LINEAR BROADCAST

AMT SERIES
50W AM TRANSMITTER

TECHNICAL HANDBOOK

CONFIDENTIAL

The material contained within this manual consists of information that is the property of FORDRAY ELECTRONICS and is intended solely for the use of the purchasers of the LINEAR BROADCAST AMT SERIES of AM TRANSMITTERS. FORDRAY ELECTRONICS expressly prohibits the duplication of any portion of this manual or the use thereof for any other purposes other than the operation of the equipment described in this manual without the written permission of FORDRAY ELECTRONICS.

DISCLAIMER

The material contained herein was accurate at the time of printing, however, due to upgrades and/or improvements; FORDRAY ELECTRONICS reserves the right to make changes at any time without notice. FORDRAY ELECTRONICS shall not be held liable in any way for any direct, indirect or incidental harm or damage caused by using the information contained in this manual.

LINEAR BROADCAST

AMT50
SPECIFICATIONS

The Linear Broadcast AMT50 transmitter was designed to meet the needs of the broadcaster requiring high performance and reliability. Self-contained in a 2RU rack case, the AMT50 provides fully adjustable power output up to 50 Watts and user-programmable Phase Locked Loop frequency settings via internal DIP switches.

Audio Input	Canon -10 - +10dBm, 600 Ohm balanced
Output Power (no modulation)	50W, 50 Ohm, N connector
Controls	Modulation Depth, RF Output Power, frequency DIP switches
Frequency Range	500 to 1700 kHz in 9 kHz steps
Carrier Freq. Stability	0.0005%
PLL Phase Jitter	0.001%
Spurious Emissions	<- 65dBc at maximum output, in and out of band
Frequency Response	30 Hz – 6 kHz, +/- 2dB / 30 Hz – 9 kHz switchable
Total Distortion	<0.8% at 90% modulation, 400Hz mod. freq.
Signal to Noise	> 60dB
Dimensions	2RU rack case x 400mm deep
Weight	5kg
Power Supply	220 – 250VAC
Finish	Stone Beige powder coat

LINEAR BROADCAST

AMT50
CONNECTION AND POWER-UP

Connect the transmitter to 240VAC and an aerial system with an impedance of 50 ohm at the output frequency. After switch on, the green “LOCK” light should illuminate after a few seconds and the RF power meter,when set to “forward”, should settle at around 0dB (about two thirds up the scale). The “OVER MOD “ and “SWR TRIP” lights should be off.

If the “SWR TRIP” light is on, there is a problem with the aerial system connected to the transmitter and RF output will automatically be shut off. Correct the problem and then press the RESET button on the front of the transmitter and RF output will resume.

An audio signal can now be connected to the input connector on the back of the transmitter. The front panel RF power meter will now begin to move into the red area with the audio signal, indicating a power increase. The audio level should be adjusted so that the “OVER MOD” light on the front panel remains off nearly all the time with occasional flashes on audio peaks. With the correct audio level the front panel power meter will reach full scale on audio peaks.

The AMT-50 has been fitted with an audio level control circuit which has been adjusted to maintain a high modulation level but not exceeding 100%,.Distortion of the audio is kept to a minimum under these conditions.

<u>High Reflected Power</u>

If the AMT-50 has shut down due to high VSWR, do the following;

1. Switch the RF output meter to REV to monitor reflected power.
2. Reduce the output power by turning the front panel power control anticlockwise until the transmitter will run without shutting down.
3. Make adjustments to the aerial system to reduce the reflected power reading on the front panel meter to the lowest possible.
4. Set the front panel meter to FWD to monitor forward power and readjust the front panel power control to give a meter reading of 0 dB (with no modulation) to return the transmitter to its original power setting.

LINEAR BROADCAST

AMT50
THEORY OF OPERATION

The operation of this transmitter can be broken down into functional blocks, each of which will be discussed separately

CARRIER FREQUENCY GENERATION

The carrier frequency is generated by the internal VCO of U4, a 74HC4046. The frequency is divided by N by U6 (74HC4040) and compared with the 9 kHz reference by the phase comparator internal to the HC4046. The resulting output on pin 13 is filtered and used to control the VCO, resulting in a VCO output locked to N×9 kHz.

The value of N is set by the binary value on DIP switch SW2. The value of N is the sum of the binary weights of all switches that are turned ON. For example, if switches 7, 5 and 4 are ON and all others OFF, N would equal 64+16+8=88, giving a frequency of 88×9 kHz = 792 kHz.

Switch	8	7	6	5	4	3	2	1
Binary Weight	128	64	32	16	8	4	2	1

The 9 kHz reference is produced by U5 a 74HC4046 which divides the 3276 kHz crystal oscillator by 364. The circuit involving Q3 and Q4 disables the PLL OUT signal while VCO is out of lock. It does this by pulling the bias at U3, pin 1 below the operating range of U3's Schmitt trigger input. When the VCO is locked, the pulses on pin 1 are very narrow negative going, charging E2 to >4.5V. This turns Q4 off, illuminating the LOCK LED and enabling output at U3 pin 2.

AUDIO CHAIN

The audio signal passes through a balancing transformer and then through a switchable low pass filter. The low pass band is either 6 kHz (all switches of SW3 off) or 9 kHz (all switches of SW3 on). The audio signal leaving U10B is then DC shifted by U11B. The DC level of the signal at U11B pin 7 sets the final RF carrier rest level. The DC level is adjusted by RV4, labelled PWR ADJ.

MODULATOR

The audio signal is used to pulse-width modulate a 75 kHz, 15V p-p square wave which appears at MODP.OUT. The signal MODN.OUT is an inverted version of MODP. OUT, with its duty cycle reduced slightly by the resistors R52 and R53. The duty cycle reduction is used to prevent simultaneous conduction of FET5 and FET2. The waveform at the junction of FET5 and FET2 is a 75 kHz square wave, 67Vp-p. The 75 kHz component of this signal is filtered through L6 and L4, leaving a large amplitude audio signal to be applied to the RF output stage. In this pulse-width modulated system the power devices are either turned hard on or completely off, resulting in similar high efficiencies as in switch mode power supplies.

The pulse-width modulated signal is generated as follows:

Ramp generator:

The reference oscillator is divided by 44 producing a 74.455 kHz 5Vp-p square wave. This is applied to integrating amplifier U11A producing a triangle wave at pin 1.

Comparator:

The audio signal with DC offset is compared with the triangle wave in U2A and U2D. When the instantaneous level is higher than the instantaneous level of the triangle wave, the output at MODP. OUT is high (15V) and visa versa. This results in a 75 kHz 15Vp-p pulse-width modulated square wave.

LINEAR BROADCAST
AMT50
THEORY OF OPERATION

RF OUTPUT STAGE

Gate drive:

The power MOSFETs FET4 and FET3 have around 500pF of gate capacitance which must be charged to +8V and then reverse charged to -8V 1.7MHz at the top end of the AM broadcast band. This requires a low impedance driver stage capable of handling some current. This consists of six paralleled CMOS gates followed by two push-pull emitter follower transistor stages. The coupling transformer has a turns ratio of 1.5:1 to ensure adequate voltage to turn on the output FETs.

RF output:

At maximum output, the modulator stage pulls the source of FET3 near to ground. The signal on C21 and C22 under this condition is near 65V p-p, and is further boosted by a 4:1 turns ratio transformer T3. The resulting output passes through a five element elliptic low pass filter with notches at the second and third harmonic frequencies. The component values for the filter are valid for a frequency range of around +/-10%, otherwise the capacitors must be changed according to the tables.

