

TELSEN 464 RECEIVER

Circuit.—The H.F. valve, AC/S2/Pen (V1), is preceded by a tuned secondary aerial transformer with iron-cored coils. A variable condenser in series with the aerial lead forms a volume and selectivity control. At its maximum position the vanes are short circuited, allowing maximum sensitivity to be obtained.

In addition to the trimmer inside the tuning condenser, a variable trimmer is mounted on a spindle concentric with the gang spindle.

The valve is used with fixed bias, and coupling to the next valve is by another tuned secondary transformer, and the anode circuit is properly decoupled.

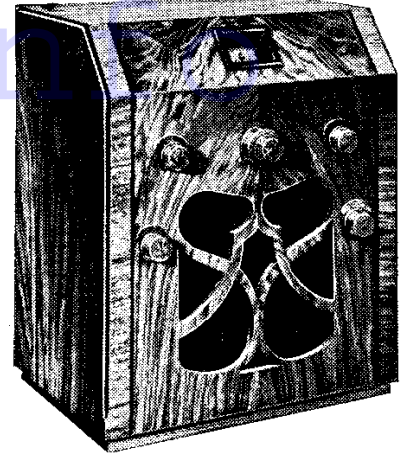
The detector valve, MH4 Catkin (V2), operates as a leaky grid detector with reaction applied by means of a differential

condenser, and the pick-up connections are between the grid and chassis. Parallel-fed transformer coupling with full L.F. decoupling completes the anode circuit.

The output valve, AC/Pen (V3), has a stabilising resistance in its grid lead, and a variable condenser between the anode and chassis acting as a tone compensator. The potential for the auxiliary grid is obtained through a 10,000 ohm voltage dropping resistance. The output transformer feeds the speech coil through a hum-bucking coil.

The mains equipment consists of transformer, a full-wave rectifier, Micromesh R2,

(Continued on opposite page.)



The "464" by the Telsen Electric Co., Ltd., is a straightforward screen-grid, detector and pentode receiver for A.C. mains supplies.

RESISTANCES

R.	Purpose.	Ohms.
1	V1 cathode bias...	300
2	Lower part of aux. grid ptr. V1	50,000
3	Upper part of aux. grid ptr. V1	50,000
4	V1 anode decoupling ...	15,000
5	V2 coupling to transformer ...	25,000
6	V2 anode decoupling ...	50,000
7	V3 cathode bias...	300
8	V2 grid leak ...	5 meg.
9	Filament potentiometer ...	30
10	Stabiliser in grid of V3...	250,000
11	Voltage dropping ...	10,000
—	L.S. field ...	2,500
—	Primary of output transformer	570

