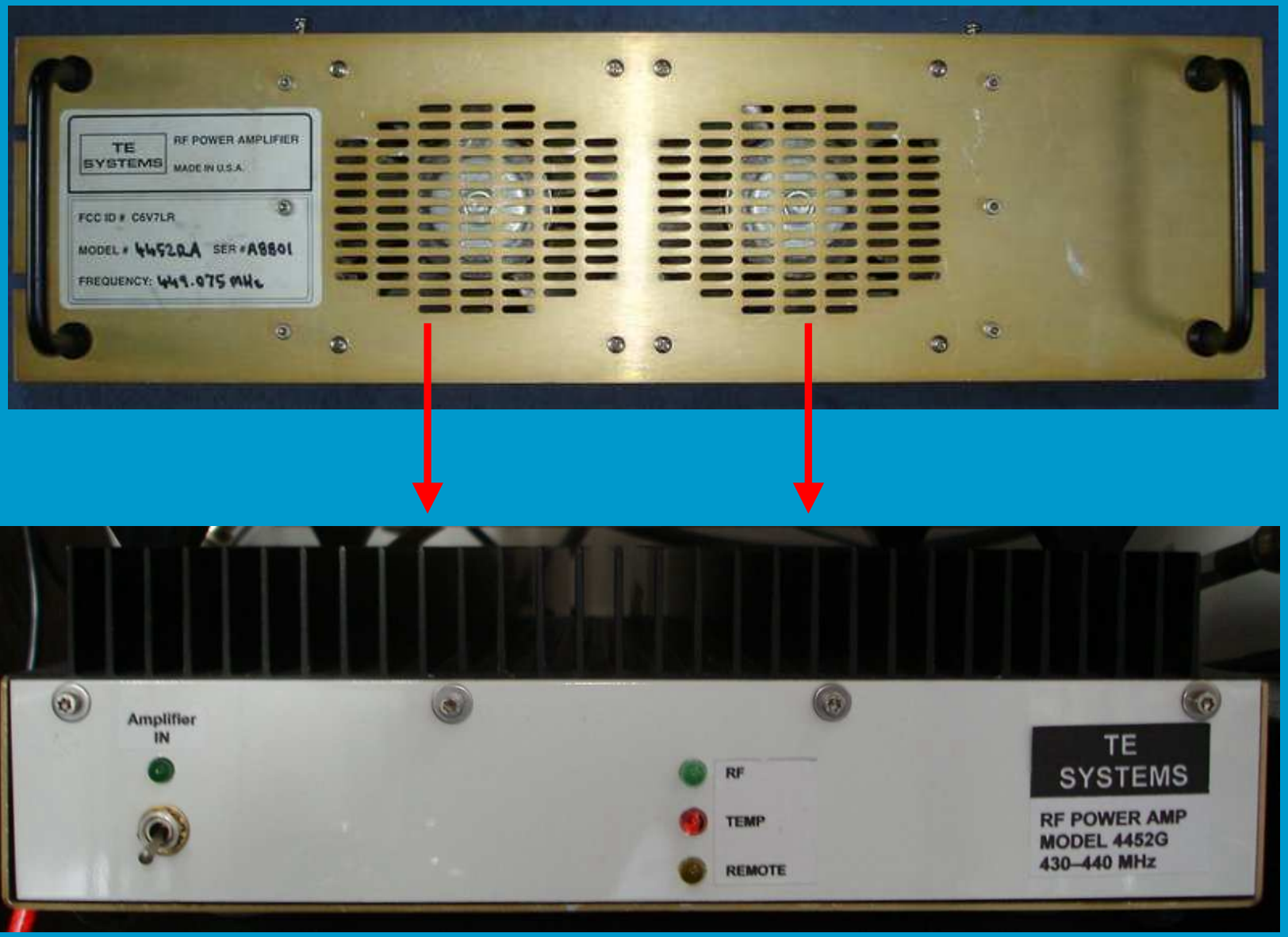
TE 4452RA UHF amplifier transformed to a TE 4452G



Réparation et linéarisation d'un ampli UHF TE SYSTEMS modèle TE 4452RA

1/ ETAT INITIAL après réception des USA:

- Ampli UHF de chez TE-SYSTEMS mort !!!
- Modèle reçu version FM en rack ventilé pour répéteur

2/ Réparation et modifications (additions) réalisées:

- Substitution des 4 transistors MRF648 (driver OK)
- Sécurité en température
- Relais de commutation TRx
- Circuit PTT avec relais séparé
- Fiche PTT cinch
- Circuits de linéarisation du driver et du final
- Alimentation +12V du préampli mât directement en amont de l'ampli
- Confection d'une face avant

3/ Mesures RFout:

Pout entre 130 et 180W pour environ 25Win max

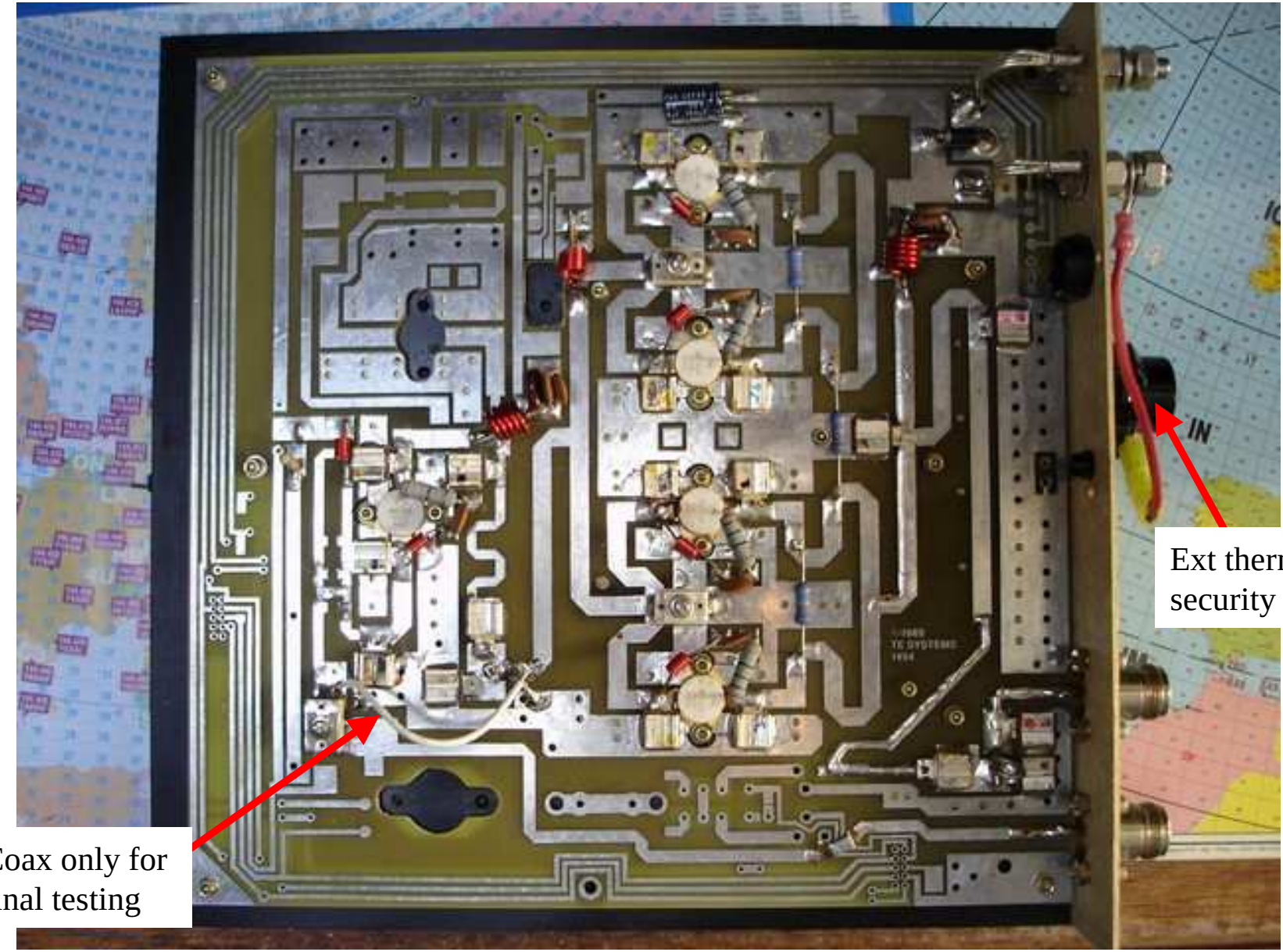
1/ TE-4452RA AS RECEIVED FROM USA

- A « technician special » bought via a QTH.com web page add
- A previously FM amp totally dead QRT !

Initial TE-4452RA amplifier in rack

Extraction from its rack .. Now no more useful

TE-4452RA printboard in class C modulation



2/ TE-4452RA MODS

First note

Mother printboards on TE 0552G, 1452G and 4452G or RA models with Pout>200W are exactly the same

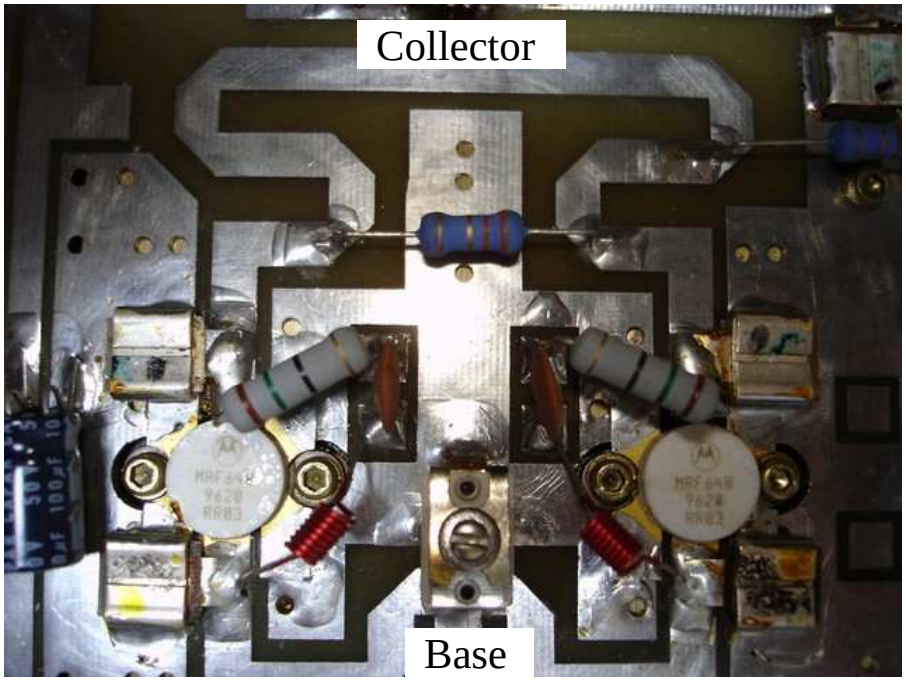
- Substitution of 4 times MRF648 in both parallel final stages
- Desoldering of the MRF650 driver … but not faulty !

