwise).

28. Receiver selectivity shall be checked at a frequency of 2.5 Mc/s with an input of 10 uV. The A. F. GAIN shall be fully clockwise and the R. F. GAIN shall be adjusted to give 10 mW. output. With the MODE OF OPER at R. T. MAN position, the band width shall be:

For 2 times input	For 1000 times input	SELECTIVITY SW.
Not more than 6 Kc/s.	Not more than 20 Kc/s.	SHARP
Not less than 7 Kc/s.	Not more than 30 Kc/s.	FLAT

29. With conditions as in para 28, the signal generator shall be tuned to the image frequency and the input signal increased until 10 mW output is again obtained. The ratios of the signal inputs required in the two cases shall not be less than the following values:

BAND	1.75-4		3.5-8		7-16	
Freq. (Mc/s.)	1.9	3.8	3.8	7.5	7.5	15
Ratio (Dbs.)	80	70	80	45	50	25

30. The receiver power output test shall be made on R/T at approximately 3 Mc/s. The receiver shall be capable of delivering into one pair of headphones (100 ohms) not less than 50 mW. with a total harmonic distortion not in excess of 20%.

31. The intermediate frequency rejection ratio at any frequency shall be greater than 80 Dbs.

32. The automatic volume control shall be checked as follows:

(a) Turn the MODE OF OPER switch to R. T. AUTO.

(b) Adjust the receiver using the lowest convenient signal input.

(c) Increase the input to 100,000 uV. and adjust the A. F. GAIN control to 40 mW. output.

(d) The input shall then be reduced, and the output shall not decrease below the values shown below:

100,000 uV. --40 mW.
100 uV. --15 mW.
10 uV. -- 5 mW.

33. When a signal has been tuned in for least meter deflection with the controls at SHARP, R. T. MAN and TUNE, the audio note which is heard when the MODE OF OPER switch is turned to C. W. AUTO shall pass through zero frequency when the HET TONE control is turned so that the dots are aligned. As the control is turned in either direction, the frequency of the audio note shall increase and shall be greater than 2000 cycles when the control is in either the extreme clockwise or counterclockwise position.

34. To check fidelity, the controls shall be adjusted to give 10 mW. output at 400 cycles. The output shall not decrease below the following values with the SELECTIVITY switch in the FLAT position:

150 cycles--1.5 mW.
3000 cycles--2.5 mW.

35. The C. W. NOTE FILTER, when switched IN, shall have a gain between ± 4 Dbs. at a resonant frequency between 900 and 1400 cycles.

36. The range of the FREQ ADJ shall be within the following limits in cycles:

Band	Freq. Mc/s.	Counterclockwise		Clockwise	
		Min	Max	Min	Max
1.75- 4	1.75	2400	3600	2400	3600
1.75- 4	4	6000	8000	6000	8000
3.5 - 8	3.5	4000	9000	10000	15000
3.5. - 8	8	10000	15000	25000	35000
7 - 16	7	3000	7000	10000	35000
7 - 16	16	8000	16000	70000	90000

The resetability shall be within the following limits:

1.75-4 Band--4 Mc/s.--100 cycles
3.5 -8 Band--8 Mc/s.--200 cycles
7 -16 Band--16 Mc/s.--300 cycles

37. The frequency of the crystal calibrator shall be accurate within .07% at 1000 Kc/s and within + .02%-0 at 100 Kc/s.

38. The output of the crystal calibrator shall be checked with the R. F. GAIN fully clockwise, the MODE OF OPER switch at C. W. MAN, and the HET TONE control adjusted to approximately 100 cycles. The following output figures shall be obtained over the whole frequency range:

Frequency Kc/s.	1.75-4 and 3.4 -8 Bands	7-16 Band
1000	25 mW.	10 mW.
100	25 mW.	10 mW.
10	25 mW.	10 mW.

39. The H. F. interference caused by the vibrator in the supply unit shall not be such as to cause serious interference with transmission or reception. As a limit to this test, the equipment may be checked at any frequency in its range and the interference must be low enough to allow the receiver to pass the standard sensitivity test.

40. With the dummy aerial connected as shown in Fig 12, the sender output shall not be less than that given in Table 2.

Table 2 - Sender Output

Conditions	Output					
Band	1.75-4		3.5-8		7-16	
Freq Mc/s	1.75	4	3.5	8	7	16
MCW HIGH power	88V	102V	100V	145V	140V	180V
CW HIGH power	68V	82V	78V	120V	115V	160V
MCW MED power	44V	60V	55V	80V	75V	125V

Conditions	Output					
Band	1.75-4		3.5-8		7-16	
CW MED power	30V	45V	33V	60V	53V	105V
MCW and CW, LOW power	1 to 6 WATTS (Measured on Wattmeter)					

41. The source voltage required at 1000 cycles for 75% modulation of the sender on R/T shall not exceed .04 V. Attenuation at 150 cycles from the value at 1000 cycles shall not be greater than 4 Dbs. The M.C.W. note frequency shall be between 700 and 1300 cycles, and the depth of modulation shall be from 100 to 120%.

42. The following sidetone output power from the sender shall be supplied to the headphones on M.C.W:

HIGH power--not less than 20 mW.
MED power--not less than 7 mW.
LOW power--not less than 3.3 mW.

43. The output voltages of the supply unit shall be within the following limits with an input voltage of 12 V. measured at the terminals of the supply unit end with full load on the output circuit:

Sender H.T.1 supply--1430 V. ± 10% at 120 mA.

Sender H.T.2 supply--300V. ±10% at 175 mA.

Receiver H.T. supply--145 V. +20%-10% at 50 mA.

44. The voltage regulation of the supply unit from full load to no load on the output circuits shall not be more than the following:

H.P. Dynamotor--40% at 120 mA.
L.P. Dynamotor--35% at 175 mA.

45. The vibrator supply output voltage shall not vary by more than 12% when changing from 50 mA. to 30 mA. load.

Fault Finding

Sender

46. Tables 3, 4 and 5 outline a complete resistance check of the sender. Remove all valves from the sender before checking resistances. Where the Switch Positions column is left blank in Tables 4 and 5, the position of switches does not affect the reading.

NOTE

Fig 14A is the suggested construction details of the Dummy Load.

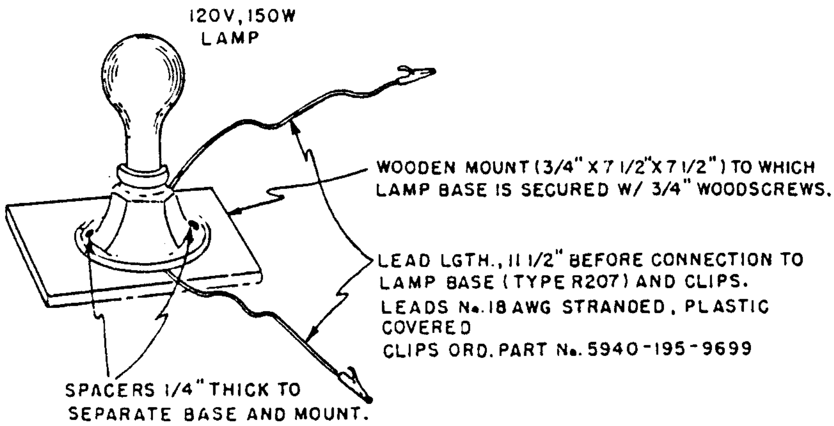


Fig 14 A - Constructional Details of Dummy Load

TABLE 4—SENDER RESISTANCE CHART "A"

Valve	Resistance to Ground (Ohms)									
	Pin Numbers									
	1	2	3	4	5	6	7	8	Grid	Plate
V5A	1 meg.	0	1.3 meg.	1.31 meg.	50,000 (18,000-S16A on R/T)	50,000 (18,000-S16A on R/T)	Infinity	0 (60–S23A on XTAL)		
V6A		0			1.31 meg.					
V5B	1 meg.	Infinity	1.3 meg.	1.315 meg.	40,000 (9,500-S16A on R/T)	40,000 (9,000-S16A on R/T)	Infinity	50		
V5C	Infinity (1 meg. –S13A on 7-16)	0	Infinity (1.3 meg. –S13A on 7-16)	Infinity (1.315 meg. –S13A on 7-16)	50,000 (20,000-S16A on R/T)	50,000 (20,000–S16A on R/T)	Infinity	50		
V7A S21A on HIGH	0		1 meg.	33,000 (1,500-S16A on R/T)	0		Infinity			1 meg.
V7A S21A on MED.	0		1 meg.	40,000 (6,500-S16A on R/T)	0		Infinity			1 meg.
V7A S21A on LOW	0		1 meg.	40,000 (11,000-S16A on R/T)	0		Infinity			1 meg.
V1J	0	Infinity	5,000	Infinity (1.3 meg. –S16A on R/T)		Infinity (1.5 meg. –S16A on R/T)			4,000	
V5D	0	Infinity	1.3 meg.	1.35 meg.	34,000 (1.6 meg. –S16A on R/T)	1 meg.	Infinity	400		

TABLE 5—SENDER RESISTANCE CHART "B"

Connector Block Term.	Switch Positions			Resistance to Ground (Ohms)
	S21A	S16A	S20A	
–METER			AER. CUR	0
	HIGH	R.T.	PA.PL	1,300
	LOW	R.T.	PA.PL or PA.GR	11,000
	MED.	R.T.	PA.PL or PA.GR	6,500
	HIGH	M.C.W., C.W., or BREAK IN	PA.PL or PA.GR	32,000
	LOW	M.C.W., C.W., or BREAK IN	PA.PL or PA.GR	40,000
	MED.	M.C.W., C.W., or BREAK IN	PA.PL or PA.GR	35,000
		R.T.	V5C GR	100
		M.C.W., C.W., or BREAK IN	V5C GR	30,000
		R.T.	V5A-V5B GR	17
		M.C.W., C.W., or BREAK IN	V5A-V5B GR	34,000
			V1J	0
			V5D	0
			H.T.1.	0
			PA.BIAS	80,000
+METER	HIGH	R.T.	PA.PL	1,300
	LOW	R.T.	PA.PL or PA.GR	9,500
	MED.	R.T.	PA.PL or PA.GR	6,300
	HIGH	M.C.W., C.W., or BREAK IN	PA.PL or PA.GR	35,000
	LOW	M.C.W., C.W., or BREAK IN	PA.PL or PA.GR	40,000
	MED.	M.C.W., C.W., or BREAK IN	PA.PL or PA.GR	36,000
		R.T.	V5C GR or V5A-V5B GR	0
		M.C.W., C.W., or BREAK IN	V5C GR or V5A-V5B GR	34,000
			V1J	100
			V5D CATH	1.5
			H.T.1	90,000
			PA.BIAS	0
FAN				12
MIC				5

TABLE 5 (Cont'd.)

Connector Block Term.	Switch Positions			Resistance to Ground (Ohms)
	S21A	S16A	S20A	
−1200	HIGH	R.T.		1,300
	LOW	R.T.		10,000
	MED.	R.T.		6,000
	HIGH	M.C.W., C.W., or BREAK IN		35,000
	LOW	M.C.W., C.W., or BREAK IN		43,000
	MED.	M.C.W., C.W., or BREAK IN		40,000
R				50
+12S				Infinity
+1200				1,000,000
RS		R.T., M.C.W., or C.W.		50
		BREAK IN		150,000
REC (RELAY OPEN)				20
REC (RELAY CLOSED)				Infinity
TEL			(RELAY OPEN)	20
			(RELAY CLOSED)	0
+300				1,000,000
T3A.1	HIGH	R.T.		1,300
	LOW	R.T.		10,000
	MED.	R.T.		6,000
	HIGH	M C.W., C.W., or BREAK IN		40,000
	LOW	M.C.W., C.W., or BREAK IN		50,000
	MED.	M.C.W.; C.W., or BREAK IN		45,000
T3A.2	HIGH	R.T.		1,400
T3A.5.6.7				0

TABLE 6—SENDER RESISTANCE CHART "C"

Point to Point Resistance Check					
Valve	From Pin No.	To: Terminal	To: Plug	Conditions	Resistance (Ohms)
V5A	3	+300	PL3A		16
	4	+300	PL3A		10,000
V6A	5	+300	PL3A		10,000
V5B	2	+12S	PL2A		0
	3	+300	PL3A		60
	4	+300	PL3A		15,000
V5C	3	+300	PL3A	S13A on 7–16	60
	4	+300	PL3A	S13A on 7–16	15,000
V7A	3	+300	PL3A		0
	Cap	+1200	PL3A		15
V1J	2	+12S	PL2A		0
	4	+300	PL3A	S16A on R.T.	140,000
	4	+300	PL3A	S16A on M.C.W., C.W., or BREAK IN	Infinity
	6	+300	PL3A	S16A on R.T.	500,000
	6	+300	PL3A	S16A on M.C.W., C.W., or BREAK IN	Infinity
V5D	2	+12S	PL2A		0
	3	+300	PL3A	S21A on HIGH	1,150
	3	+300	PL3A	S21A on LOW	8,000
	3	+300	PL3A	S21A on MED.	4,000
	4	+300	PL3A	S21A on HIGH	40,000
	4	+300	PL3A	S21A on LOW	48,000
	4	+300	PL3A	S21A on MED.	44,000

Receiver

48. Table 7 outlines a voltage check of the receiver unit. This check is carried out with the valves in their sockets. The readings shown were obtained with a 20,000 ohms per volt meter.

TABLE 7—RECEIVER VOLTAGE CHECK

Valve	Voltage to Ground					
	Pin numbers					
	1	3	4	5	6	7
V1A	12	1–40*	145		30–20*	1–40*
V1B	12	115	115		115	0
V1C	12	−1.5	26		26	5
V1D	12	36	160		160	36
V1E	12	36	160	160	160	36
V1F	12	−1.5	−1.5		−1.5	.5
V1G	12	4	70	0	8	4
V1H	12	4	150		85	4
V2A	12	.5	4			
V2B	12		1	1		
*Rotate R.F. GAIN						

49. Remove valves and pilot lamps before checking receiver resistances as outlined in Tables 8 and 9.

TABLE 8—RECEIVER RESISTANCE CHART A

Valve	Pin No.	Resistance to Gnd. (Ohms)	Conditions
V1A	1	Infinity	S3A on all positions except L.T.
	1	30,000	S3A on L.T.
	2	0	
	3	300-10,300	Rotate R.F. GAIN
	7	10,300-300	Rotate R.F. GAIN
	Cap	1 meg.	S2A on C.W.MAN and R.T. MAN
	Cap	6.35 meg.	S2A on C.W. AUTO
	Cap	2.35 meg.	S2A on R.T. AUTO
V1B	1	Infinity	S3A on all positions except L.T.
	1	30,000	S3A on L.T.
	2	0	
	7	0	
	Cap	54,000	
V1C	1	Infinity	S3A on all positions except L.T.
	1	30,000	S3A on L.T.
	2	0	
	3	250,000	
	7	1,000	
	Cap	200,000	S2A on C.W.MAN. and R.T.MAN
	Cap	6 meg.	S2A on C.W. AUTO
	Cap	1.5 meg.	S2A on R.T. AUTO
V1D	1	Infinity	S3A on all positions except L.T.
	1	30,000	S3A on L.T.
	2	0	
	3	300-10,300	Rotate R.F. GAIN
	7	10,000-300	Rotate R.F. GAIN
	Cap	300,000	S2A on C.W.MAN and R.T.MAN
	Cap	6 meg.	S2A on C.W. AUTO
	Cap	1.5 meg.	S2A on R.T. AUTO
V1E	1	Infinity	S3A on all positions except L.T.
	1	30,000	S3A on L.T.
	2	0	
	3	300	
	7	300	
	Cap	100,000	S2A on C.W.MAN and R.T.MAN
	Cap	4.35 meg.	S2A on C.W. AUTO
	Cap	350,000	S2A on R.T. AUTO

TABLE 8 (Cont'd.)

Valve	Pin No.	Resistance to Gnd. (Ohms)	Conditions
V2A	1	Infinity	S3A on all positions except L.T.
	1	30,000	S3A on L.T.
	2	0	
	3	350,000	
	4	600	
	5	750,000	S2A on C.W. MAN, C.W. AUTO R.T. AUTO
	5	300,000	S2A on R.T. MAN
V2B	1	Infinity	S3A on all positions except L.T.
	1	30,000	S3A on L.T.
	2	0	
	3	250,000	
	4	1.85 meg.	
	5	1.35 meg.	
V1G	1	Infinity	S3A on all positions except L.T.
	1	30,000	S3A on L.T.
	2	0	
	3	1000	
	7	1000	
	Cap	1.2 meg.	S2A on C.W.MAN and R.T.MAN
	Cap	5.35 meg.	S2A on C.W. AUTO
	Cap	1.35 meg.	S2A on R.T. AUTO
V1F	1	Infinity	S3A on all positions except L.T.
	1	30,000	S3A on L.T.
	2	0	
	7	1000	
	Cap	2.6	
V1H	1	Infinity	S3A on all positions except L.T.
	1	30,000	S3A on L.T.
	2	0	
	3	600	
	7	600	
	Cap	25,000-125,000	Rotate A.F. GAIN
	Cap	Infinity	Relay held closed with finger

TABLE 9—RECEIVER RESISTANCE CHART B

From		To		
Component	Pin	Component	Pin	Resistance (Ohms)
V1A	4	PL1A	+150	3,000
	6	PL1A	+150	250,000
V1B	3	PL1A	+150	5,000
	4	PL1A	+150	5,000
	6	PL1A	+150	5,000
V1C	4	V1C	6	8
	6	PL1A	+150	100,000
V1D	4	V1D	6	8
	6	PL1A	+150	1,000
V1E	4	V1E	6	8
	6	PL1A	+150	1,000
V1G	4	PL1A	+150	105,000
	6	PL1A	+150	1,005,000
V1F	6	PL1A	+150	110,000 (S2A on C.W. MAN and AUTO)
	6	PL1A	+150	Infinity (S2A on R.T. MAN and AUTO)
V1H	4	PL1A	+150	3,000
	4	V1H	6	53,000
	6	PL1A	+150	50,000
PL1A	+150	Gnd.		40,000
	Rec	Gnd.		10
	+12	Gnd.		30,000 (S3A on L.T.)
	+12	Gnd.		Infinity (S3A on all positions except L.T.)
	−1200	Gnd.		Infinity
	Relay	Gnd.		50
	+Meter	Gnd.		Infinity
	−Meter	Gnd.		Infinity

Crystal calibrator

50. Remove three valves in the crystal calibrator unit and turn S7A to OFF when checking crystal calibrator resistances as outlined in Table 10. The resistance checks outlined in Table 11 are taken with the crystal calibrator valves removed from their sockets also.

TABLE 10—CRYSTAL CALIBRATOR RESISTANCE CHART A

Valve	Resistance to Ground (Ohms)							
	Pin Number							
	1	2	3	4	5	6	7	8
V3A	0		1 meg.	1 meg.		0	Infinity	0
V3B	0		300,000	300,000		0	Infinity	0
V3C	0	500,000	500,000	500,000	500,000	1,000	Infinity	0

TABLE 11—CRYSTAL CALIBRATOR RESISTANCE CHART B

From		To	Resistance (Ohms)	Conditions
Valve	Pin	Lug		
V3A	2	H.T.	26	S7A to 1000
	5	H.T.	135	S7A to 100 and 10
	7	+12 V.	0	S7A on all positions except OFF
V3B	2	H.T.	205,000	S7A to 10
	5	H.T.	15,000	S7A to 10
	7	+12 V.	0	S7A on all positions except OFF
V3C	7	+12 V.	0	S7A on all positions except OFF

TABLE 12—SUPPLY UNIT RESISTANCE CHART

From		To	Conditions	Resistance (Ohms)
Plug	Term.			
PL4A	−	Ground		0
	+	Ground	S8A to OFF	Infinity
	+	Ground	S8A to ON	150
	+	+12 term., PL7A	S8A to OFF	Infinity
	+	+12 term., PL7A	S8A to ON	0
	+	+12S and GATE SWITCH terms., PL8A	S8A to ON S8B to OFF	Infinity
	+	+12S and GATE SWITCH terms., PL8A	S8A to ON S8B to ON	0
PL7A	+150	Ground		10,000

TABLE 13—VIBRATOR RESISTANCE CHART

From		To	Conditions	Resistance (Ohms)
Plug	Term.			
PL9A	3	Ground		0
	2	8 term., V4A		0
	2	Ground		Infinity
	1	3 term., PL9A		150
VIBR-1B	1	Ground	VIBR-1B removed	0
	2	Ground	VIBR-1B removed	300
	3	Ground	VIBR-1B removed	300
	4	Ground	VIBR-1B removed	0

Component Specifications

Treatment

51. Following is a list of various treatments for lateral wound coils, the appropriate treatment for each coil being designated in the winding data tables in this section:

(a) Tape—Bookbinder's Cloth, 3/16" wide secures finish lead to coil and coil to former.

(b) Before final adjustment on assembly, finish lead to be secured with "A-A" Cerise Wax spread on coil periphery and approximately 1/16" over the edges.

(c) Tape—Bookbinder's Cloth, gummed 3/16" wide secures finish lead to coil.

(d) To be treated with amyl acetate to act as binder during winding.

(e) Tape—Bookbinder's Cloth, gummed 3/16" wide placed on coil opposite tape holding leads, to hold coil together.

(f) Before final adjustment on assembly, finish lead to be secured with medical adhesive tape.

Note: Bookbinder's Cloth, specified under (a), (c) and (e) above to be of acid-free type.

Impregnation

52. Various methods of impregnation are outlined below, the appropriate method for each coil being designated in the winding data table:

(a) Before impregnation, the threaded shanks and bushings of powdered iron core assemblies are to be protected from varnish. The open end of the guide tube in which these cores slide, to be sealed with masking tape. This seal should be left in place after impregnation. The threads of any tapped hole or parts which cannot be cleaned out after impregnation will be protected from varnish.

(b) The component is to be baked for four hours at 100° C. Immediately after this baking period the areas of the component, as indicated by (c), (d) and (e) below, will be treated, as specified by (f), (g) or (h) below, with Bakelite Varnish XV452. After this treatment, the component will be examined to see that no air bubbles or droplets of varnish have formed, and that the varnish is spread uniformly. After not more than 30 minutes have elapsed from the time treatment (f), (g) or (h) was completed, the component will be placed in an oven and baked for four hours at 100° C. During this baking period the component will be so supported that it does not rest on its varnished surface. The component will then be allowed to cool for at least one hour before being handled.

(c) Windings only. No precaution need be taken (unless specified) to keep varnish off former.

(d) Windings and all surfaces of former, inside and outside surfaces and edges. In cases where the ends of the former are sealed (as with masking tape) neither the inside of the former nor the edges will be treated.

(e) Panels (insulating material). All surfaces, sheared edges, holes and flat surfaces. If necessary, panels may be impregnated after hardware has been assembled.

