SINCLABS INC. IS A NORTH AMERICAN COMPANY
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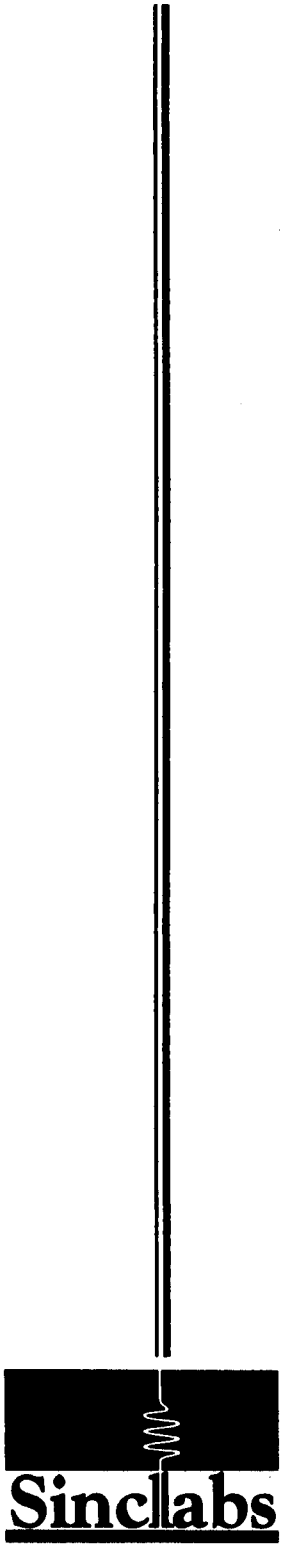
UNITED STATES AND CANADA



TRANSVERTERS

MODELS

ST144-28

AND

ST220-28

SINCLABS INC.
SPECIALTY PRODUCTS DIVISION
85 MARY STREET
AURORA, ONTARIO,
CANADA
L4G 3G9

SPECIFICATIONS: ST144-28 & ST220-28 TRANSVERTERS JULY 30, 1990

SPECIFICATION: MODEL	ST144-28	ST220-28
POWER REQUIREMENTS:	0.125 AMPS ON RECEIVE	
@ +13.8 VOLTS	2.5 AMPS TYPICAL ON TX (15 WATTS OUTPUT)	2.0 AMPS TYPICAL ON TX (10 WATTS OUTPUT)
RECEIVE CONVERTER SECTION:		
INPUT/OUTPUT IMPEDANCE:	50 OHMS	
NOISE FIGURE:	2.0DB TYP.	2.4DB TYP.
CONVERSION GAIN:	20DB MINIMUM	
OUTPUT FREQ.:	28-30MHZ (FOR 144-146MHZ INPUT)	28-30MHZ (FOR 220-222MHZ INPUT)
TRANSMIT SECTION:		
INPUT/OUTPUT IMPEDANCE:	50 OHMS	
RF OUTPUT:	15 WATTS MINIMUM	10 WATTS MINIMUM
	(SET WITH 100mW INPUT)	
SPURIOUS RADIATION:	-40 DB TYPICAL	
INPUT DRIVE REQUIREMENTS:	100 mW NOMINAL(2.3V) 500 mW MAX.	
	(10 mW FOR FULL OUTPUT WITH INPUT PAD SHUNTED	
KEYING:	PUSH-TO-TALK LINE OR +10DBM TYP. FOR RF SENSED KEYING.	
OUTPUT FREQ.:	144-146MHZ	220-222MHZ
	(FOR 28-30MHZ INPUT)	

CONNECTORS: RF: BNC FEMALE PANEL MOUNT
POWER/PTT: 5-PIN DIN PANEL MOUNT
(MATING 5-PIN DIN PLUG SUPPLIED)

SIZE: 2.5"H X 7.375"W X 5.5"D (63.5mm X 187.3mm X 139.7mm)

WEIGHT: 1.92LBS (0.87KG)

NOTE: SPECIFICATIONS SUBJECT TO CHANGE WITHOUT NOTICE.

WHAT IS A TRANSVERTER?

TRANSVERTER IS A COINED TERM MADE FROM TRANSMIT/RECEIVE CONVERTER.