Further additions

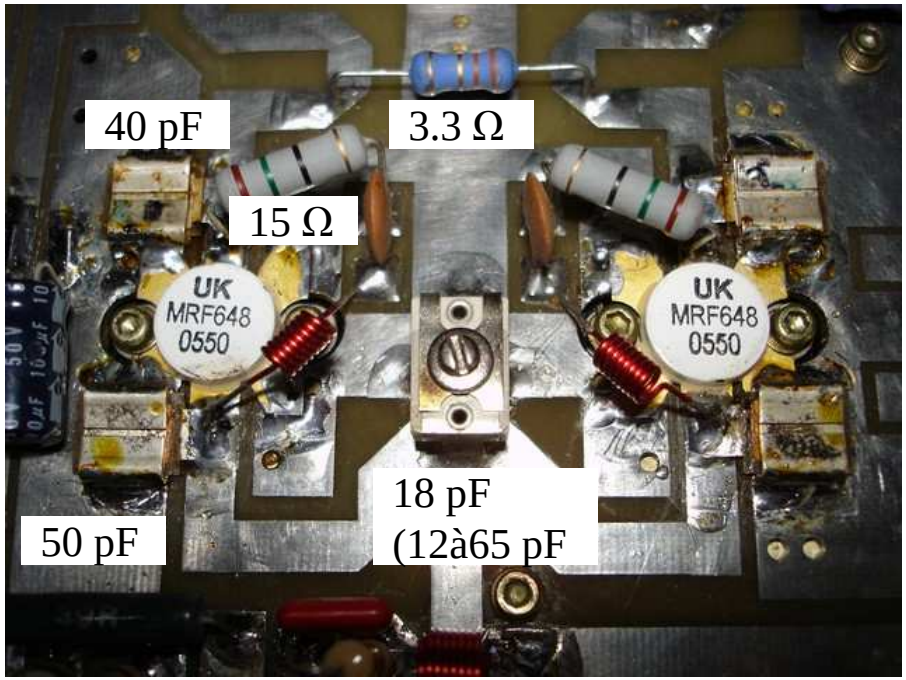
- DC sockets for front panel and RF commutation
- Temperature switch
- TRx relay
- PTT cinch socket
- PTT switching board
- Driver and final stages linearisation with separate DC biasing
- Output serial cap position mod (after Relay output) allowing +12V direct mast preamp feeding with the FT-847, as with a Mirage D3010 amp

TE-4452RA : 4 x MRF648 substitution

1 final stage before



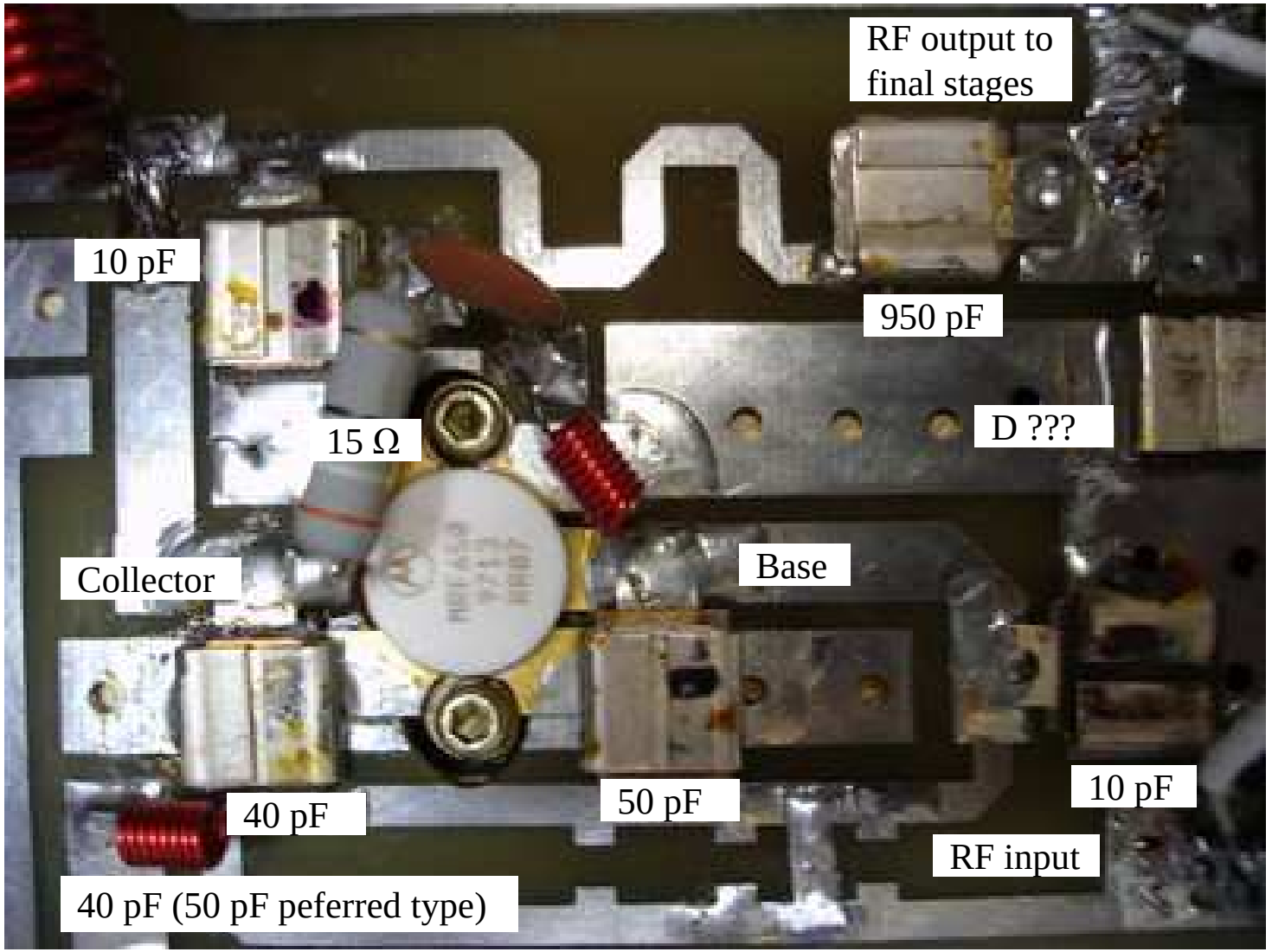
After



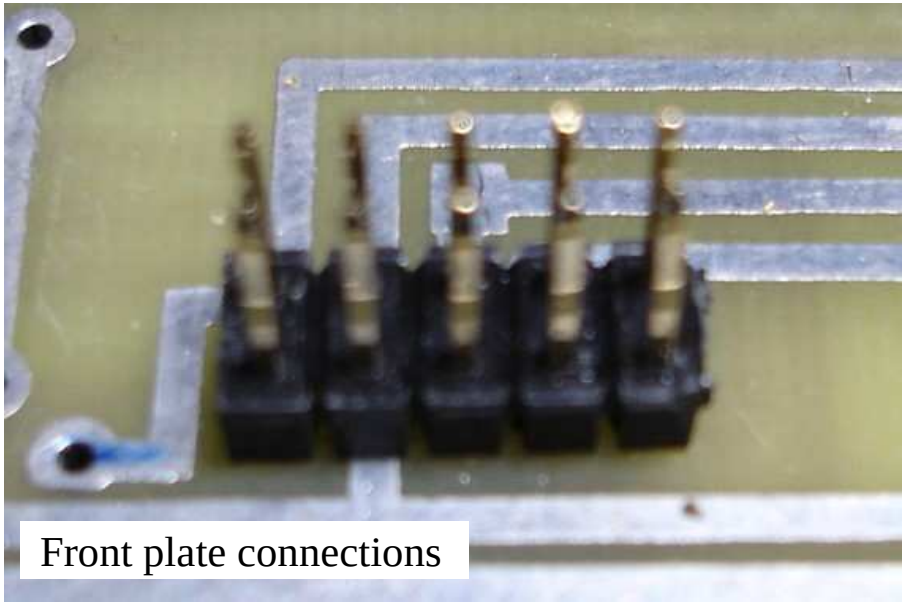
- Substitution possible only after desoldering all previous metal clad mica capacitors on base and collector sides
- Network 15 Ω + 50 nF + 8turns #22ga enam wire on .1 choke

TE-4452RA : unchanged MRF650 driver

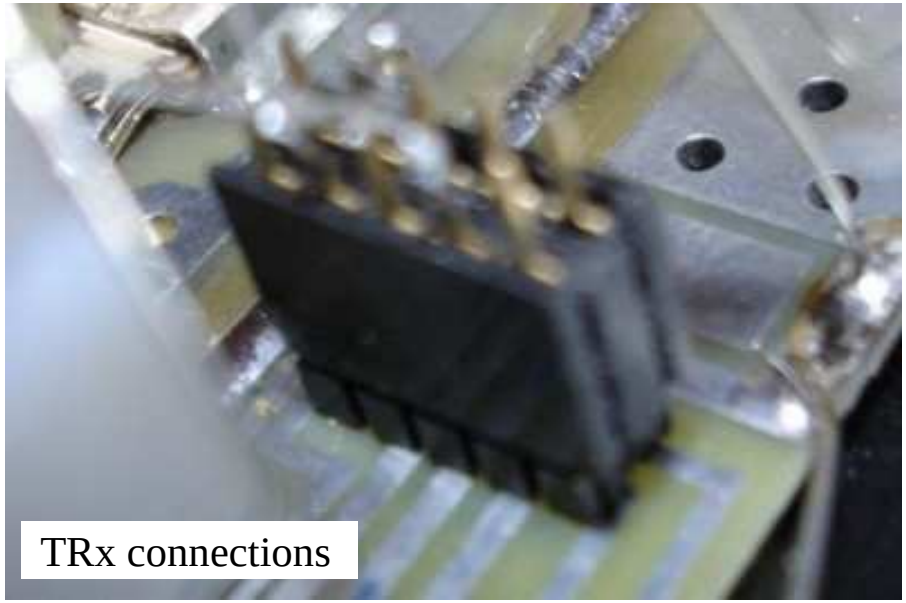
Unnecessary desoldering / resoldering !