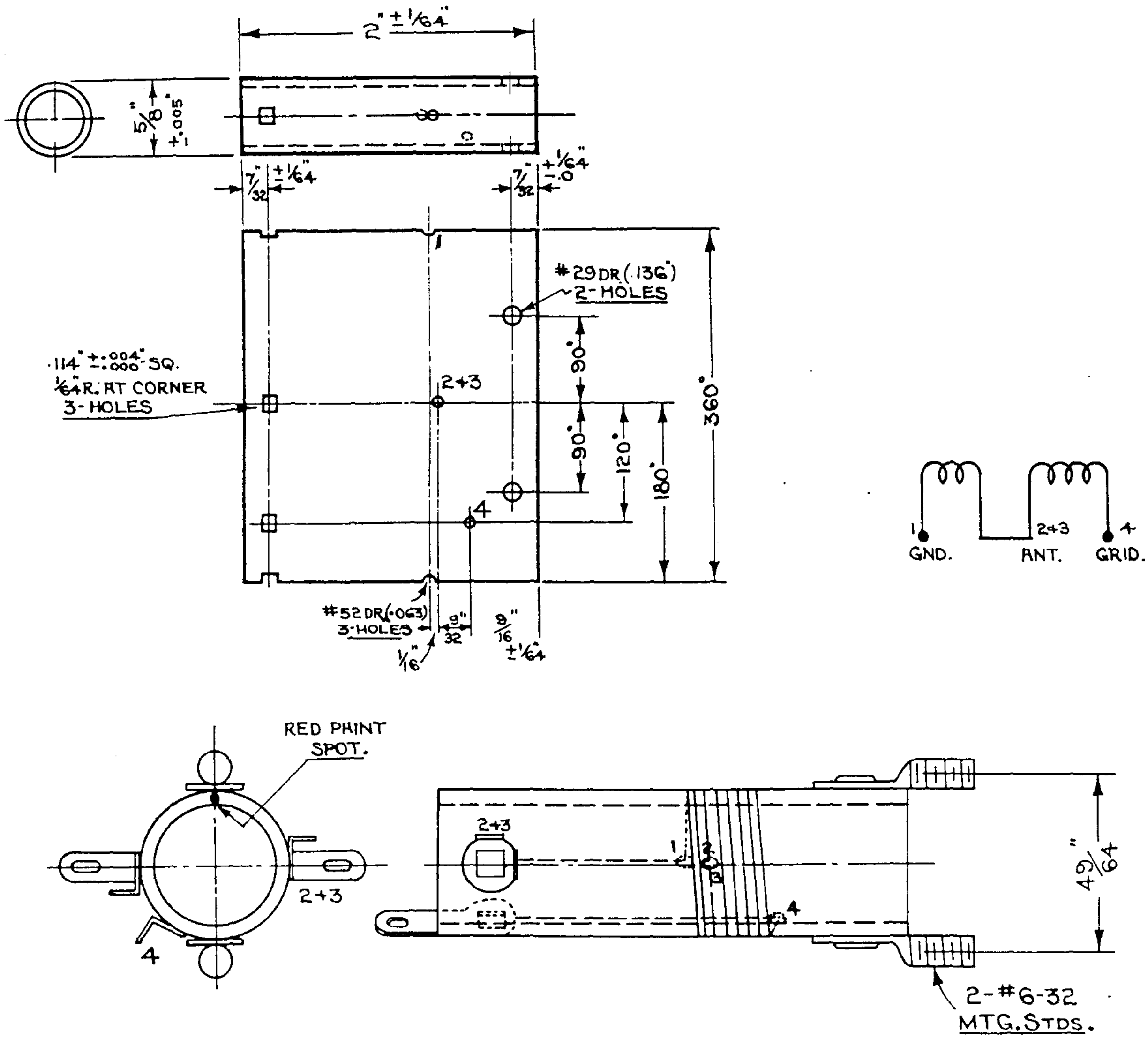
(f) Brushed or sprayed.

(g) Flash dip.

(h) Immersed. Immersion will continue until air bubbles from the component have ceased. The component will then be removed from the bath and drained for approximately 30 minutes. The component must not rest on its varnished surface.

(j) As in (a) but instead of masking tape use plugs which are to be removed after impregnation to protect inside of formers from varnish.

(k) Bake coil or coil assembly for one hour at an average temperature between 150° F. and 160° F. While the coil or coil assembly is at this temperature, flash dip in Zophar Mills Co. No. 1436 Zophar Wax at an average temperature between 250° F. and 260° F. The coil or coil assembly is to be drained in a hot atmosphere so that drops of wax do not tend to form. The dipping operation is to be controlled so as to give a thin, even coating of wax. The coil or coil assembly is to be allowed to cool for at least one hour before being processed further. When necessary, mounting screw holes, adjusting screws, etc., are to be suitably protected from filling with wax during impregnation.

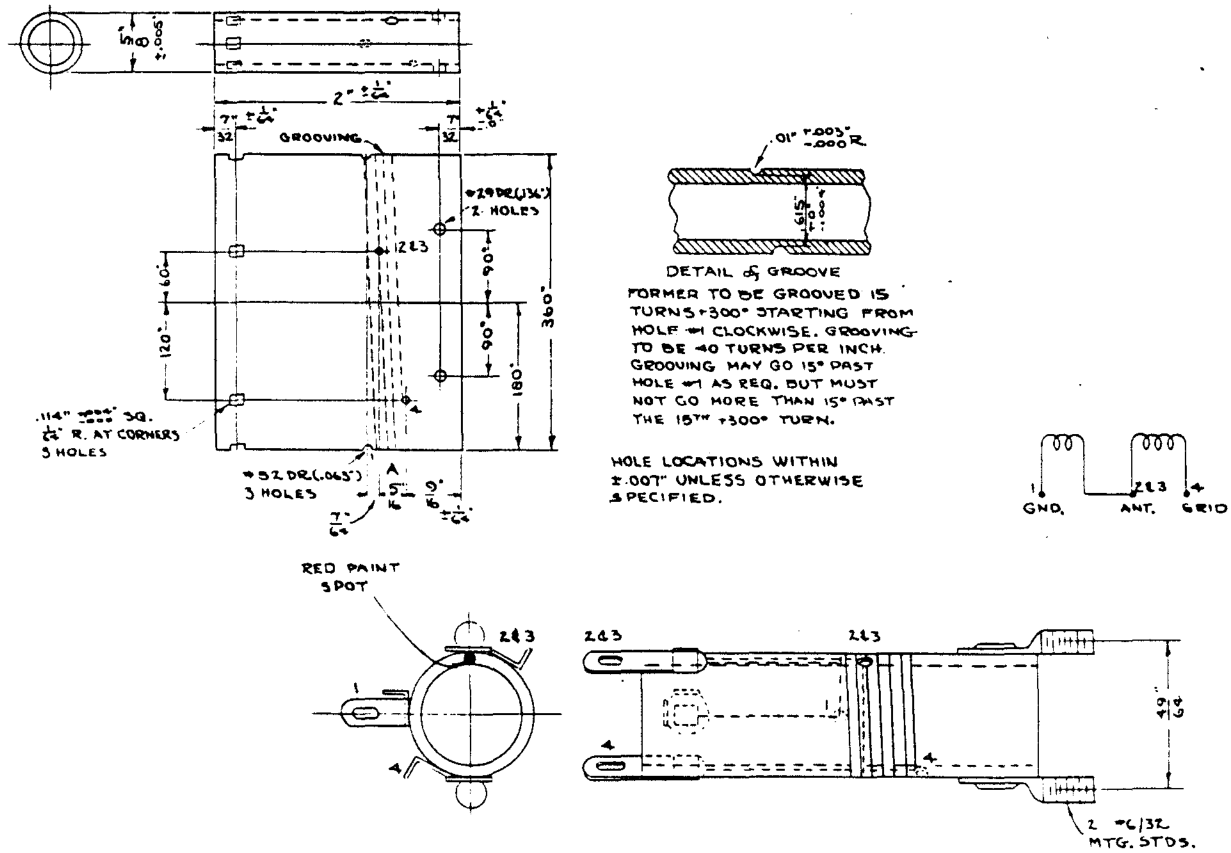


T FZ 524 / 1-15

FIG. 15—L1A, ANTENNA COIL (1.75–4 Mc/s.)

TABLE 14—L1A WINDING DATA

Former	Bakelite tube—2" long, 5/8" diameter, 1/16" wall.	
Windings	Primary	Secondary
Conductor	No. 31, B. & S., enamelled copper	No. 31, B. & S., enamelled copper
Turns	5—wound at 90 turns per inch	24—wound at 90 turns per inch
Test	Q of primary = 33 at 8 Mc/s. with resonating capacity of 368 $\mu\mu$F. Q of primary and secondary = 75 at 2.1 Mc/s. with resonating capacity of 387 $\mu\mu$F.	
Impregnation	See Para. 52 (b), (d) and (g).	

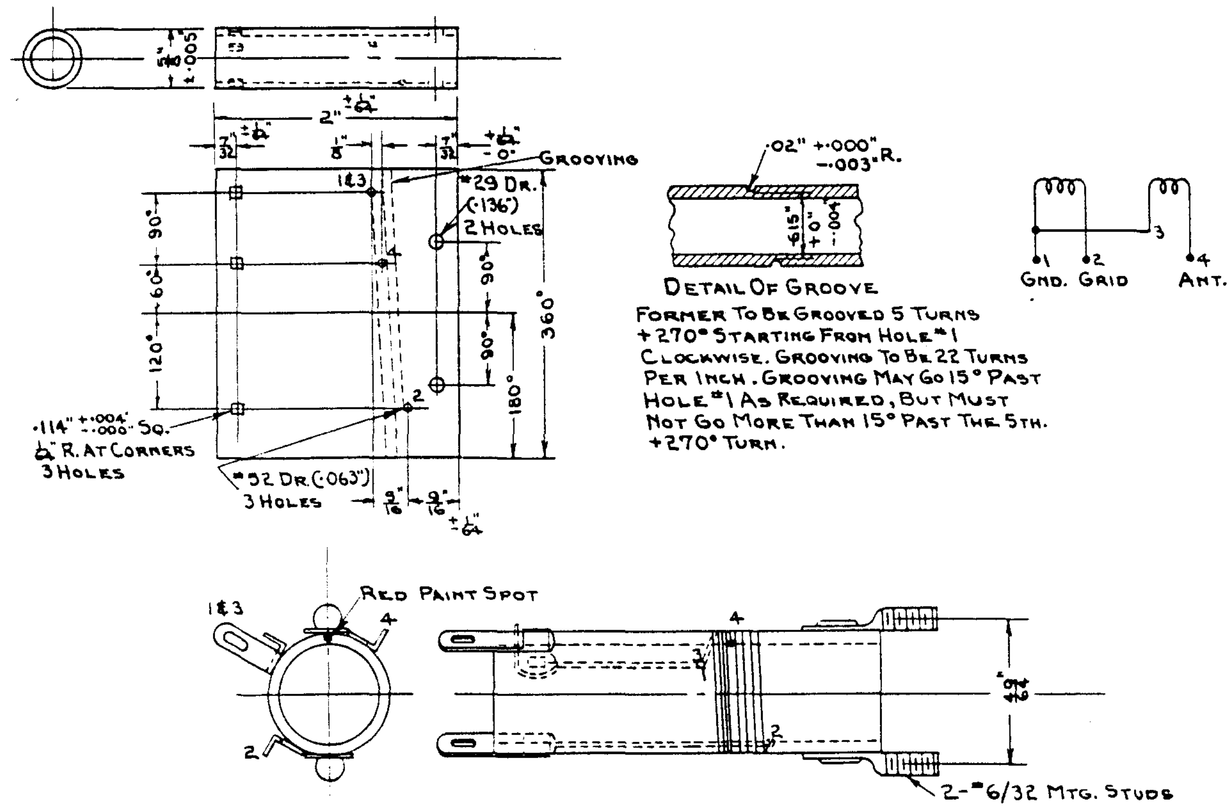


T FZ 524 / 1-16

Fig. 16—L2A, Antenna Coil (3.5–8 Mc/s.)

Table 15—L2A Winding Data

Former	Bakelite tube—2″ x ⅝″ x 1/16″	
Windings	Primary	Secondary
Conductor	No. 26, B. & S., enamelled copper	No. 26, B. & S., enamelled copper
Turns	4—wound in grooves at 40 turns per inch	12—11 turns wound in grooves, 1 turn at finish end wound without groove
Test	Q of primary = 60 at 11 Mc/s. with resonating capacity of 340 μμF. Q of primary and secondary = 100 at 4 Mc/s. with resonating capacity of 388 μμF.	
Impregnation	See Para 52 (b), (d) and (g).	



T FZ 524 / 1-17

FIG. 17—L3A, ANTENNA COIL (7-16 Mc/s.)

TABLE 16—L3A WINDING DATA

Former	Bakelite tube—2″ x 5/8″ x 1/16″	
Windings	Primary	Secondary
Conductor	No. 22, B. & S., enamelled copper	No. 36, B. & S., triple silk covered copper
Turns	6—5 turns wound in grooves, 1 turn wound at 22 turns per inch out of groove at finish end.	3—interwound with primary winding, starting at hole No. 1
Test	Q = 80 at 8.5 Mc/s. with resonating capacity of 396 μμF.	Q = 30 at 12 Mc/s. with resonating capacity of 404 μμF.
Impregnation	See Para. 52 (b), (d) and (g).	

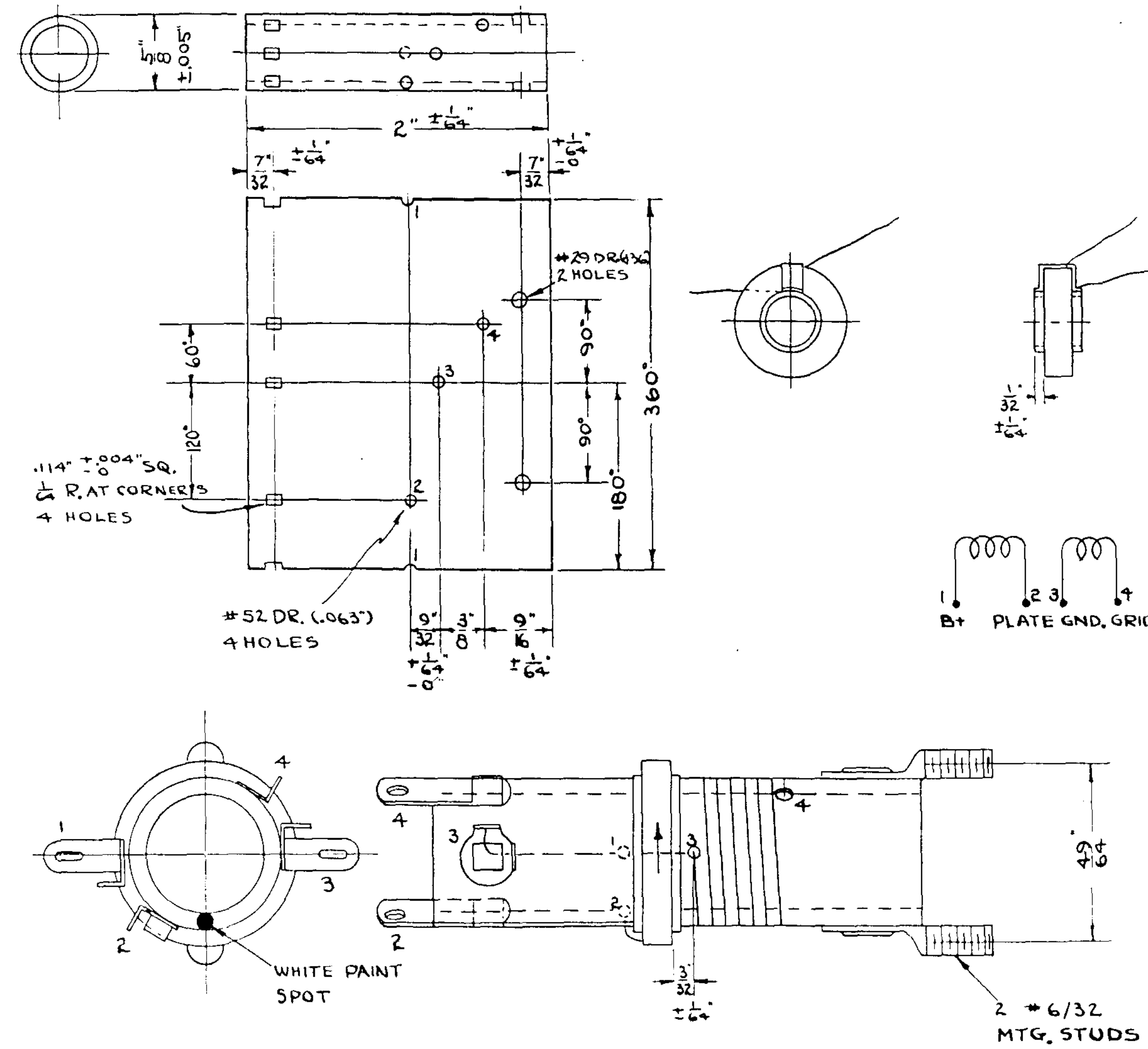


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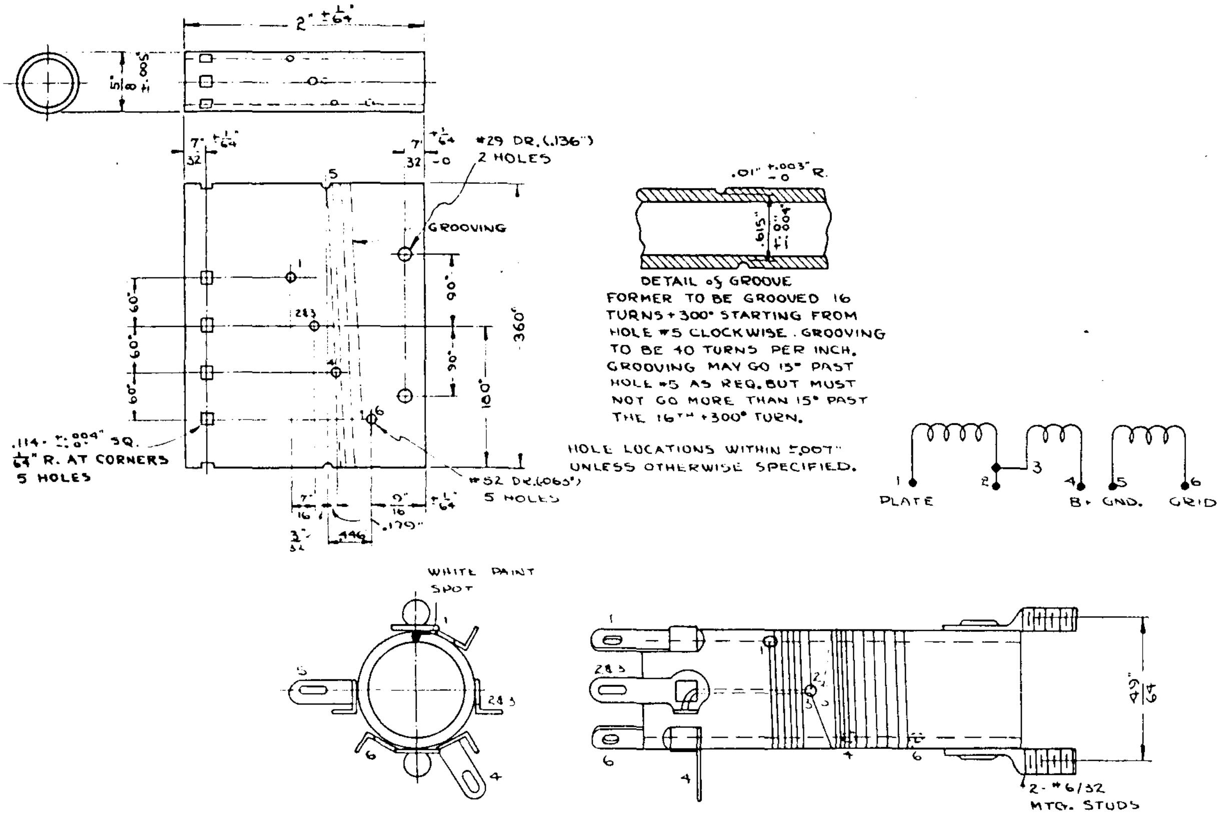
FIG. 18—L4A, DETECTOR COIL (1.75–4 Mc/s.)

TABLE 17—L4A WINDING DATA

Windings	Primary	Secondary
Former	Gummed Kraft paper Inside dia.—.634″ Wall—1/32″ Length—3/16″	Bakelite tube—2″ x 5/8″ x 1/16″
Conductor	No. 38 B. & S., double enamelled copper	No. 31 B. & S., enamelled copper
Turns	120—wound at 13 turns per layer	33—wound at 90 turns per inch
Cam	1/8″	
Crosses per turn	4	
Treatment	During winding, see Para. 51 (d). After winding, see Para. 51 (f).	
Test	Q = 50 at 550 Kc/s. with resonating capacity of 175 μμF.	Q = 32 at 2 Mc/s. with resonating capacity of 320 μμF.
Impregnation	See Para. 52 (b), (d), and (g).	

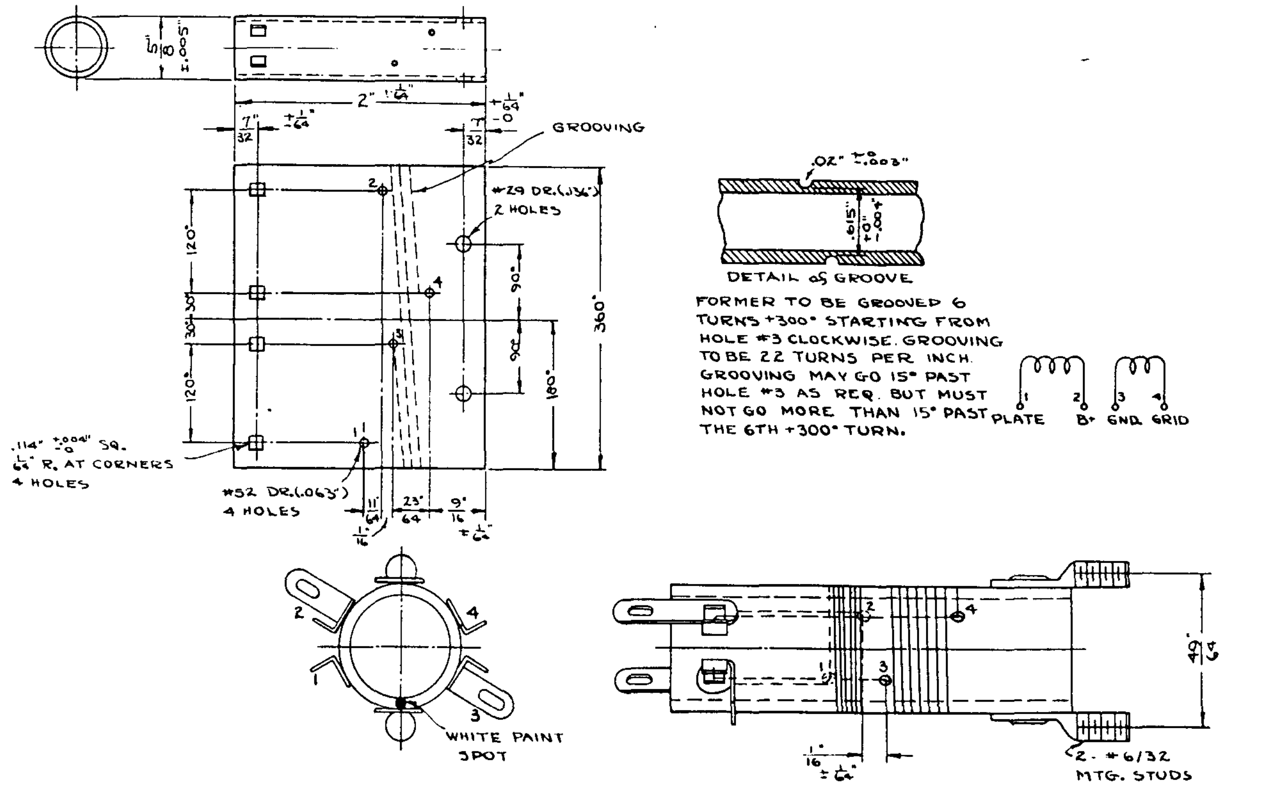


T FZ 524 / 1-19

FIG. 19—L5A, DETECTOR COIL (3.5–8 Mc/s.)

TABLE 18—L5A WINDING DATA

Former	Bakelite tube—2″ x 5/8″ x 1/16″		
Windings	1-2	3-4	5-6
Conductor	No. 38 B. & S., enamelled copper	No. 36 B. & S. triple silk covered copper	No. 26 B. & S., enamelled copper
Turns	90—close wound	7—interwound with windings 5-6 at 40 turns per inch	17—16 turns wound in grooves, 1 turn at finish end wound without groove
Test	Q=42 at 750 Kc/s. with resonating capacity of 400 $\mu\mu$F.	Q=25 at 8 Mc/s. with resonating capacity of 270 $\mu\mu$F.	Q=95 at 3.3 Mc/s. with resonating capacity of 350 $\mu\mu$F.
Impregnation	See Para. 52 (b), (d), and (g).		

