

## G3WDG005 2 Stage Amplifier

The G3WDG005 2-stage amplifier can be constructed in two forms, a standard version and an "F" version. The latter contains a narrow-band filter to provide rejection of image noise, when the following receiver has low or no image rejection. The circuit diagram covering both types is shown in Fig 005/1. Microstrip matching circuits are used throughout, and DC blocking is provided by C1, C4 and C9 (or the filter in the F version). High impedance quarter-wave chokes are used to feed the bias voltages and drain currents are set by adjusting the gate bias potentiometers VR1 and VR2.

For low-noise applications, a "red dot" FET is recommended. In case of otherwise incurable instability this may be replaced by a "black dot" device with a small penalty in noise figure. Where the amplifier is to be used as a PA, F1 should be a "black dot" device. None of the prototypes showed any sign of instability with a "red dot" device in the first stage. Lossy rubber glued to the inside of the RF compartment lid helps to guarantee stability.

The layout of the amplifier is shown in Figs 005/2 and 005/3. Construction follows the methods described in the first part of this booklet. For the standard amplifier C9 is fitted and gap "S" is bridged, for example by a piece of FET source lead. For the F version, ensure that the board has clearance holes around the filter probe pins "C" and that the piece of microstrip between them has been removed. When fitting the filter probe pins, take care not to push them too hard, as it is possible to push them through the board. The only other constructional point which requires attention is the fitting of the lossy rubber to the lid of the box. The best adhesive for this found by the writer is Evostick. A thin smear is applied to the rubber, and after drying for a short time the rubber is applied to the lid. It is best if the rubber is clamped in position, as otherwise the corners have a tendency to lift while the glue is drying.

The power supply for the G3WDG005 is configured for 5 volts. Referring to Fig 5 and 6, the zener diode is replaced by a shorting link and the i.c. regulator required is a uA7805 or 78L05. The value of R1 is 4.7k.

Alignment of the module is straightforward. For the standard version simply set the drain current of F1 to 15mA and F2 to 20mA. For power amplifier applications the currents can be readjusted later for best gain/power output. For low noise applications, the currents may be set later for optimum gain/noise figure if equipment is available to measure this. However the values given will be close enough for most purposes. The F version of course requires the filter to be tuned to the required frequency. For receivers, simply adjust the tuning screw for highest noise output. If the receiver has poor image rejection it is likely that two peaks will be found, approximately 3/8 turn apart. If a 10224MHz LO is used with a 144MHz IF the correct peak is the one with the screw further OUT of the cavity (higher frequency). The correct way to adjust the screw is to maintain some tightness on the locknut with a spanner while adjusting the screw with a screwdriver (like setting tappets). Some constructors have found the silver plated screws supplied slightly too short. The solution is to either file the top conical section off the filter cavity (prior to assembly is best), or to use a half-nut as the locknut. If there is any doubt that the cavity is not tuning correctly, it is perfectly satisfactory to check out the amplifier with a longer brass or steel screw from another source (M4 thread).

Typical performance for the prototype amplifiers was 18-20dB gain with 1.9-2.0 dB noise figure.

### Parts list

C1, C4, C9	2.2pF ATC SMD
C2, C3, C5, C6	180pF SMD (0805 size)
C7, C8	10uF Tantalum bead
R1-4	47R SMD (0805 size)
VR1-2	10K
L1-4	wire inductors 0.2mm dia
F1	P35-1145 (Birkett "red spot") [see text]
F2	P23-1108 (Birkett "black spot")
FL1	cavity filter
Misc:	Tinplate box type 7752 (Piper Communications)
	2 off SMA flange connectors
	1000pF feedthrough capacitor
	G4FRE023 psu board and components
	16 off 1mm veropins
	G3WDG005 pcb
	Piece of lossy rubber

### Items in G3WDG005 short kit

	G3WDG005	G3WDG005F
G4FRE023 PCB	1	1
G3WDG005 PCB	1	1
2.2pF ATC (loose)	3	2
47R chip (green)	4	4
180pF chip	4	4
Veropins	11	16
Filter metalwork	0	1
Lossy rubber	1	1
Booklet	1	1

