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The Montis phone transmitter

Introduction

This phone transmitter is normally used with the Sutton receiver. Together they are called the **Sutton Montis** which is a small village in Somerset! It is a broadband nominal 1.5 W double sideband suppressed carrier TX for use up to 10m, with its own PCB mounted output low pass filter (normally 80m); it also has a relay to select alternative external filters – normally those of the Sutton band cards. Frequency control is normally from an external source such as the Sutton's LO tuneable output. Thus it can be used as a transceiver with the Sutton on 80m or whatever band is plugged into the RX. It has changeover circuits for the antenna and muting of the Sutton receiver.

The main PCB is 80 x 100 mm and has to be mounted close to the Sutton receiver, normally being placed immediately behind it. The kit includes all parts to make it open style as shown in the photographs but it can be easily boxed if you prefer. Please read right through these instructions thoroughly before commencing assembly! The parts are numbered:-

Sutton receiver from 100
Receiver band parts from 150
(Mallet CW general transmitter parts from 200
Mallet CW transmitter band parts on the Sutton plug in cards from 250
Mallet CW transmitter main PCB optional extra parts from 270)
Montis phone transmitter parts from 300

Technical Description

The block diagram is shown in Fig. 1. The circuit is shown in Fig 3.

Supply aspects: The supply voltage can be in the range 8.5 to 22 volts. A power diode is included to provide reversed supply protection. A 6 volt zener diode D302 provides a stable low voltage supply when the PTT switch is pressed.

Control aspects This is entirely dependent on operation of the mike push to talk (PTT) switch which grounds the input point P. This turns on TR300 to activate the antenna relay RL301 and the RF stages. The antenna relay reverts to reception immediately point P is ungrounded. With P grounded, the internal 6 volt supply to IC300 is also used to apply bias to the output stage via RT301 and to turn on the muting FET TR305. This is connected via point M to the muting input of the RX to silence it during transmission.

Speech amplifier Transistors TR306/7 are connected as a feedback pair so that audio output is developed across R312 where there is normal DC level of just over 2 volts - sufficient to just turn on TR307. The voltage gain is nominally 100 for speech signals with a bandwidth limited by C322 to about 3 KHz. The Mike gain preset RT302 provides the normal input impedance for commonly used dynamic microphones. If the CW kit is to be used, its transmitter sidetone is injected at point W where the gain is lower at about 20. The speech amp is active all the time to prevent nasty thumps when going to transmit.

Modulator The doubly balanced mixer IC300 has the local oscillator input applied at point C from an external source – usually the LO output of the Sutton. The mixer is broadband and produces both audio sidebands either side of the LO, like AM but with the carrier suppressed. A buffered version of the LO input can be observed on pin 7 of this chip. The modulator is switched off during reception to let the buffer stage TR304 cool off, especially on high supply voltages, as it runs with quite a high current. The source output of the buffer is connected to the Drive preset RT300. (This preset must NOT be changed to a front panel control as it is carrying RF signals.) The modulator can also be grossly unbalanced, to produce an un-modulated output carrier, by grounding point R – this is not suitable for producing proper CW signals but can help with setting up (see later).

RF driver stage The DC feedback pair TR302/3 provide RF gain and a low driving impedance for the output stage, which is required for the higher frequencies – hence the need for the output 2:1 bifilar transformer L304. The output impedance is further reduced by the negative feedback applied through L305/R304, which is made frequency dependent to increase the gain at higher frequencies. The first stage TR303 is run off the PTT switched supply (point T) so that both transistors can cool off during reception.

RF output L302/3 are high impedance RF supply chokes. The direct 50R load on the drain of TR300 from the antenna/filters defines this as a '1.5W' rig when used on a normal 13.8 volt supply. The output IRF510 FET is mounted on a finned heatsink as it has to have a significant DC current to achieve reasonable linearity for the amplitude modulated sideband signals. Its bias is set by RT301 and is turned off during reception. The PCB normally has an 80m low pass filter fitted at L300/1 etc, this is selected when RL300 is turned on by the receiver's band-switch connected to point 80. (The L300/1 filter can also be built for other bands.) The TR relay contacts RL301/A connect the antenna to RX or the TX filters as appropriate - its other contacts are spare. Since all the transmitter stages are broadband, except for the output filters, it can work with any LO frequency from the Sutton receiver provided there is an appropriate transmitter low pass filter on the band card. In this way, changing the Sutton receiver band-card automatically makes the necessary changes for the transmitter. RF output does vary appreciably with supply voltage; removing L303 allows a higher output supply to be applied to C308/TR301 (for increased output) while the rest of the rig can use a normal supply voltage. Provision is also made for connection of the standard 10W Linear amplifier to the two points L between TR300 and the filters; this enables the Linear to use the existing filters and antenna changeover of the transmitter.

Mechanical aspects

When used with the Sutton RX, the Montis should be mounted close behind the rear edge of the RX. The ground planes should be well bonded together. Two PCB joining strips are provided to form a rigid joint over the joining line of the two PCBs. If a box is to be used, do provide plenty of ventilation, as the constrained heat will impair the frequency stability of the ceramic resonators in the RX.

General Construction Advice

Not all of the points below maybe applicable to your particular kit but in general you should sort the parts into different types and check against the parts list to make sure all are present and can be identified. If some parts come in a separate band bag do not mix them with the rest! The electrolytic capacitors supplied may have a higher voltage rating than stated in the parts list - this is quite in order - their polarity is indicated by the minus sign on one side of their body. If necessary, use a magnifying glass to read the value of small ceramic plate capacitors or, if possible, measure them. The number printed on capacitors is the value and does not indicate the temperature characteristics. Comparing the actual number of each size with the parts list can also help. The smaller the capacitance value, the smaller will be the physical size - examine them very carefully because small changes in size will help identify them. If there is any doubt about the colour code of resistors, check their value with a meter. When resistors are mounted on end, put them into the board as shown in the layout diagram since the top end maybe used as a test point. There are also pads for additional test points into which you can solder 10mm off cuts of stiff wire or Vero-pins. Turn all presets fully anti clockwise now as a safety precaution.