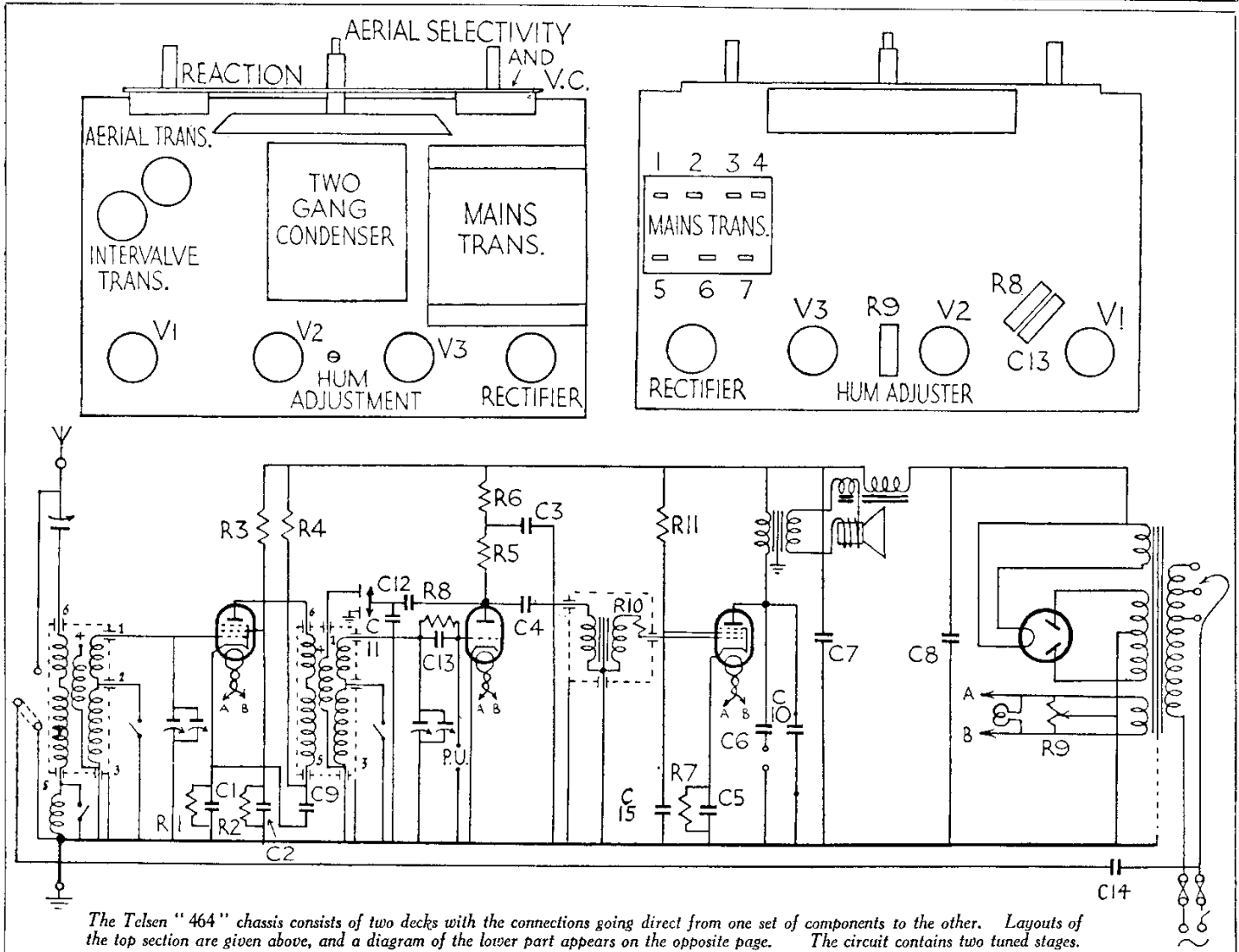
CONDENSERS

C.	Purpose.	Mfd.
1	V1 cathode1
2	V1 aux. grid ...	1
3	Decoupling anode V2 ...	2
4	Filter to L.F. transformer5
5	V3 cathode ...	2
6	Between V3 anode and ex. L.S. terminal	1
7	H.T. smoothing (electrolytic) ...	8
8	H.T. smoothing (electrolytic) ...	8
9	V1 anode decoupling1
10	V3 anode tone compensator01
11	V2 anode by-pass0005
12	Feed from V2 anode to reaction circuit.	.1
13	V2 grid condenser0001
14	Mains aerial005
15	V3 Aux grid decoupler ...	2

VALVE READINGS

No signal and no reaction.

Valve	Type.	Electrode.	Volts.	M.A.
1	A.C./S2/Pen.	anode ...	198	4.5
		aux. grid ...	95	
2	M.H.4 (Cat.)	anode ...	70	2.7
		aux. grid ...	262	
3	A.C./Pen.	anode ...	270	36
		aux. grid ...	270	



The Telsen "464" chassis consists of two decks with the connections going direct from one set of components to the other. Layouts of the top section are given above, and a diagram of the lower part appears on the opposite page. The circuit contains two tuned stages.

(Continued from previous page.)

and L.S. field in the positive H.T. lead, and two 8 mfd. electrolytic condensers.

An artificial centre-point of the set filament winding is obtained by a variable potentiometer across the winding, which is accessible from the outside. This acts as a "hum" control.

Special Notes.—There are really two chassis in this set, the block condensers and resistances being mounted above the lower deck and the mains transformer, tuning coils, condensers and valves being on the upper deck.