TE-4452RA : front panel and RF commutation pins adds

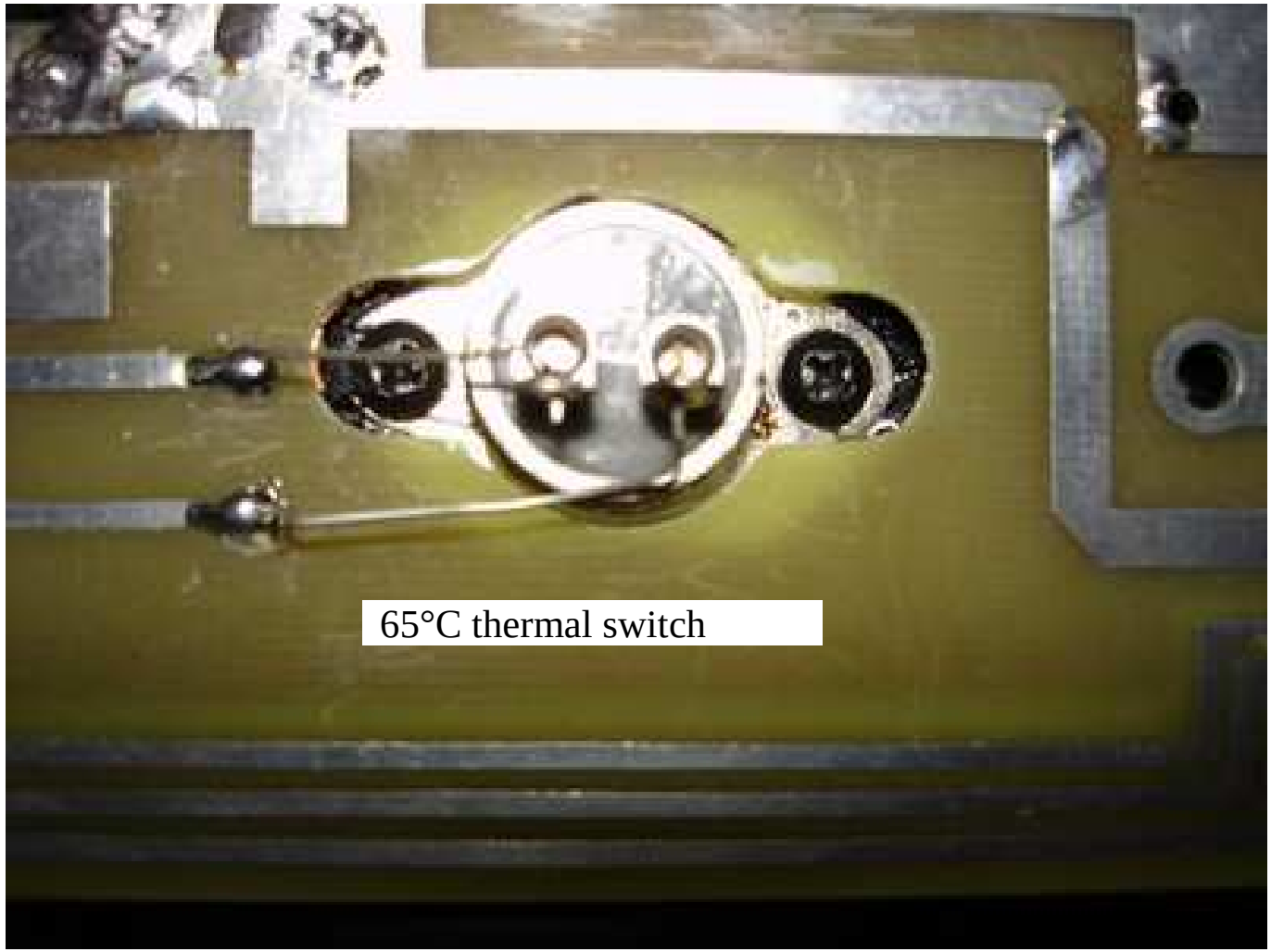


Front plate connections

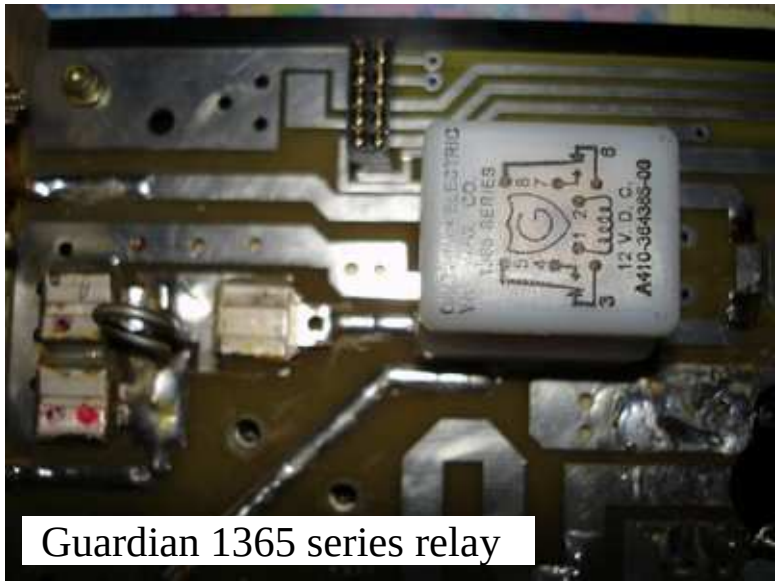


TRx connections

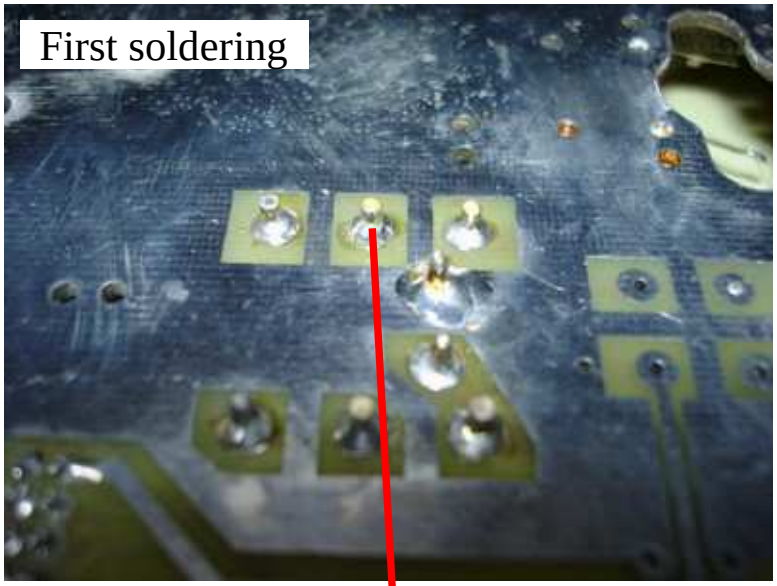
TE-4452RA : thermal switch addition

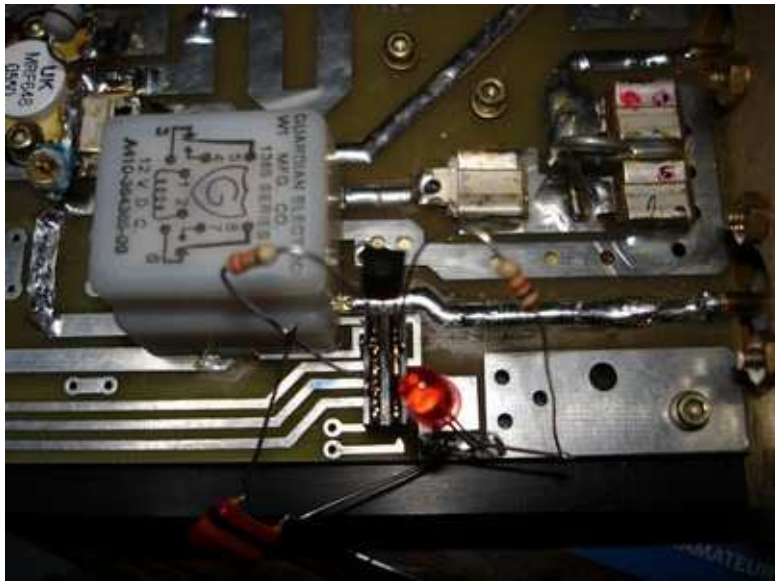


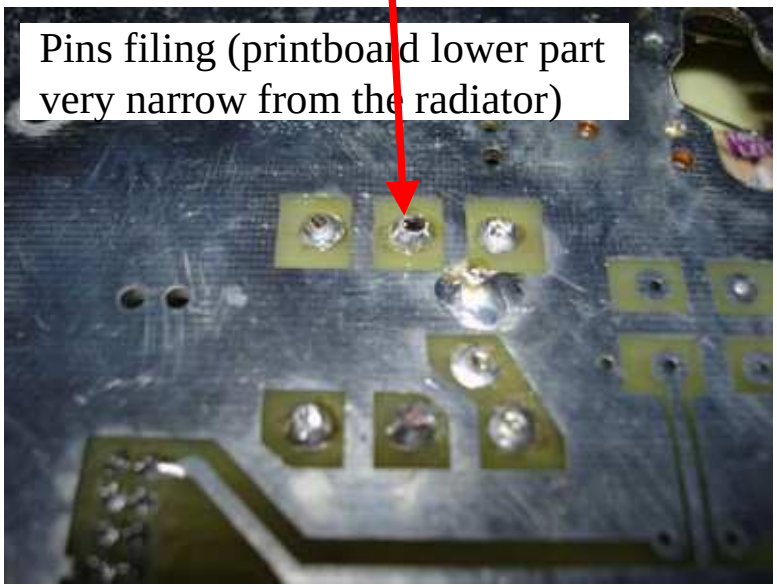
TE-4452RA : TRx relay addition



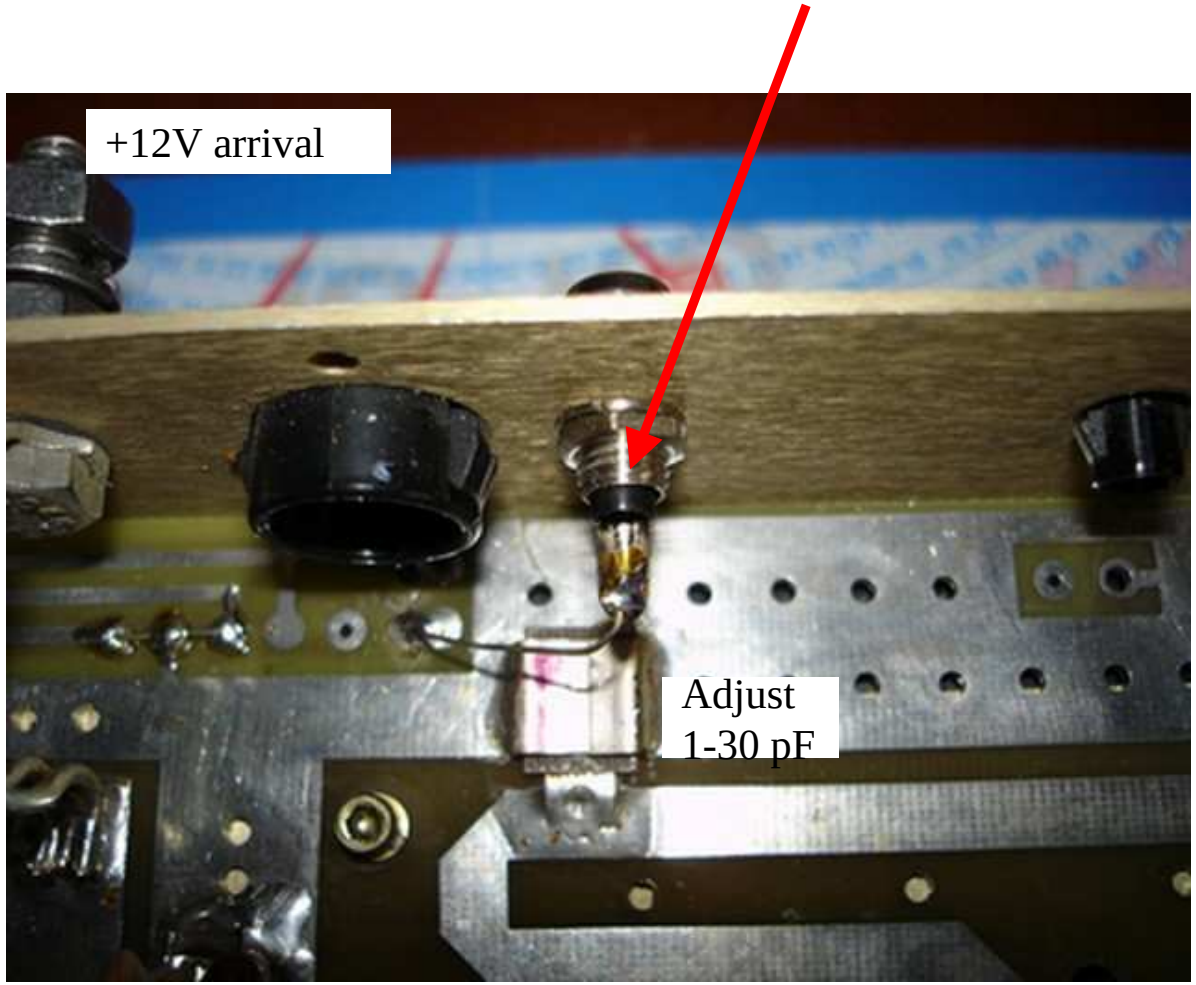
Guardian 1365 series relay