The PCB is etched on one side, with a continuous ground plane on the other top or component side, so beware of pushing parts in too far and shorting unintentionally to the ground plane at the edge of the countersinking; take particular care with chokes, integrated circuits and the leads of transistors which are more prone to touching the countersinking of non-earthy holes. The PCB has been lacquered to resist oxidation; it is specially designed to be soldered through so do not attempt to remove it! Only insert parts with the power off. Follow the layout diagram *very* carefully and it is a good habit to compare the circuit with the track pattern as you insert parts so as to check for correct part location and to help understanding of the circuit. If you have difficulty finding a particular part on the layout diagram, use the circuit to identify its 'role' and hence to find its general position on the PCB. The layout diagram shows large black "blobs" on the earthy end of some components (usually resistors or disc capacitors) which are connected to 0 volts; you have to solder these points on the top of the board as well as on the track side in order to make the ground connections. *Failure to make these ground connections is the most common source of trouble.* For these ground connections, disc capacitors may need to be soldered in place with their earthy lead slightly high to be sure of enough lead length to obtain good solder adhesion close to their body. Make all these ground plane top-side connections as you insert each part or you will miss some out! In the construction sequence later, they are marked with an E in brackets. The PCB is arranged so that you only need to solder those parts on the top side of the board that can easily be soldered on both sides. Do not attempt to solder other earthy parts to the ground plane as their shape is not suitable. For each table, do the left column first as this usually contains the earthy parts which are best fitted before others. Earth/0 volt tracks are shown with 'hairs' similar to those of a chassis symbol. Use an 18 Watt iron with 60:40 tin/lead resin cored solder; you may find that the protective lacquer requires the iron to be applied for slightly longer than normal to obtain a good joint – this will not damage the parts. Some transistors and integrated circuits are static sensitive, so it is desirable to use a proprietary personal earthing strap - especially if your shack is dry and has a synthetic carpet! Keep the semiconductors in the black static conducting bag until needed. Make sure your iron is earthed and connecting your PSU 0 volt terminal to mains earth through a 1M resistor is sensible. The layout diagram shows the position of individual parts as viewed from on top of the component side; the transistors are drawn as though you could see all of their leads to help get their orientation correct, in reality part of their leads will be obscured by the transistor's body. Take particular care with the orientation of transistors and integrated circuits which can easily be put in the wrong way round. Some transistors may need their central lead bending the opposite way to that done by the manufacturer. All parts should be on the ground plane side of the PCB. Load the PCB in the order suggested and test each stage as you go. As you insert parts, cross them off in the construction sequence. This approach much increases the chances of it working properly from the start! Do not build the whole thing and hope it will work! Spares for all parts are normally readily available from Walford Electronics.

Assembling the PCB

Fig. 2 shows the parts layout. Start with some parts to help locate others later:-

Four rubber feet underside			RT301	10K Preset	
Four screw terminal block			RT302	1K Preset	
Mike Socket – see below			RL300	DPCO Relay	
RT300	220R Preset		RL301	DPCO Relay	

The mike socket can be fitted to the PCB or to a front panel; when used with the Sutton RX, there is space for it in the bottom right of the PCB front panel. When fitting the mike socket to the front panel remember to connect the sleeve contact to 0 volts and connect the tip contact to point Q, the ring contact to point P on the TX PCB. Turn all three presets fully anti-clockwise. Next fit the main supply parts:-

C308	10 nF disc - 103	(E)	L302	47 µH choke	
C325	10 nF disc	(E)	L303	47 µH choke	
C324	10 µF 35v electro	Check polarity	D303	21DQ06	Check orientation

There is not much that can be sensibly checked here, so add the control parts:-

C319	10 nF disc	(E)	D300	1N4148	Check orientation
R300	1K - BN,BK,RD		D301	1N4148	Check orientation
R301	4K7 - YL,VI,RD		D302	6v2 Zener	Check orientation
R308	330R - OR,OR,BN		TR300	BC212 –C/L fwd	Check orientation
C310	10 nF disc		TR305	BS170 – C/L fwd	Check orientation

Arrange to be able to ground point P, either with your mike PTT switch or by a temporary lead. Connect up your supply to the four screw connector and prepare to measure the DC voltage on point 6 with respect to 0 volts – switch on and the voltage should be 0 volts. When you ground point P the relay RL301 should click on and the DC voltage on point 6 rise to near 6 volts. When you disconnect point P the relay should click off immediately. You can also check that RL300 clicks on by grounding point 80. Switch off and start on the speech amplifier:-

R312	1K	(E)	C320	10 µF 35v electro	Check polarity
R311	330R		C321	1 µF 35v electro	Check polarity
R313	100K - BN,BK,YL		C322	470 pF – 471	
R314	1K		C323	1 µF 35v electro	Check polarity
R315	100K		TR306	BS170 – C/L fwd	Check orientation
R316	1K		TR307	BS170 – C/L fwd	Check orientation
R317	4K7				

Get ready to measure the DC voltage on junction of R312/R313. Switch on, the voltage should be near 2 volts. If you temporally connect a general purpose audio amp to the IC300 side of C321, and connect your microphone; you should be able to hear your own audio from the mike when RT302 is advanced (beware that some mikes also need the PTT to be pressed). Switch off and fit the balanced modulator and buffer:-