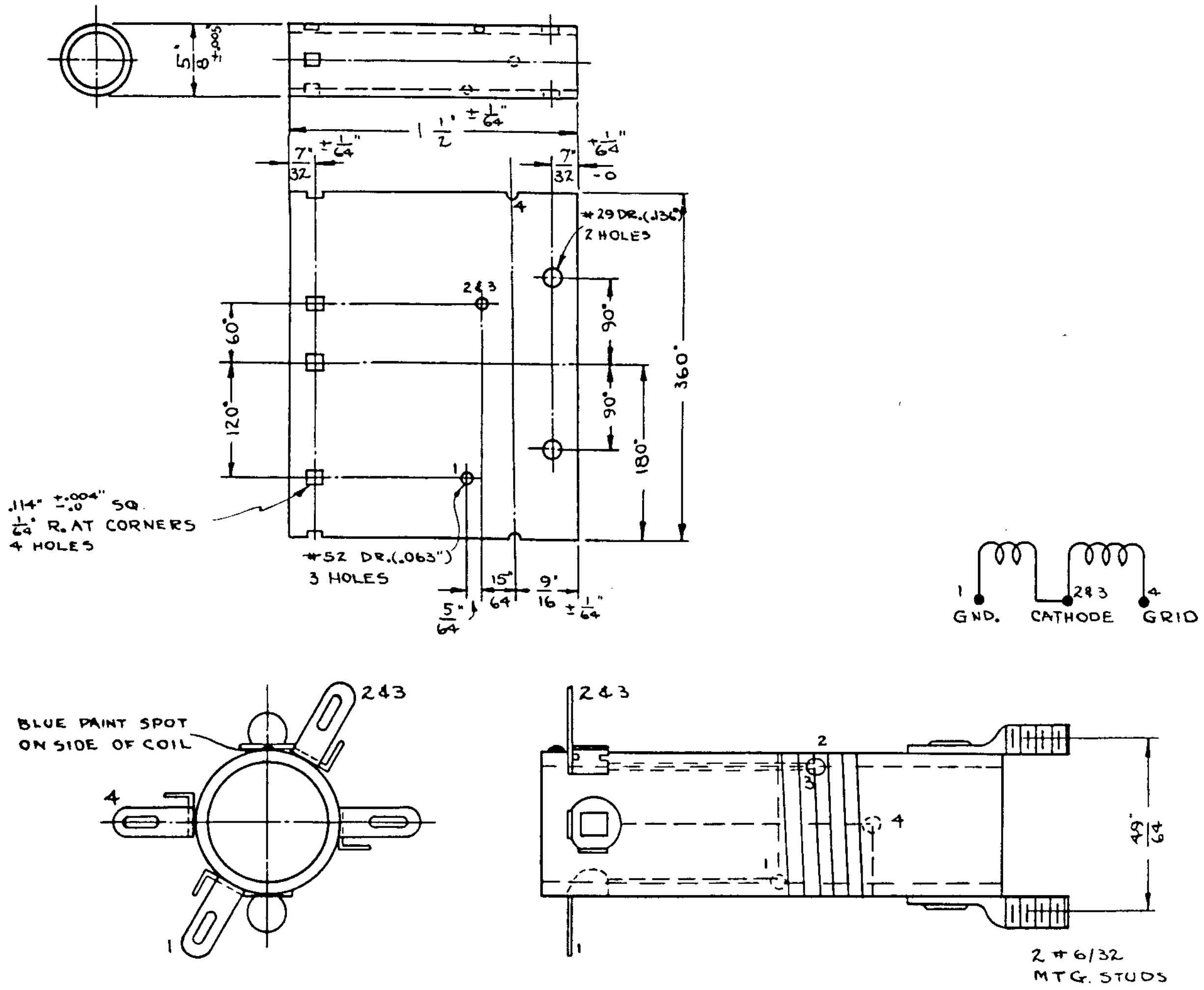


T $\frac{\text{FZ 524}}{\text{1 - 20}}$

FIG. 20—L6A, DETECTOR COIL (7-16 Mc/s.)

TABLE 19—L6A WINDING DATA

Former	Bakelite tube—2" x ⅝" x 1/16"	
Windings	1-2	3-4
Conductor	No. 38 B. & S., enamelled copper	No. 22 B. & S., enamelled copper
Turns	34—close wound	7—wound at 22 turns per inch—6 turns in grooves and 1 turn at finish end outside of groove.
Test	Q = 50 at 1.6 Mc/s. with resonating capacity of 378 μμF.	Q = 87 at 15.5 Mc/s. with resonating capacity of 96.5 μμF.
Impregnation	See Para. 52 (b), (d), and (g).	

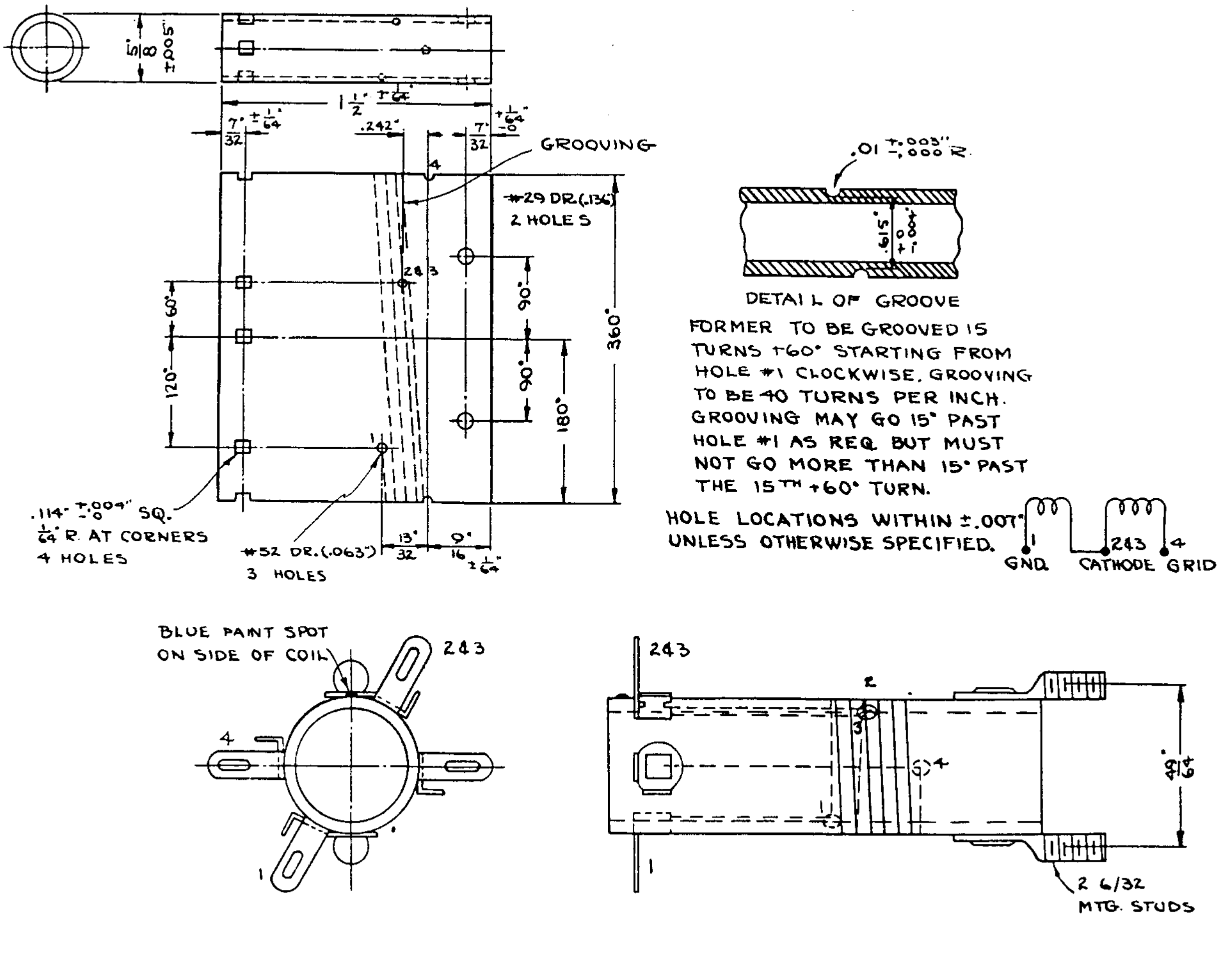


T FZ 524 1 - 21

FIG. 21—L7A, OSCILLATOR COIL (1.75–4 Mc/s.)

TABLE 20—L7A WINDING DATA

Former	Bakelite tube—1½" x ⅝" x 1/16"
Conductor	No. 31 B. & S., enamelled copper
Turns	27—wound at 90 turns per inch
Tap	At end of 7th turn
Test	Q, taken from start to tap (1-2), = 43 at 6 Mc/s. with resonating capacity of 405 $\mu\mu$F. Q, taken from start to finish (1-4), = 74 at 2.2 Mc/s. with resonating capacity of 385 $\mu\mu$F.
Impregnation	See Para. 52 (b), (d), and (g).

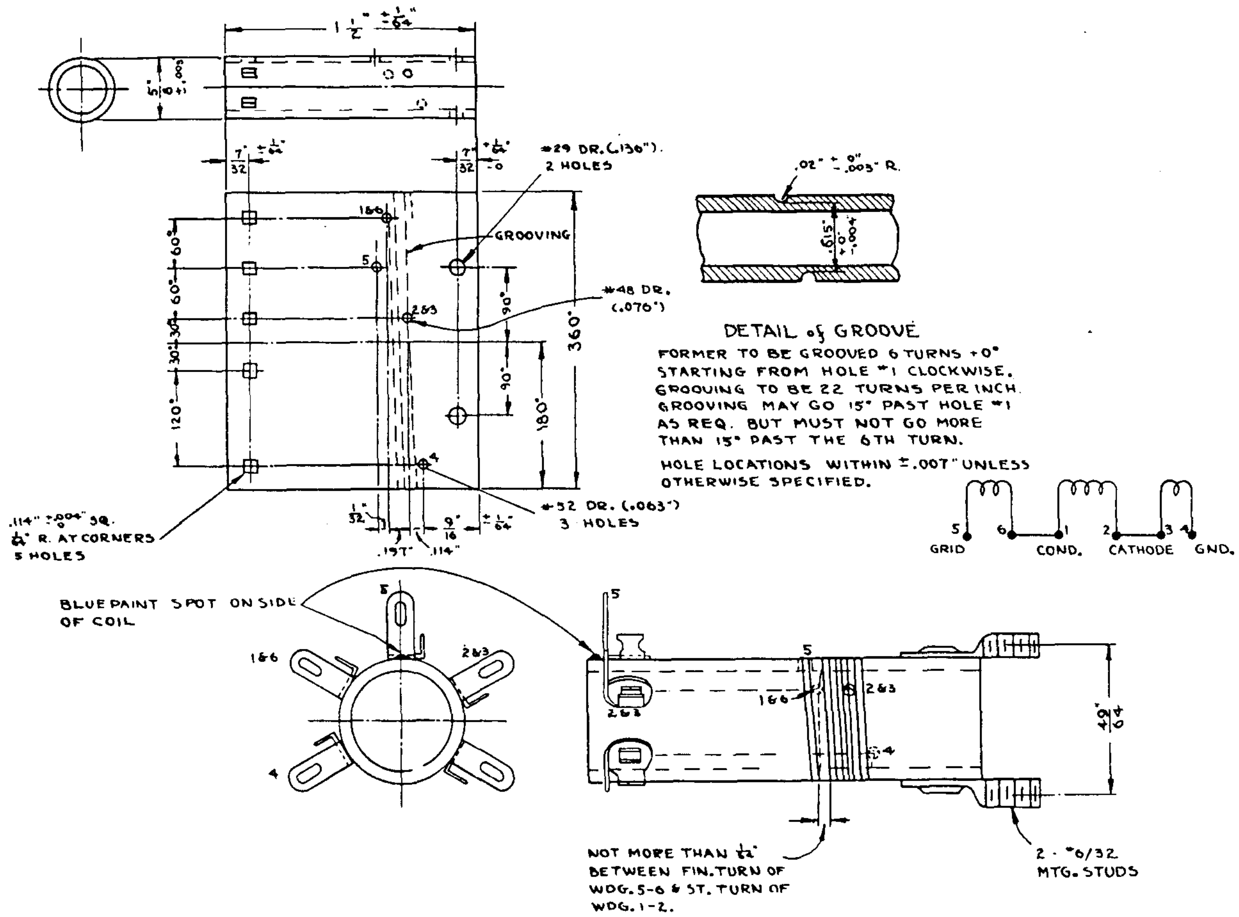


T FZ 524 / 1 - 22

FIG. 22—L8A, OSCILLATOR COIL (3.5–8 Mc/s.)

TABLE 21—L8A WINDING DATA

Former	Bakelite tube—1½" x ⅝" x 1/16"
Conductor	No. 26 B. & S., enamelled copper
Turns	15—wound at 40 turns per inch with one turn at finish end outside of groove
Tap	At end of 6th turn
Test	Q, between start and tap (1-2) = 82 at 8 Mc/s. with resonating capacity of 214 μμF. Q, from start to finish, (1-4) = 87 at 4 Mc/s. with resonating capacity of 413 μμF.
Impregnation	See Para. 52 (b), (d), and (g).

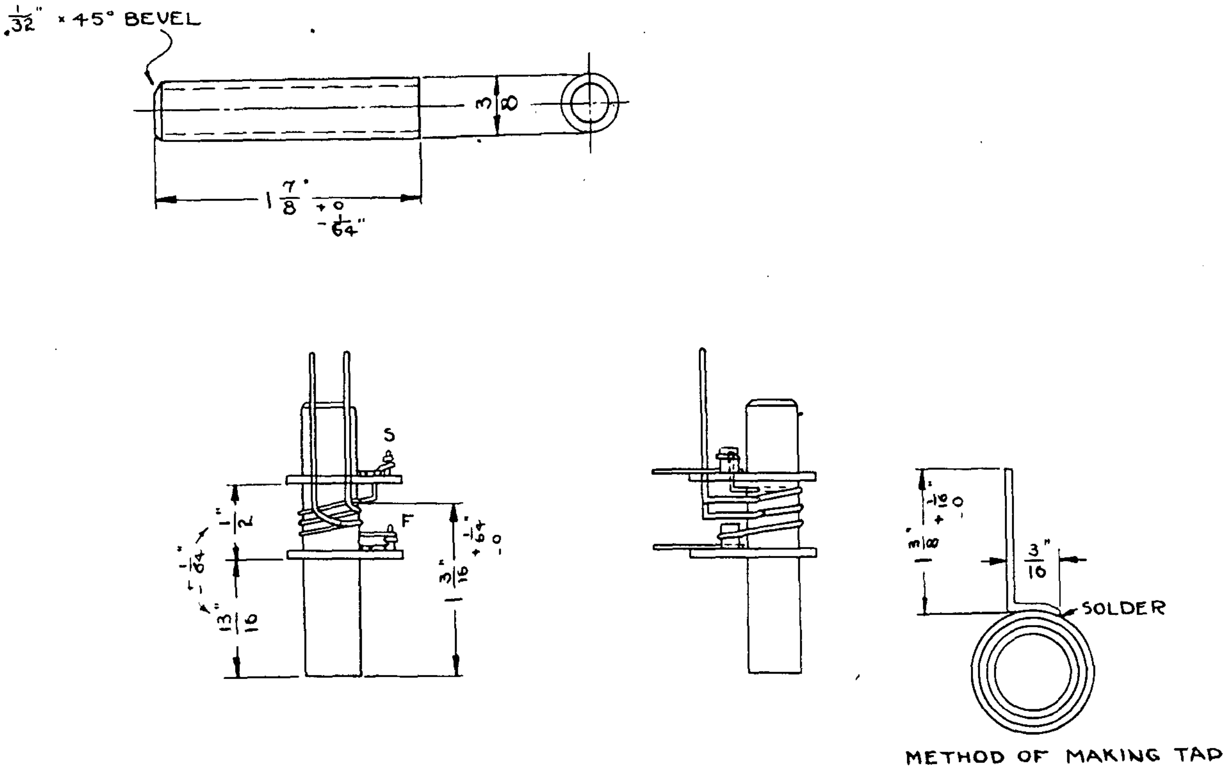


T $\frac{\text{FZ 524}}{1-23}$

FIG. 23—L9A, OSCILLATOR COIL (7–16 Mc/s.)

TABLE 22—L9A WINDING DATA

Former	Bakelite tube—1½" x ⅝" x 1/16"		
Windings	1-2	3-4	5-6
Conductor	No. 22 B. & S., enamelled copper	No. 22 B. & S., enamelled copper	No. 36 B. & S., triple silk covered copper
Turns	4—wound at 22 turns per inch	2—one turn in groove and one turn at finish end out of groove	2—close wound
Test	Q=65 at 11 Mc/s. with resonating capacity of 414 μμF.		Q=25 at 13 Mc/s. with resonating capacity of 373 μμF.
	Q, between 1 and 4=74 at 8.2 Mc/s. with resonating capacity of 423 μμF.		
Impregnation	See Para. 52 (b), (d), and (g).		

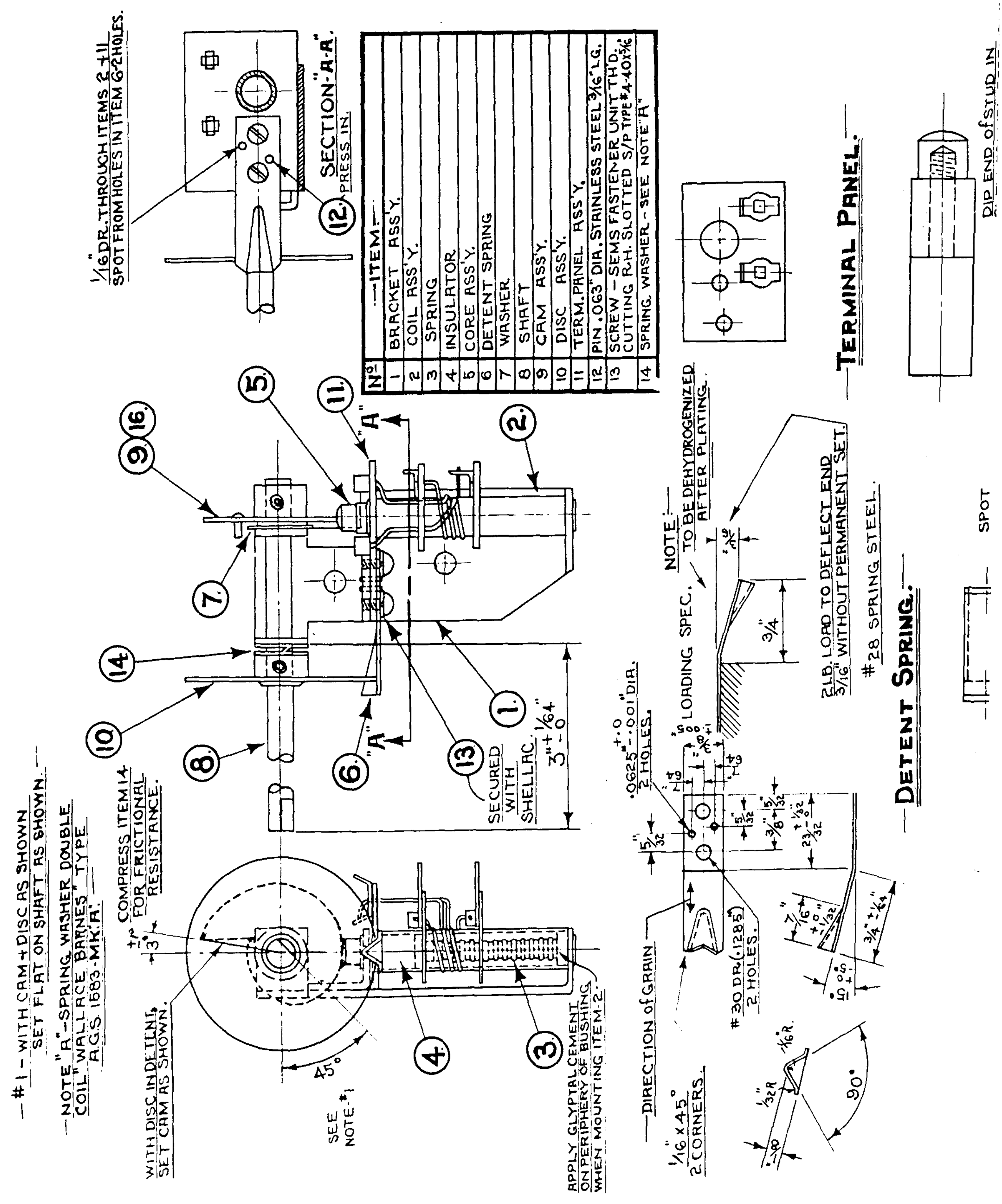


T FZ 524 / 1 - 24

FIG. 24—L10A, OSCILLATOR FREQUENCY VERNIER

TABLE 23—L10A WINDING DATA

Former	Bakelite tube—1⅞" x ⅜" outside dia. x 5/16" inside dia.
Conductor	No. 20 B. & S., bare solid tinned copper
Turns	3—wound tightly and spaced at 3/32" pitch
Taps	At 1st and 2nd turns
Impregnation	See Para. 52 (b), (d), (e), (g), and (j).