First soldering



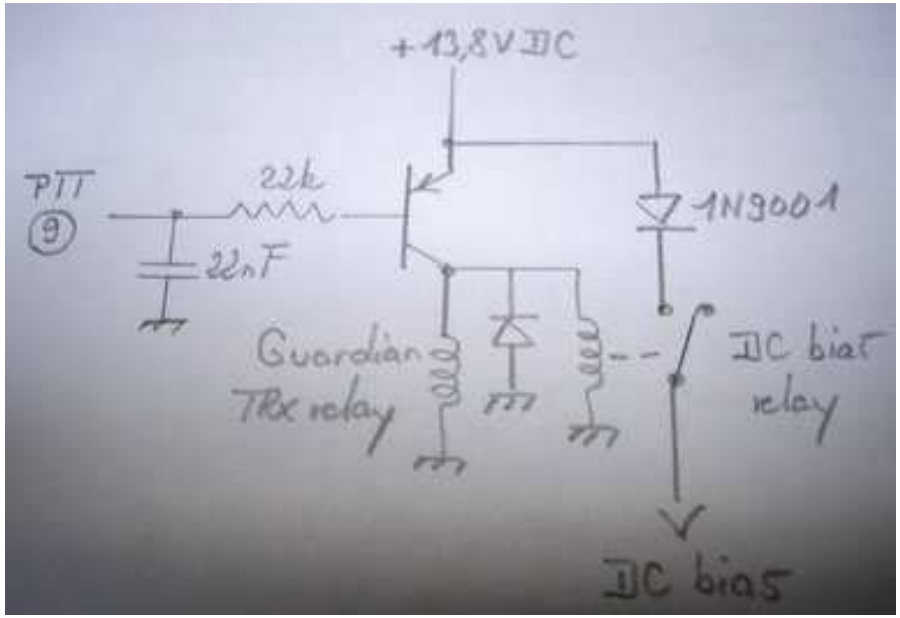

Pins filing (printboard lower part very narrow from the radiator)

TE-4452RA : adding of PTT cinch socket on rear panel

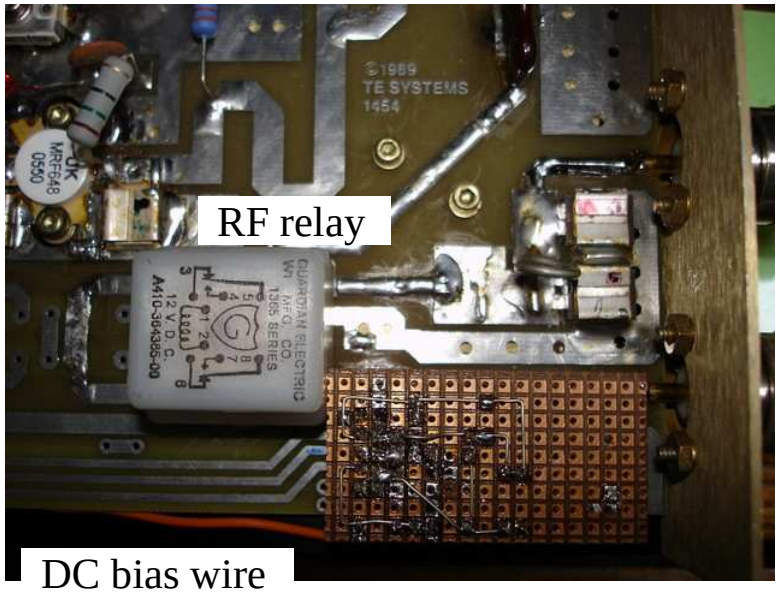


- The initial remote accessory socket in normal & G versions had no utility
- Every other brand has a PTT cinch connector

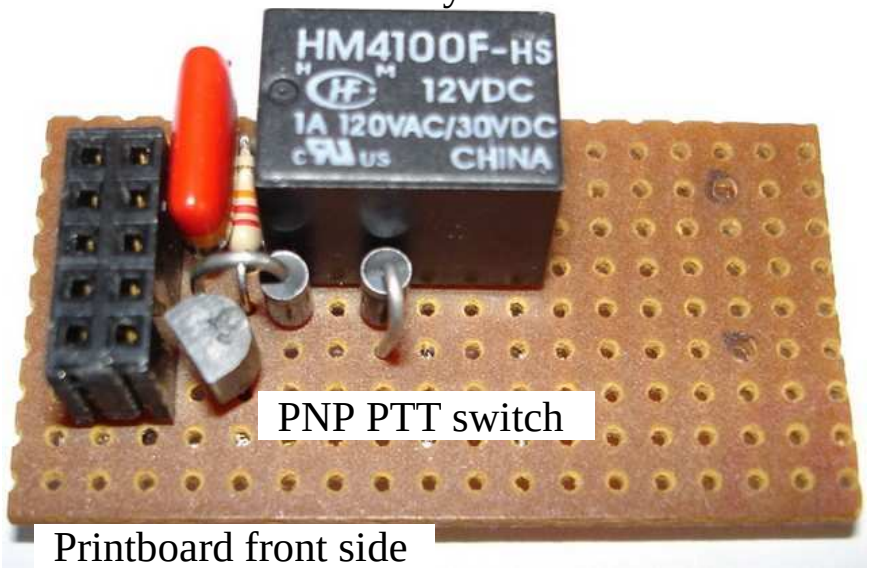
TE-4452RA : definitive PTT switching board