C314	10 nF disc	(E)	C318	1 µF 35v electro	Check polarity
R309	47R - YL,VI,BK		IC300	SA602/612	Check orientation
R310	47R		TR304	BS170 - C/L back	Check orientation
C317	10 nF disc				

Switch on, ground point P or press the PTT switch, and measure the DC voltages on pins 1 and 2 of IC300 – they should be the equal at about 1.25 volts. The DC voltage on pins 4 and 5 should also be equal at near 5 volts. The DC voltage on the junction of RT300 and source of TR304 should be near 2.5 volts. Switch off and fit the RF drive stage:-

R305	150R BN GN BN	(E)	R307	150R	
C312	10 nF disc	(E)	C315	10 nF disc	
C313	10 nF disc	(E)	L305	10 µH – 100J - moulded	
R303	150R		L304	10t bifilar on FT50-61 – see below	
R304	150R		TR302	BS170 –C/L back	Check orientation
R306	47R		TR303	BS170 – C/L back	Check orientation

L304 is wound as 10 bifilar turns of 27 gauge enamelled wire on a black FT50-61 toroid. Take 500 mm of the wire to make a twisted pair; start by bending it back sharply in the middle to form a 'knob' so that you can easily grip it; then separate out and straighten the free ends. Assuming you are right handed, hold this 'knob' in your right hand; then pull and twist the 'knob' so that the two loose ends run separately through the fingers of your left hand to prevent them tangling each other. Aim for about 3 to 5 twists every 25 mm with an even pattern. Having twisted and tidied up the wires, put them through the middle of the black FT50-61 core and run it to the middle of the twisted pair. This will be the first turn as each time it goes through the middle of the core, it counts as one turn. Put on 4 more turns with one end of the pair; then with the other end, put on the remaining 5 turns. Space the turns evenly around about three quarters of the core's circumference. Cut the ends off about 25 mm from the core and separate out the individual wires. You now need to identify the wires with your multi-meter. First identify the two ends of either wire, i.e. one that DOES show continuity, call these ends A1 and A2. The ends of the other wire will be B1 and B2. Now twist together the opposite ends A2 and B1 of the two wires to form the centre tap - there should NOT be any continuity between them prior to this twisting together! Leave their other ends free. Burn off the enamel with a hot iron and tin all three 'wires' making certain that the solder runs up the twists of the centre tap. Do not breath the fumes. It should now look like Photo 1. It is fitted by putting the centre tap into the central hole for L304 (which connects to C311) but it does not matter which of the two remaining wires goes into which hole for the other two connections to L304.

Only DC checks can be done at this stage, so switch on and measure the DC voltage across C312. It should be the same as the protected supply voltage VP when the PTT switch is NOT pressed, falling to between 4 and 5 volts when P is grounded.

Switch off and fit the output stage:-

R302	100K- on end		C311	10 nF disc	
C309	100 nF Polyester		TR301	IRF510 – see below	Check orientation

TR301 and its heatsink are attached with a nut and bolt. First make certain your tools, the PCB and yourself are 'static discharged' by touching mains earth – the case of a mains PSU, etc.; then carefully bend the two outer leads of the IRF510 downwards near the body of the device, and then bend the central lead down nearer its tip – so that their pattern approximately matches the holes for it in the PCB. Then put the heatsink mounting bolt up through the PCB, place on the heatsink (using the hole nearer one end), then the insulating rectangular grey washer, then the device, then the plastic bush pointing down and finally the nut! Adjust this lot so the device leads penetrate the three PCB holes and shake/adjust the bush and washer so that the bush goes through the device and washer just into the heatsink, with the device sitting squarely on the washer. Lightly tighten the nut and bolt, then solder the source lead on the ground plane side *only* to make its 0 volt connection – this will make it easier to remove if you have to! Finally do the nut up – taking care not to over-compress (crack!) the bush. Now solder the gate and drain leads only underside.

Arrange to measure the supply current on a 2 Amp meter and check that the bias preset RT301 is fully anti-clockwise. Switch on, the current show be very low – about 2 mAmp. Then note the higher value when you press the PTT switch or ground point P – typically about 175 mA on 13.8 volts, or plus an extra 50 mA if the 80m relay RL300 is on. Now gingerly increase RT301 to about ¾ up, where the supply current should begin to rise further. Adjust it for an increase of about 0.5 Amp compared to the fully anticlockwise current – giving a total supply current of around 0.75 Amp. (Take care as it can go to over 2 Amps!) When you disconnect point P or release the PTT switch, the current should drop to near zero or the approximate 50 mA taken by RL300 if 80m is selected. Switch off and fit the low pass filter.

Note that there are options on the PCB for the various filter capacitors so that they can be connected either singly, or as two in parallel, or in series using the pairs of 'linking' pads between the wider spaced ground and 'hot' sets of pads. For use with the Sutton, the low pass filter is assembled for 80m as detailed below. (For other applications, different combinations of capacitors and windings can suit any HF band as shown in Table 1.)