METERING/PROTECTION

The RF passes through a directional coupler which produces two DC voltages corresponding to the average reflected and forward powers. The forward is signal is processed to give the following signals;

RFMON: this appears on the alarm connector on the back panel. Typically it is set by RV5 to be 2V at full modulation and 1V with no modulation.

ALARM: Not used in SHT models. This output voltage is 15VDC if the carrier is above a set threshold.

METER: this signal level is affected by both RV5 and RV1. It drives the front panel power meter.

The reverse signal feeds a latching reverse power protection circuit. The trip point of this circuit can be set by adjusting RV7. Typically it is set to trip at 2:1 VSWR at 50W rest carrier. When tripped, Q8 removes the bias from the input of U3A, stopping RF drive to the RF output stage. The latching circuit is reset by the SWRRSET switch on the front panel of the transmitter.

SUPPLIES

The secondary of the mains transformer is full wave rectified and filtered by a 10 000 microfarad 100V capacitor, producing an un-regulated 80V. The secondary 15v winding of the mains transformer is also filtered to produce around 20V which feeds the 12V regulator on the exciter board.

The unregulated 80V rail is regulated to 67V by a linear series pass regulator consisting of FET Q5 and feedback transistor Q6.

The 5V supply for the 74HC series ICs in the exciter is produced by a 7805 fed by the +12V rail.

LINEAR BROADCAST

AMT50
ALIGNMENT PROCEDURE

TEST EQUIPMENT REQUIRED:

- RF power meter capable of 100W at 0.5 to 1.7MHz
- Two 100W dummy loads (50 Ohms)
- Digital Multimeter
- Low distortion audio oscillator capable of +12dBm 600 Ohm, balanced
- AM modulation monitor
- Noise and distortion test set
- Digital frequency counter
- Spectrum analyser

TRANSMITTER

1. Connect power meter and dummy load to **Antenna** socket, select appropriate power range
2. select the desired frequency using the DIP switches on the exciter board
3. connect 240VAC supply and switch on transmitter
4. Adjust the desired rest power level (no modulation) by adjusting RV4 on the exciter board. Do not exceed 50W output with no modulation
5. Trim the carrier frequency by adjusting CV1 on the exciter board. This should be done after allowing adequate warm-up period
6. connect the spectrum analyser to sample the RF output and confirm the second and third harmonics are at least 65dB below carrier
7. connect the AM modulation monitor and noise and distortion test set to sample RF output
8. Connect the audio generator to the balanced audio inputs and set for 400Hz at the desired input level. Adjust RV2 on the exciter board to achieve 102% modulation depth.
9. Adjust RV3 anticlockwise to illuminate the OVERMOD indicator on the front panel. Once on, adjust RV3 slowly until the OVERMOD light goes off. Leave at this setting. This setting must be done after the RF power level has been set.
10. confirm the signal to noise ratio is greater than 60dB after replacing the main lid of the transmitter

METER ADJUSTMENTS

Before doing metering adjustments, ensure that RV6 on the output board is set correctly. With the transmitter running into a perfect 50 Ohm load, RV6 should be adjusted for minimum voltage on the REV jumper between the output and exciter boards. This voltage will rise at either end of RV6's adjustment with a null part way through its range

1. Place a multimeter on the RF monitor terminal on the rear of the transmitter. With 100% modulation, adjust RV5 on the exciter board to read the desired voltage. This is set to 2V at factory final test.
2. With zero modulation, adjust RV1 on the exciter board to set the front panel meter to read 100% on the lower scale. When 100% modulation is applied, the meter will rise to around +2.5 on the red section of the top meter scale, indicating a rise in peak output power.

VSWR TRIP SETTING

The VSWR trip should be set no higher than 2:1. This is done as follows.

1. Place a tee connector on the RF output line to allow for connection of two 50 Ohm loads to the transmitter. Connect only one load at this point.
2. Remove modulation and turn on the transmitter. Adjust the VSWR trip setting (RV7 on the output board) for maximum sensitivity
3. Briefly connect the second load to the RF output. The transmitter should shut down and the trip light will illuminate on the front panel.
4. Reset the trip, adjust RV7 by a small increment and briefly connect the second load
5. Repeat step 4 until the transmitter no longer trips after 1 second. Do not run the transmitter into two loads for more than 5 seconds because in this state the output dissipation is higher than normal.