RF sensing has no sense on UHF because of :
- too much high output power handling.
- external masthead preamp obligatory

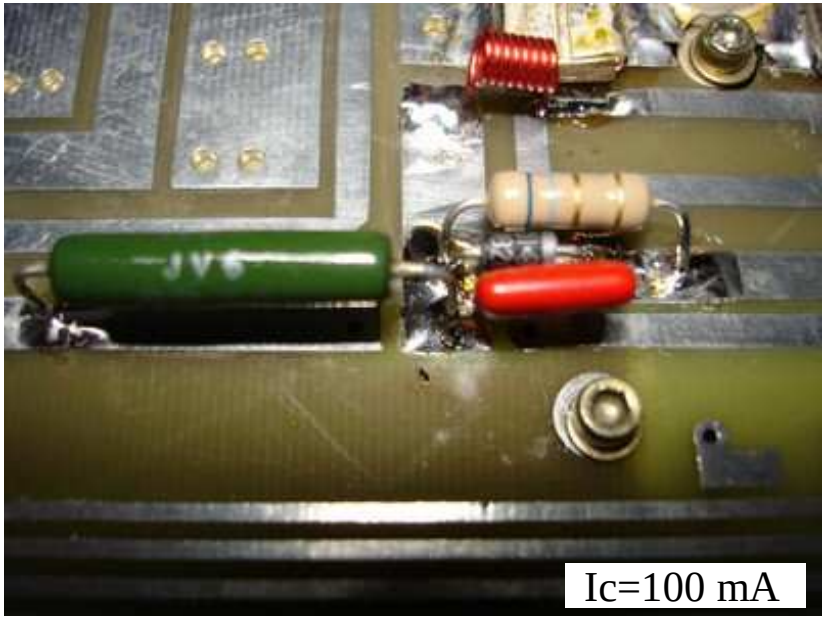


DC bias relay

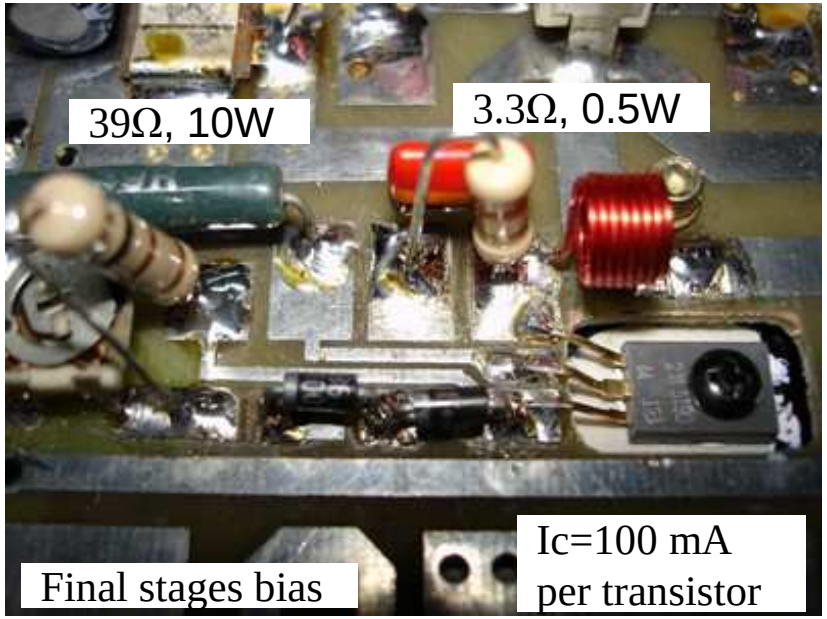


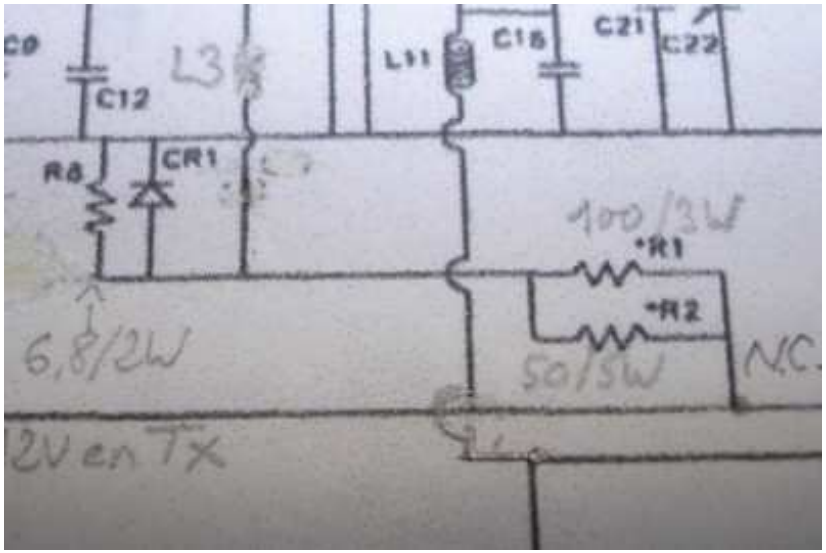
TE-4452RA : DC bias addition

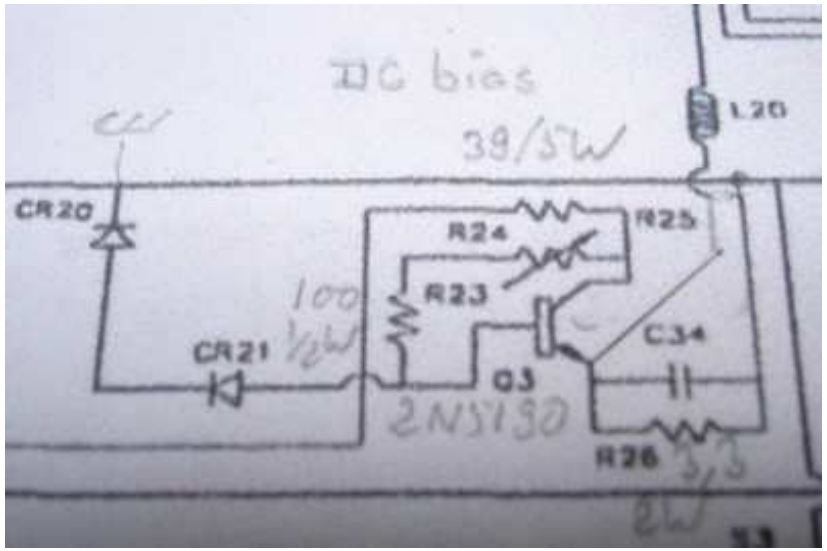
DRIVER



FINAL

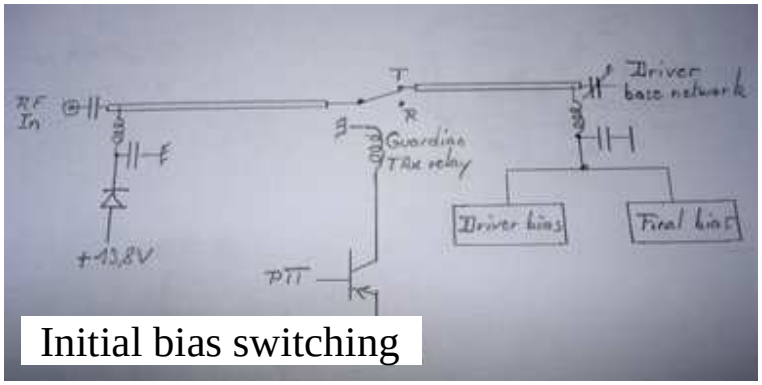






TE-4452RA : initial & modified biasing switching

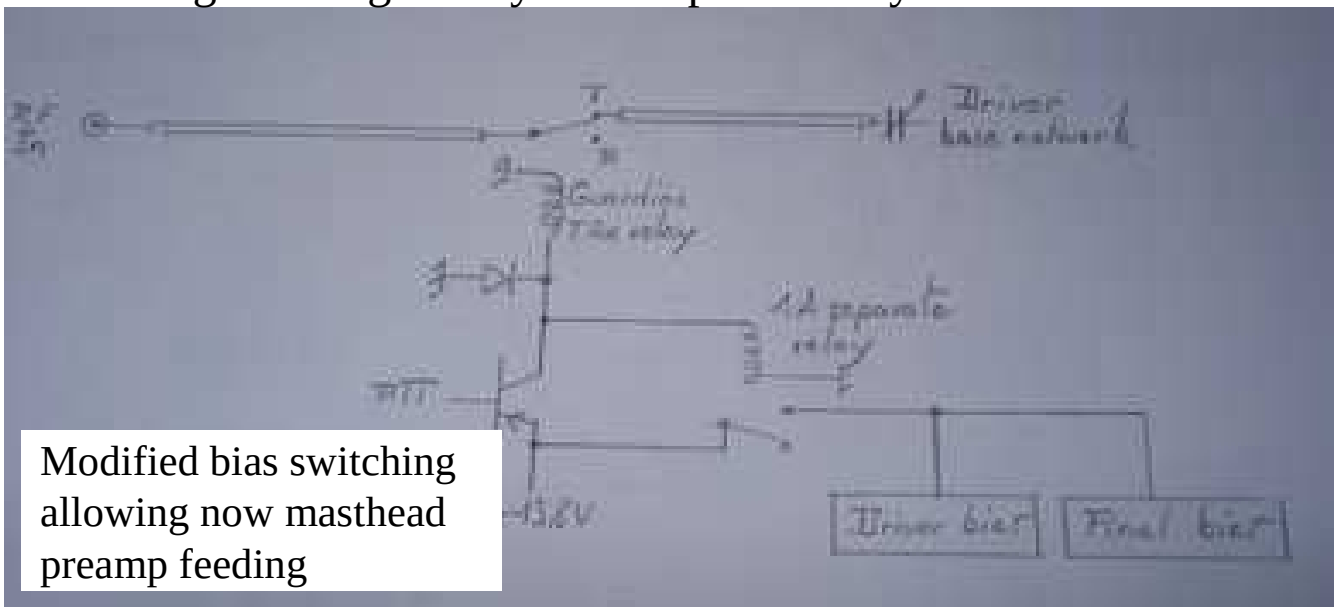
Initially the Guardian 1st RT contact is used both for Rfin and DC biasing injection