T $\frac{\text{FZ 514}}{\text{1 - 25}}$

Fig. 25—L10A Assembl

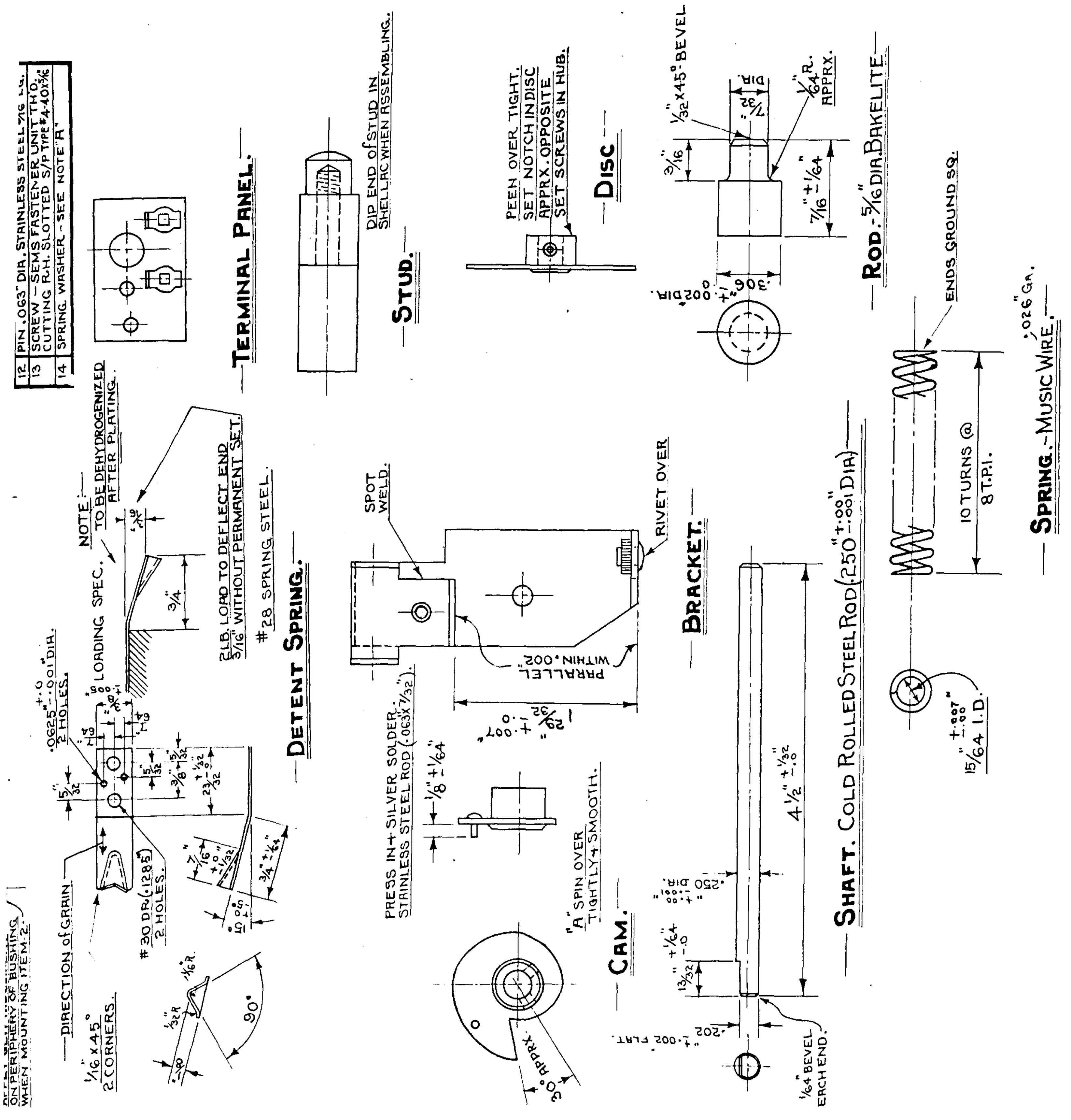
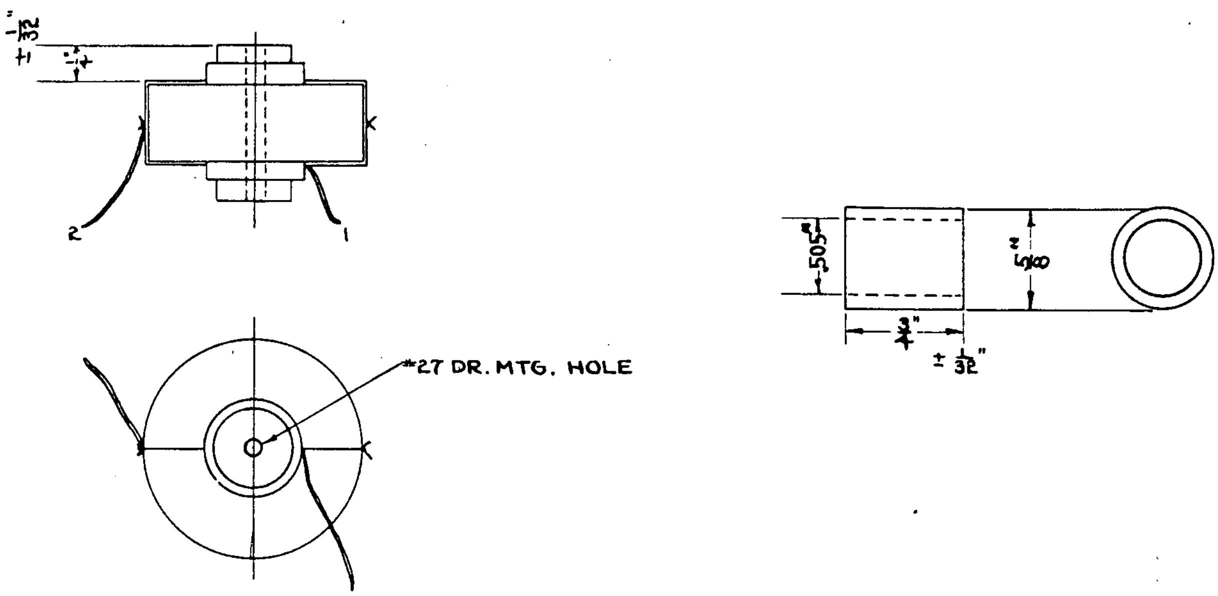


FIG. 25—L10A ASSEMBLY

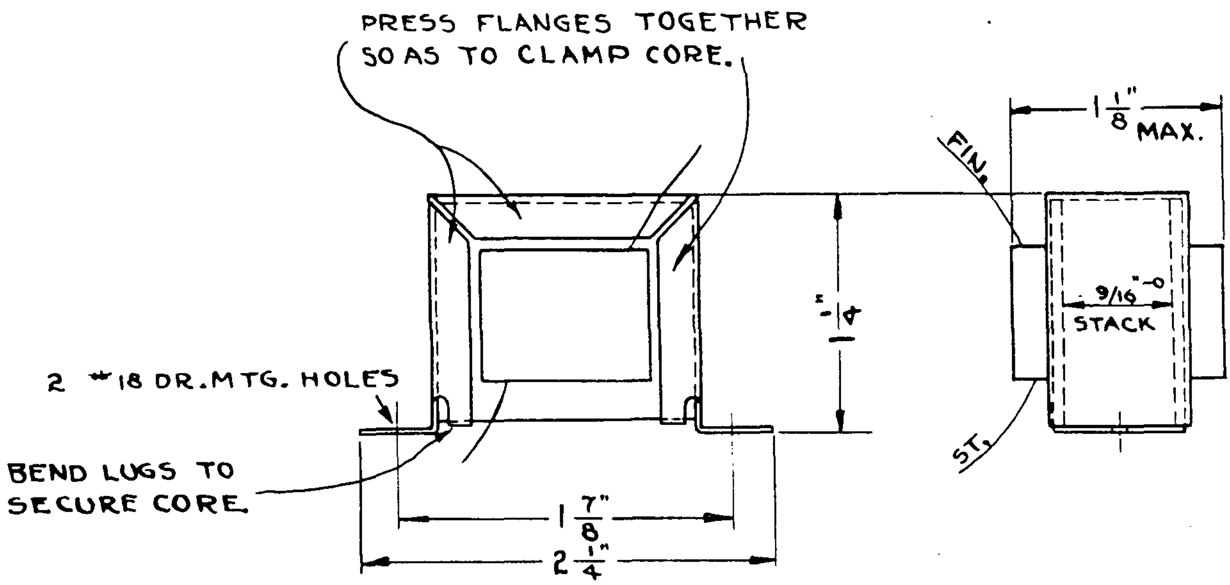


T $\frac{\text{FZ 524}}{\text{1 - 26}}$

FIG. 26—L11B, FILTER FOR HASH

TABLE 24—L11B WINDING DATA

Former	¾″ x ⅝″ of .12″ Kraft paper
Turns	50½—wound at 6 turns per layer and centrally located on former
Conductor	No. 16 B. & S., G.E., S.C.C.E. copper
Crosses per turn	2
Cam	½″
Lead Length	6″
Treatment	Flash dip in Amphenol Polystyrene Varnish
Test	Q=36 at 2 Mc/s. with resonating capacity of 133 $\mu\mu$F.

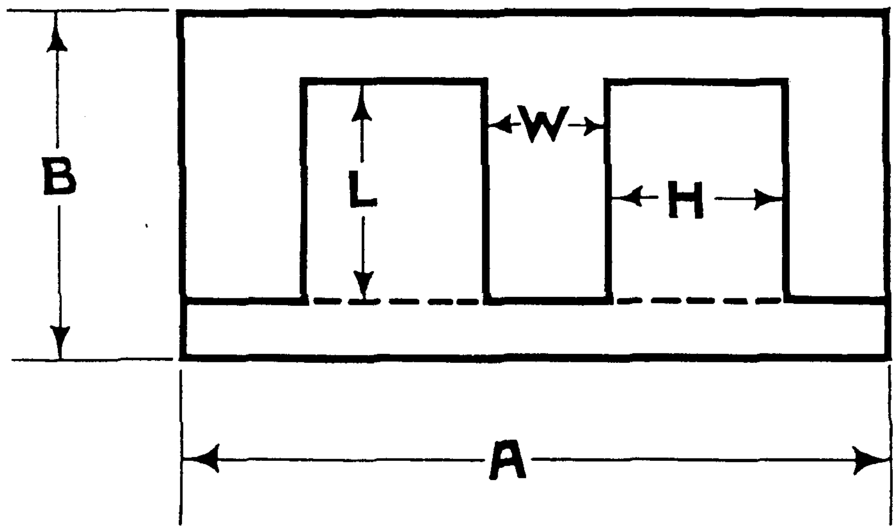


T FZ 524 / 1 - 27

FIG. 27—L12A, HASH FILTER CHOKE

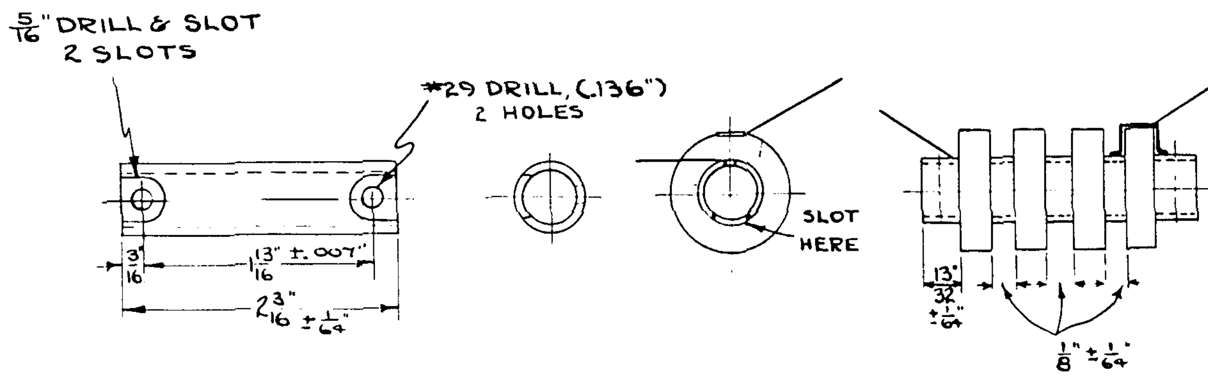
TABLE 25—L12A WINDING DATA

Former	1/64" Pressboard wrapped with 1 layer of .002" glassine paper—15/32" x 5/8" x 21/32"
Conductor	No. 16 B. & S., S.C.C.E. copper
Layers	3
Turns	24—9 in 1st layer, 8 in 2nd layer, 7 in 3rd layer
Throw	15/32"
Wrapper	1 layer of No. 50 Kraft paper
Core	.025" RAD.4C
Laminations	A = 1 3/8", B = 1.145", H = .229", L = 11/16", W = .458" (See Fig. 28).
Stack	9/16"
Barriers	4—.005" fish paper, 1/2" x 3/4", L type
Test	Resistance = .027 ohms



T FZ 524 / 1 - 28

Fig. 28—Lamination Measurements

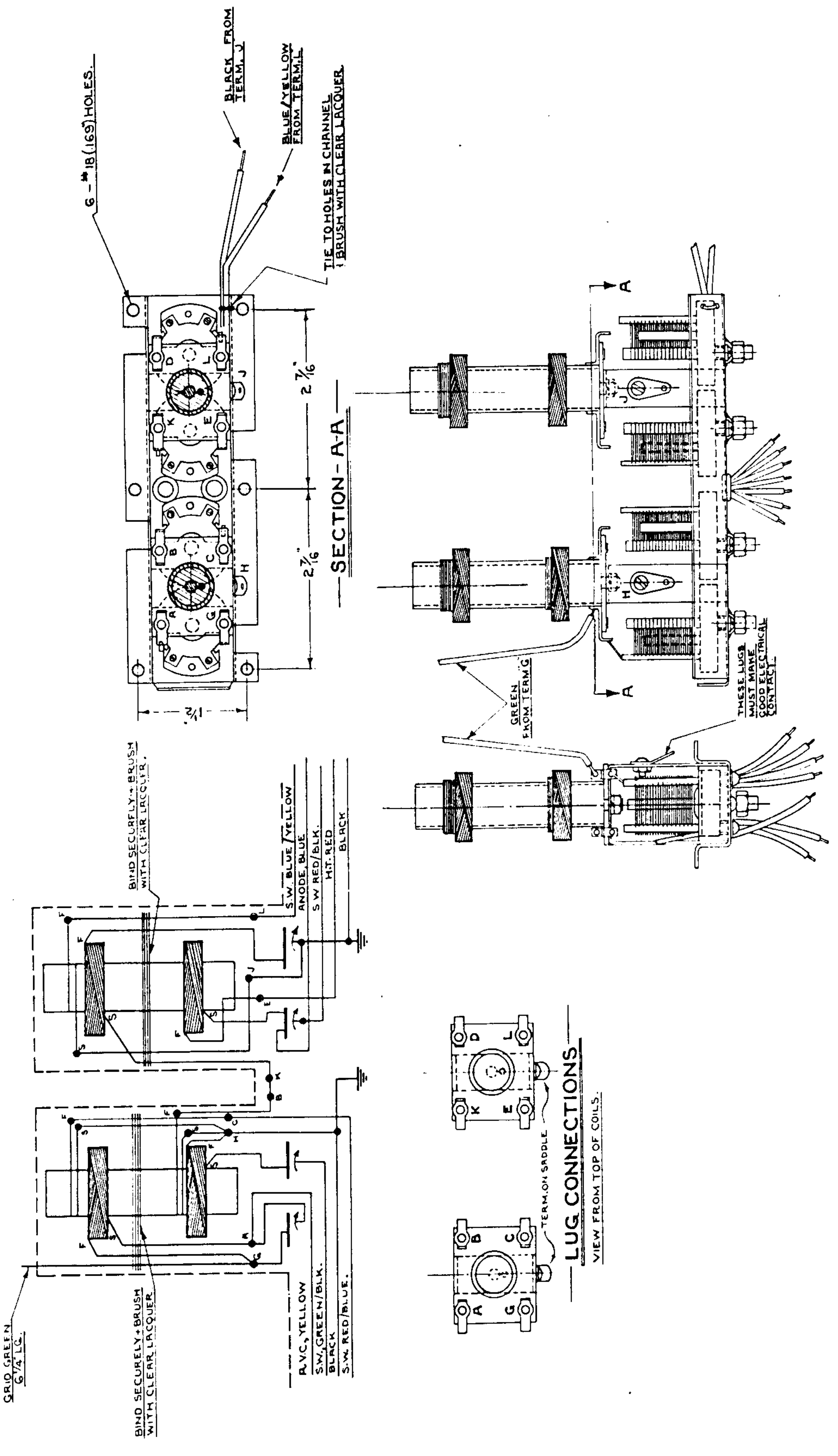


T FZ 524 / 1 - 29

Fig. 29—L14B, R.F. Filter

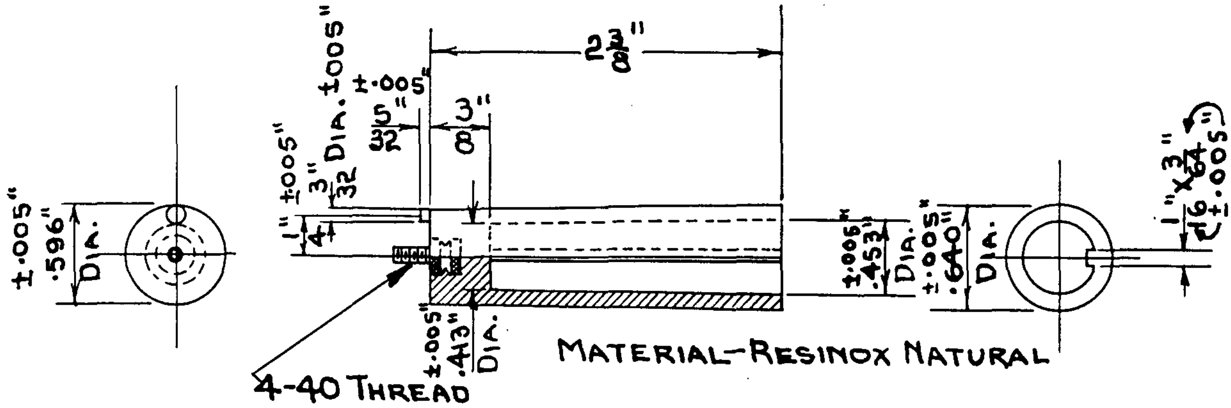
Table 26—L14B Winding Data

Former	Bakelite tube—½" outside dia. x 1/16" wall x 2 3/16" long
Conductor	No. 30 B. & S., D.C.C. copper
Turns	400—100 per pie
Winding	Wound on progressive wave winder; duolateral
Lead lengths	2¼"
Test	For continuity
Impregnation	See Para. 52 (b), (c), and (h).



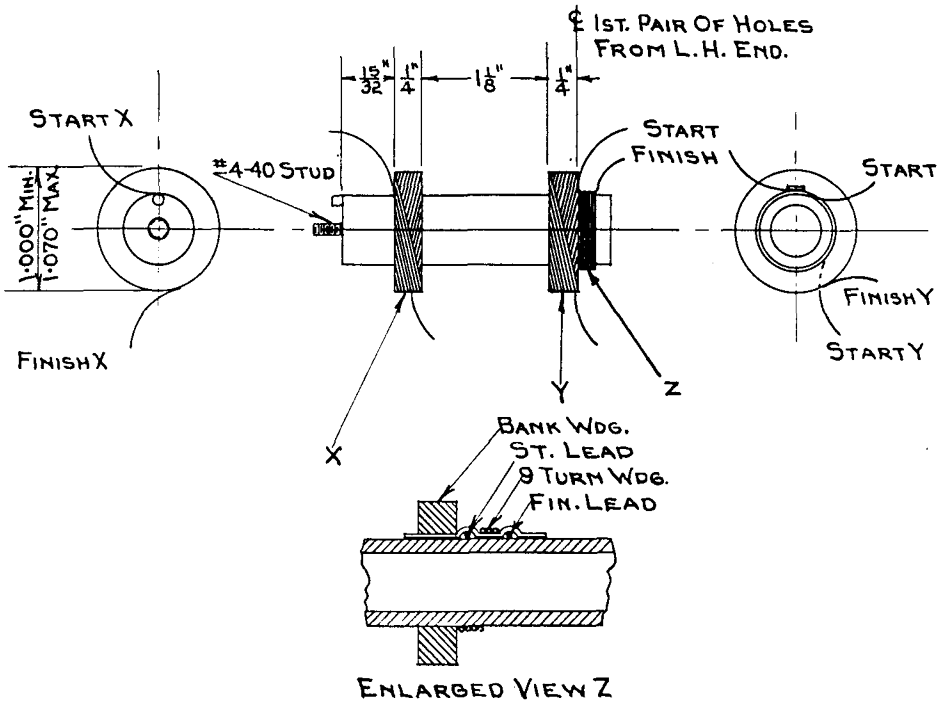
T $\frac{\text{FZ 524}}{\text{1 - 30}}$

FIG. 30—I.F. LAYOUT



T FZ 524 / 1-31

Fig. 31—Former for I.F. Coils

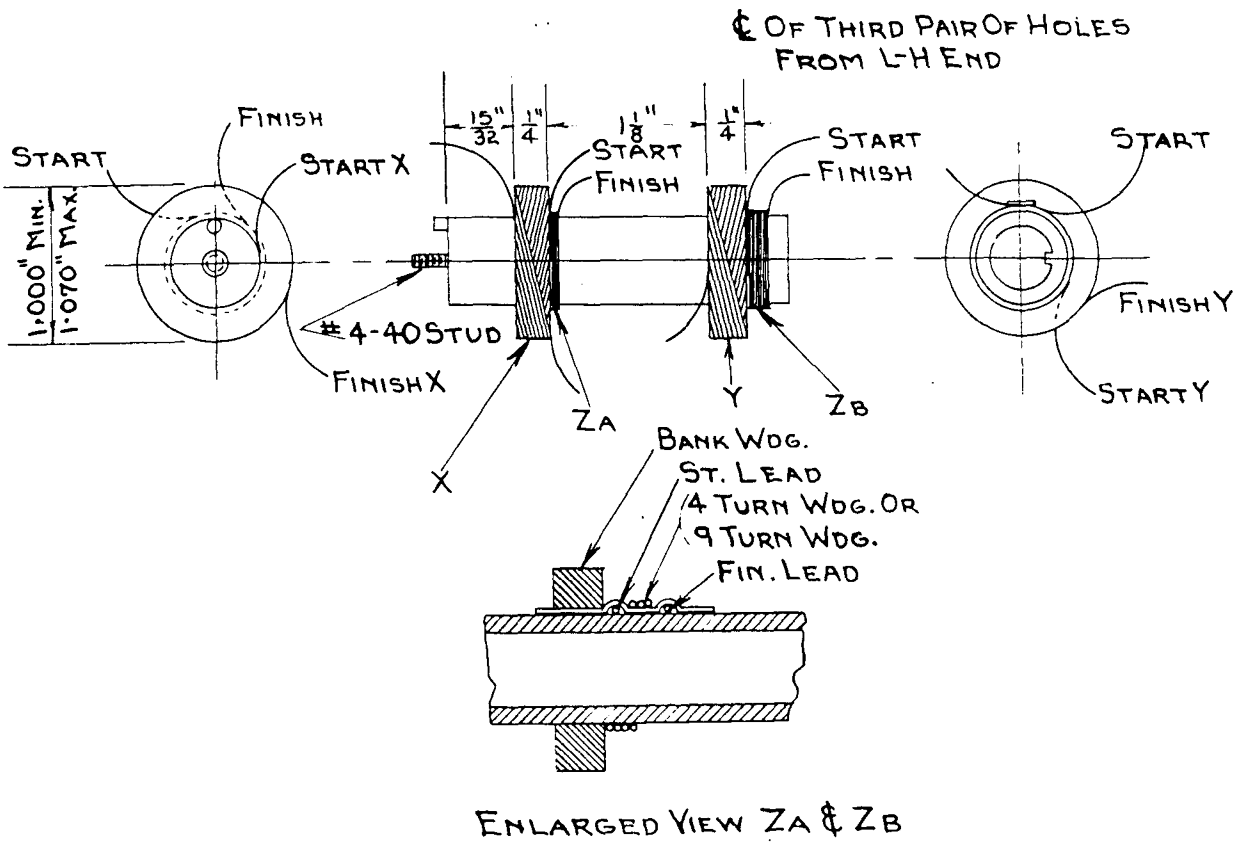


T FZ 524 / 1-32

Fig. 32—L16A, 1st I.F. Transformer Input
L18A, 2nd I.F. Transformer Input

Table 27—L16A, L18A Winding Data

Windings	X	Y	Z
Conductor	10/41 B. & S., S.S.C. twisted Litz copper		No. 32 B. & S., D.S.C. enamelled copper
Turns	272—wound counter-clockwise in single wave winding	272—wound counter-clockwise in single wave winding	9—wound counter-clockwise and close wound to Y
Cam	1/4"	1/4"	
Turns per layer	14	14	
Crosses per turn	2	2	
Test	Q = 135 at 420 Kc/s. with resonating capacity of 412 μμF.	Q = 135 at 420 Kc/s. with resonating capacity of 396 μμF.	Test for continuity
Treatment	See Para. 51 (a) and (e)		
Impregnation	See Para. 52 (a), (b), (d) and (f)		