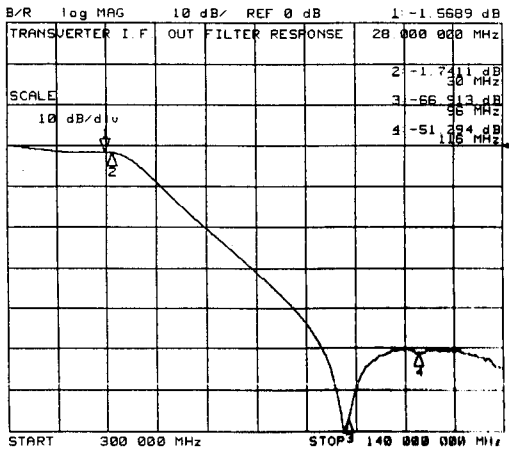
A COMMON CRYSTAL CONTROLLED FREQUENCY IS MIXED WITH AN INTERMEDIATE FREQUENCY (I.F.) TO PRODUCE THE DESIRED THIRD FREQUENCY OF OPERATION.

SINCLABS MODELS ST144-28 AND ST220-28 TRANSVERTERS CONSIST OF THE FOLLOWING:

USING THE R.F. TRANSCEIVE PORT, ON RECEIVE, THE VHF SIGNAL PASSES THROUGH THE PIN DIODE T/R SWITCHING AND A TWO POLE BANDPASS FILTER PRIOR TO THE LOW NOISE FRONT END PREAMP. THE PREAMP OUTPUT PASSES THROUGH A TWO POLE BANDPASS FILTER TO THE RECEIVE MIXER. THE MIXER OUTPUT PASSES THROUGH A TUNED I.F. FILTER TO A LOWPASS FILTER WHICH CUTS OFF ABOVE 30MHZ. THIS LOWPASS FILTER VIRTUALLY ELIMINATES THE LOCAL OSCILLATOR LEAKAGE PROBLEM (WHICH WAS COMMON ON EARLIER GENERATION TRANSVERTERS) BY REDUCING IT BY TYPICALLY 50DB. IF SEPERATE TRANSMIT AND RECEIVE RF PORTS ARE USED, THE RECEIVE INPUT SIGNAL WILL NOW BYPASS THE PIN DIODE T/R SWITCH AND ONE STAGE OF INPUT FILTERING. NOISE FIGURE WILL BE IMPROVED IF THIS IS DONE, BUT THE UNIT FRONT END WILL BE MORE SUSCEPTABLE TO OUT OF BAND SIGNALS WHICH COULD CREATE AN OVERLOAD OR INTERMOD CONDITION.

ON TRANSMIT, THE I.F. SIGNAL COMES INTO AN R.F. SENSING CIRCUIT FOR KEYING THE UNIT (NOTE: THE PTT LINE SHOULD BE USED WHENEVER PRACTICAL) AND AN INPUT POWER ADJUST CIRCUIT. THE OUTPUT OF THE POWER ADJUST CIRCUIT IS MIXED WITH THE LOCAL OSCILLATOR. THE MIXER OUTPUT GOES THROUGH A TWO POLE CIRCUIT TUNED TO THE DESIRED FREQUENCY TO THE POST MIXER AMPLIFIERS(TOTAL OF 4 STAGES).

THE OUTPUT OF THE FINAL AMPLIFIER GOES TO A TUNED CIRCUIT, PIN DIODE T/R SWITCH, AND HARMONIC FILTER STAGE TO PRODUCED THE SPECIFIED R.F. OUTPUT.



HOOK-UP GUIDELINES FOR TRANSVERTERS

EVEN THOUGH THE TRANSVERTER WILL SENSE RF LEVELS AS LOW AS 10mW AND KEY THE UNIT, IT IS RECOMMENDED THAT THE PUSH-TO-TALK (PTT) LINE BE USED WHENEVER PRACTICAL.