C300	470 pF HV - yellow	(E) – 471	C305	330 pF HV - yellow	
C301	330 pF HV - yellow	331	C306	470 pF HV - yellow	(E)
C302	470 pF HV - yellow	(E)	C307	330 pF HV - yellow	
C303	330 pF HV - yellow		L300	20 turns on T50-2	See below
C304	470 pF HV - yellow	(E)	L301	20 turns on T50-2	See below

L300 and L301 are wound as single layer windings of 22 gauge wire on the red T50-2 toroids. Each winding needs about 0.5m of enamelled wire. Each time the wire goes through the middle of the toroid it counts as one turn. Thread the wire onto the toroid and slide it halfway along the wire. This is the first turn! Put on the rest of half the winding (9 turns) with one end, winding the turns tight and spaced around about a third of the circumference. Then put on the rest of the winding (10 turns) with the other end, around another third of the circumference so there is a gap between the ends. Trim the ends to about 1 cm long, tin them with a hot iron (do not breath the fumes) and fit to the PCB. Repeat for the second inductor. There is nothing more that can be easily checked at this stage. Remove all temporary connections. It should look similar to Photo 2.

It can be tested fairly easily on 80m assuming that you have a signal source for 80m, or a lower frequency band, that can act as a substitute for the LO input. A dip oscillator with a few turns over its coil, or a signal generator, set for about 3.5 MHz would be suitable. It needs a minimum of 100 mV p-p. If you wish to test it separately like this, skip to the Testing section, noting that you will need to ground point 80 to select the 80m LPF. However, most builders will be using it with the Sutton and will find it easiest to connect the two units together first, as described in the next section.

Connection to the Sutton RX

The Montis should be installed immediately behind the Sutton and close to it – ideally so that the ground planes can be directly linked together as shown in Photo 3. The two supplied joining PCB strips can be soldered vertically to the topside rear outer edges of the Sutton and similarly to the topside front outer edges of the Montis so that they bridge the joint rigidly. Then make three more short stout connections between the ground planes of the two kits. Make the following wire connections, mostly underside except where noted:-

RX V+	From TX V+ terminal to RX V+ terminal
RX aerial	From TX point A to RX aerial input terminal
LPF	From point G of TX to point G on RX
	From point D of TX to point D of RX
Band relay	From point 80 of TX on topside to upper tag of S102 on RX front panel
Muting	From point M of TX to point M of RX
LO	From point C of TX on topside to point C of RX
Mike	From point Q of TX topside to speech (tip) contact of mike socket
	From point P of TX topside to control (ring) contact of mike socket
	(Check that the sleeve contact of the mike socket is connected to 0 volts!)

RF Testing the Montis

Turn all transmitter presets fully anticlockwise. Reconnect your supply and antenna to the transmitter terminal block and check that the receiver is working as before. Substitute your 50R dummy load for the antenna. Set S102 for 80m, which should make RL300 turn on. Connect the mike, pressing its PTT switch should silence the RX. If you have some form of RF detector, you can check that the 80m LO frequency is present on pin 7 of IC300 when the PTT switch is closed. Arrange to measure the supply current and go to transmit, observe the value and then increase the Bias preset RT301 for about half an Amp increase in current. There should not be any RF yet. Before you do the proper setting up for speech, you can temporally make it produce RF (at the LO frequency) by unbalancing the modulator IC300 - achieved by grounding point R. Gingerly advance the Drive preset RT300 to see if there is any output RF to the dummy load. It should be able to produce full output but leave the Drive preset RT set to produce only about half output for your particular supply voltage.

Subject to the point about limiting in the next sentence, the settings of the two presets RT300 and RT302 are interchangeable – one high, other low or vice-versa. You need to ensure that IC300 does not limit or clip (causing poor audio quality), which could occur with large audio input caused by an excessive mike gain setting of RT302. It is also important that the output stage does not clip or limit since this will cause splatter across the band near your signal and is very bad practice! Having got a rough setting for the Drive preset RT300 in the previous test when you unbalanced the modulator, next try for some RF when you speak or say 'Aaaah', by advancing the Mike Gain preset RT302. The best procedure is to keep the Drive preset RT300 (and hence RF output) low – say half max output for the supply voltage being used - thus well below the clipping limit of TR301. While doing this, and if necessary reducing the Drive further with RT300, cautiously advance the mike gain RT302 to a little below the point where output ceases to increase due to IC300 beginning to limit. You can then increase the Drive preset RT300 to just below the point at which RF output ceases to increase due to TR301 limiting – this should be near 1.5W (on 80m) using 13.8 volts. When used with a 9 volt supply, maximum output will be appreciably lower. This is a bit subjective without an oscilloscope so when you get it on air, conduct experiments with another station whose signals are easy to copy both ways and try different settings for these two presets!

If you have a scope, it will be easiest to first apply a single audio tone instead of the mike input. When triggered from this audio tone, the RF envelope should look like a pair of anti-phase sine waves (at the audio frequency) filled with RF in between them. The envelope should be sinusoidal with a sharp cross-over at 0 volts. Flat topping, on either negative or positive peaks, is what you need to avoid. You will be able to observe the effects of the two presets very much more easily and obtain the right conditions so that neither IC300 nor TR301 are clipping noticeably. Having explored things with the single tone, then change to the mike and adjust only the Mike gain preset RT302 to compensate for the different audio level from the mike while looking for signs of flat topping

For the non 80m bands, you will need to use the transmitter parts on the RX band cards. The build sequence for the band cards is described in the Sutton instructions but you will obviously need to have fitted their TX parts! (L250/1 and C250 to C253 – note that like other band capacitors, these can be fitted as singles or two in parallel or two in series using a linking track.) There is nothing to adjust in these TX aspects. Put in your lowest frequency band card, select it with S102 and if possible, check that the LO signal for this band is present on pin 7 of IC300 when P is grounded. You might wish to check the adjustments of the RX LO BPFs L152/3 on the band card for the cleanest signal on pin 7 of IC300. Then go to transmit and observe the RF output level – if necessary carefully adjusting the Drive and Mike gain presets RT300 and RT302. The bias of TR301 does also influence its gain and consequently it does have some impact on output level. Repeat these tests for your other band cards - it may need a little patience to get the best settings on the highest bands, especially where you have bands with large frequency differences - a set of compromise settings will have to be found as there is no provision to adjust the RF drive for each band. Having explored the rig's characteristics using the dummy load, next change to your aerial.