This allows the leads to the various components to be taken direct from one deck to the other. As these are not covered, almost all the components are easily reached without removing the chassis.

Quick Tests.—Use an insulated test prod for voltage tests at top ends of resistances on panel. For convenience, these have been numbered on the circuit diagram in the order in which they are mounted. Beginning from the left (looking from the back) :—

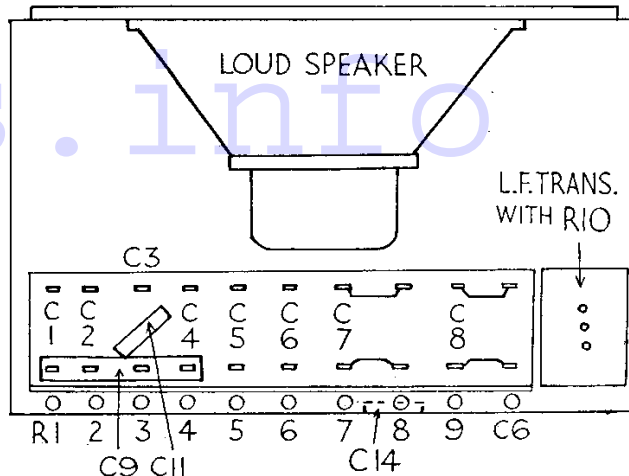
- R1 (bias on V1), 1.5 volts negative.
- R2 (aux. grid of V1), 95 volts positive.
- R3 (aux. grid of V1), 95 volts positive.
- R4, voltage to V1 anode, 198 volts positive.
- R5, V2 anode, 70 volts positive.
- R6, H.T.+smoothed, 270 volts positive.
- R7, bias on V3, 12 volts negative.

Corner socket on rectifier valve holder (H.T.+unsmoothed).

Removing Chassis.—Remove knobs (grub screw), unscrew wave change switch lever, remove four screws underneath cabinet and six wood screws holding brackets.

General Notes.—In our model the tone compensator condenser C10 was connected to the low H.T. potential side of C6 (an equiva-

This diagram shows the arrangement of components on the lower deck of the Telsen 464 chassis. For convenience the resistances and condensers are numbered in the order in which they are found on the chassis.



lent method). The condenser C12 was not in our model.

The grid stabilising resistance of V3 is inside the L.F. transformer container, which is complete as a unit.

To reach the terminals underneath the upper deck, and those on the block condenser on the lower deck, it is advisable to release the speaker by undoing the six screws holding the wooden frame to the chassis. The leads are sufficiently long to allow the speaker to be laid at the side while repairs are being carried out.

Comparison with the lay-out diagram of the condensers and resistances should obviate difficulties in reconnecting leads.

The leads to the L.F. transformer unit are :—Black, earth; yellow to C4; yellow and red to V3 grid.

Mains Transformer.—Four terminals in front (counting from outside) : 1 and 2, rectifier filament; 3 and 4, set filaments.

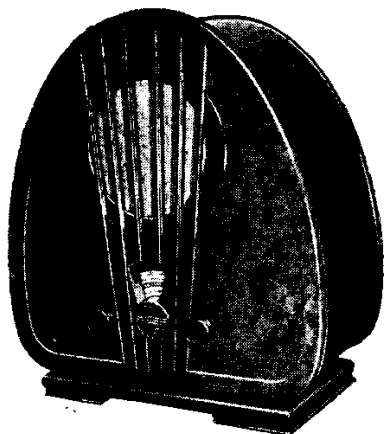
At rear (counting from outside) : 5 and 7, rectifier anodes; 6, earth (H.T.—).

Switch contacts are :—Inner pair, green lead to anti-break through coil near V2 valveholder, black lead to coil tapping; outer pair, black lead to coil and systoflex covered lead to chassis. Contacts are easily cleaned with a piece of clean tape.

Replacing Chassis.—See that rubber washers are in correct position inside the cabinet (it is advisable to use scotch tape to hold them) and lift chassis into cabinet.

Replace six screws on brackets and four screws underneath.

Screw in the wave-change switch lever and replace the knobs.