### Acknowledgement

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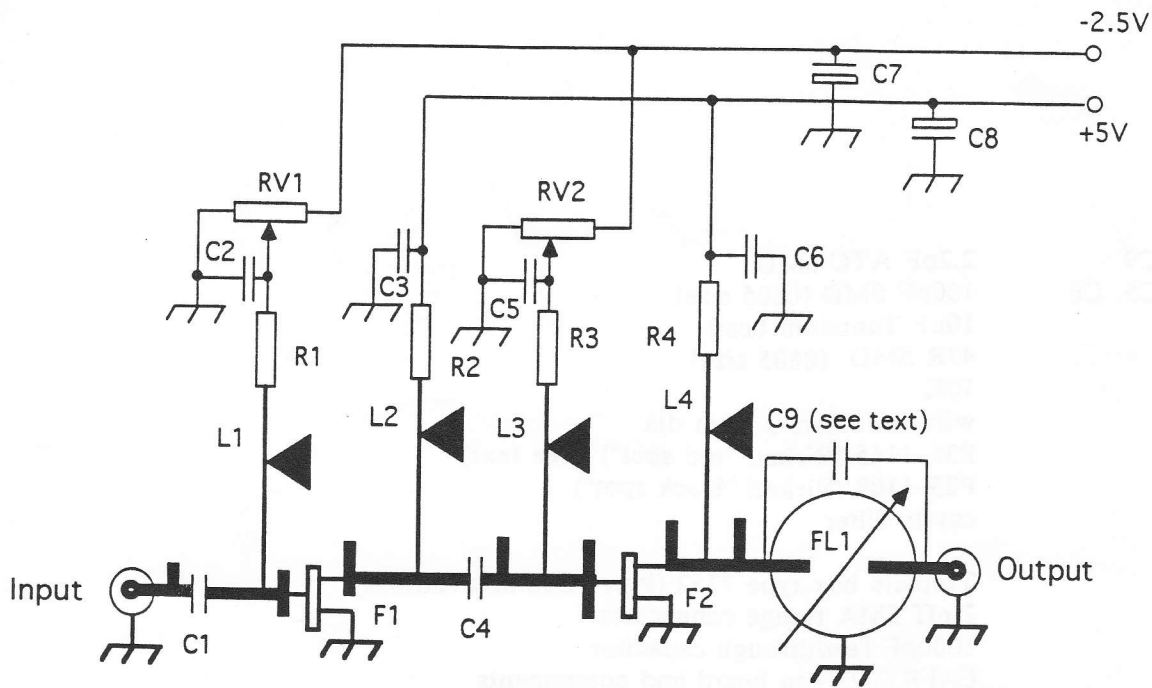
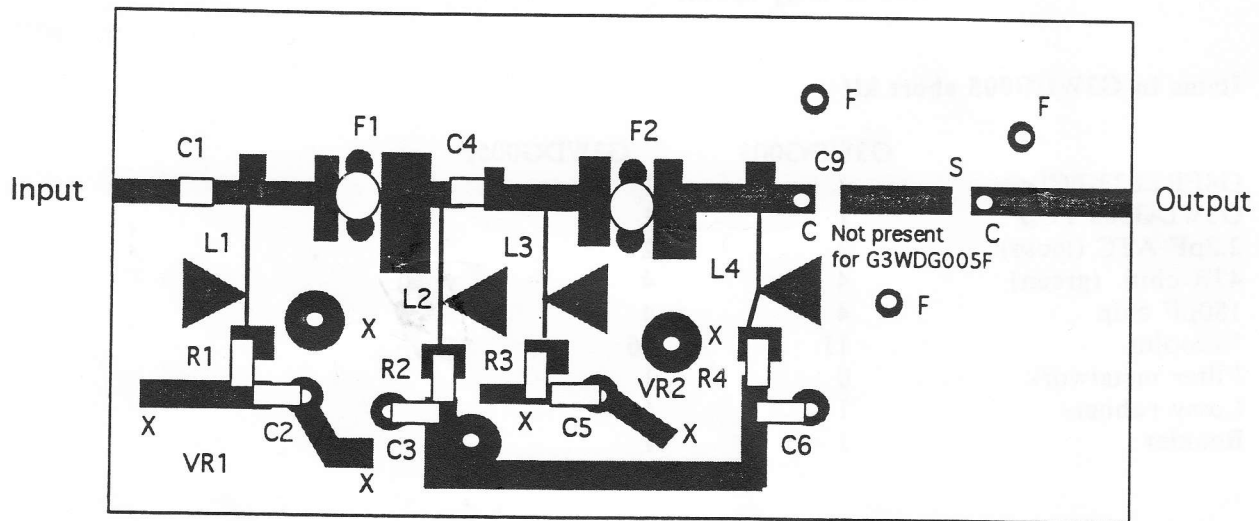


Fig 005/1 Circuit diagram of the G 3WDG005 amplifier



- C = Filter probes (L= 3.4mm [see Fig 2a])
- F = Filter locating pins
- S = Shorting link (see text)
- X = Position of VR1 and 2 connections

Fig 005/2 Layout of RF components

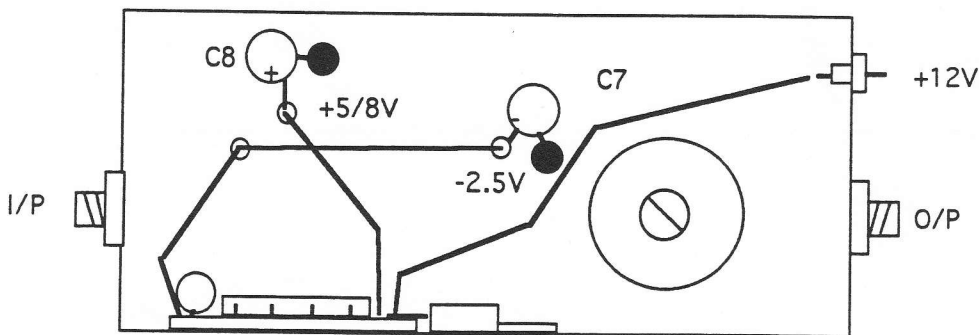


Fig 005/3 Layout of DC circuitry