Output filter Table 1

Carrier	L8	C 2h	L5	L7	C 3h	L5	2nd harm L8	3rd harm L7	DIP Switch Settings								CA,CB
KHz	uH	nF	uH	uH	nF	Turns	Turns	Turns	8	7	6	5	4	3	2	1	nF
549	15.43	1.36	9.86	8.76	1.07	27.0	33.77	25.5	0	0	1	1	1	1	0	1	6.81
558	15.18	1.34	9.70	8.62	1.05	26.8	33.50	25.2	0	0	1	1	1	1	1	0	6.70
567	14.94	1.32	9.55	8.49	1.03	26.6	33.24	25.0	0	0	1	1	1	1	1	1	6.59
576	14.71	1.30	9.40	8.35	1.02	26.4	32.98	24.9	0	1	0	0	0	0	0	0	6.49
585	14.48	1.28	9.25	8.23	1.00	26.2	32.72	24.7	0	1	0	0	0	0	0	1	6.39
594	14.26	1.26	9.11	8.10	0.98	26.0	32.47	24.5	0	1	0	0	0	0	1	0	6.29
603	14.05	1.24	8.98	7.98	0.97	25.8	32.23	24.3	0	1	0	0	0	0	1	1	6.20
612	13.84	1.22	8.85	7.86	0.96	25.6	31.99	24.1	0	1	0	0	0	1	0	0	6.11
621	13.64	1.20	8.72	7.75	0.94	25.4	31.76	23.9	0	1	0	0	0	1	0	1	6.02
630	13.45	1.19	8.59	7.64	0.93	25.2	31.53	23.8	0	1	0	0	0	1	1	0	5.93
639	13.25	1.17	8.47	7.53	0.92	25.0	31.30	23.6	0	1	0	0	0	1	1	1	5.85
648	13.07	1.15	8.35	7.43	0.90	24.9	31.09	23.4	0	1	0	0	1	0	0	0	5.77
657	12.89	1.14	8.24	7.32	0.89	24.7	30.88	23.3	0	1	0	0	1	0	0	1	5.69
666	12.72	1.12	8.13	7.22	0.88	24.5	30.67	23.1	0	1	0	0	1	0	1	0	5.61
675	12.55	1.11	8.02	7.13	0.87	24.4	30.46	23.0	0	1	0	0	1	0	1	1	5.54
684	12.38	1.09	7.91	7.03	0.86	24.2	30.26	22.8	0	1	0	0	1	1	0	0	5.47
693	12.22	1.08	7.81	6.94	0.84	24.0	30.06	22.7	0	1	0	0	1	1	0	1	5.40
702	12.07	1.07	7.71	6.85	0.83	23.9	29.87	22.5	0	1	0	0	1	1	1	0	5.33
711	11.91	1.05	7.61	6.77	0.82	23.7	29.68	22.4	0	1	0	0	1	1	1	1	5.26
720	11.76	1.04	7.52	6.68	0.81	23.6	29.49	22.2	0	1	0	1	0	0	0	0	5.19
729	11.62	1.03	7.43	6.60	0.80	23.4	29.31	22.1	0	1	0	1	0	0	0	1	5.13
738	11.48	1.01	7.33	6.52	0.79	23.3	29.13	22.0	0	1	0	1	0	0	1	0	5.07
747	11.34	1.00	7.25	6.44	0.78	23.1	28.96	21.8	0	1	0	1	0	0	1	1	5.01
756	11.20	0.99	7.16	6.36	0.77	23.0	28.78	21.7	0	1	0	1	0	1	0	0	4.95
765	11.07	0.98	7.08	6.29	0.76	22.9	28.61	21.6	0	1	0	1	0	1	0	1	4.89
774	10.94	0.97	6.99	6.22	0.76	22.7	28.45	21.4	0	1	0	1	0	1	1	0	4.83
783	10.82	0.95	6.91	6.15	0.75	22.6	28.28	21.3	0	1	0	1	0	1	1	1	4.78
792	10.69	0.94	6.83	6.08	0.74	22.5	28.12	21.2	0	1	0	1	1	0	0	0	4.72
801	10.57	0.93	6.76	6.01	0.73	22.4	27.96	21.1	0	1	0	1	1	0	0	1	4.67
810	10.46	0.92	6.68	5.94	0.72	22.2	27.81	21.0	0	1	0	1	1	0	1	0	4.62
819	10.34	0.91	6.61	5.88	0.71	22.1	27.65	20.8	0	1	0	1	1	0	1	1	4.57
828	10.23	0.90	6.54	5.81	0.71	22.0	27.50	20.7	0	1	0	1	1	1	0	0	4.52
837	10.12	0.89	6.47	5.75	0.70	21.9	27.35	20.6	0	1	0	1	1	1	0	1	4.47
846	10.01	0.88	6.40	5.69	0.69	21.8	27.21	20.5	0	1	0	1	1	1	1	0	4.42
855	9.91	0.87	6.33	5.63	0.68	21.6	27.07	20.4	0	1	0	1	1	1	1	1	4.37
864	9.80	0.87	6.27	5.57	0.68	21.5	26.92	20.3	0	1	1	0	0	0	0	0	4.33
873	9.70	0.86	6.20	5.51	0.67	21.4	26.78	20.2	0	1	1	0	0	0	0	1	4.28
882	9.60	0.85	6.14	5.46	0.66	21.3	26.65	20.1	0	1	1	0	0	0	1	0	4.24
891	9.51	0.84	6.08	5.40	0.66	21.2	26.51	20.0	0	1	1	0	0	0	1	1	4.20
900	9.41	0.83	6.01	5.35	0.65	21.1	26.38	19.9	0	1	1	0	0	1	0	0	4.15
909	9.32	0.82	5.96	5.29	0.64	21.0	26.25	19.8	0	1	1	0	0	1	0	1	4.11
918	9.23	0.81	5.90	5.24	0.64	20.9	26.12	19.7	0	1	1	0	0	1	1	0	4.07
927	9.14	0.81	5.84	5.19	0.63	20.8	25.99	19.6	0	1	1	0	0	1	1	1	4.03
936	9.05	0.80	5.78	5.14	0.62	20.7	25.87	19.5	0	1	1	0	1	0	0	0	3.99
945	8.96	0.79	5.73	5.09	0.62	20.6	25.74	19.4	0	1	1	0	1	0	0	1	3.96
954	8.88	0.78	5.67	5.04	0.61	20.5	25.62	19.3	0	1	1	0	1	0	1	0	3.92
963	8.80	0.78	5.62	5.00	0.61	20.4	25.50	19.2	0	1	1	0	1	0	1	1	3.88
972	8.71	0.77	5.57	4.95	0.60	20.3	25.38	19.1	0	1	1	0	1	1	0	0	3.85
981	8.63	0.76	5.52	4.90	0.60	20.2	25.27	19.0	0	1	1	0	1	1	0	1	3.81
990	8.56	0.76	5.47	4.86	0.59	20.1	25.15	19.0	0	1	1	0	1	1	1	0	3.78
999	8.48	0.75	5.42	4.82	0.59	20.0	25.04	18.9	0	1	1	0	1	1	1	1	3.74
1008	8.40	0.74	5.37	4.77	0.58	19.9	24.93	18.8	0	1	1	1	0	0	0	0	3.71
1017	8.33	0.74	5.32	4.73	0.58	19.8	24.82	18.7	0	1	1	1	0	0	0	1	3.68