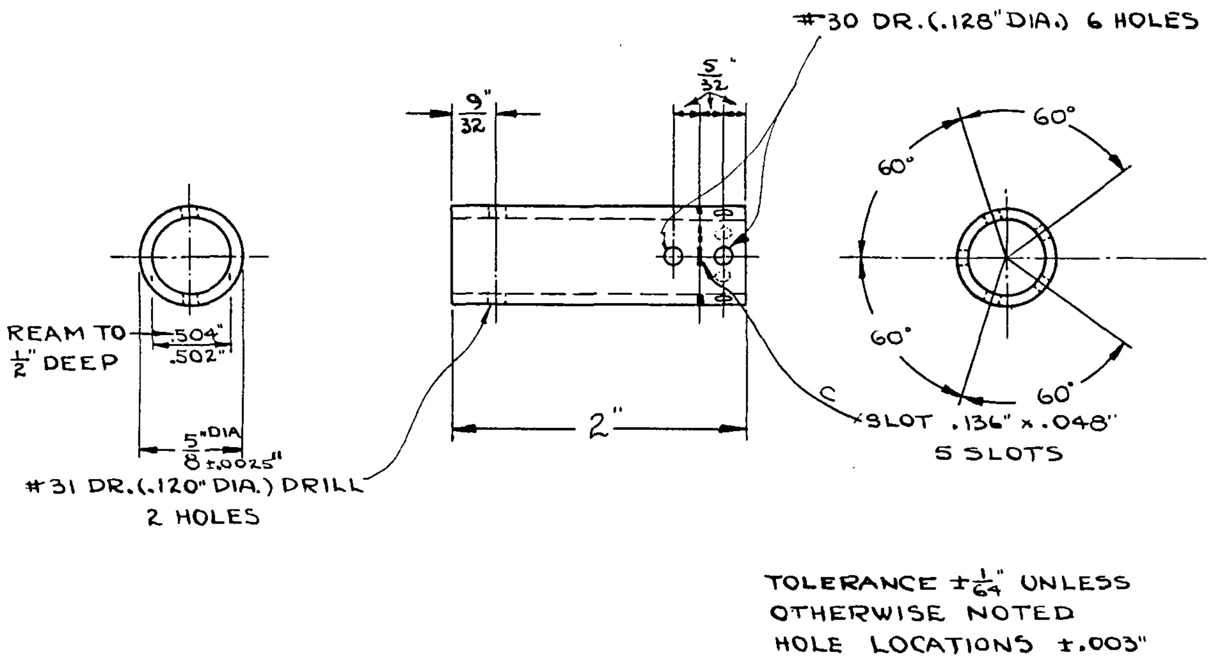


T FZ 524 / 1-33

FIG. 33—L17A, 1ST I.F. TRANSFORMER OUTPUT
L19A, 2ND I.F. TRANSFORMER OUTPUT

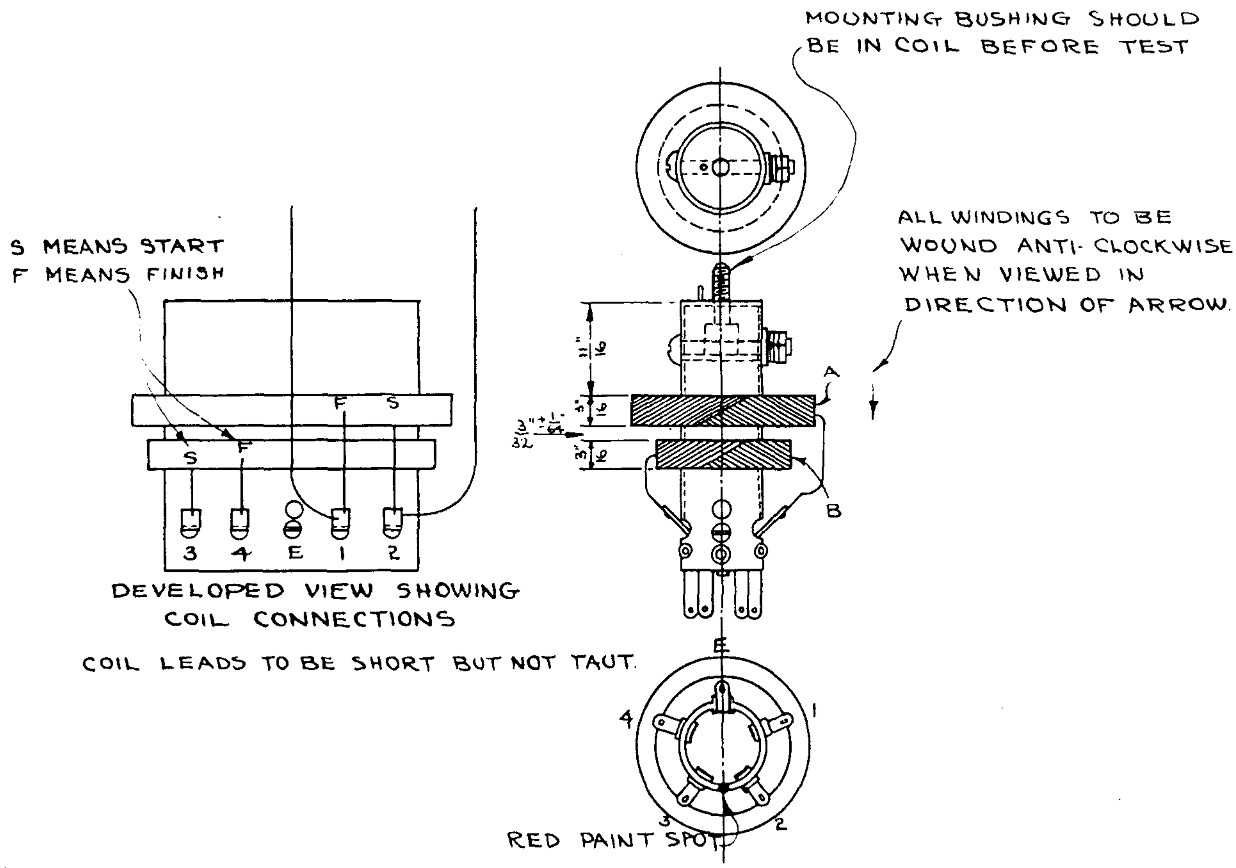
TABLE 28—L17A, L19A WINDING DATA

Windings	X	Y	ZA	ZB
Conductor	10/41 B. & S. S.C.C. twisted Litz copper	10/41 B. & S. S.C.C. twisted Litz copper	No. 32 B. & S. D.S.C. enamelled copper	No. 32 B. & S. D.S.C. enamelled copper
Turns	272—single wave winding, wound counterclockwise	272—single wave winding, wound counterclockwise	4—close wound, counterclockwise	9—close wound, counterclockwise
Cam	¼"	¼"		
Turns per layer	14	14		
Crosses per turn	2	2		
Test	Q = 135 at 420 Kc/s. with resonating capacity of 412 μμF.	Q = 135 at 420 Kc/s. with resonating capacity of 396 μμF.	Test for continuity	Test for continuity
Treatment	See Para. 51 (a) and (e)			
Impregnation	See Para. 52 (a), (b), (d), and (f)			



T FZ 524 / 1 - 34

FIG. 34—FORMER FOR L20A AND L21A

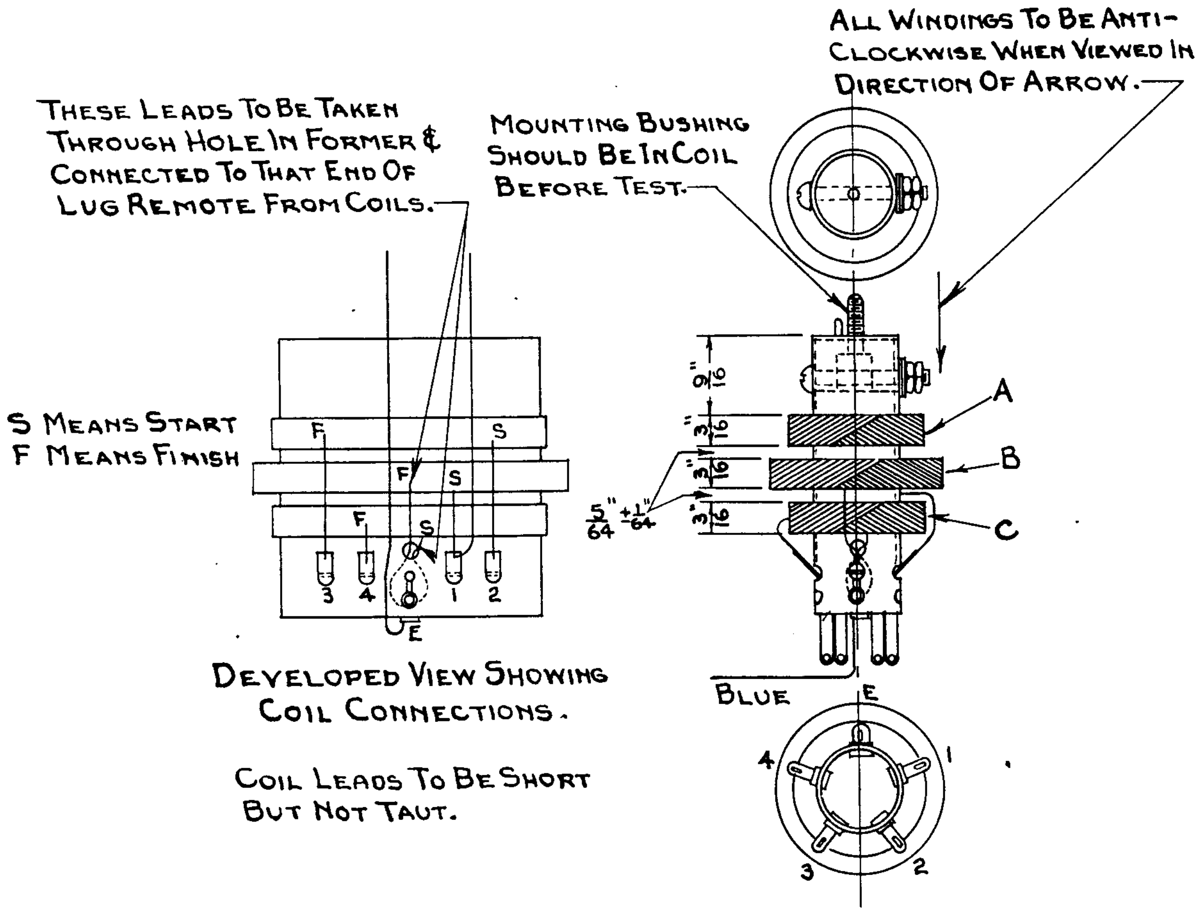


T FZ 524 / 1 - 35

FIG. 35—L20A, I.F. DIODE TRANSFORMER

TABLE 29—L20A WINDING DATA

Former	Paper base bakelite tube—see Fig. 34 for dimensions	
Conductor	10/41 B. & S., G.E., S.S.C. twisted Litz copper	
Windings	A	B
Turns	261	107
Turns per layer	12	12
Crosses per turn	2	2
Cam	3/16″	3/16″
Treatment before Test	See Para. 51 (a)	See Para. 51 (a)
Lead lengths	4″	4″
Test	Q = 117 at 200 Kc/s. with resonating capacity of 402 $\mu\mu$F. D.C. resistance = 8 ohms	Q = 97 at 500 Kc/s. with resonating capacity of 388 $\mu\mu$F. D.C. resistance = 3 ohms
1st Impregnation	See Para. 52 (a), (b), (d), and (f)	
2nd Impregnation	See Para. 52 (k)	

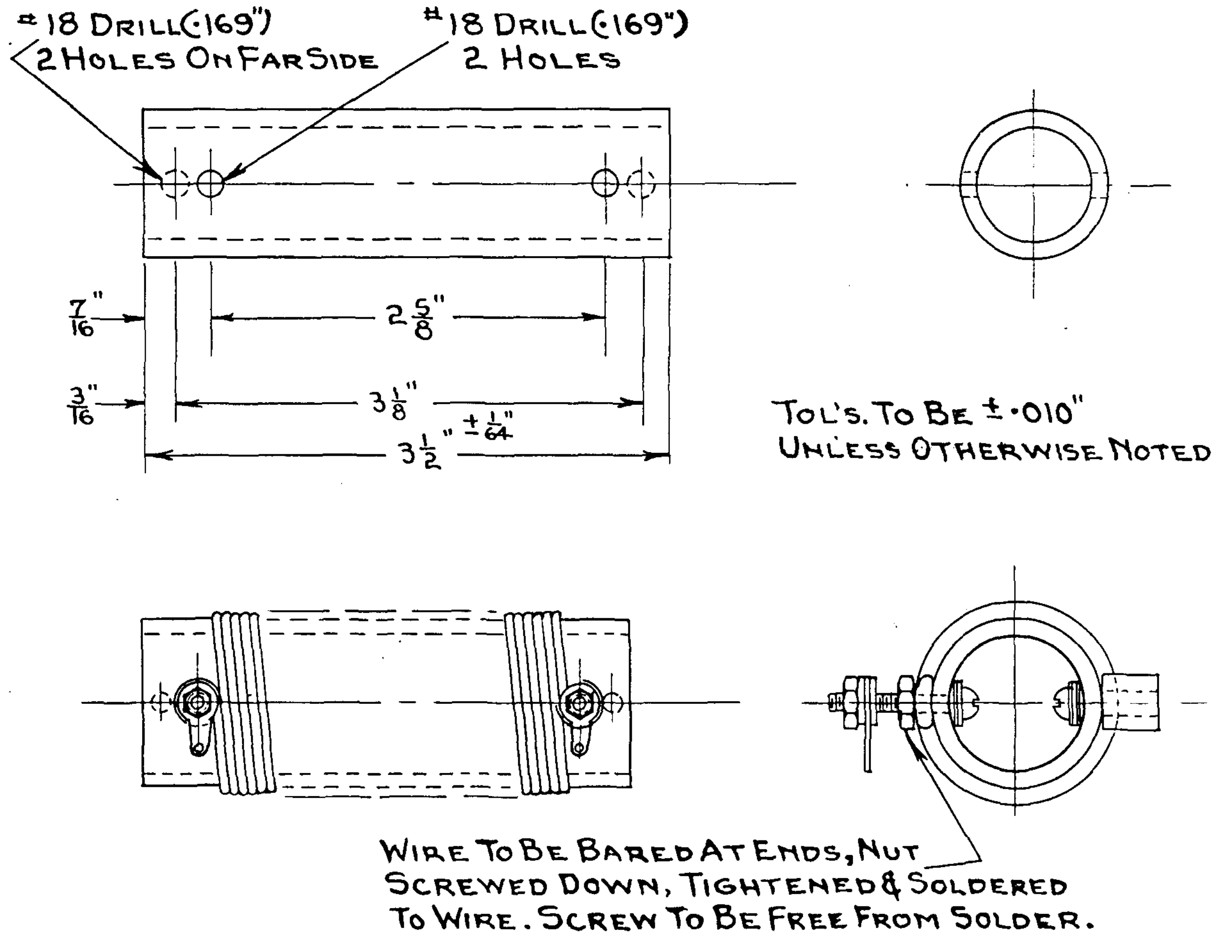


T FZ 524 / 1 - 36

FIG. 36—L21A, B.F.O. COIL

TABLE 31—L24A WINDING DATA

Former	Paper base bakelite tube—see Fig. 34 for dimensions		
Conductor	10/41 B. & S., G.E., S.S.C. twisted Litz copper		
Windings	A	B	C
Turns	102	165	95
Turns per layer	12	12	12
Crosses per turn	2	2	2
Cam	3/16"	3/16"	3/16"
Treatment before Test	See Para. 51 (a)	See Para. 51 (a)	See Para. 51 (a)
Lead lengths	4"	4"	4"
Test	Q = 82 at 700 Kc/s. with resonating capacity of 224 μμF.—D.C. resistance = 2.7 ohms	Q = 115 at 350 Kc/s. with resonating capacity of 343 μμF.—D.C. resistance = 4.5 ohms	B. & C. in series: Q = 120 at 300 Kc/s. with resonating capacity of 298 μμF.—D.C. resistance = 6.4 ohms
1st Impregnation	See Para. 52 (a), (b), (d), and (f)		
2nd Impregnation	See Para. 52 (k)		

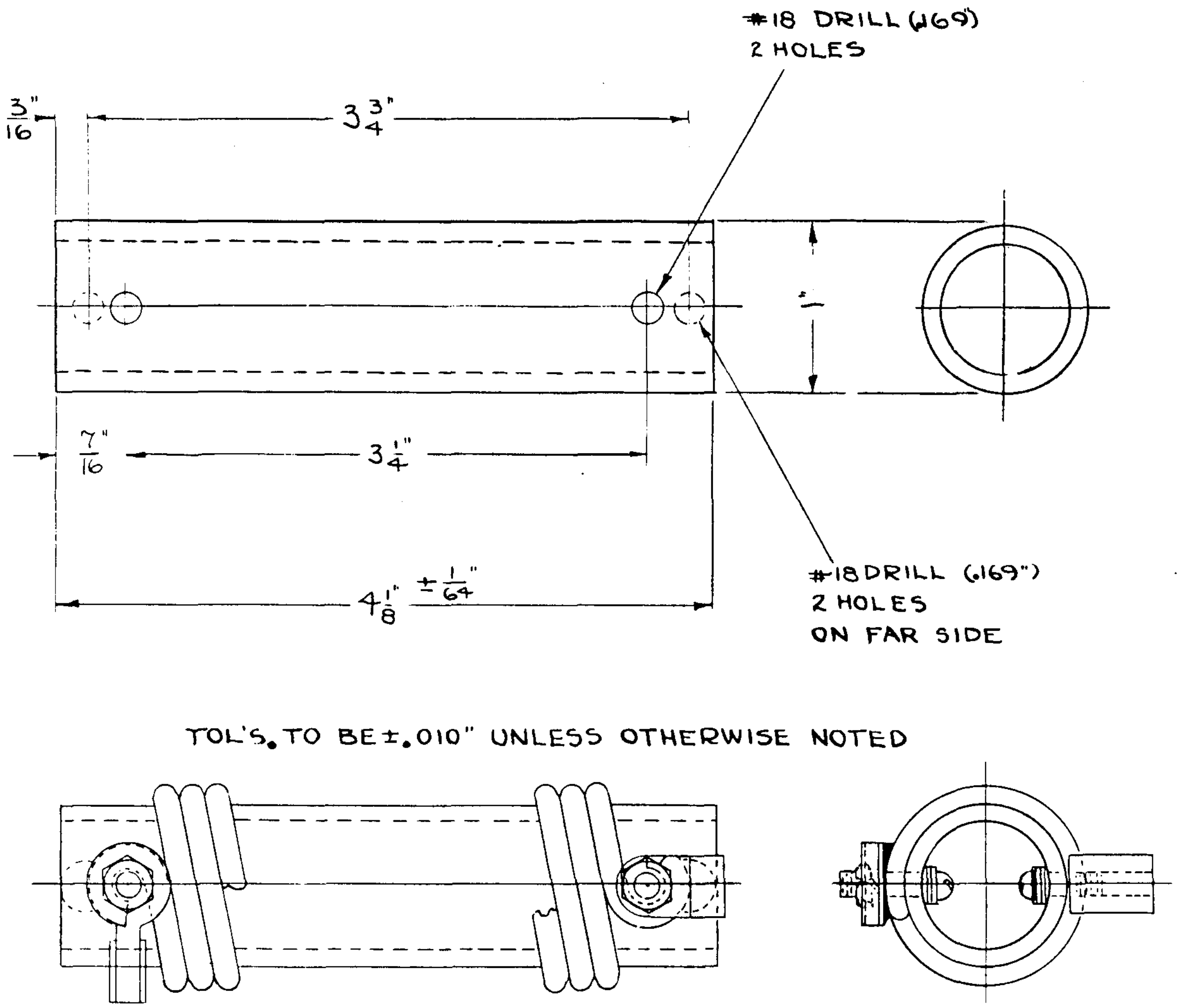


T FZ 524 / 1-37

FIG. 37—L24A, R.F. CHOKE

TABLE 31—L24A WINDING DATA

Former	Bakelite tube—3½" x 1" outside dia. x ⅛" wall
Conductor	No. 13 B. & S., D.C.C. copper
Turns	28—close wound
Test	For continuity
Impregnation	See Para. 52 (a), (b), (c) and (h)

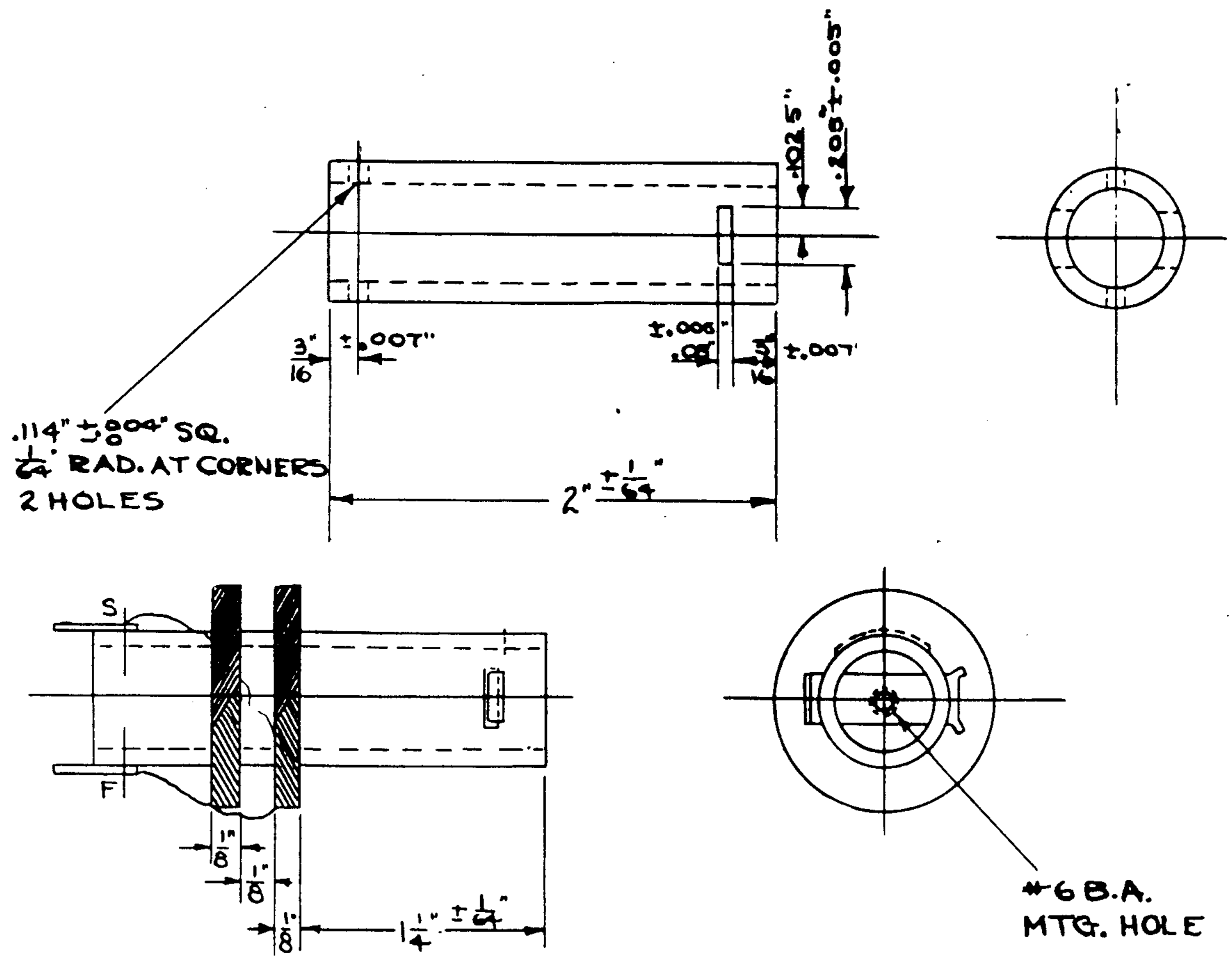


T FZ 524/1-38

Fig. 38—L25A, R.F. Choke

Table 32—L25A Winding Data

Former	Bakelite tube—4 1/8" x 1" outside dia. x 1/8" wall
Conductor	No. 8 B. & S., D.C.C. copper
Turns	20—close wound
Test	For continuity
Impregnation	See Para. 52 (a), (b), (c), and (h)



T FZ 524 / 1 - 40

FIG. 40—L27A, R.F. CHOKE

TABLE 34—L27A WINDING DATA

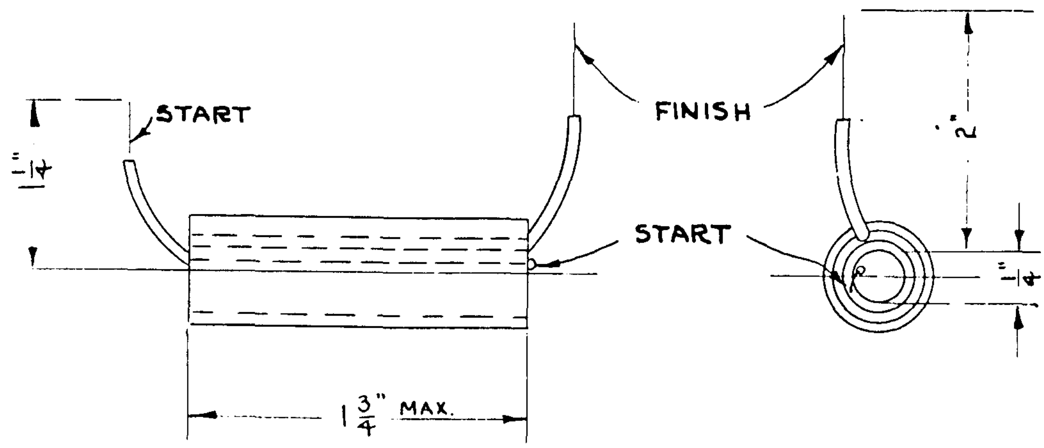
Former	Natural Dilecto—2″ x 9/16″ outside dia. x 1/16″ wall
Conductor	No. 28 B. & S., D.S.C. copper
Turns	120 per pie; 2 pies
Test	Q=20 at 289 Kc/s. with resonating capacity of 350 μμF.
Treatment	Bake assembly in ventilated oven for 1 hour at 212°F.-220°F. Dip hot coils in Zophar Mills No. 1436 wax at 250°F. for 30 seconds. Coating must be even. After cooling dip in C.I.L. DUCO Household Cement. Allow eight hours for cement to dry. Keep tapped hole clear.