Super-inductance tuning developed by Philips Lamps, Ltd., gives their 834A "straight" mains five high selectivity, although there are only two tuned circuits.

Circuit.—The first H.F. valve, MM4V (V1), is preceded by a single-tuned aerial circuit with alternative aerial series capacities. The variable-mu characteristic is used by varying the bias through the variable resistance, R1, in the common negative H.T. lead. Coupling to the next H.F. valve is by H.F. transformer with tuned secondary.

The second H.F. valve, S4VB (V2), is a "straight" S.G. with a fixed cathode biasing resistance, R10. It is coupled to the detector valve by a semi-aperiodic H.F. transformer, as in other models.

The detector, a PM994V (V3), is a triode used as an anode bend detector, and is resistance-capacity coupled to the output valve.

The output valve, PM24A (V4), is a directly-heated pentode. The grid circuit contains an H.F. stopper, R19, and the anode circuit has the usual tone-compensa-

ting condenser, C21, connected between the anode and H.T.

The mains transformer has primary tapings, making it suitable for use on A.C. mains from 103 to 253 volts (the diagram of connections is inside the lid). Full wave rectification by a 1821 is followed by resistance and condenser smoothing, with large electrolytic condensers.

The smoothing resistances are in the negative lead, and provide bias for the first H.F. valve and the pentode. The H.T.+ lead has an air-cored choke.

A permanent magnet moving-coil speaker is fitted.

Special Notes.—This set has the mains plug fixed to the back panel, so that when the back is taken off the mains are automatically disconnected.

The A.1 terminal is not connected to anything in the set, as the capacity between the metal socket and the aerial wire is sufficient in many cases.

The small jack-plug at the back must be inserted into the appropriate socket, "R" for radio, and "P" for pick-up. This operates by connecting the grid of V3 to the semi-aperiodic coil in the "R" socket, and to the pick-up terminal in the "P" socket.

VALVE READINGS
V.C. max.

Valve.	Type.	Volts.	M.A.
V1 ...	MM4V ...	220	2.5
V2 ...	S4VB ...	60-65	2.2
V3 ...	994V ...	220	
V4 ...	PM24A ...	95-110	
		80-90	.15
		200	18
		220	

Quick Tests.—Between the primary terminals on speaker transformer and chassis. (1) 220 volts, (2) 200 volts (V4 anode).

Removing Chassis.—Unsolder earthing lead to speaker support from soldering tag on C2.

Remove knobs (grub screw) and four screws underneath. Unsolder the L.S. leads from the transformer.

Removing Speaker.—If this has to be removed it is better to undo the bolts holding the front of the cabinet. These are easily recognised by the moulded projections that secure them.

The speaker can then be freed by undoing the nuts holding the frame.

General Notes.—When the wiring has to be disturbed care must be taken that the disarrangement does not cause a short circuit.

The resistances on the panel at the end of the chassis are Philips own manufacture, and are obtainable for replacement. In soldering the connections take care that the iron is not too hot.

Connections to Mains Transformer.—Front, outside, beginning next baseplate : (1) H.T.—; (2) rect. fil. (H.T.+); (3) rect. anode; (4) rect. filament; (5) rect. anode.

Front, inside : (1) Set filament; (2) centre tap to chassis; (3) set filament.

When a transformer has to be replaced it is necessary to connect the mains tappings to the panel on the chassis.

When a transformer is sent out by the makers, a complete wiring diagram is enclosed with it.

If the ganging is disturbed the set must be returned to the makers, as the alignment

(Continued on next page.)

TELSEN 464

Three valve, plus rectifier, two waveband, TRF receiver for operation from AC mains. A mains aerial device is incorporated and provision is made for connecting a PU and extra loudspeaker. Marketed by Telsan Electric Co, Ltd, in 1933.

SIGNALS pass first through a variable condenser VC1 which acts as a selectivity and volume control. When in the maximum capacity position, the fixed and moving vanes are shorted thus connecting the aerial direct to the aerial coupling coils for maximum volume and sensitivity.