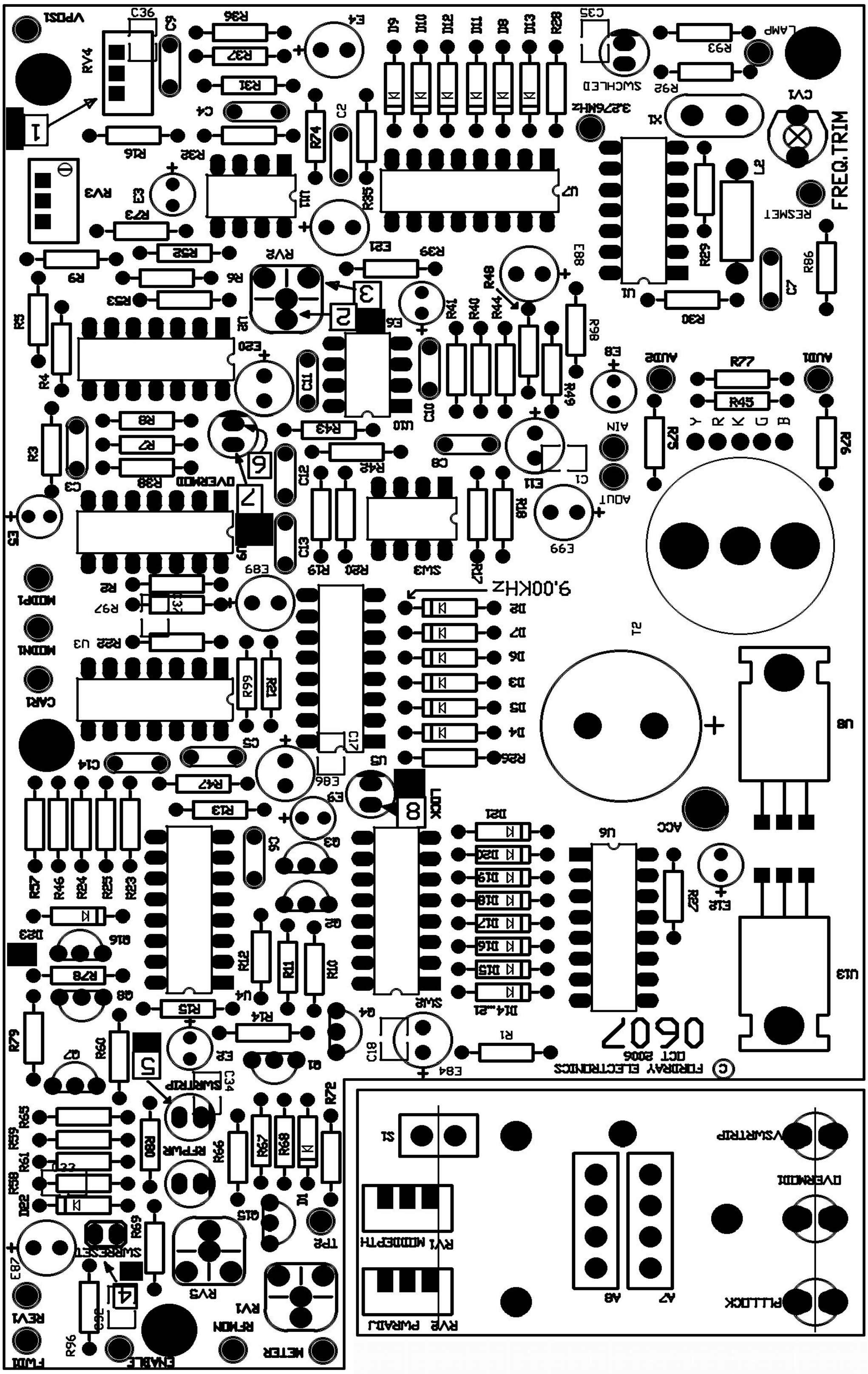
Output filter Table 2

Carrier KHz	L8 uH	C 2h nF	L5 uH	L7 uH	C 3h nF	L5 Turns	2nd harm L8 Turns	3rd harm L7 Turns	DIP Switch Settings 8	7	6	5	4	3	2	1	CA,CB nF
1026	8.26	0.73	5.28	4.69	0.57	19.8	24.71	18.6	0	1	1	1	0	0	1	0	3.64
1035	8.18	0.72	5.23	4.65	0.57	19.7	24.60	18.5	0	1	1	1	0	0	1	1	3.61
1044	8.11	0.72	5.19	4.61	0.56	19.6	24.49	18.5	0	1	1	1	0	1	0	0	3.58
1053	8.04	0.71	5.14	4.57	0.56	19.5	24.39	18.4	0	1	1	1	0	1	0	1	3.55
1062	7.98	0.70	5.10	4.53	0.55	19.4	24.28	18.3	0	1	1	1	0	1	1	0	3.52
1071	7.91	0.70	5.05	4.49	0.55	19.3	24.18	18.2	0	1	1	1	0	1	1	1	3.49
1080	7.84	0.69	5.01	4.46	0.54	19.3	24.08	18.2	0	1	1	1	1	0	0	0	3.46
1089	7.78	0.69	4.97	4.42	0.54	19.2	23.98	18.1	0	1	1	1	1	0	0	1	3.43
1098	7.71	0.68	4.93	4.38	0.53	19.1	23.88	18.0	0	1	1	1	1	0	1	0	3.41
1107	7.65	0.68	4.89	4.35	0.53	19.0	23.79	17.9	0	1	1	1	1	0	1	1	3.38
1116	7.59	0.67	4.85	4.31	0.52	18.9	23.69	17.9	0	1	1	1	1	1	0	0	3.35
1125	7.53	0.66	4.81	4.28	0.52	18.9	23.59	17.8	0	1	1	1	1	1	0	1	3.32
1134	7.47	0.66	4.77	4.24	0.52	18.8	23.50	17.7	0	1	1	1	1	1	1	0	3.30
1143	7.41	0.65	4.74	4.21	0.51	18.7	23.41	17.6	0	1	1	1	1	1	1	1	3.27
1152	7.35	0.65	4.70	4.18	0.51	18.6	23.32	17.6	1	0	0	0	0	0	0	0	3.25
1161	7.30	0.64	4.66	4.14	0.50	18.6	23.23	17.5	1	0	0	0	0	0	0	1	3.22
1170	7.24	0.64	4.63	4.11	0.50	18.5	23.14	17.4	1	0	0	0	0	0	1	0	3.20
1179	7.18	0.63	4.59	4.08	0.50	18.4	23.05	17.4	1	0	0	0	0	0	1	1	3.17
1188	7.13	0.63	4.56	4.05	0.49	18.4	22.96	17.3	1	0	0	0	0	1	0	0	3.15
1197	7.08	0.62	4.52	4.02	0.49	18.3	22.87	17.2	1	0	0	0	0	1	0	1	3.12
1206	7.02	0.62	4.49	3.99	0.49	18.2	22.79	17.2	1	0	0	0	0	1	1	0	3.10
1215	6.97	0.62	4.46	3.96	0.48	18.2	22.70	17.1	1	0	0	0	0	1	1	1	3.08
1224	6.92	0.61	4.42	3.93	0.48	18.1	22.62	17.0	1	0	0	0	1	0	0	0	3.05
1233	6.87	0.61	4.39	3.90	0.47	18.0	22.54	17.0	1	0	0	0	1	0	0	1	3.03
1242	6.82	0.60	4.36	3.87	0.47	18.0	22.46	16.9	1	0	0	0	1	0	1	0	3.01
1251	6.77	0.60	4.33	3.85	0.47	17.9	22.38	16.9	1	0	0	0	1	0	1	1	2.99
1260	6.72	0.59	4.30	3.82	0.46	17.8	22.29	16.8	1	0	0	0	1	1	0	0	2.97
1269	6.67	0.59	4.27	3.79	0.46	17.8	22.22	16.7	1	0	0	0	1	1	0	1	2.95
1278	6.63	0.59	4.24	3.77	0.46	17.7	22.14	16.7	1	0	0	0	1	1	1	0	2.93
1287	6.58	0.58	4.21	3.74	0.45	17.6	22.06	16.6	1	0	0	0	1	1	1	1	2.91
1296	6.54	0.58	4.18	3.71	0.45	17.6	21.98	16.6	1	0	0	1	0	0	0	0	2.89
1305	6.49	0.57	4.15	3.69	0.45	17.5	21.91	16.5	1	0	0	1	0	0	0	1	2.87
1314	6.45	0.57	4.12	3.66	0.45	17.5	21.83	16.5	1	0	0	1	0	0	1	0	2.85
1323	6.40	0.57	4.09	3.64	0.44	17.4	21.76	16.4	1	0	0	1	0	0	1	1	2.83
1332	6.36	0.56	4.06	3.61	0.44	17.3	21.68	16.3	1	0	0	1	0	1	0	0	2.81
1341	6.32	0.56	4.04	3.59	0.44	17.3	21.61	16.3	1	0	0	1	0	1	0	1	2.79
1350	6.27	0.55	4.01	3.56	0.43	17.2	21.54	16.2	1	0	0	1	0	1	1	0	2.77
1359	6.23	0.55	3.98	3.54	0.43	17.2	21.47	16.2	1	0	0	1	0	1	1	1	2.75
1368	6.19	0.55	3.96	3.52	0.43	17.1	21.40	16.1	1	0	0	1	1	0	0	0	2.73
1377	6.15	0.54	3.93	3.49	0.42	17.0	21.33	16.1	1	0	0	1	1	0	0	1	2.72
1386	6.11	0.54	3.91	3.47	0.42	17.0	21.26	16.0	1	0	0	1	1	0	1	0	2.70
1395	6.07	0.54	3.88	3.45	0.42	16.9	21.19	16.0	1	0	0	1	1	0	1	1	2.68
1404	6.03	0.53	3.86	3.43	0.42	16.9	21.12	15.9	1	0	0	1	1	1	0	0	2.66
1413	5.99	0.53	3.83	3.41	0.41	16.8	21.05	15.9	1	0	0	1	1	1	0	1	2.65
1422	5.96	0.53	3.81	3.38	0.41	16.8	20.99	15.8	1	0	0	1	1	1	1	0	2.63
1431	5.92	0.52	3.78	3.36	0.41	16.7	20.92	15.8	1	0	0	1	1	1	1	1	2.61
1440	5.88	0.52	3.76	3.34	0.41	16.7	20.86	15.7	1	0	1	0	0	0	0	0	2.60
1449	5.85	0.52	3.74	3.32	0.40	16.6	20.79	15.7	1	0	1	0	0	0	0	1	2.58
1458	5.81	0.51	3.71	3.30	0.40	16.6	20.73	15.6	1	0	1	0	0	0	1	0	2.56
1467	5.77	0.51	3.69	3.28	0.40	16.5	20.66	15.6	1	0	1	0	0	0	1	1	2.55
1476	5.74	0.51	3.67	3.26	0.40	16.5	20.60	15.5	1	0	1	0	0	1	0	0	2.53
1485	5.70	0.50	3.65	3.24	0.39	16.4	20.54	15.5	1	0	1	0	0	1	0	1	2.52
1494	5.67	0.50	3.62	3.22	0.39	16.4	20.47	15.4	1	0	1	0	0	1	1	0	2.50