Initial bias switching

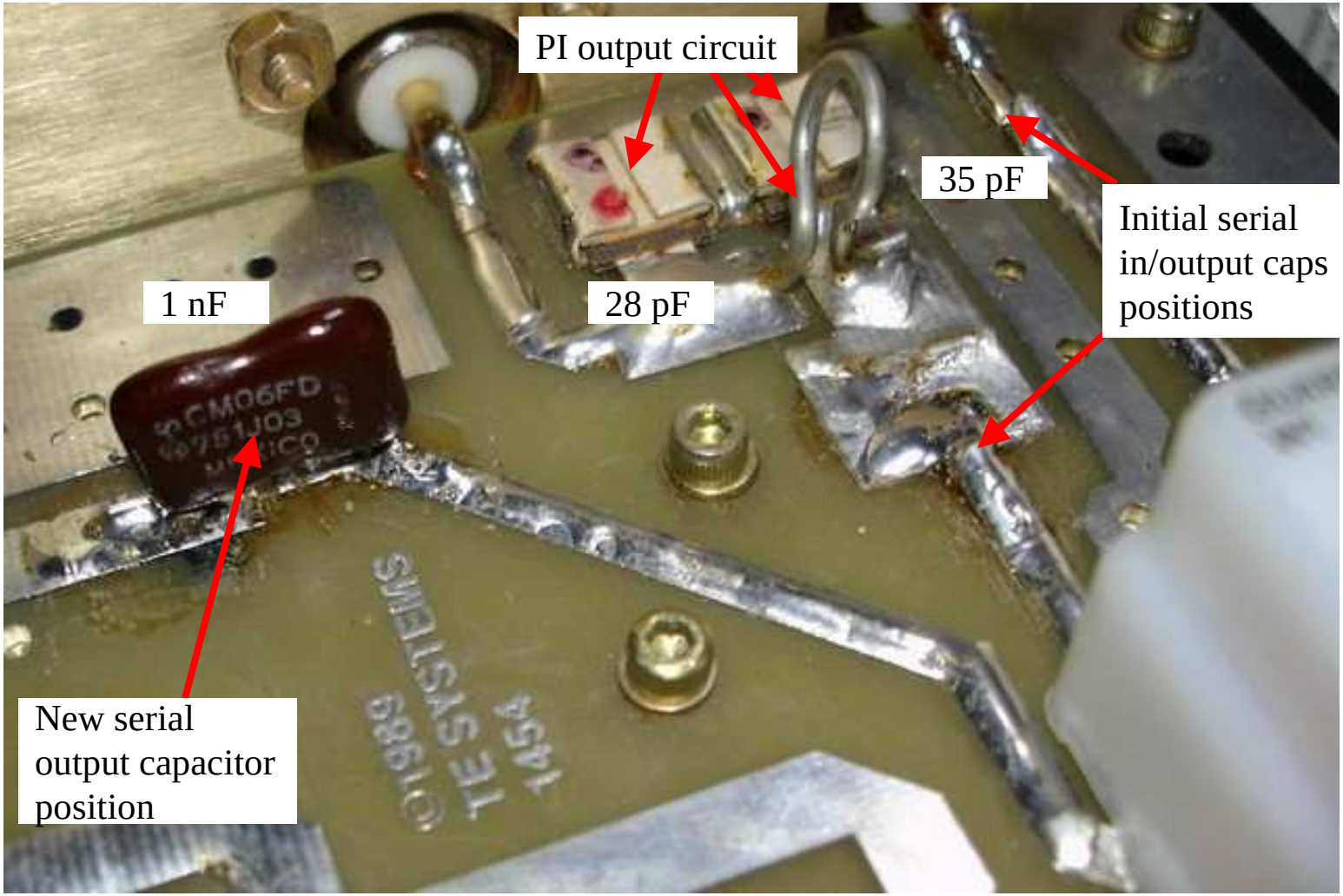
In Rx position the +12V DC is always present on all collectors & circuitry, except for the DC biasing

- The Guardian relay 1st RT contact is now only used for Rfin connection
- +12V biasing is now given by a 2nd separate relay



Modified bias switching allowing now masthead preamp feeding

TE-4452RA : modification of the serial capa output position



- Allows **direct DC feeding from RFin to RFout socket to the mast preamp** with a FT-847
- No more need of the RF input capacitor

TE-4452RA : printboard connectors pin layout

1	2	3	4	5
6	7	8	9	10

Front panel with switches & LEDs

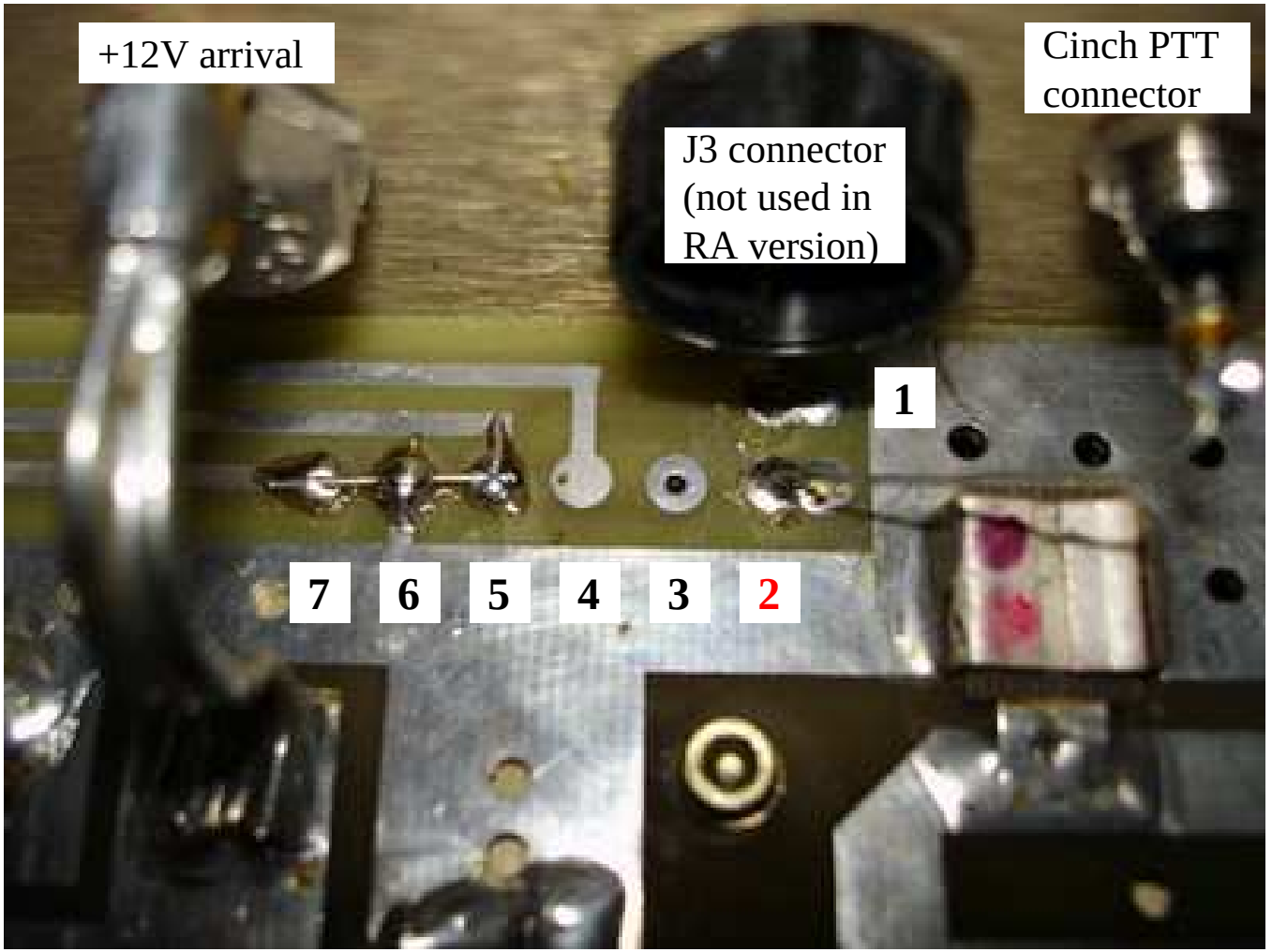
Rear panel with RF in/out connectors

1	2	3	4	5
6	7	8	9	10

	On/off connector 1 near front panel
1	FM/SSB switching
2	DC bias & RF LED
3	+12V after amp on switch
4	PTT or remote LED
5	NC
6	**Ground**
7	Preamp & LED switch
8	+12V after thermal security
9	General +12V incoming
10	Output J3 remote plug