Using the Sutton Montis

70mA rx
650mA tx

When radiating for the first time, it is sensible to reduce power just in case the antenna matching is not properly adjusted. The use of a resistive matching bridge will ensure that a safe load is presented to the TX irrespective of the actual impedance of the antenna system. Alternatively reduce RT300 a little. A resonant Antenna Matching Unit (AMU) with link or transformer coupling is desirable since this will provide extra attenuation for the unwanted transmitter harmonics, and also separate the rig's 0 volts (which might be connected to mains earth) from the real RF earth of the antenna system. As a sweeping generality, it is best to get out as much wire as possible for the antenna and get it up as high as possible. Balanced schemes with symmetrical lengths in each arm are preferred. Provided that you have low loss line from the antenna arms, and the matching unit is able to tune out the reactance, it is not essential for the arm lengths to be resonant. Long wire end fed aerials can also give good results provided there is a good RF earth or counterpoise! Although the transmitter has low pass filters, it is always a good thing to use a resonant AMU to improve the matching and out of band rejection. Checking for interference on your own TV, video recorder and VHF FM broadcast receiver is always sensible.

The correct tuning technique for working another station is very simple! Just tune the receiver for best clarity of speech from the other station, using both the Main and Fine tuning controls. When you go to transmit, it will automatically be on the correct frequency. Unlike the CW Sutton Mallet combination, the Fine control remains active on transmit. Because the Sutton can receive either sideband and the Montis transmits both sidebands, other stations can use either upper or lower sideband for transmitting and reception; they will not normally be aware that you are also sending the other sideband, which they are NOT listening too! They should be of equal strength and quality if you want to get the other station to check it!

Choose a time when conditions are reasonable and try for a QSO on a clear frequency with someone who has a good signal to you. Ask him to be critical and analyse any comments. There should not be any sign of poor audio quality due to the transmitter being inadvertently frequency modulated - this makes it unusually difficult to find the optimum receiver tuning setting. The rig has plenty of decoupling with conservative circuitry to give trouble free operation. However, beware of long unscreened leads, poorly filtered or inadequate supplies/leads causing either low supply voltage at the rig (which might also be transient with RF output), or PSU shut down after a few minutes transmission due to the PSU's regulator overheating or a low over - current setting. (If using a battery, consider that it might be flagging after a while!) The use of end fed antennas tuned by a poor matching unit, with the PSU mains earth lead acting as RF earth, is quite likely to lead to RF all over the place and a strong possibility of trouble! It is always useful to listen to it on another rig if you can, and to observe if running it off a well charged battery makes any difference. Note whether the problem disappears when using a dummy load - if so, then I am sorry to say your antenna system is probably suspect!

Modifications

The Mike gain preset RT302 can be changed to a front panel control. This might be useful for helping adjust output between bands.

The 10 Watt Linear amplifier can be driven; connect its input and output to the two points marked L in the Montis. Cut the track between them! That kit's instructions explain how to set it up for phone use, the RF Drive level from the Montis will need to be adjusted to just prevent clipping of the maximum modulation peak RF output at the 10W level.

Adding CW as well as phone This is best done with the standard CW kit which produces keyed sinusoidal tones for injection into the Montis speech amplifier (at point W) and into the RX at point S. That kit explains the other control connections for semi-break in operation. It will make the Montis produce two carriers spaced about 725 Hz either side of the LO frequency. Hence it can be used directly with other stations without any need for RIT cancellation - just tune the RX to either sideband and press the key!

RF Gain on front panel using screened audio cable is screened humming.

Photographs

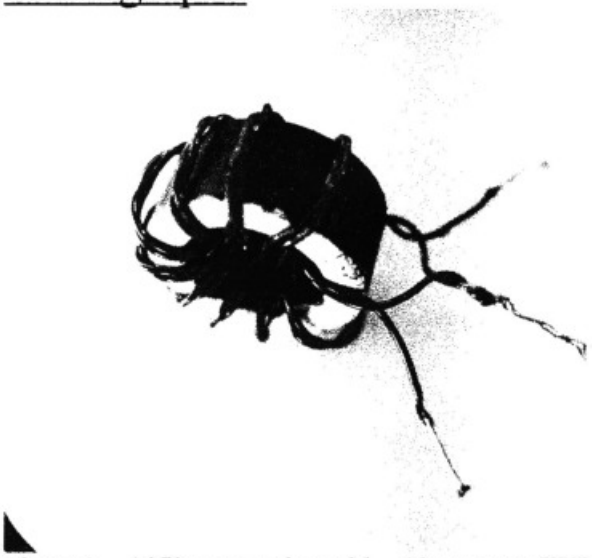


Photo 1 – Bifilar wound toroid – 10 turns on FT50-61 (with white painted sides!)