When desired, the mains may be used as an aerial by plugging C14 into the aerial circuit. When not required, C14 is earthed thus effecting a certain amount of mains filtering.

The aerial coupling coils are aperiodic but an extra switched coil may be brought into circuit on LW to load up the aerial circuit and improve selectivity by preventing MW breakthrough. A winding shown in the accompanying circuit

diagram between the coupling and secondary coils is not employed in the aerial coil assembly. It is used for reaction purposes in the HF transformer which is a similar assembly.

The secondary windings of the aerial coil are tuned by VC2 and feed the signal direct to the grid of the HF pentode V1, which is biased by R1 decoupled by C1. The screen of this valve is fed from the potential divider network R2, R3 and decoupled by C2.

R4 decoupled by C9 feeds the anode of V1, which is coupled to V2, the triode detector, by an HF transformer. The primary coils are aperiodic, but the secondaries are tuned by the VC3 section of the two-gang tuning condenser. R8 and C13 are the grid leak and condenser.

C12 (which is not present in some chassis) is an HT blocking condenser to guard against any breakdown to earth in the reaction circuit which comprises the differential variable condenser VC4 and a winding on the HF transformer. C11 is the anode bypass condenser for V2.

PU sockets are introduced across the grid-cathode circuit of V2 and, as the valve is not biased, a separate volume control across the PU must be used to prevent overloading of V2 and consequent distortion.

The anode circuit of V2 is decoupled by R6 and C3 while R5 is the LF coupling resistance which, via C4, introduces the LF signal to the primary of the inter-

valve transformer. The secondary of this transformer feeds the grid of the output pentode V3 via a grid stopper R10 which is located inside the transformer container.

V3 is biased by R7 which is decoupled by C5, while the screening grid is fed from the HT line by R11 decoupled by C15. A certain amount of permanent tone correction is effected by C10. The low impedance energised loudspeaker is coupled to V3 by an output transformer, a hum-bucking coil being introduced into the speech coil circuit.

A high impedance loudspeaker, or a low impedance speaker with suitable pentode matching transformer, may be connected to the extra loudspeaker sockets which are fed from the anode of V3 via C6.

The HT and LT supply circuits follow conventional lines. The output from the full wave rectifier V4 is smoothed by the loudspeaker field winding and condensers C7, C8. A hum control potentiometer, R9, is connected across the heater supply circuit.

GANGING

The trimmer T2 should be adjusted on a signal of about 210 m with no reaction. T1 trimmer is arranged so that it may be adjusted by the operator as a fine tuning control and is concentric with the main tuning control.

Testing by Signal Injection

ARTICLES in "Service Engineer" describing how a signal generator can be used for stage-by-stage testing recently brought from a reader a complaint that he did not seem to be able to get the results described. As it explains points which may have interested other engineers, we here publish the reply sent to him:—

Typical Instruments

Results do depend a great deal upon the type of oscillator being used, but, generally speaking, most oscillators, provided that they are working up to standard, should be capable of giving sufficient out-

put to enable signal tracing to be carried out.

Before writing this reply we have carried out some experiments on a standard type of four-valve, plus rectifier, mains superhet using a battery service oscillator with a circuit very similar to yours and also to that shown in the second article of our series dealing with the maintenance of servicing equipment (January, 1943).

On injecting to the anode of the IF valve results on normal output from the service oscillator were very weak, but quite a good signal was obtained on the high impedance output, or, as you term it, "full force."

At the grid of the IF valve a good signal was obtained on the low impedance output, the increase in signal strength being due, of course, to the amplification of the IF amplifier.

Loss in IF Coupling

Injecting to the anode of the previous valve (the frequency-changer), signals were less than at the IF grid, due to losses in the IF transformer and coil coupling.

At the frequency-changer grid signals were very loud.

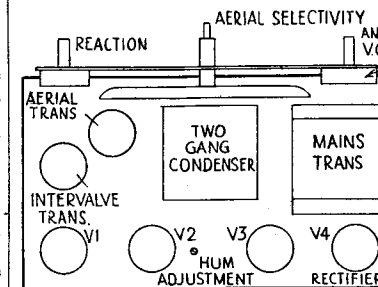
These tests were made with the volume control of the receiver at maximum, and we used a very small coupling condenser of some 350 mmfd's between the HF lead of the service oscillator and the test points.