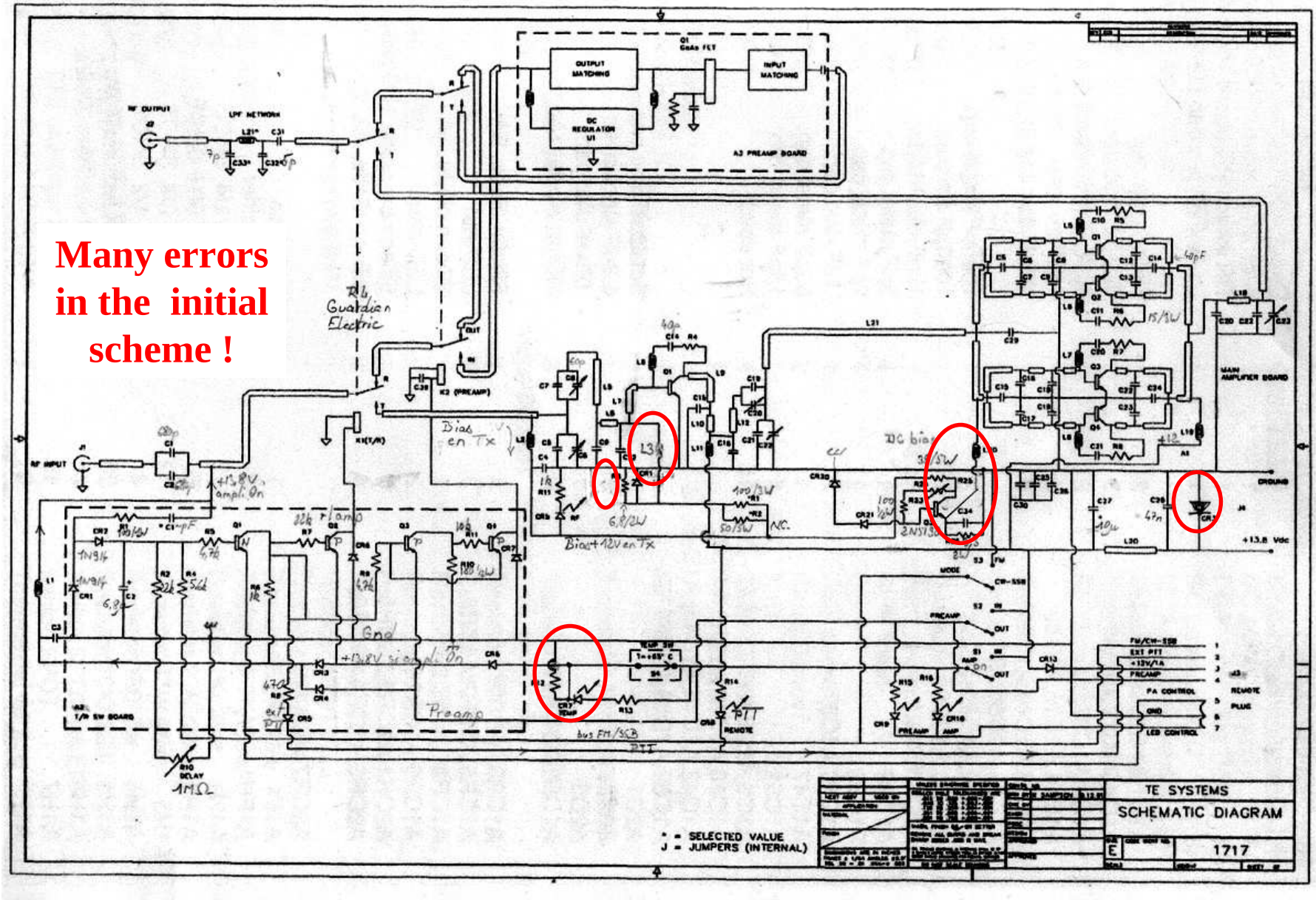
	RF switching connector 2 near rear panel
1	Preamp relay
2	Guardian TRx relay
3	DC bias output
4	**Ground**
5	Output LED to 7 on J3
6	Output on J3
7	+12V from 3 conn 1
8	FM/SSB switching from 1 conn 1
9	PTT from 4 conn 1
10	J3 SSB delay pot

TE-4452RA : J3 remote plug

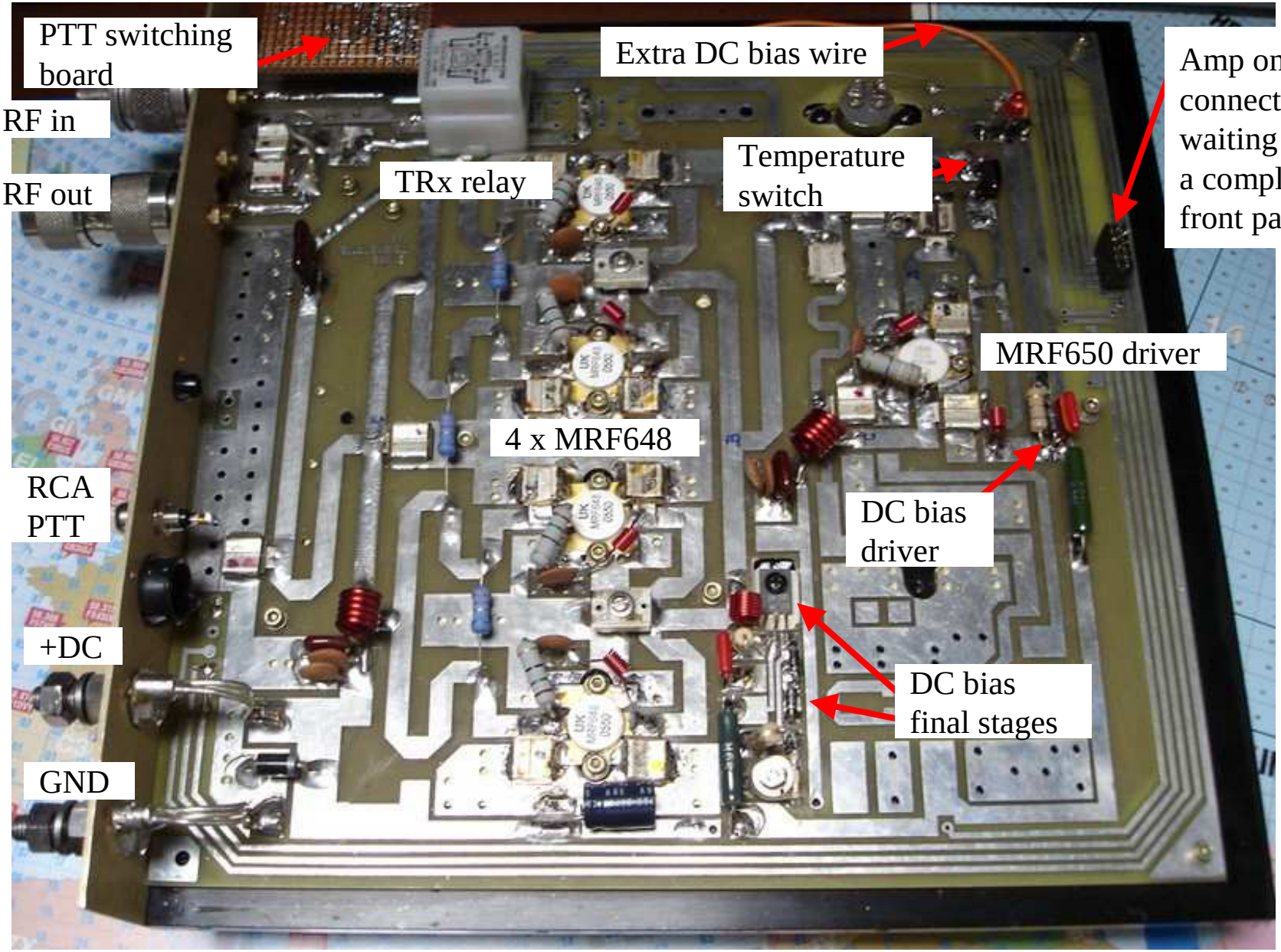


	J3 remote plug
1	FM/SSB
2	PTT
3	+12V, max 1A
4	Preamp
5	PA cntrl gnded
6	**Ground**
7	LED cntrl gnded