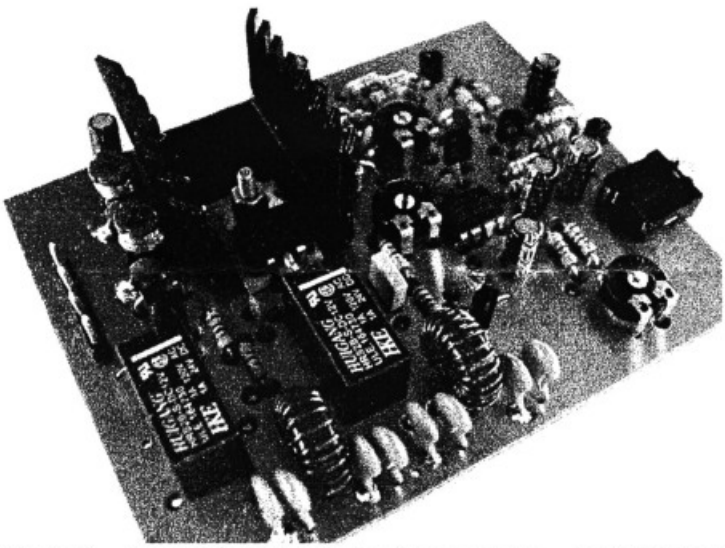


Photo 2 – Assembled Montis (early prototype – not 100% correct in top right)

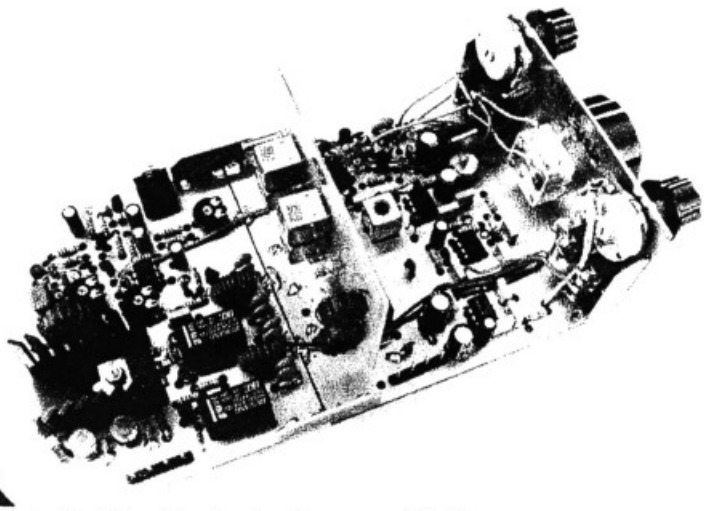


Photo 3 – Montis attached to rear of Sutton

Parts List for the Montis

Resistors			Capacitors		
3	47R	R306, 309, 310	1	470 pF disc - 471	C322
4	150R	R303,304,305,307	4	330 pF HV YL	C301,303,305,307
2	330R	R308, 311	4	470 pF HV YL	C300,302,304,306
4	1K	R300,312,314,316	10	10 nF disc	C308,310,311,312, 313,314,315,317, 319,325
2	4K7	R301, 317	1	100 nF Polyester	C309
3	100K	R302,313,315	3	1 /uF 35v electro	C318,321,323
			2	10 /uF 35v electro	C320,324
1	220R Preset	RT300			
1	1K Preset	RT302			
1	10K Preset	RT301	C316 is not used		
Inductors			Miscellaneous		
2	T50-2 RD toroid	L300, 301	4	Rubber feet	
2	47 /uH choke	L302, 303	1	Four screw connector	
1	FT50-61 BK toroid	L304	1	3.5mm stereo PCB skt for mike	
1	10 /uH – 100J moulded	L305	1	3.5 mm stereo plug for mike	
1m of 22 gauge enam wire for L300, 301			1	U finned heat sink for TR301	
500 mm of 27 gauge enam wire for L304			0.5m multi core hook up wire		
2	12v DPCO relay	RL300, 301	2	PCB joining strips	
			1	DS Montis PCB	Is 2
Semiconductors		In anti-static bag			
1	21DQ06	D303			
2	1N4148	D300, 301			
1	6v2 Zener	D302 – bent leads			
1	BC212	TR300			
6	BS170	TR302, 303, 304, 305, 306, 307			
1	IRF510	TR301			
1	SA602/612	IC300			
1	6 BA nut, bolt, washer and bush		TRN Walford G3PCJ		April 2nd 2005

That's all – I hope you have enjoyed building it and that it will give many hours pleasure! I am always glad to have any comments or suggestions.

Tim Walford G3PCJ April 7/25th 2005

Table 1 — Montis Low Pass Filter data (for single bands other than 80m)

Band	Filter Capacitors Nom Val pF	Form	All yellow high voltage disc capacitors C300(E)	C301	C302(E)	C303	C304(E)	C305	C306(E)	C307	Filter Inductors Nom Val microH	Wire Length	L300 Turns on T50-2	L301 Turns on T50-2	Band
160m	1600 pF	Parallel	1000 pF	680 pF	1000 pF	680 pF	1000 pF	680 pF	1000 pF	680 pF	4	0.75m	28	28	160m
40m	400 pF	Single	470 pF		470 pF		470 pF		470 pF		1	0.4m	14	14	40m
20m	200 pF	Series	470 pF	330 pF	470 pF	330 pF	470 pF	330 pF	470 pF	330 pF	0.5	0.3m	10	10	20m
15m	150 pF	Single	150 pF		150 pF		150 pF		150 pF		0.35	0.25m	8	8	15m
10m	100 pF	Single	100 pF		100 pF		100 pF		100 pF		0.25	0.2m	7	7	10m

The standard 80m capacitors can be used for 20 and 40m.

A blank in this table means that nothing is fitted in that location.