Overloading and AVC

An interesting feature is that with a high input into the frequency-changer grid test point signals were lower than at the other test points, due, no doubt, to overloading of the frequency-changer and to AVC action. In all cases the earthy lead of the service oscillator was connected to the chassis of the receiver.

Possibly the output circuit of your oscillator has a rather large capacity effect when placed in parallel with the trimmers of the IF transformers, and you may obtain better results by using a very small capacity condenser in series with the injection lead.

In your case it would appear that the use of an external LT battery may be causing radiation from the oscillator so that the IF circuits are receiving the input direct instead of only through the oscillator test leads. This can be the only explanation to account for the fact that you can get a signal right through the receiver when the secondary winding of the first IFT is open-circuited.



The top of chassis layout identifying the principal components. There are only two trimmers, both located on the gang condenser.

CONDENSERS

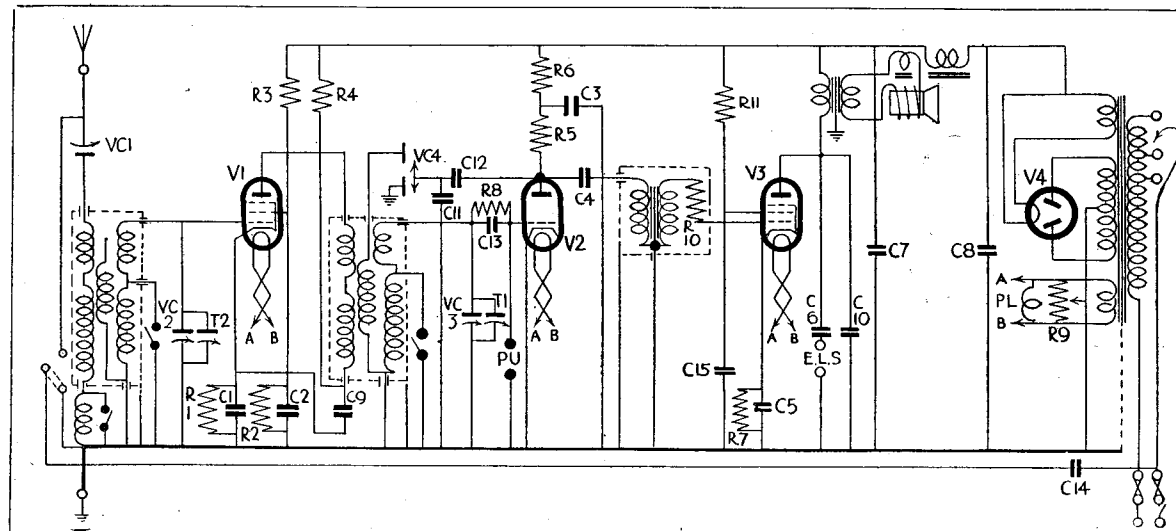
C	Mfds	C	Mfds
1	.1	9	.1
2	1	10	.01
3	2	11	.0005
4	.5	12	.1
5	2	13	.0001
6	1	14	.005
7	8	15	2
8	8		

RESISTANCES

R	Ohms	R	Ohms
1	300	8	5 meg
2	50,000	9	30
3	50,000	10	.25 meg
4	15,000	11	10,000
5	25,000		LS field 2,500
6	50,000		Primary of
7	300		O/Transfr. 570

VALVE READINGS

V	No signal and no reaction.	Type	Electrode	Volts	Ma
1	AC/S2/Pen	Anode	Screen	198	4.5
		Screen	Anode	95	—
2	MH4	Anode	Screen	70	2.7
3	AC/Pen	Anode	Screen	262	36
		Screen	Anode	270	7
4	R2 (micromesh)			—	—



This popular 1933 model still brings requests for service data. The set is a straight three for AC operation and is a typical set of the time. Note the differential reaction condenser VC4 and parallel-fed LF transformer.