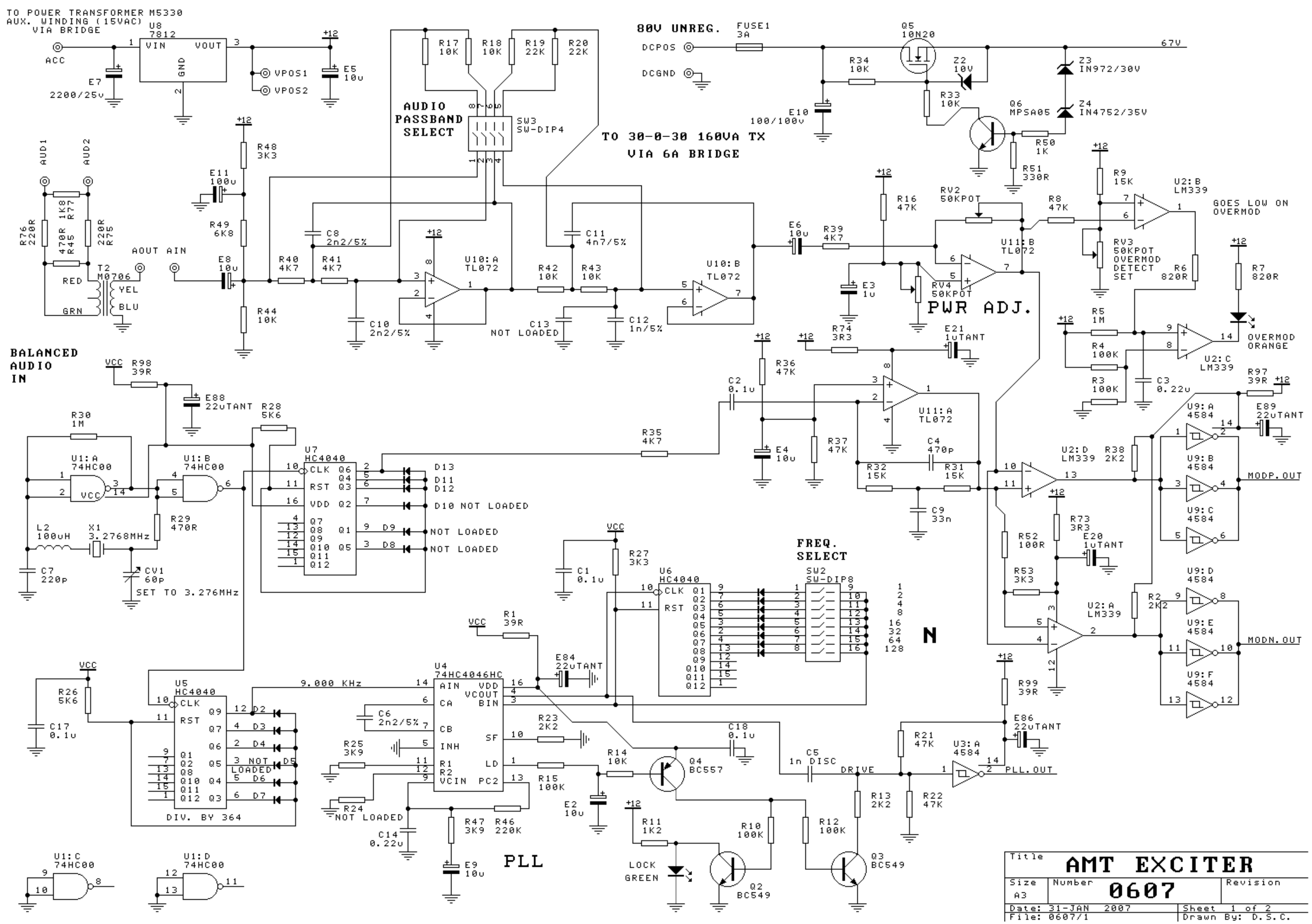
Output filter Table 3

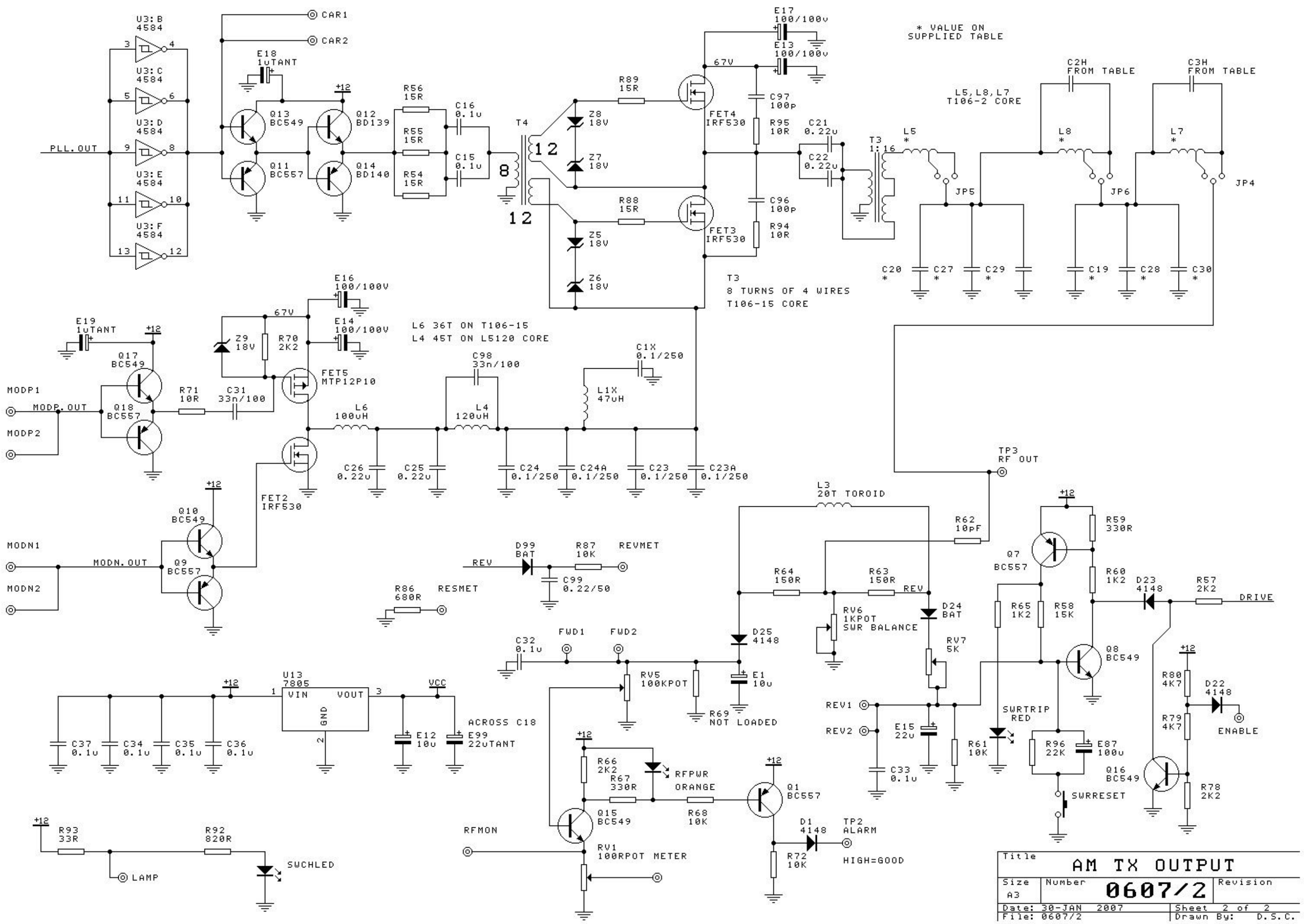
Carrier	L8	C 2h	L5	L7	C 3h	L5	2nd harm L8	3rd harm L7	DIP Switch Settings								CA,CB
KHz	uH	nF	uH	uH	nF	Turns	Turns	Turns	8	7	6	5	4	3	2	1	nF
1503	5.64	0.50	3.60	3.20	0.39	16.3	20.41	15.4	1	0	1	0	0	1	1	1	2.49
1512	5.60	0.49	3.58	3.18	0.39	16.3	20.35	15.3	1	0	1	0	1	0	0	0	2.47
1521	5.57	0.49	3.56	3.16	0.38	16.2	20.29	15.3	1	0	1	0	1	0	0	1	2.46
1530	5.54	0.49	3.54	3.14	0.38	16.2	20.23	15.2	1	0	1	0	1	0	1	0	2.44
1539	5.50	0.49	3.52	3.13	0.38	16.1	20.17	15.2	1	0	1	0	1	0	1	1	2.43
1548	5.47	0.48	3.50	3.11	0.38	16.1	20.11	15.2	1	0	1	0	1	1	0	0	2.42
1557	5.44	0.48	3.48	3.09	0.38	16.0	20.06	15.1	1	0	1	0	1	1	0	1	2.40
1566	5.41	0.48	3.46	3.07	0.37	16.0	20.00	15.1	1	0	1	0	1	1	1	0	2.39
1575	5.38	0.47	3.44	3.06	0.37	15.9	19.94	15.0	1	0	1	0	1	1	1	1	2.37
1584	5.35	0.47	3.42	3.04	0.37	15.9	19.88	15.0	1	0	1	1	0	0	0	0	2.36
1593	5.32	0.47	3.40	3.02	0.37	15.9	19.83	14.9	1	0	1	1	0	0	0	1	2.35
1602	5.29	0.47	3.38	3.00	0.37	15.8	19.77	14.9	1	0	1	1	0	0	1	0	2.33
1611	5.26	0.46	3.36	2.99	0.36	15.8	19.72	14.9	1	0	1	1	0	0	1	1	2.32
1620	5.23	0.46	3.34	2.97	0.36	15.7	19.66	14.8	1	0	1	1	0	1	0	0	2.31
1629	5.20	0.46	3.32	2.95	0.36	15.7	19.61	14.8	1	0	1	1	0	1	0	1	2.30
1638	5.17	0.46	3.30	2.94	0.36	15.6	19.55	14.7	1	0	1	1	0	1	1	0	2.28
1647	5.14	0.45	3.29	2.92	0.36	15.6	19.50	14.7	1	0	1	1	0	1	1	1	2.27
1656	5.11	0.45	3.27	2.91	0.35	15.5	19.45	14.7	1	0	1	1	1	0	0	0	2.26