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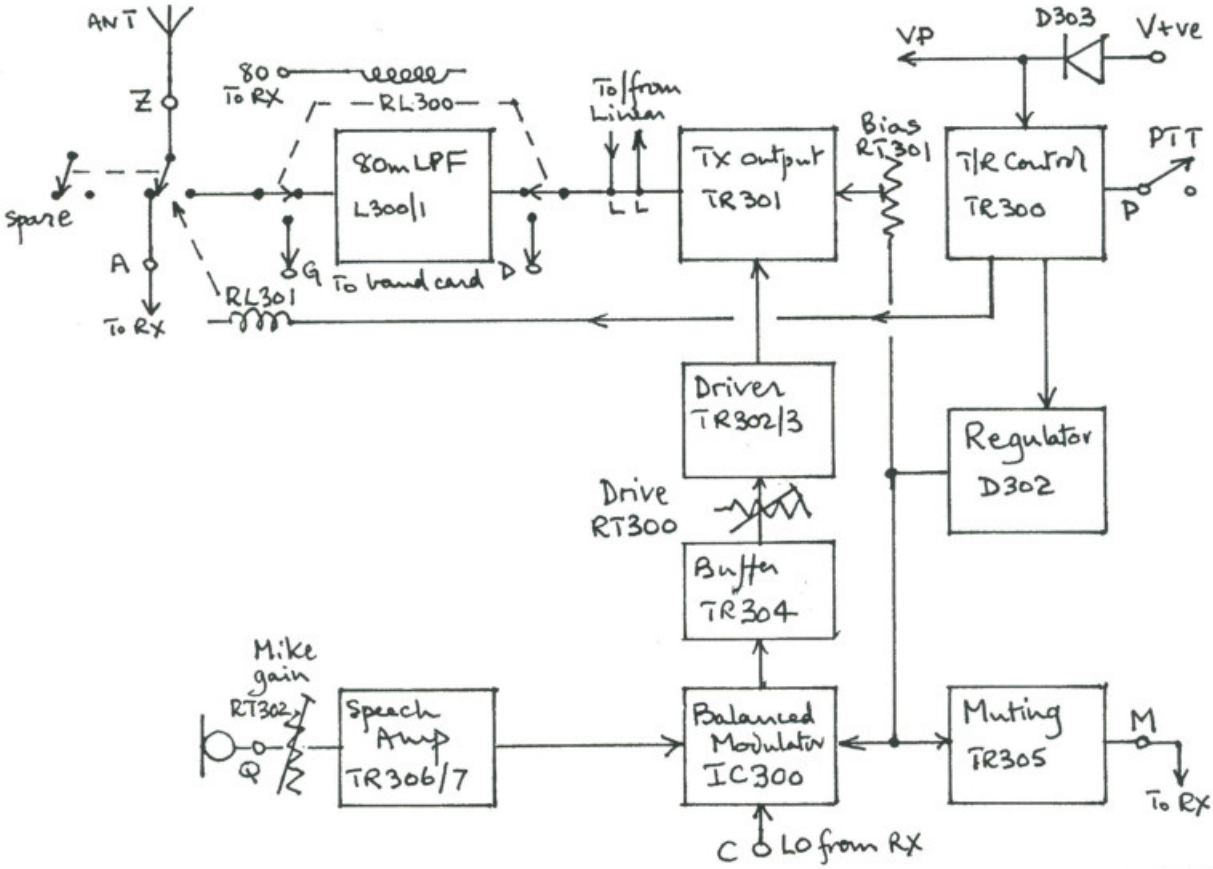


FIG 1 : Block Diagram of Montis

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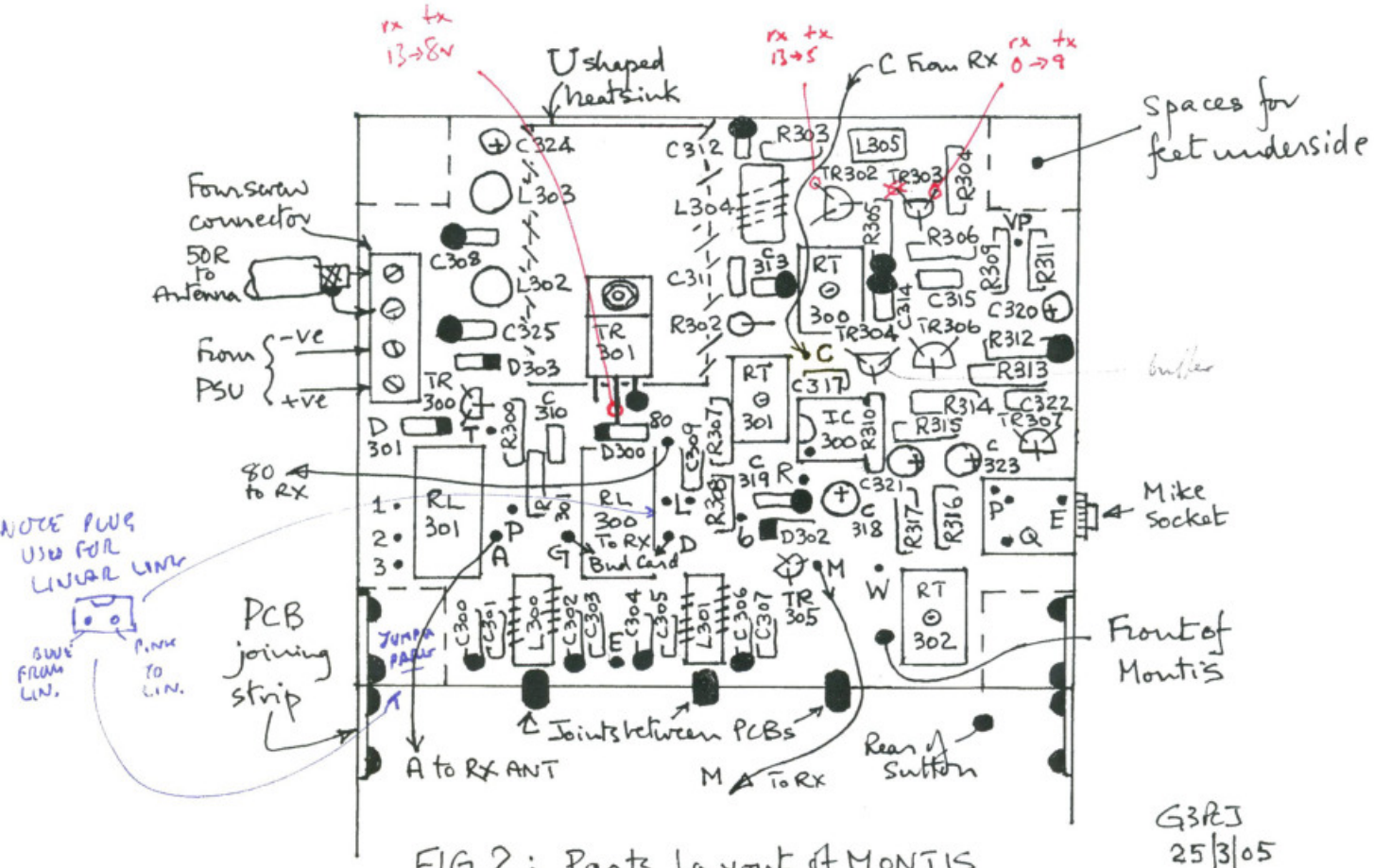