TABLE 35—L28A, AUDIO FREQUENCY CHOKE, WINDING DATA

Former	1/32″ paper base wrapped with 2 layers of .005″ Empire cloth—19/32″ x 1″ x 1 1/64″
Conductor	No. 30 B. & S., enamelled copper
Turns	1696
Turns per layer	53
No. layers	32
Inter layer insulation	One layer of .001″ glassine paper
Length of winding	41/64″
Wrapper	2 layers of .005″ Empire cloth, 1 layer of .010″ fish paper.
Core	.025″ RAD.4C
Laminations	A = 2 5/16″, B = 1 5/8″, H = 37/64″, L = 1 3/64″, W = 37/64″ (See Fig. 28)
Stack	7/8″
Barriers	4—of 9/16″ x 1 1/4″ .010″ fish paper
Test	Inductance = 1.85 H. at .18 amps., 20 volts, 60 cycles
Treatment	Brush with clear lacquer

TABLE 36—L29A AUDIO FREQUENCY CHOKE, WINDING DATA

Former	1/64″ paper base wrapped with 1 layer of .001″ glassine paper—35/64″ x 1¼″ x 25/32″
Conductor	No. 34 B. & S. enamelled copper
Turns	1360
Turns per layer	68
No. layers	20
Inter layer insulation	1 layer of .001″ glassine paper
Length of winding	17/32″
Wrapper	1 layer of .001″ glassine paper and 1 layer of No. 50 Kraft paper
Core	.025″ RAD.4C
Laminations	A = 1⅝″, B = 1.354″, H = .271″, L = .813″, W = .542″ (See Fig. 28)
Stack	1⅛″
Test	Inductance = 3.18 H. at 70 mA., 20 volts, 60 cycles
Treatment	Varnish core edges

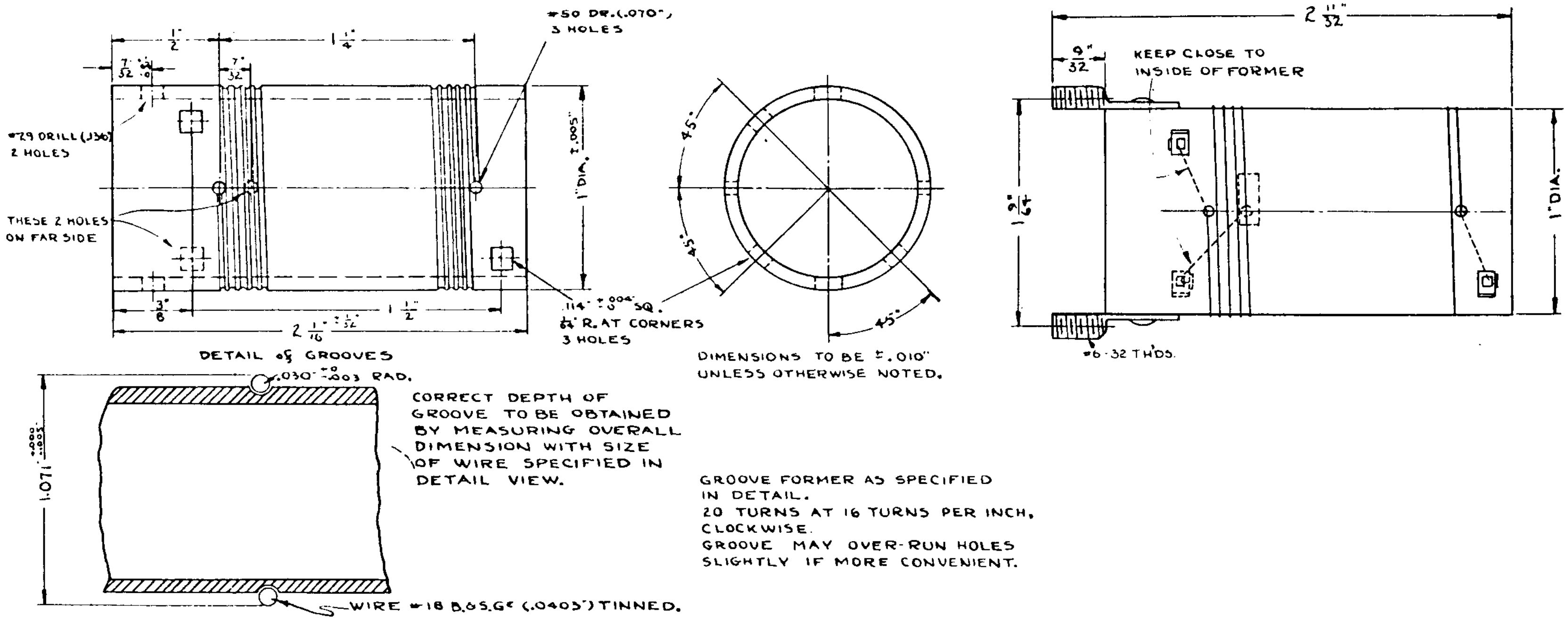


T FZ 524 / 1-41

FIG. 41—L30A, R.F. CHOKE
L30B, R.F. CHOKE

TABLE 37—L30A, L30B WINDING DATA

Former	Air core—inside dia. ¼″, length 1¾″
Conductor	No. 18 B. & S., G.E., D.C.C. copper
Turns	63—wound at 18 turns per inch
Layers	2
Turns per layer	1st layer—32, 2nd layer—31
Wrapper	2 layers of .003″ gummed Kraft paper, 1¾″ wide
Test	For continuity

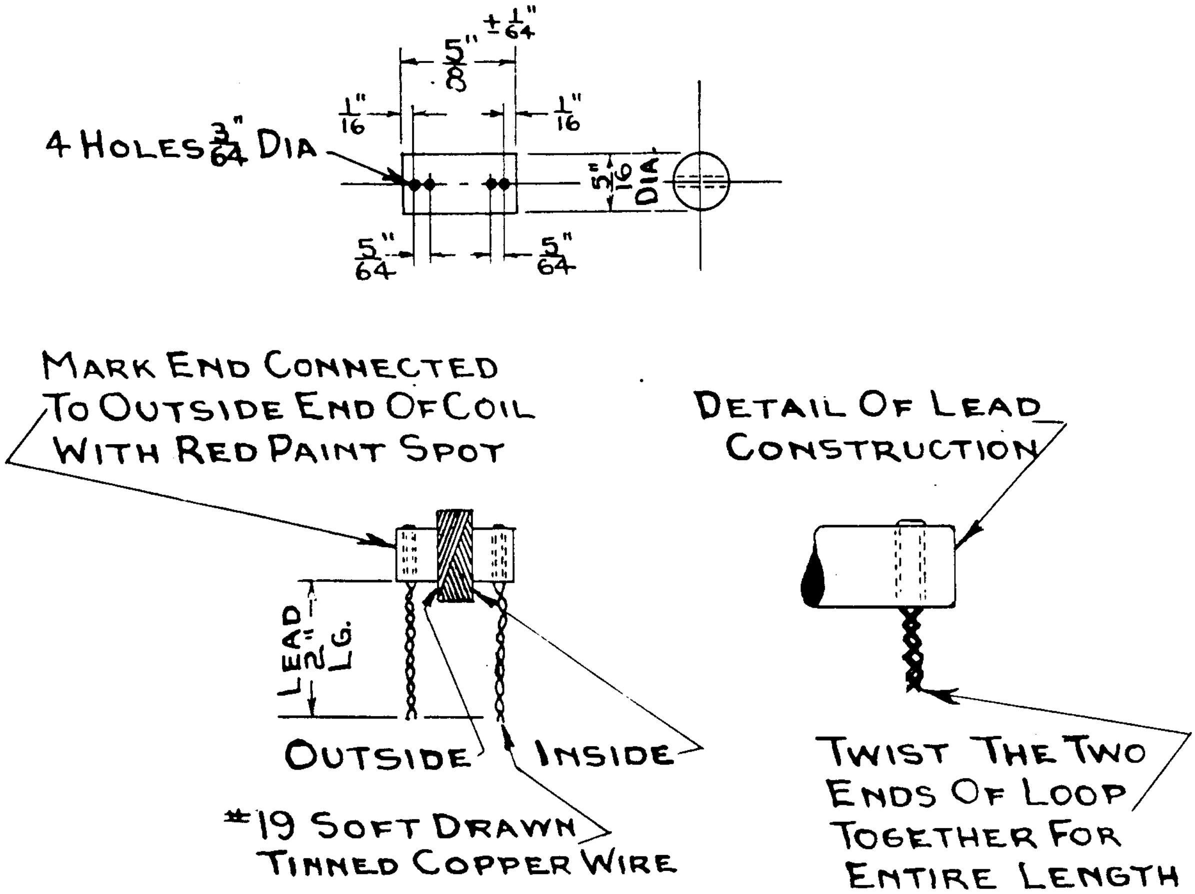


T FZ 524 / 1-42

FIG. 42—L31A, OSCILLATOR TANK COIL

TABLE 38—L31A WINDING DATA

Former	Bakelite tube—2 1/16" x 1" outside dia. x 1/16" wall
Conductor	No. 18 B. & S., G.E., bare tinned copper
Turns	20—wound in grooves at 20 turns per inch
Tap	At 3½ turns
Impregnation	See Para. 52 (b), (d), and (h)
Test	Q = 213 at 11 Mc/s. with resonating capacity of 32.2 μμF.

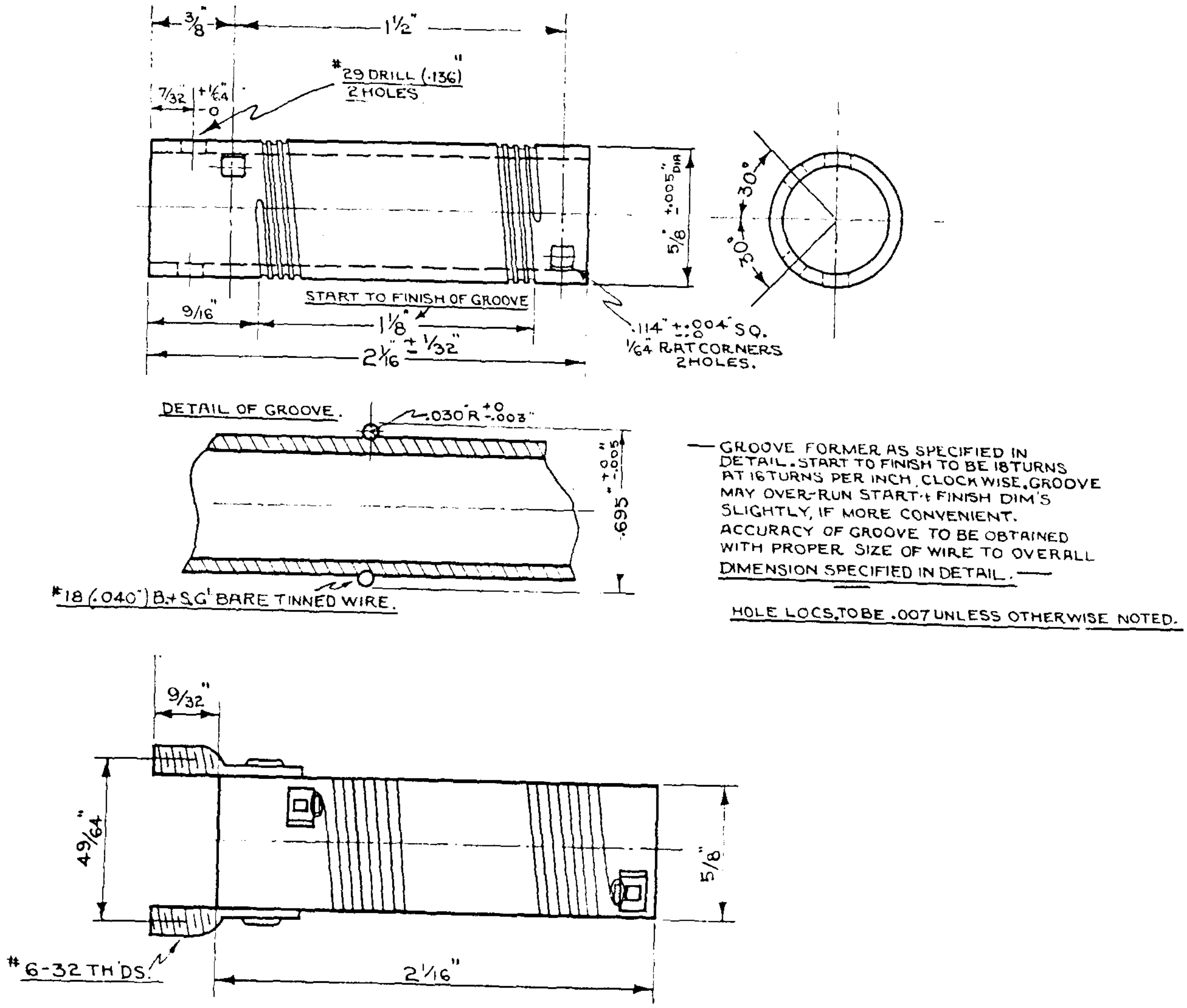


T FZ 524 / 1 - 43

FIG. 43—L32A, R.F. CHOKE
L32B, R.F. CHOKE

TABLE 39—L32A, L32B WINDING DATA

Former	Beech dowelling—5/8" x 5/16"
Conductor	No. 38 B. & S., S.S.E. copper
Turns	234
Test	Nominal inductance—410 μH. Nominal resistance—16.5 ohms
Treatment	Bake coil in ventilated oven for 1 hour at 212°F.-220°F. Dip hot coils in Zophar Mills No. 1436 wax at 250°F. for 30 seconds. Coating must be even. After cooling, dip in C.I.L. DUCO Household Cement. Allow eight hours for cement to dry.

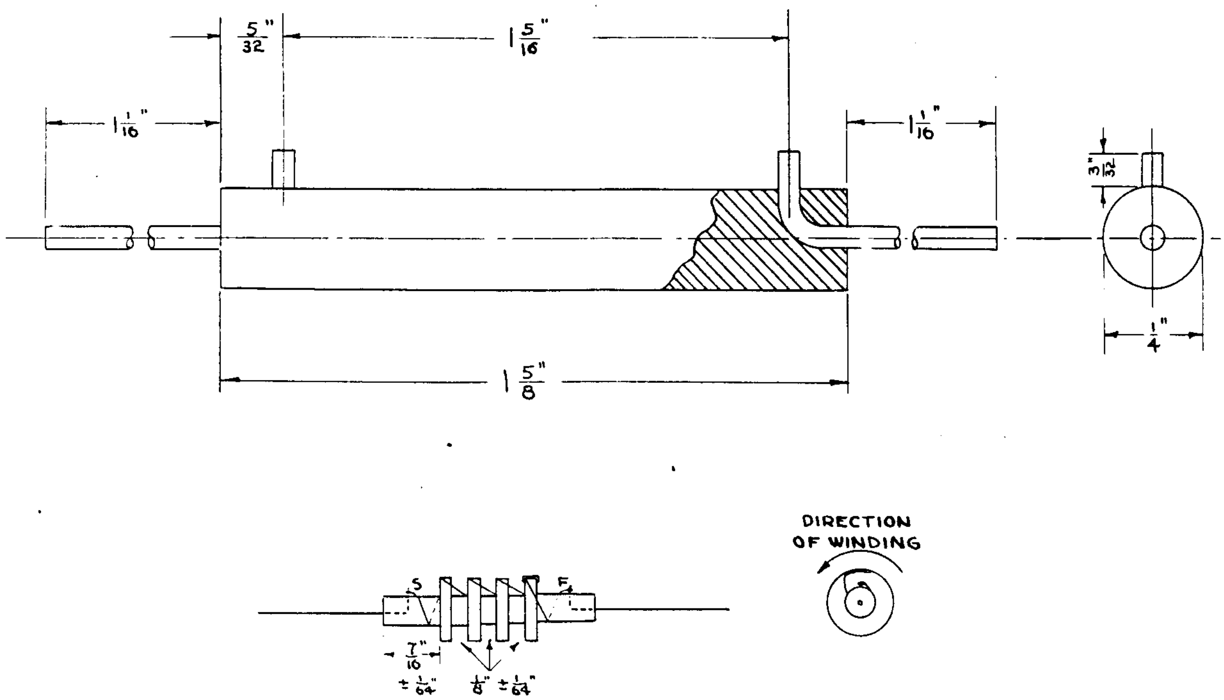


T FZ 524 / 1-44

FIG. 44—L33A, TANK COIL
L33B, TANK COIL

TABLE 40—L33A, L33B WINDING DATA

Former	Bakelite tube—2 1/16" x 5/8" outside dia. x 1/16" wall
Conductor	No. 18 B. & S., G.E., bare tinned copper
Turns	18—wound in grooves
Impregnation	See Para. 52 (b), (d), and (h)
Test	Q = 170 at 11 Mc/s. with resonating capacity of 85 $\mu\mu$F.

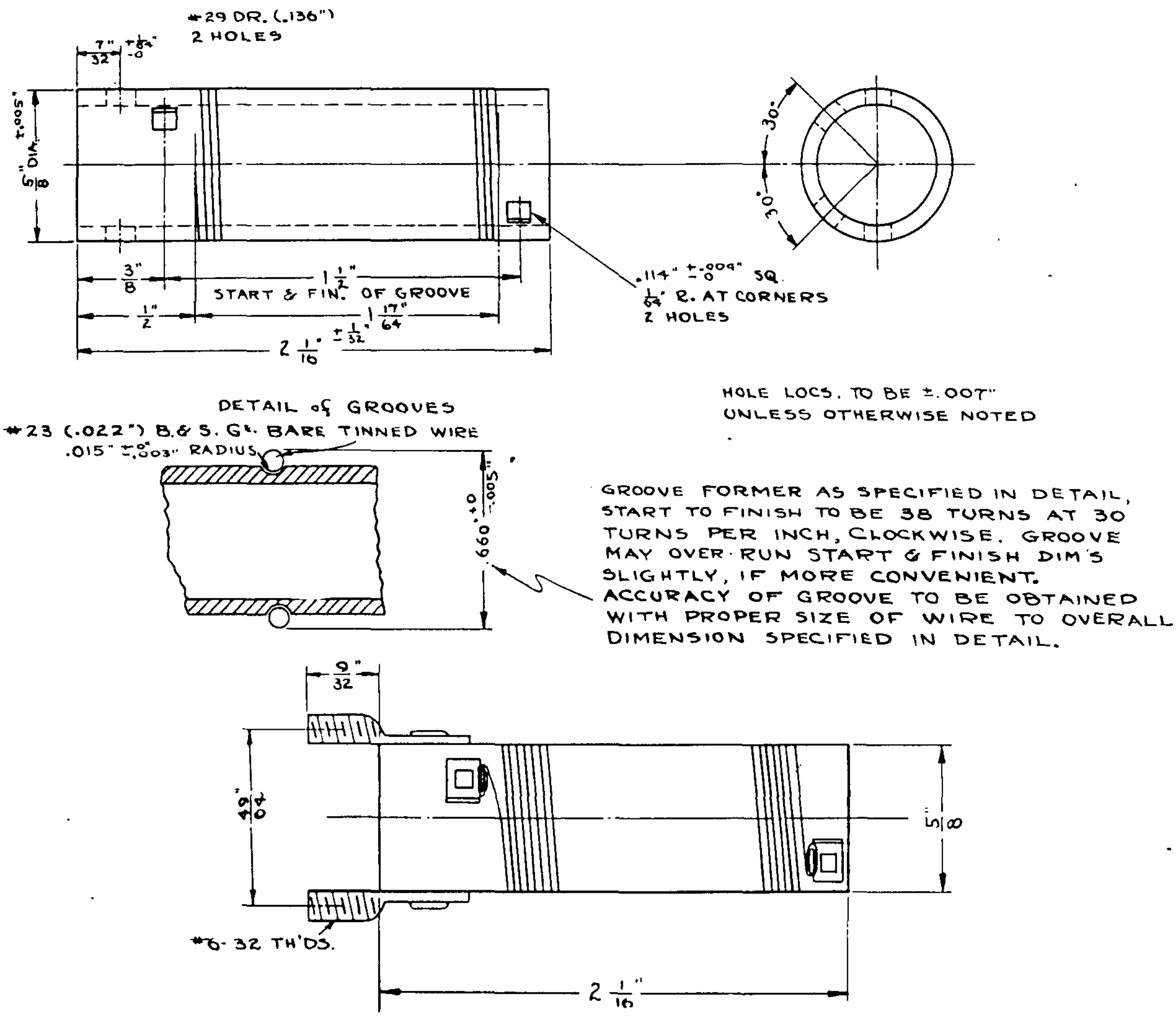


T FZ 524 / 1 - 45

FIG. 45—L34A, L34B, L34C, L34D, L34E—R.F. CHOKES

TABLE 41—L34A, L34B, L34C, L34D, L34E WINDING DATA

Former	Low loss Bakelite moulding—1⅝" x ¼"
Conductor	No. 38 B. & S., G.E., S.S. enamelled copper
Turns	900
Turns per pie	225—4 pies
Turns per layer	12
Crosses per turn	2
Cam	⅛"
Winding	Duolateral
Treatment	See Para. 51 (d) and (e)
Test	For continuity
Impregnation	See Para. 52 (b), (c), and (h)



T FZ 524 / 1-46

FIG. 46—L.35A, TANK COIL

TABLE 42—L35A WINDING DATA

Former	Bakelite tube—2 1/16" x 5/8" outside dia. x 1/16" wall
Conductor	No. 23 B. &S., G.E., bare tinned copper
Turns	38—wound in grooves
Impregnation	See Para 52 (b), (d), and (h)
Test	Q = 140 at 4 Mc/s. with resonating capacity of 170 $\mu\mu$F.