1665	5.09	0.45	3.25	2.89	0.35	15.5	19.39	14.6	1	0	1	1	1	0	0	1	2.25
1674	5.06	0.45	3.23	2.87	0.35	15.5	19.34	14.6	1	0	1	1	1	0	1	0	2.23
1683	5.03	0.44	3.22	2.86	0.35	15.4	19.29	14.5	1	0	1	1	1	0	1	1	2.22
1692	5.01	0.44	3.20	2.84	0.35	15.4	19.24	14.5	1	0	1	1	1	1	0	0	2.21
1701	4.98	0.44	3.18	2.83	0.34	15.3	19.19	14.5	1	0	1	1	1	1	0	1	2.20
1710	4.95	0.44	3.17	2.81	0.34	15.3	19.14	14.4	1	0	1	1	1	1	1	0	2.19
1719	4.93	0.43	3.15	2.80	0.34	15.3	19.09	14.4	1	0	1	1	1	1	1	1	2.18
1728	4.90	0.43	3.13	2.78	0.34	15.2	19.04	14.3	1	1	0	0	0	0	0	0	2.16
1737	4.88	0.43	3.12	2.77	0.34	15.2	18.99	14.3	1	1	0	0	0	0	0	1	2.15
1746	4.85	0.43	3.10	2.76	0.34	15.1	18.94	14.3	1	1	0	0	0	0	1	0	2.14
1755	4.83	0.43	3.08	2.74	0.33	15.1	18.89	14.2	1	1	0	0	0	0	1	1	2.13
1764	4.80	0.42	3.07	2.73	0.33	15.1	18.84	14.2	1	1	0	0	0	1	0	0	2.12
1773	4.78	0.42	3.05	2.71	0.33	15.0	18.79	14.2	1	1	0	0	0	1	0	1	2.11
1782	4.75	0.42	3.04	2.70	0.33	15.0	18.75	14.1	1	1	0	0	0	1	1	0	2.10
1791	4.73	0.42	3.02	2.69	0.33	14.9	18.70	14.1	1	1	0	0	0	1	1	1	2.09
1800	4.71	0.42	3.01	2.67	0.32	14.9	18.65	14.1	1	1	0	0	1	0	0	0	2.08
1809	4.68	0.41	2.99	2.66	0.32	14.9	18.61	14.0	1	1	0	0	1	0	0	1	2.07
1818	4.66	0.41	2.98	2.65	0.32	14.8	18.56	14.0	1	1	0	0	1	0	1	0	2.06

CA is the sum of C20, C27 and C29
CB is the sum of C19, C28 and C30
C 2h and L8 form the second harmonic trap.
C 3h and L7 form the third harmonic trap.
In the Dip Switch Settings column, 0 = off , 1 = on.