FIG 2 : Parts Layout of MONTIS

- Component topside view
- Large black blobs ● are topside solder points

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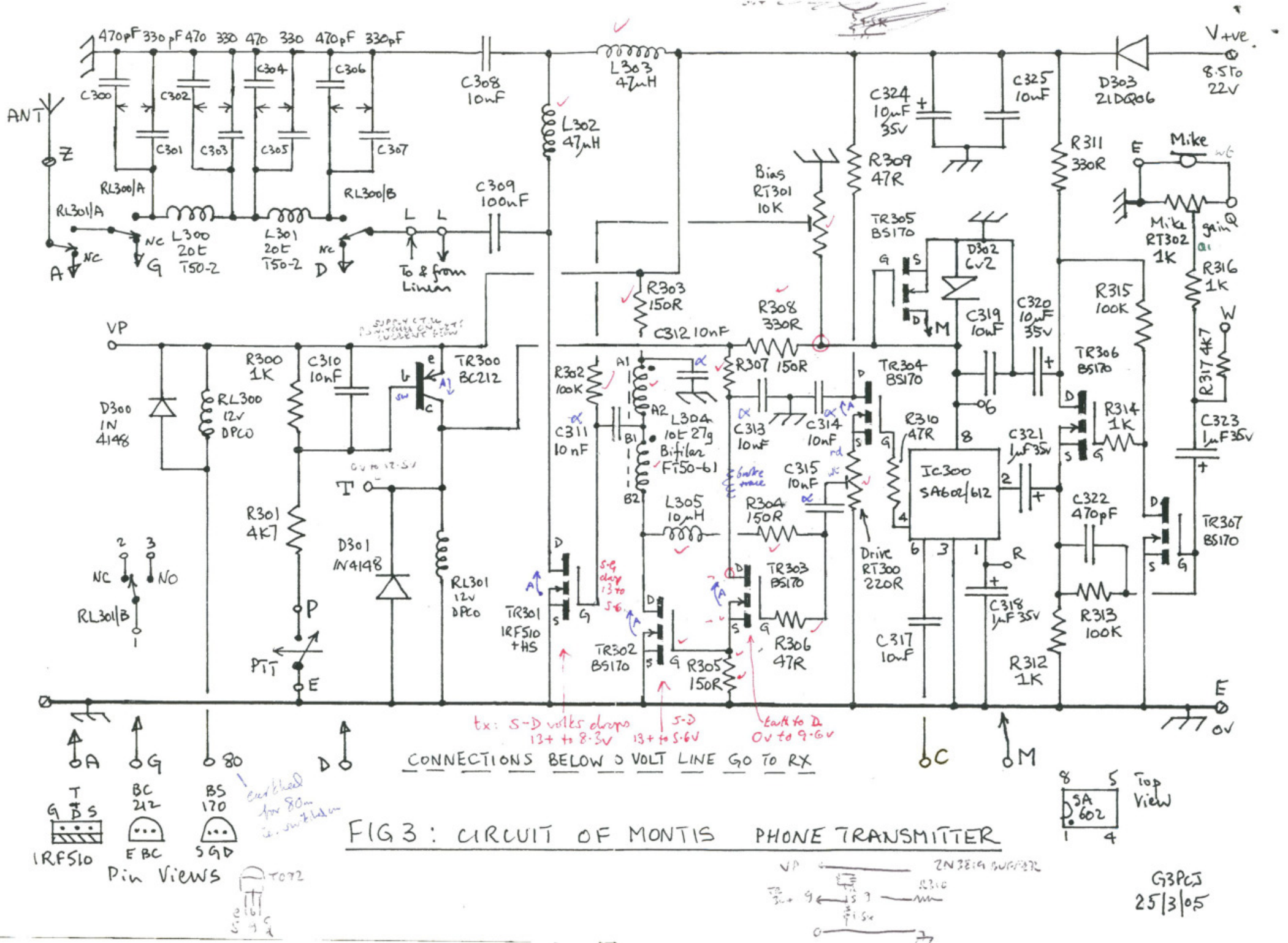


FIG 3 : CIRCUIT OF MONTIS PHONE TRANSMITTER

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