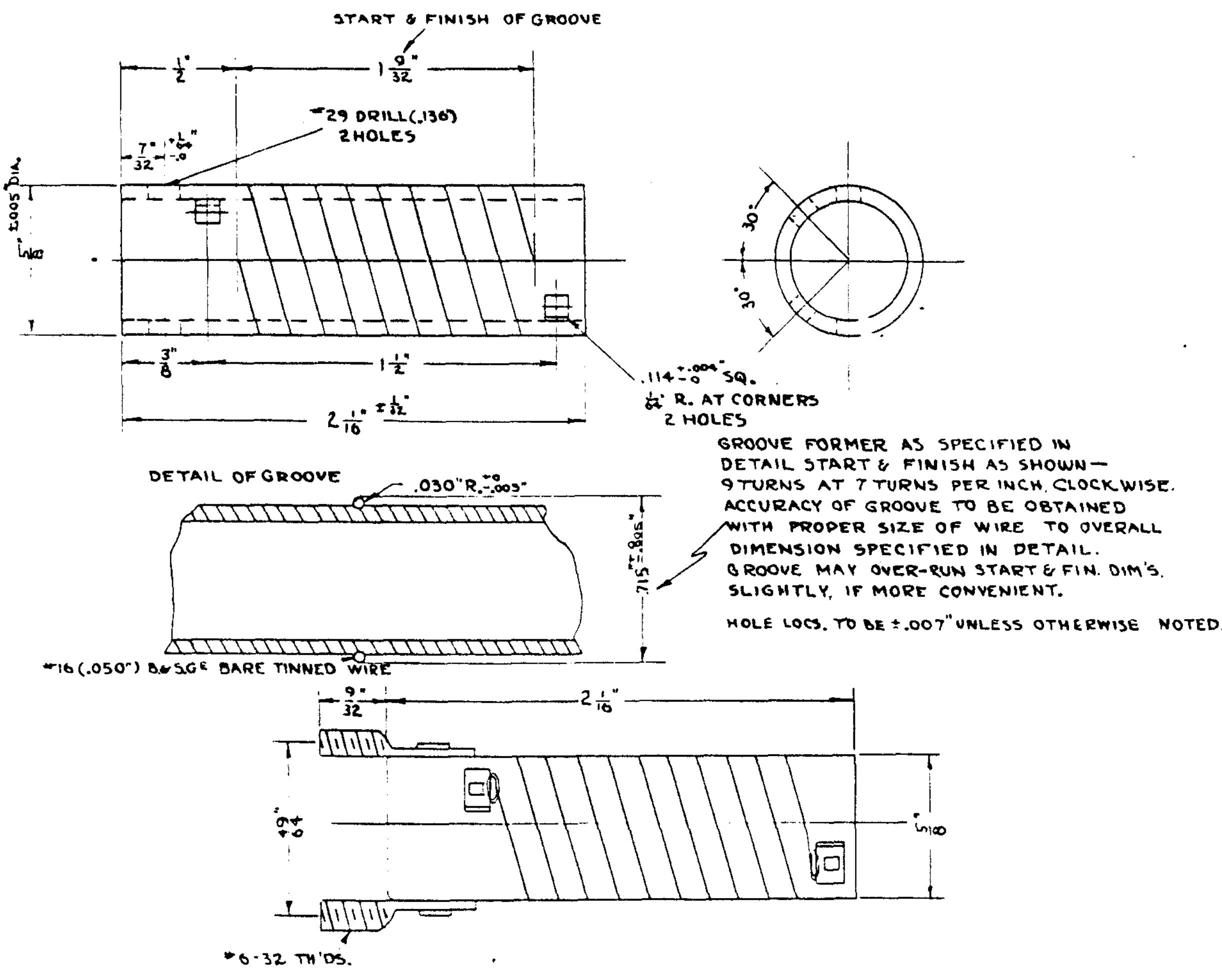


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Fig. 47—L36A, Tank Coil

Table 43—L36A Winding Data

Former	Bakelite tube—2 1/16" x 5/8" outside dia. x 1/16" wall
Conductor	No. 16 B. & S., G.E., bare tinned copper
Turns	9—wound in grooves
Impregnation	See Para. 52 (b), (d), and (h)
Test	Q = 105 at 11 Mc/s. with resonating capacity of 308 $\mu\mu$F.

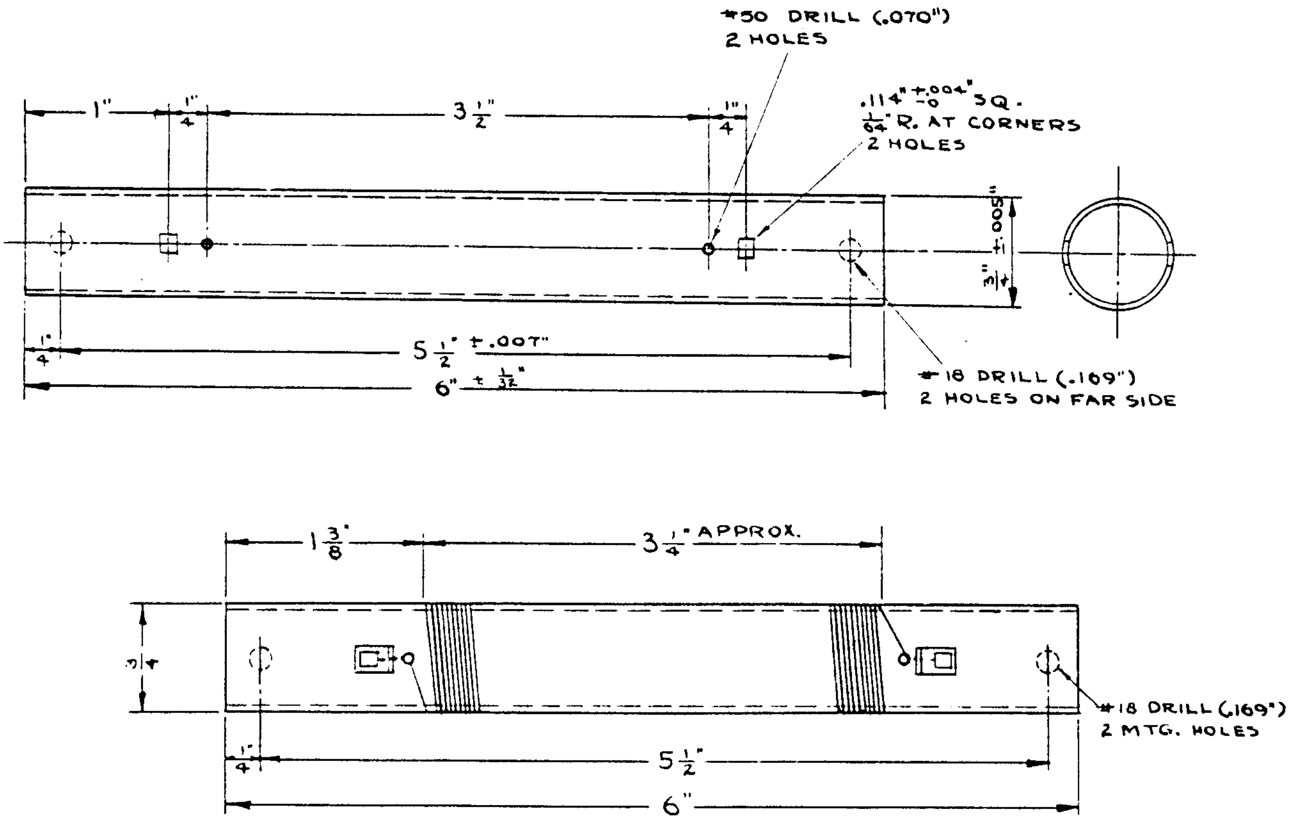

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Fig. 48—L37A, R.F. Choke

Table 44—L37A Winding Data

Former	Bakelite tube—6″ x ¼″ outside dia. x 1/16″ wall
Conductor	No. 36 B. & S., G.E., enamelled copper
Turns	195—wound at 60 turns per inch
Impregnation	See Para. 52 (b), (d), and (h)
Test	For continuity

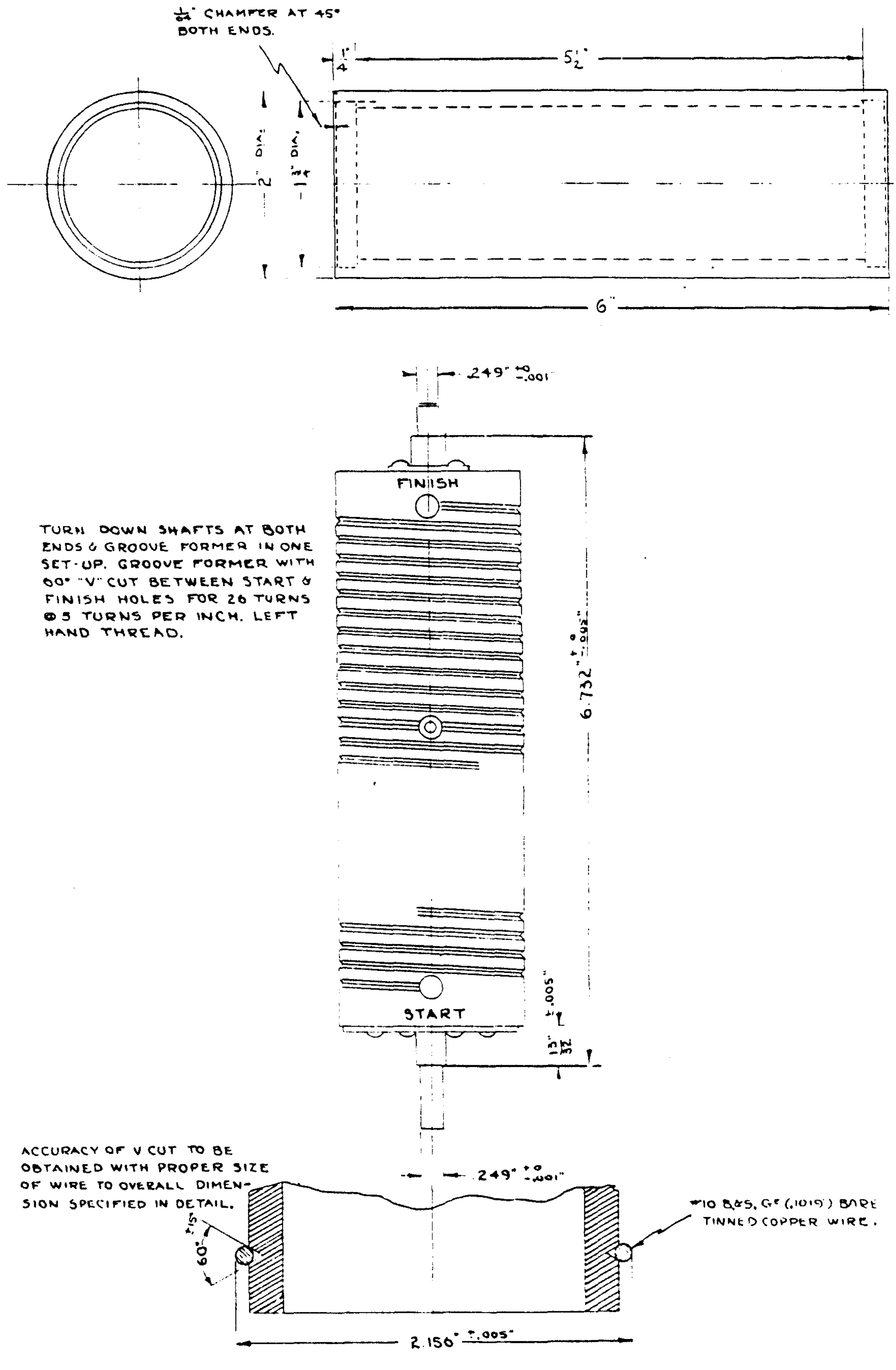

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FIG. 49—L38A, FORMER ASSEMBLY

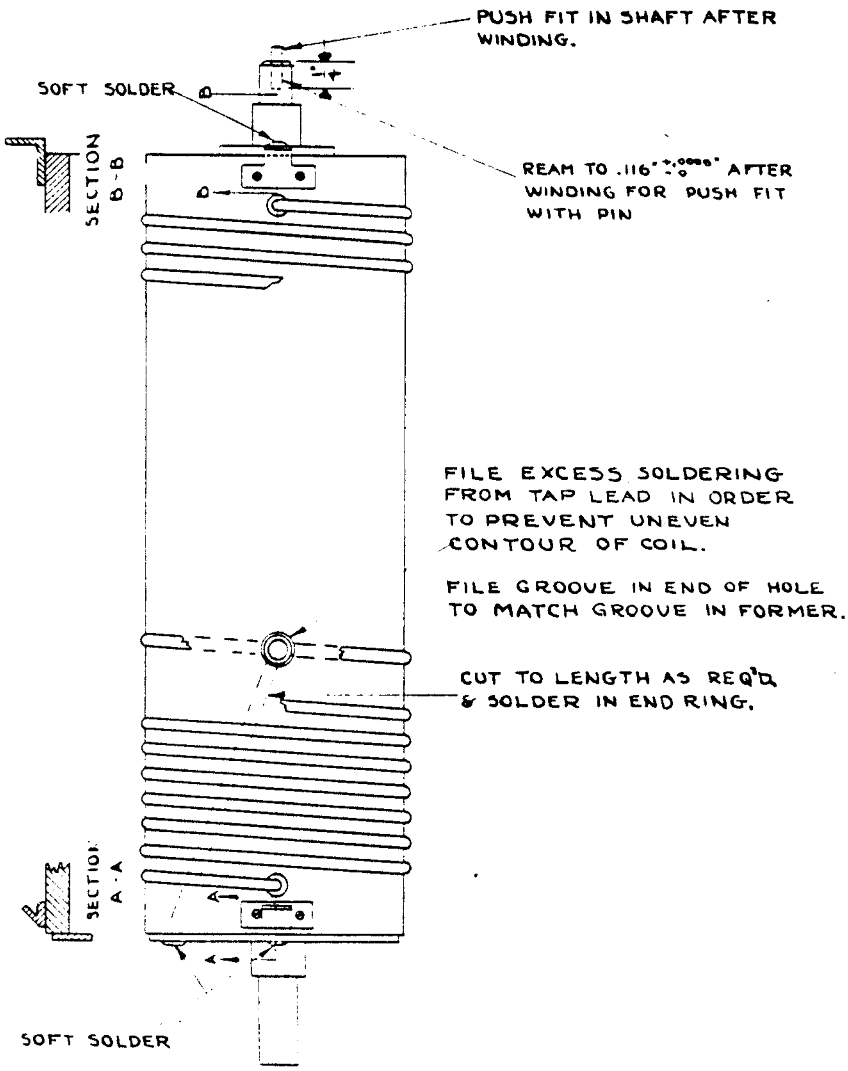

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FIG. 50—L38A, TANK COIL

TABLE 45—L38A WINDING DATA

Former	Natural Bakelite tube—6" x 2" outside dia. x 3/16" wall
Conductor	No. 10 B. & S., G.E., bare tinned copper
Turns	26—wound in grooves
Tap	At 9½ turns
Test	Visual inspection

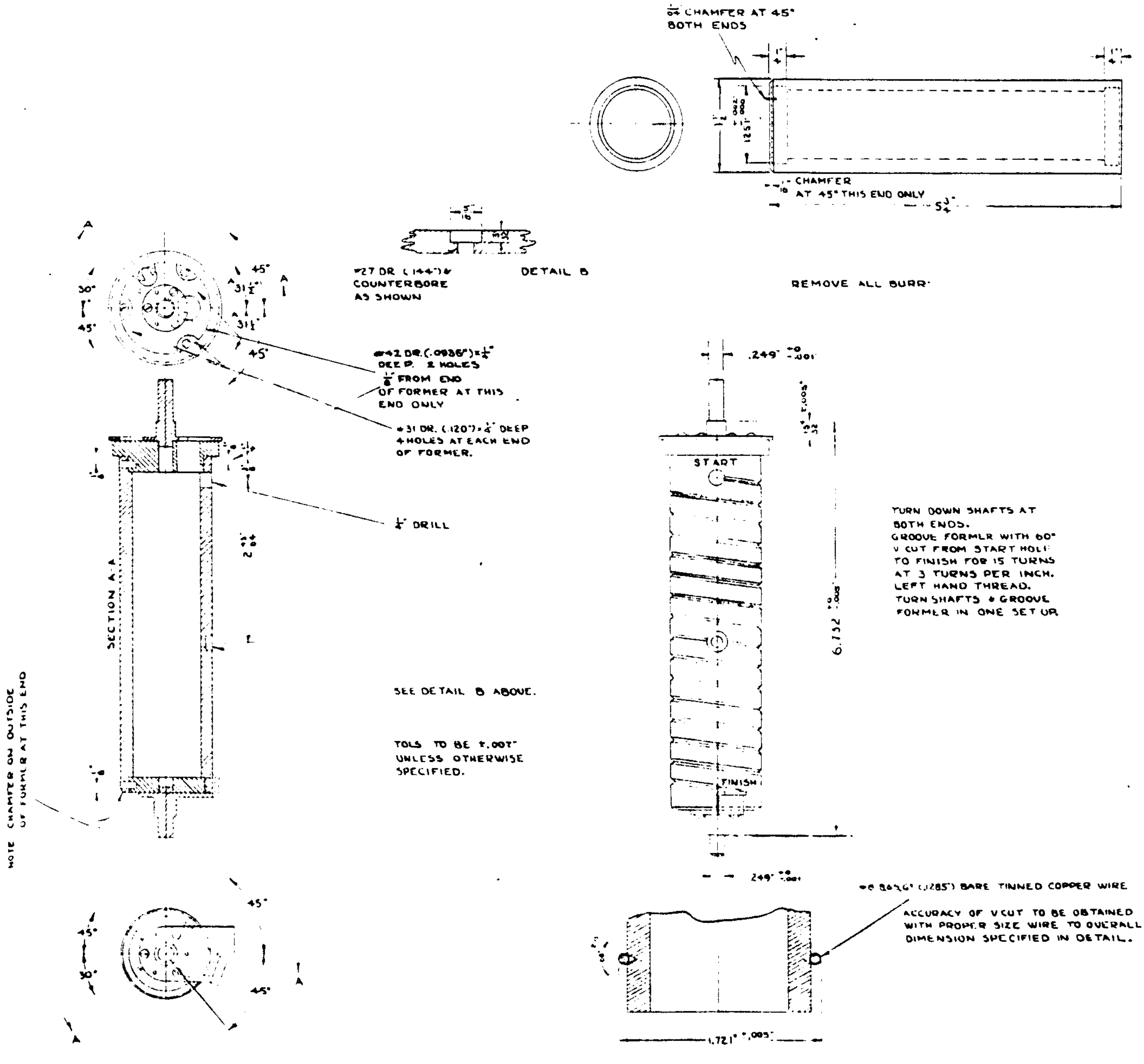

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Fig. 51—L39A, Former Assembly

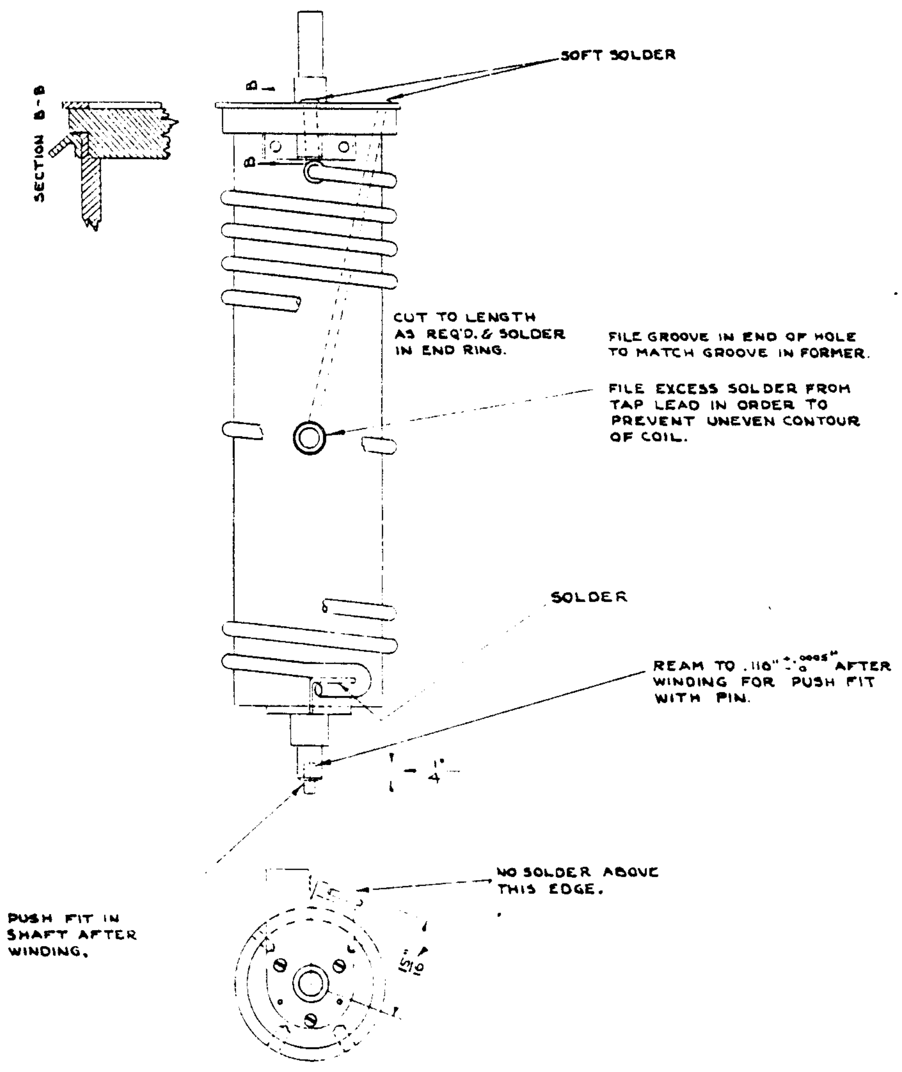

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FIG. 52– L39A. TANK COIL

TABLE 46 – L39A WINDING DATA

Former	Bakelite tube—5¾" x 1½" outside dia. x 3/16" wall
Conductor	No. 8 B. & S., G.E., bare tinned copper
Turns	15
Tap	At 8 turns
Test	Q=210 at 7 Mc/s. with resonating capacity of 353 μμF.

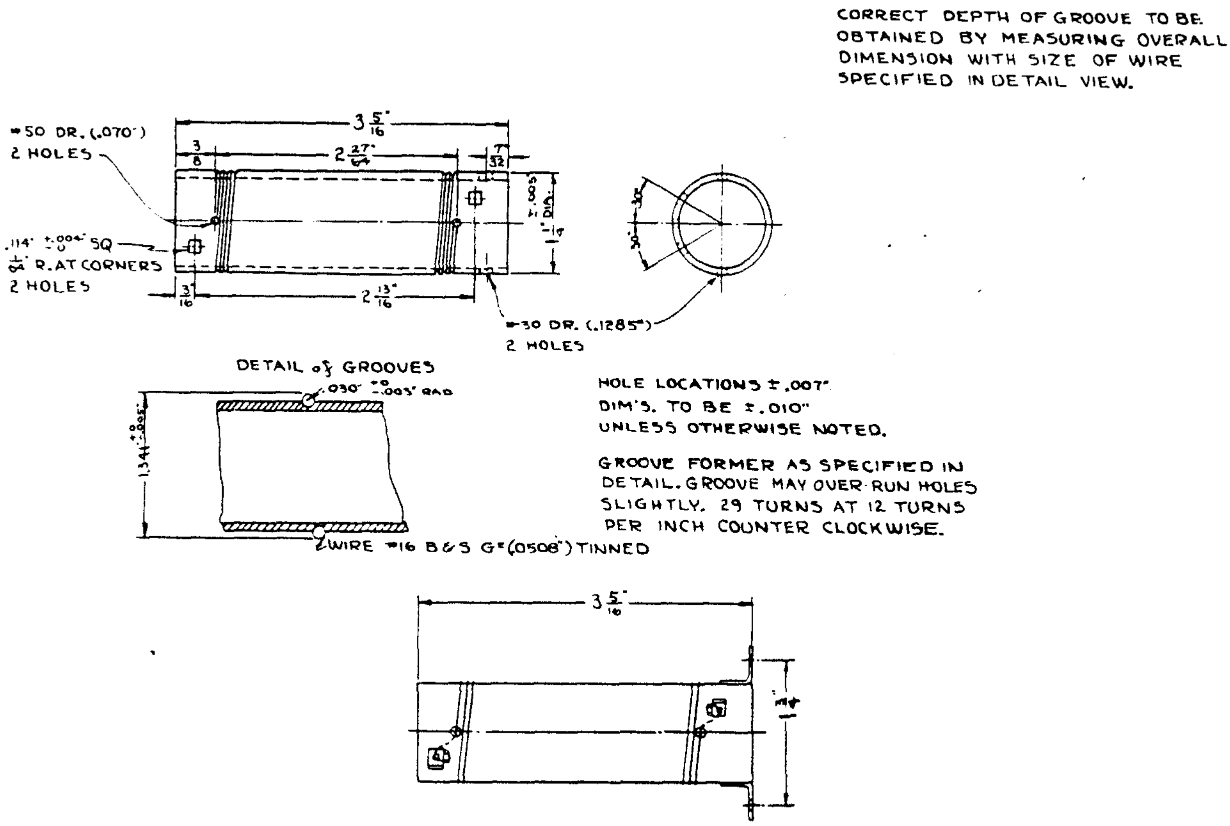

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FIG. 53—L40A, TANK COIL

TABLE 47—L40A WINDING DATA

Former	Bakelite tube—$3\frac{5}{16}''$ x $1\frac{1}{4}''$ outside dia. x $\frac{1}{16}''$ wall
Conductor	No. 16 B. & S., G.E., bare tinned copper
Turns	29—wound in grooves
Impregnation	See Para. 52 (b), (d), and (h)
Test	Q = 235 at 3 Mc/s. with resonating capacity of 247 $\mu\mu$F.