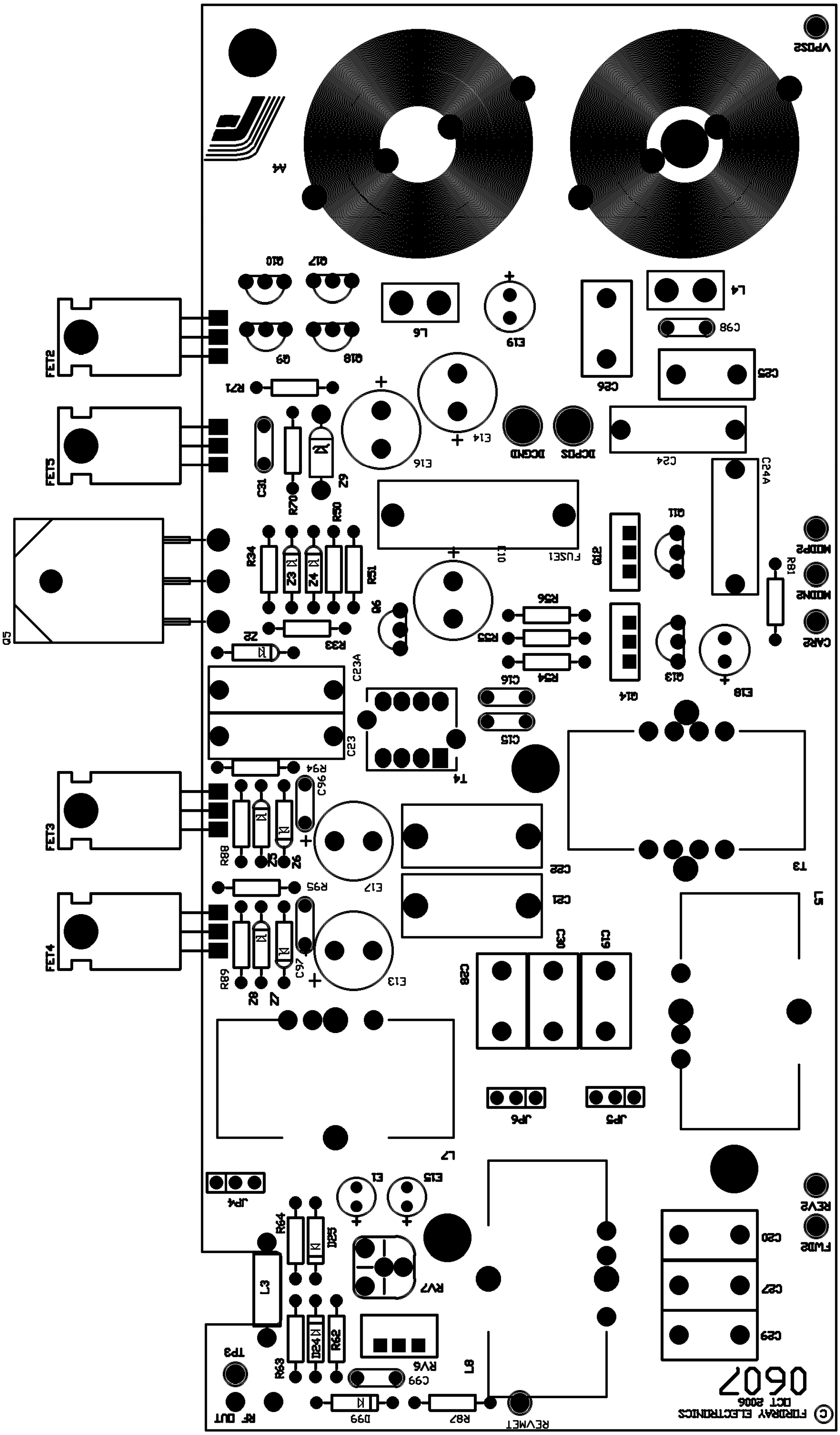


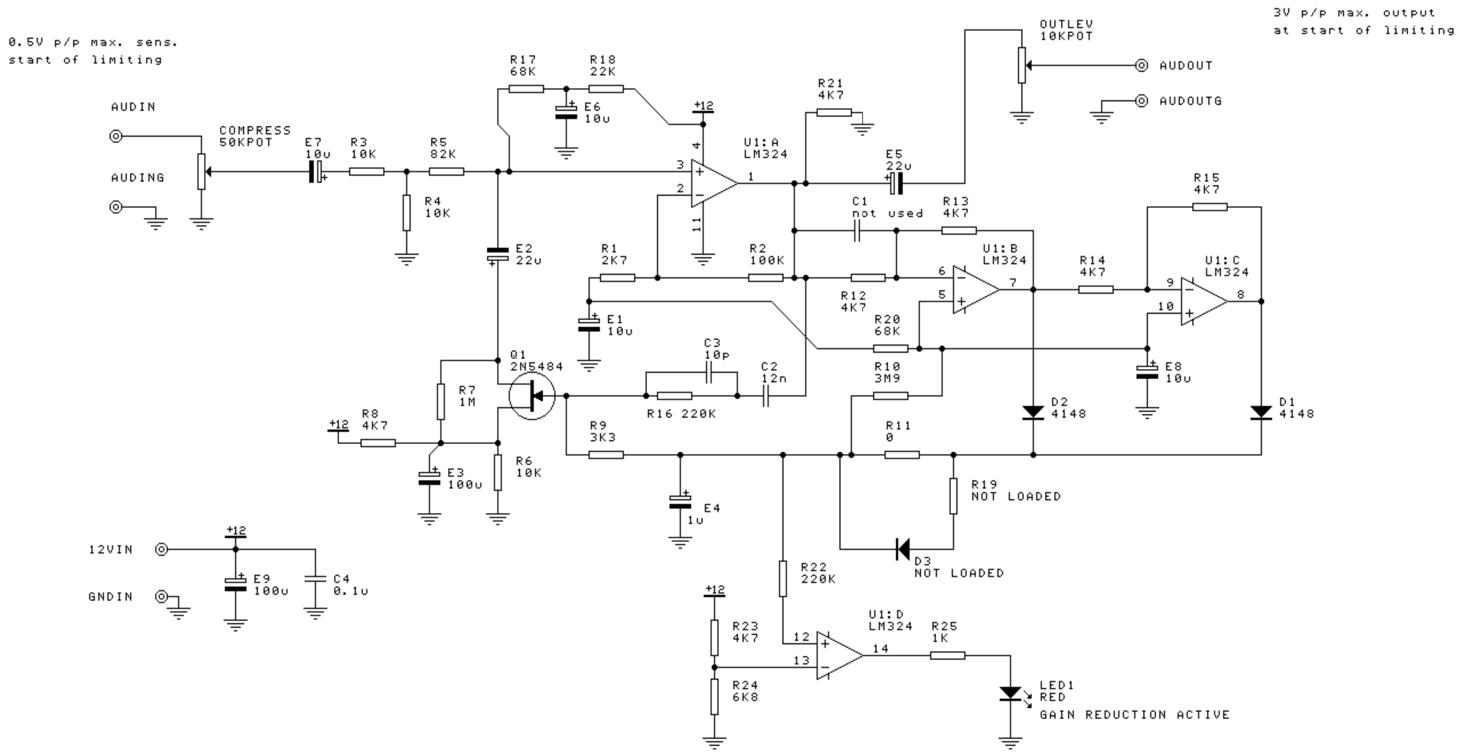
FREQ.TRIM
R77
R45
R74


TO POWER TRANSFORMER M5330
AUX. WINDING (15VAC)
VIA BRIDGE
80V UNREG.
TO 30-0-30 160VA TX
VIA 6A BRIDGE
AUDIO
PASSBAND
SELECT
BALANCED
AUDIO
IN
PWR ADJ.
GOES LOW ON
OVERMOD
OVERMOD
ORANGE
FREQ.
SELECT
N
PLL
LOCK
GREEN
9.000 KHz
DIV. BY 364
SET TO 3.276MHz
MODP.OUT
MODN.OUT
PLL.OUT
DRIVE
Title
AMT EXCITER
Size
A3
Number
0607
Revision
Date: 31-JAN 2007
File: 0607/1
Sheet 1 of 2
Drawn By: D.S.C.