TE-4452RA : copy/paste from TE-1452G schematic

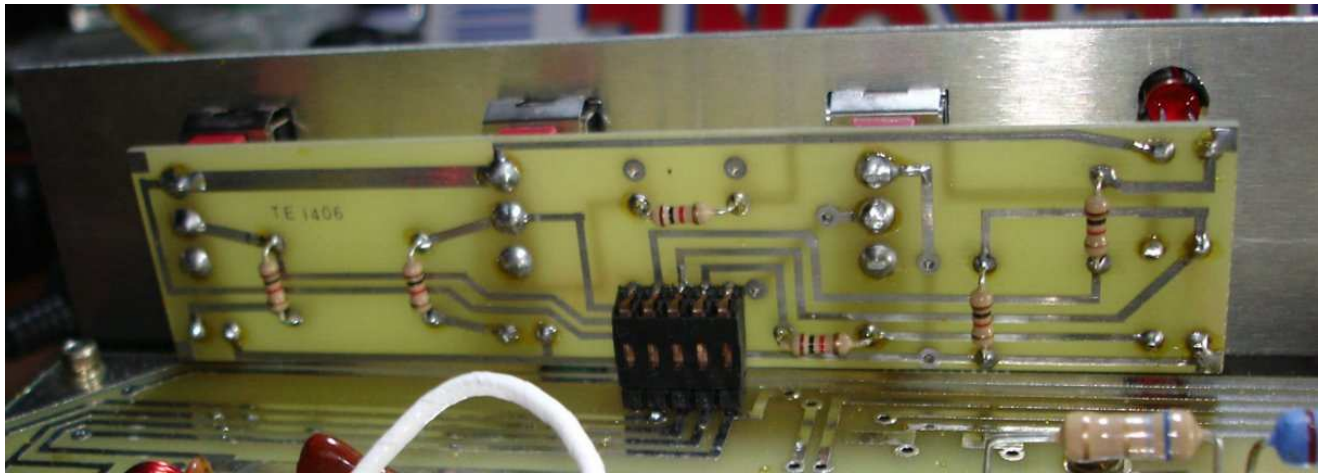


TE-4452RA : all 4 x MRF648 substitution & adds

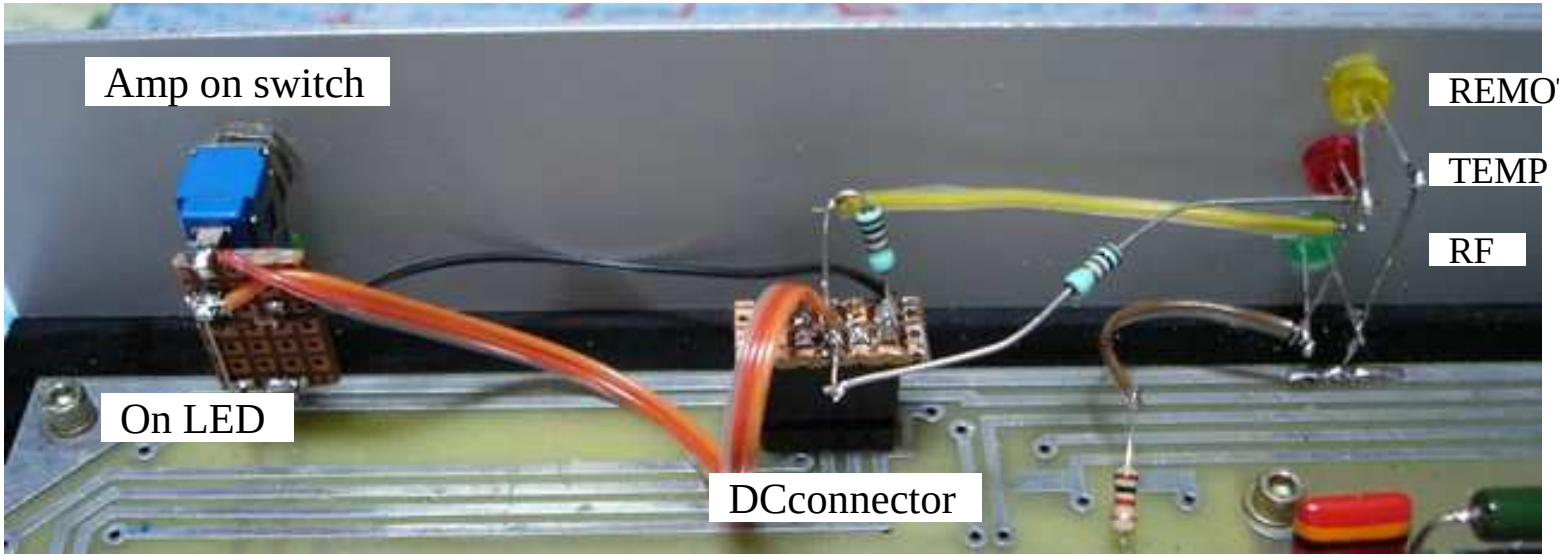


TE-4452RA : back side of front panel

Original TE 1452G VHF front panel



Home made TE 4452G UHF front panel



TE-4452RA : front panel derived from TE 1452G

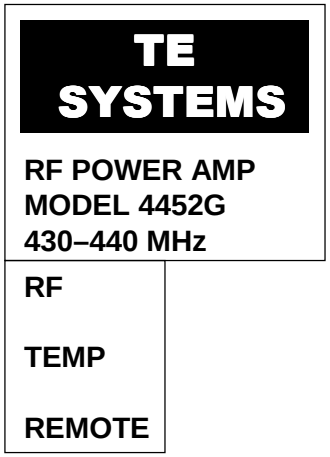
Original TE 1452G VHF front panel : aluminium 250 x 44, depth 1.5 mm

Home made TE 4452G UHF front panel

No use of preamp and mode switches (manual PTT with RCA connector)

TE-4452RA upside down with initial cover

TE-4452RA final aspect


TE
SYSTEMS
RF POWER AMP
MODEL 4452G
430–440 MHz
RF
TEMP
REMOTE

3/ TE-4552RA biasing current

- Rig FT-847, Pin from 2 to 38W
- Wattmeter Telewave model 44A
- Dummy load BIRD Termaline 8135 - 150W
- MAAS SPS9600 power supply à 13.8V

MRF650 driver

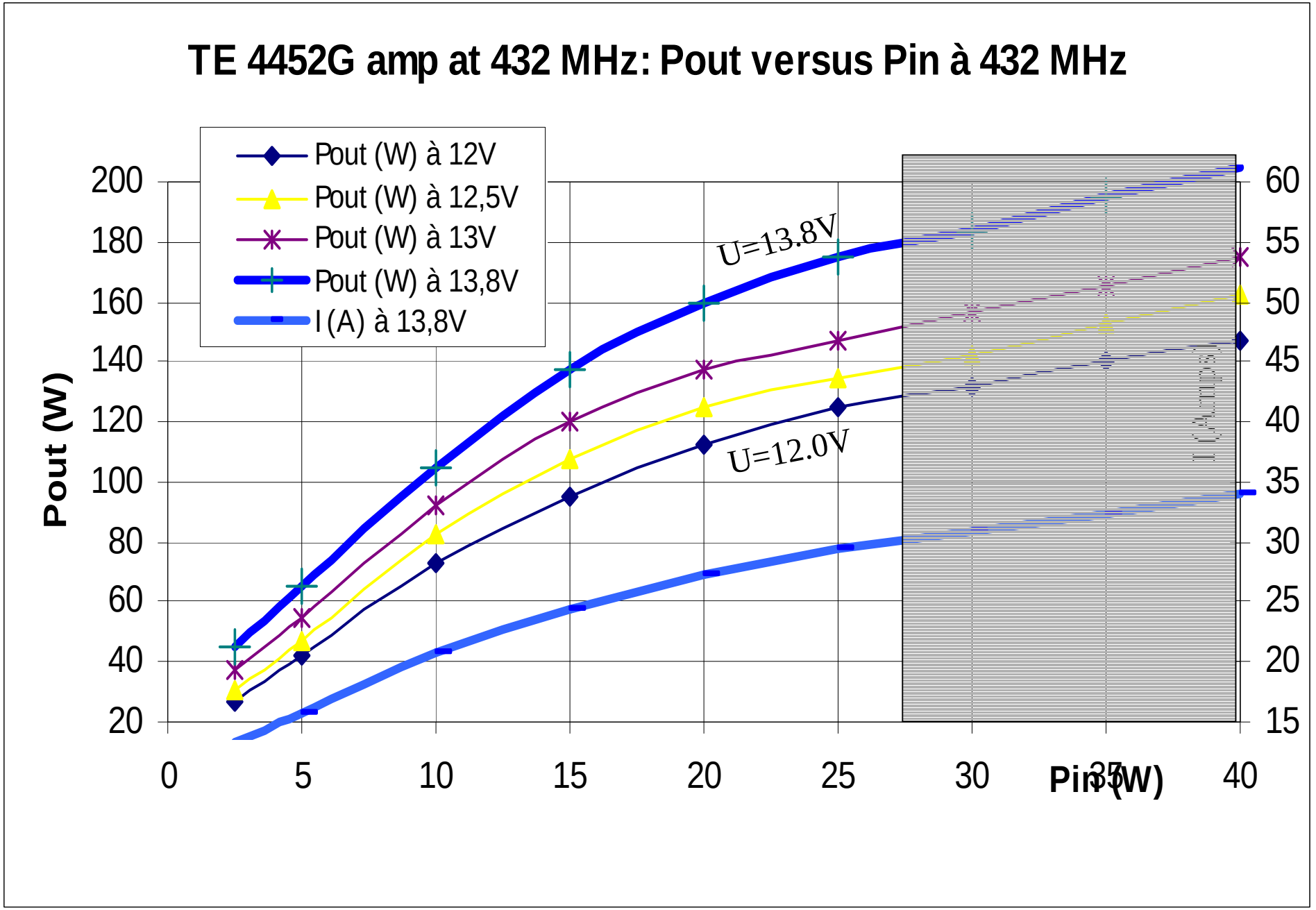
	12V	**12.5V**	**13V**	**13.5V**	**13.8V**
IC bias (mA)	35	60	90	130	170
VBE (V)	0.655	0.670	0.687	0.698	0.705
I total (A)	0.5	0.7	0.9	1.1	1.3

4 x MRF648 final stages

	12V	**12.5V**	**13V**	**13.5V**	**13.8V**
IC bias (mA)	140	240	390	580	750
VBE (V)	0.673	0.686	0.699	0.709	0.715

3/ TE-4452RA: Pout versus Pin à 432.200 MHz

Pin (W)	12V	12.5V	13V	13.8V	I à 13.8V (A)	Yield %
2.5	27	31	37	45	13.3	24.5
5	39	47	51	62	15.8	28.4
10	73	83	92	105	20.8	36.6
15	95	108	122	135	24.3	40.25
20	115	125	137	152	27.3	40.3
25	125	135	147	175	29.4	43.1
30	132	142	152	180	30.8	42.3
35	135	149	165	185	32.3	41.5
40	150	162	175	205	35.3	42


TE 4452G amp at 432 MHz: Pout versus Pin à 432 MHz
Pout (W) à 12V
Pout (W) à 12,5V
Pout (W) à 13V
Pout (W) à 13,8V
I (A) à 13,8V
U=13.8V
U=12.0V
Pout (W)
Pin (W)
200
180
160
140
120
100
80
60
40
20
60
55
50
45
40
35
30
25
20
15
0
5
10
15
20
25
30
35
40

Aknowledgements

- Special thanks to Jim W3ATV who'd sell me this « technician special » amp, also to many US hams but especially Jeff Allen KB9YSJ from Los Angeles, Dave WB0GAZ, David W3KM, Don N8ECH, KT0WN, John VE3MPH, Maximo EA7FGJ and many others for the precious help I'd get and the very constructive discussions we'd have about

- Also to many french hams who kindly'd give me complementary US screws vy difficult to find here in W-Europe !!!

- The AD5TH site also gives many infos about TE Systems six & two meter amps