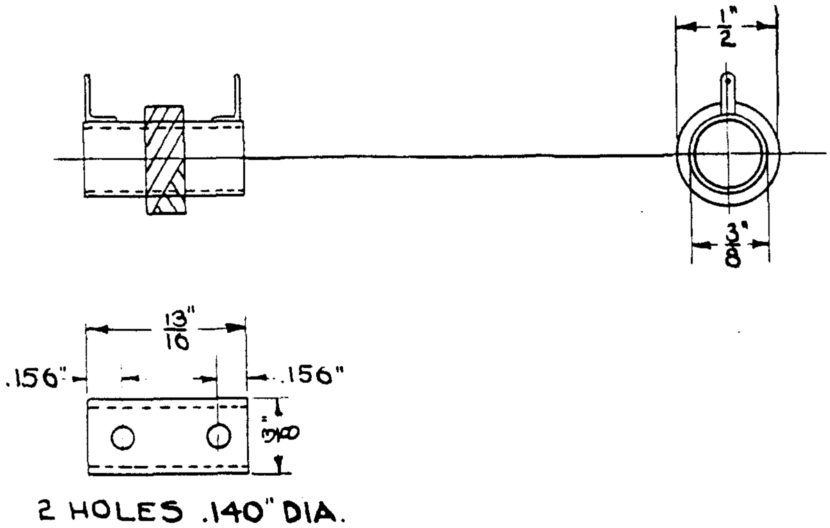

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FIG 54—L41A, R.F. CHOKE

TABLE 48—L41A WINDING DATA

Former	Natural Dilecto—13/16" x 3/8"
Conductor	No. 38 B. & S., S.S., enamelled
Turns	208
Winding	3/16" wide, Universal wound
Test	Nominal inductance = 47 μH. Nominal resistance = 16.5 ohms
Treatment	Bake coil in ventilated oven for 1 hour at 212°-220°F. Dip hot coils in Zophar Mills No. 1436 wax at 250°F. for 30 seconds. Coating must be even. After cooling, dip in C.I.L. Household Cement. Allow eight hours for cement to dry.

TABLE 49—L42A, M.C.W. OSCILLATOR INDUCTANCE, WINDING DATA

Former	1/64″ Kraft paper, wrapped with one layer of .002″ glassine paper—35/64″ x 3/4″ x 3/4″
Conductor	No. 33 B. & S., enamelled copper
Turns	1180
Tap	At 236½ turns
Winding length	½″
Turns per layer	59
No. layers	20
Inter layer insulation	1 layer of .001″ glassine paper
Wrapper	2 layers of No. 50 Kraft paper
Core	.014″ RAD.4C
Laminations	A = 1⅝″, B = 1.354″, H = .271″, L = .813″, W = .542″ (See Fig. 28)
Stack	⅝″
Barriers	4—of ⅞″ x ½″ .010″ fish paper, L type
Test	Inductance = .33 H. at 20 volts, 60 or 75 cycles

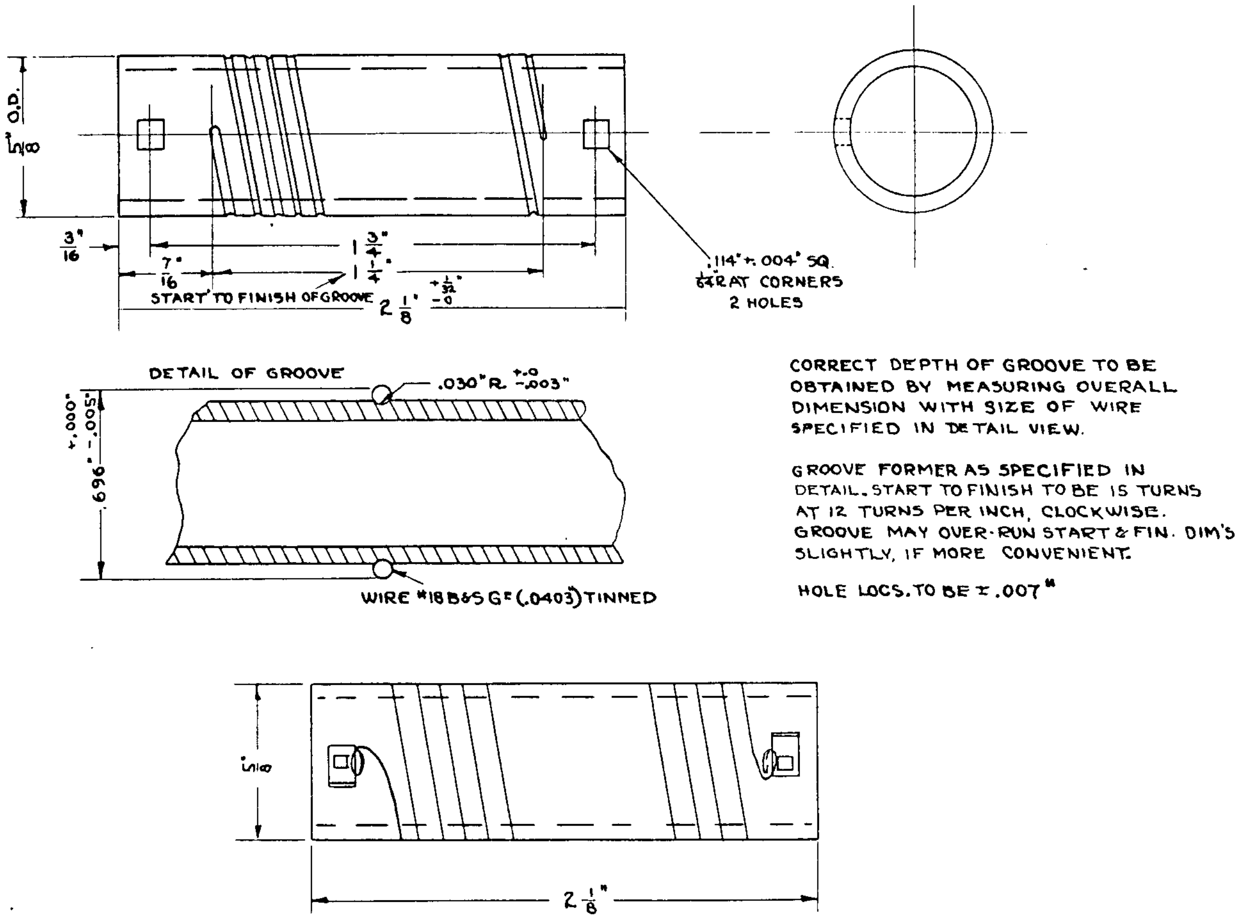

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FIG. 55—L43A, TANK COIL

TABLE 50—L43A WINDING DATA

Former	Bakelite tube—2⅛" x ⅝" outside dia. x 1/16" wall
Conductor	No. 18 B. & S., G.E., bare tinned copper
Turns	15—wound in grooves
Impregnation	See Para. 52 (b), (d), and (h)
Test	Q = 75 at 11 Mc/s. with resonating capacity of 127 μμF.

TABLE 51—L44A, A.F. CHOKE, WINDING DATA

Former	1/64″ Kraft paper, wrapped with 1 layer of .002″ glassine paper—35/64″ x 3/4″ x 25/32″
Conductor	No. 30 B. & S., enamelled copper
Turns	704
Turns per layer	44
No. layers	16
Length of winding	17/32″
Inter layer insulation	1 layer of .001″ glassine paper
Wrapper	1 layer of .005″ fish paper
Core	.025″ RAD.4C
Laminations	A = 1 5/8″, B = 1.354″, H = .271″, L = .813″, W = .542″ (See Fig. 28)
Stack	5/8″
Barriers	4—of .010″ fish paper, .5″ x 1 1/4″, L type
Test	Inductance = .5 H. at 80 mA., 3 volts, 60 cycles

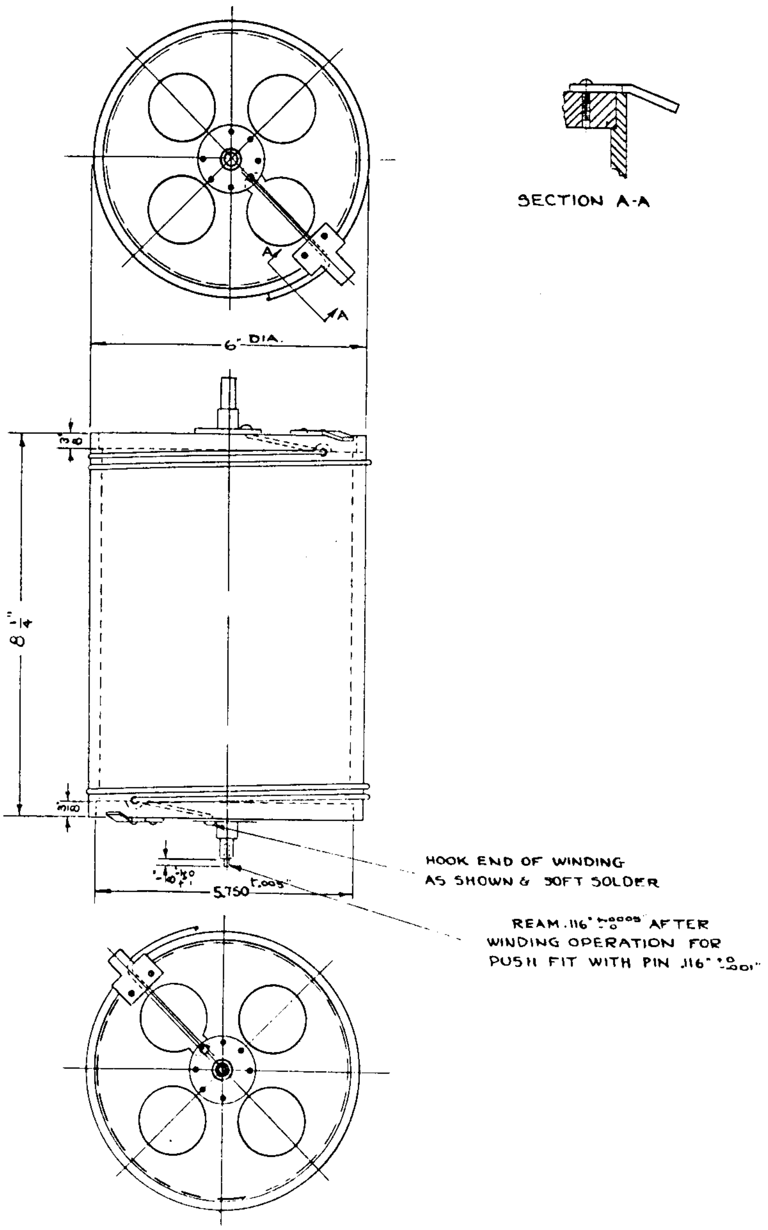

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FIG. 56—L45A, AERIAL TUNING COIL

TABLE 52—L45A WINDING DATA

Former	Bakelite tube—8¼" x 6" outside dia. x 3/16" wall
Conductor	No. 12 B. & S., bare tinned copper
Turns	45¼
Test	Visual inspection

TABLE 53—T1A, AUDIO TRANSFOMER, WINDING DATA

Former	1/32" paper base, wrapped with 1 layer of .010" Empire cloth—19/32" x 3/4" x 11/64"		
Windings	Primary	2nd Secondary	1st Secondary
Conductor	No. 40 B. & S., enamelled copper	No. 27 B. & S., enamelled copper	No. 21 B. & S. enamelled copper
Length of winding	49/64"	45/64"	49/64"
Turns	8686	264	66
Turns per layer	202	44	22
No. layers	43	6	3
Inter layer insulation	1 layer of No. 5 Kraft paper	1 layer of .002" glassine paper	1 layer of No. 50 Kraft paper
Lead coding	Start—red Fin.—blue	Start—green Fin.—yellow	Start—yellow Fin.—black
Core	.025" RAD.4C		
Laminations	A = 25/16", B = 15/8", H = 37/64", L = 13/64", W = 37/64" (See Fig. 28)		
Stack	11/16"		
Barriers	4—of 1" x 11/4" .005" fish paper, L type		
Test	Primary—Inductance = 85 H. at 7.5 mA., 100 volts, 60 cycles Ratio—Primary: 1st Secondary = 132 : 1 Primary: 2nd Secondary = 32.6 : 1 2nd Secondary—Inductance = 86.5 H. at 7.5 mA., 100 volts, 60 cycles		
Treatment	Bake coil and core in case for 1 hour at 100°C. Brush with clear lacquer.		

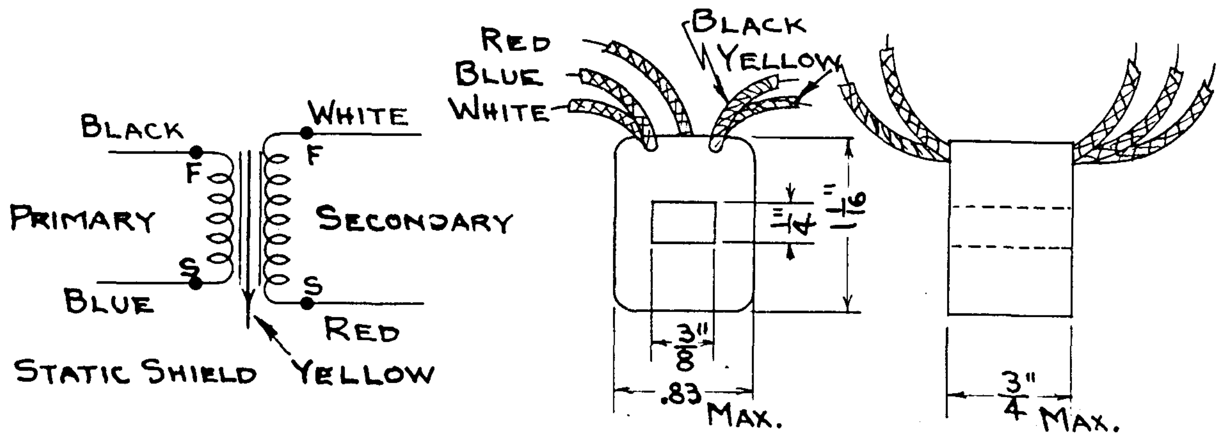

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FIG. 57—T2A, MICROPHONE TRANSFORMER

TABLE 54—T2A WINDING DATA

Former	Paper base—outside dimensions—¼″ x ⅜″ x ¾″		
Windings	Primary	Secondary	Static Shield
Conductor	No. 31 B. & S., enamelled copper	No. 44 B. & S., enamelled copper	No. 44 B. & S., enamelled copper
Turns	200	10000	222
Turns per layer	50	222	222
No. layers	4	45	1
Inter layer insulation	1 layer of .010″ Kraft paper	1 layer of .005″ Kraft paper	
Leads	Start—blue Fin.—black	Start—red Fin.—white	Fin.—yellow
Wrapper	2 layers of .030″ glassine paper		
Test	Nominal impedance—Primary = 50 ohms Secondary = 125000 ohms		

TABLE 55—T3A, MODULATION TRANSFORMER, WINDING DATA

Former	1/32″ paper base, wrapped with 2 layers of .005″ Empire cloth—49/64″ x 1 1/8″ x 1 7/32″		
Windings	Secondary	Primary	Tertiary
Conductor	No. 33 B. & S., enamelled copper	No. 30 B. & S., enamelled copper	No. 19 B. & S., enamelled copper
Turns	1120	2240	43
Tap			At 22 turns
Turns per layer	112	80	24
No. layers	10	28	1.9
Inter layer insulation	1 layer of .001″ glassine paper	1 layer of .001″ glassine paper	1 layer of No. 50 Kraft paper
Length of winding	31/32″	31/32″	31/32″
Wrapper	3 layers of .005″ Empire cloth	3 layers of .005″ Empire cloth	2 layers of .005″ fish paper
Leads	Start—green Fin.—green-red	Start—red Fin.—blue	Start—black Tap—yellow-red Fin.—yellow
Core	.025″ RAD.4C		
Laminations	A = 3″, B = 2″, H = 3/4″, L = 1 1/4″, W = 3/4″ (See Fig. 28)		
Stack	1″		
Barriers	4—of .010″ fish paper, 1 3/8″ x 1 1/2″, L type		
Test	Sec. Resistance = 83.7 ohms	Prim. Resistance = 110.9 ohms	Tert. Resistance = .27 ohms
Treatment	Brush with clear lacquer		

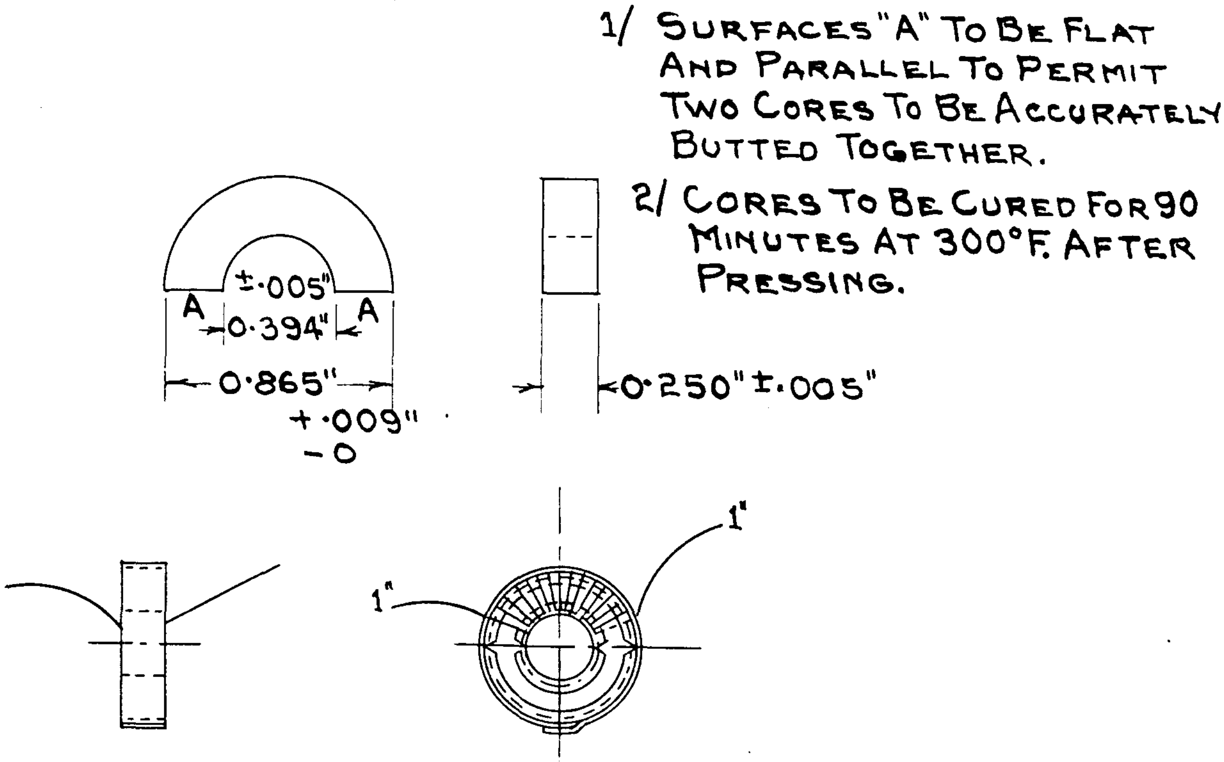

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FIG. 58—T4A, AERIAL COUPLING TRANSFORMER

TABLE 56—T4A, WINDING DATA

Former	Crescent iron core (See Fig. 58)
Conductor	No. 36 B. & S., S.S. enamelled copper
Turns	43—close wound
Test	Q=40 at 3 Mc/s. with resonating capacity of 105 $\mu\mu$F.
Treatment	During winding brush with Polystyrene

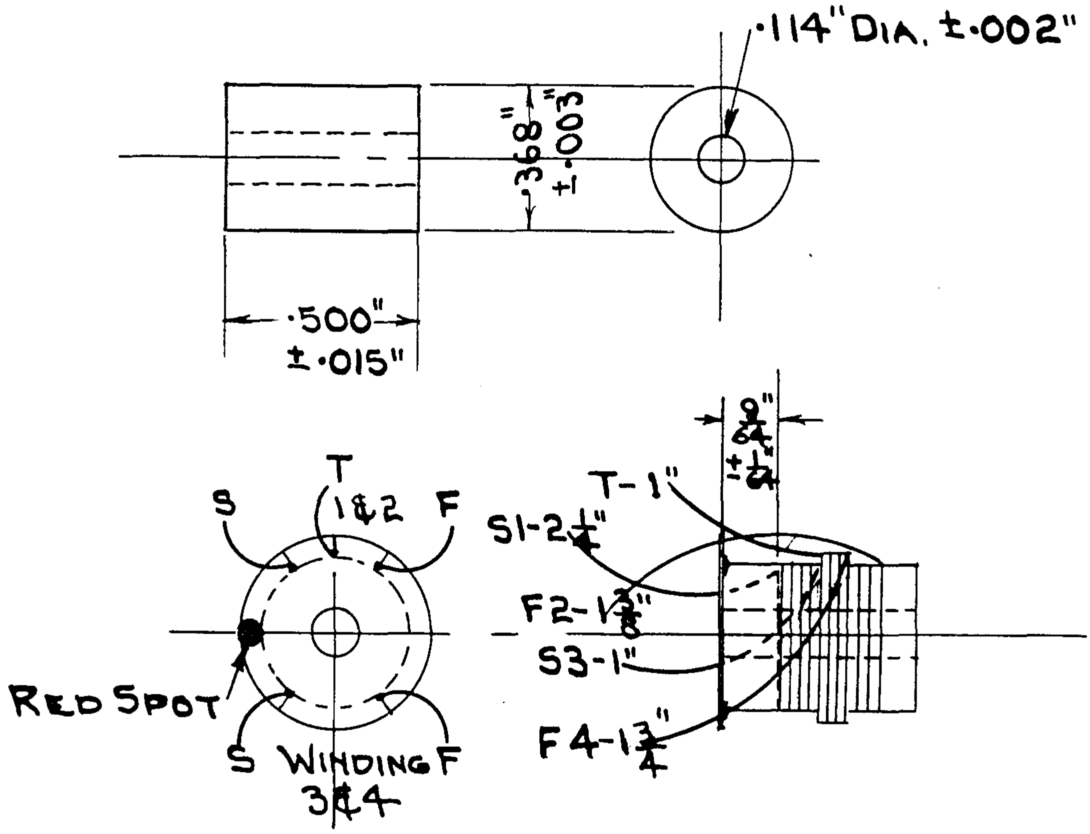

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FIG. 59—T5A, AERIAL TUNING TRANSFORMER

TABLE 59—T5A, WINDING DATA

Former	Porcelain—.5″ x .368″ outside dia.	
Windings	1-2	3-4
Conductor	No. 36 B. & S., D.S.C. magnet	No. 36 B. & S., D.S.C. magnet
Turns	28—close wound	10—close wound
Tap	At 14 turns	
Test	Q=50 at 3 Mc/s. with resonating capacity of 125 μμF.	Q=25 at 4 Mc/s. with resonating capacity of 375 μμF.
Treatment	Brush with Polystyrene during winding	

TABLE 58—T7A, VIBRATOR TRANSFORMER, WINDING DATA

Former	1/32″ paper base, wrapped with 2 layers of .005″ Empire cloth—49/64″ x 1½″ x 17/32″	
Windings	Vibrator	Secondary
Conductor	No. 18 B. & S., enamelled copper	No. 35 B. & S., enamelled copper
Turns	146	2820
Tap	At 73 turns	At 1410 turns
Turns per layer	19	141
No. layers	7.8	20
Inter layer insulation	1 layer of .005″ fish paper	1 layer of .001″ glassine paper
Length of winding	31/32″	31/32″
Leads	Start—yellow Tap—yellow-red Fin.—yellow	Start—red Tap—black-red Fin.—red
Core	.025″ RAD.4C	
Laminations	A = 3″, B = 2″, H = ¾″, L = 1¼″, W = ¾″ (See Fig. 28)	
Barriers	4—of .010″ fish paper, 1½″ x 2″, L type	
Test	Check for continuity. Windings must not short to case	

END