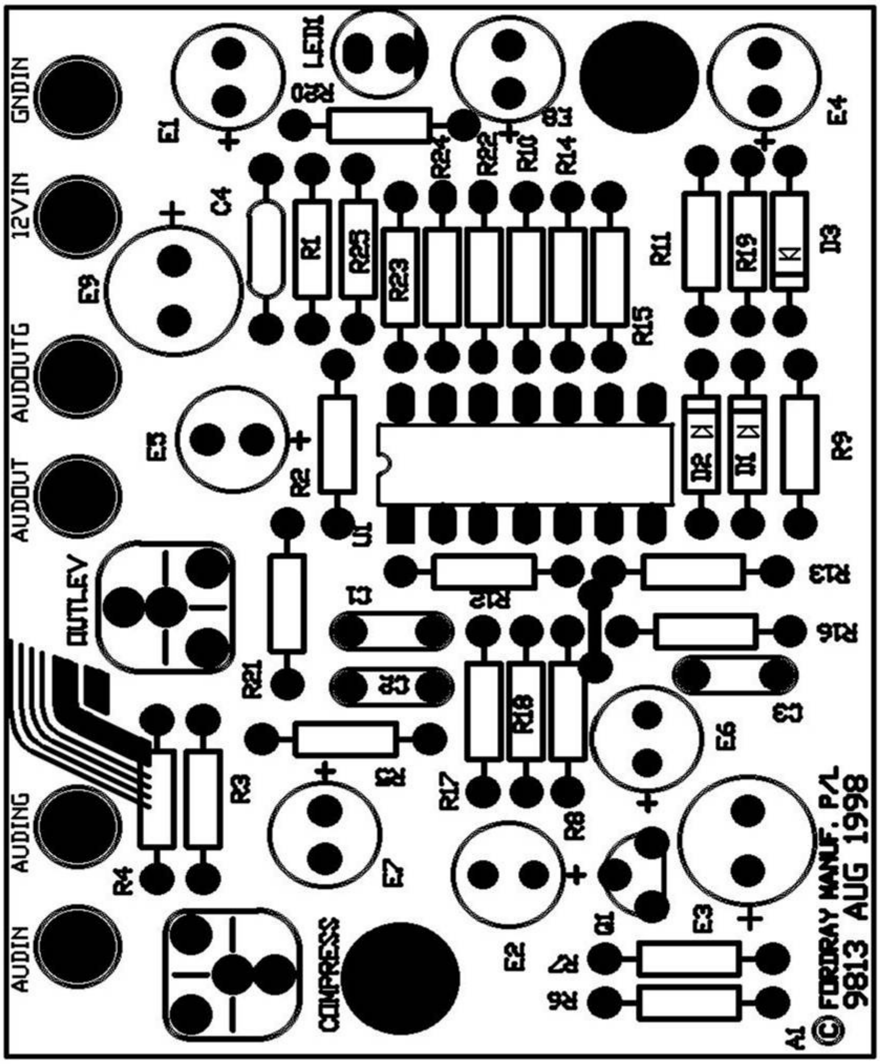


AM TX OUTPUT
Title
Size A3
Number 0607/2
Revision
Date: 30-JAN 2007
Sheet 2 of 2
File: 0607/2
Drawn By: D.S.C.
* VALUE ON SUPPLIED TABLE
L5,L8,L7 T106-2 CORE
C2H FROM TABLE
C3H FROM TABLE
L5 *
L8 *
L7 *
JP4
JP5
JP6
C20 *
C27 *
C29 *
C19 *
C28 *
C30 *
T3 1:16
T3 8 TURNS OF 4 WIRES T106-15 CORE
L6 36T ON T106-15
L4 45T ON L5120 CORE
U3:B 4584
U3:C 4584
U3:D 4584
U3:E 4584
U3:F 4584
PLL.OUT
CAR1
CAR2
E18 1uTANT
Q13 BC549
Q11 BC557
Q12 BD139
Q14 BD140
+12
R56 15R
R55 15R
R54 15R
C16 0.1u
C15 0.1u
T4
8
12
12
Z8 18V
Z7 18V
Z5 18V
Z6 18V
R89 15R
R88 15R
FET4 IRF530
FET3 IRF530
67V
E17 100/100v
E13 100/100v
C97 100p
R95 10R
C96 100p
R94 10R
C21 0.22u
C22 0.22u
E16 100/100V
E14 100/100V
E19 1uTANT
Q17 BC549
Q18 BC557
MODP1
MODP2
MODP.OUT
R71 10R
C31 33n/100
Z9 18V
R70 2K2
FET5 MTP12P10
L6 100uH
C98 33n/100
L4 120uH
L1X 47uH
C1X 0.1/250
C26 0.22u
C25 0.22u
C24 0.1/250
C24A 0.1/250
C23 0.1/250
C23A 0.1/250
FET2 IRF530
Q10 BC549
Q9 BC557
MODN1
MODN2
MODN.OUT
TP3 RF OUT
L3 20T TOROID
R62 10pF
D99 BAT
REV
R87 10K
REVMET
C99 0.22/50
R86 680R
RESMET
R64 150R
R63 150R
RV6 1KPOT SWR BALANCE
D24 BAT
D25 4148
RV7 5K
C32 0.1u
FWD1
FWD2
RV5 100KPOT
R69 NOT LOADED
E1 10u
REV1
REV2
E15 22u
C33 0.1u
R61 10K
SURTRIP RED
R96 22K
E87 100u
SURRESET
Q7 BC557
R59 330R
R60 1K2
R65 1K2
R58 15K
Q8 BC549
D23 4148
R57 2K2
DRIVE
R80 4K7
R79 4K7
D22 4148
ENABLE
Q16 BC549
R78 2K2
U13 7805
VIN
VOUT
GND
1
2
3
VCC
E12 10u
E99 22uTANT
ACROSS C18
C37 0.1u
C34 0.1u
C35 0.1u
C36 0.1u
R66 2K2
R67 330R
RFPWR ORANGE
R68 10K
Q15 BC549
Q1 BC557
D1 4148
TP2 ALARM
HIGH=GOOD
R72 10K
RFMON
RV1 100RPOT METER
R93 33R
R92 820R
LAMP
SWCHLED


FET2
FET5
Q5
R34
Z3
Z4
R50
R51
R70
C31
Z9
C23A
C23
FET3
R88
Z5
Z6
C96
FET4
R89
Z8
Z7
C97
R64
D25
L3
R63
D24
R62
TP3



Title	MODULATION CONTROL	
Size A3	Number 9813	Revision AM
Date: 30-JAN 2007		Sheet 1 of 1
File: 9813AM/1		Drawn By: D.S.C.



GNDIN
12VIN
AUDOUTG
AUDOUT
AUDING
AUDIN
OUTLEV
COMPRESS
LED1
U1
© FORDRAY MANUF. P/L
9813 AUG 1998