BEFORE HOOKING UP THE PTT OF THE TRANSVERTER, MEASURE THE VOLTAGE ON THE PTT LINE OF THE 10M I.F. RADIO. IF IT IS GREATER THAN +9 VOLTS (AND LESS THAN +50V) THEN CONNECT THE PTT FROM THE TRANSVERTER DIRECTLY TO THE PTT OF THE 10M TRANSCEIVER. KEY THE 10M I.F. RADIO WITH NO RF OUTPUT AND VERIFY THIS PTT VOLTAGE GOES TO GROUND AND THE TRANSVERTER KEYS ON. (RED TX LIGHT COMES ON)

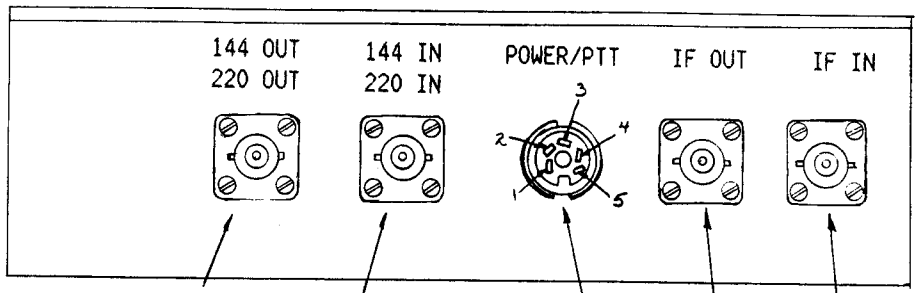
IF THE PTT LINE UNKEYED VOLTAGE ON THE 10M I.F. RADIO IS NEGATIVE, THEN AN EXTERNAL KEYING CIRCUIT (RELAY, ETC.) WILL BE REQUIRED TO GROUND THE TRANSVERTER PTT CIRCUIT.

IF THE 10M I.F. RADIO DOES NOT HAVE SEPERATE TX AND RX PORTS THEN AN EXTERNAL RELAY WILL BE REQUIRED TO SWITCH BETWEEN THE TRANSVERTER I.F. INPUT AND I.F. OUTPUT PORTS.

**** CAUTION: I.F. INPUT DRIVE LEVELS EXCEEDING 500mWATTS CAN DAMAGE THE TRANSVERTER. IF THE 10M I.F. RADIO IS CAPABLE OF PRODUCING MORE OUTPUT POWER THAN THIS, THEN AN EXTERNAL RF ATTENUATOR MUST BE USED TO REDUCE THE INPUT DRIVE POWER TO THE TRANSVERTER. FOR EXAMPLE, IF YOUR 10M RADIO OUTPUTS 100 WATTS, YOU WOULD NEED TO REDUCE THIS BY A MINIMUM OF 23dB IF YOU RUN THE FULL 100 WATTS OUTPUT. IF YOUR RADIO RUNS ONLY 10WATTS OUTPUT THEN A MINIMUM PAD OF 13dB WOULD BE REQUIRED. THE RECEIVE SECTION OF THE TRANSVERTER HAS SUFFICIENT GAIN SO THE 13dB PAD COULD BE LEFT IN LINE WHEN A 10M TRANSCEIVER WITH ONLY ONE TRANSCEIVE PORT IS USED.

IF THE RADIO HAS AN RF OUTPUT POWER CONTROL, THEN IT SHOULD BE SET TO ITS MINIMUM, MEASURED FOR AMOUNT OF OUTPUT WHEN SET TO THIS LEVEL, AND IF LESS THAN 500mW THEN HOOKED UP TO THE TRANSVERTER. SET THE R21 POT IN THE TRANSVERTER TO ITS MID POSITION, KEY THE UNITS, AND SLOWLY INCREASE THE I.F. INPUT DRIVE UNTIL THE SPECIFIED OUTPUT POWER IS ATTAINED.

**** TAKE EXTRA CAUTION IF USING THIS METHOD OF INPUT POWER CONTROL SO YOU DO NOT ACCIDENTLY TRANSMIT MORE THAN 500mW OF DRIVE.



RF PORT:
Transmit out
Receive in

I.F. OUTPUT
28 MHZ

I.F. INPUT
28 MHZ

RF PORT:
Receive in only
For radios with
separate transmit
and receive connections
or amplifier use.
Modifications to unit
required to activate
this port.

POWER/PTT CONNECTOR:
1 PTT
2 N/C
3 GROUND
4 N/C
5 +13.8V

I.F. IN DRIVE REQUIREMENTS

I.F. INPUT DRIVE(PEAK)	R22 SHUNT
500mW(MAXIMUM)	NONE
250mW	NONE
100mW	750
50mW	220
10mW	10

NOTE: IN ALL CASES, ADJUST THE INPUT POWER ADJUST POT (R21) MAXIMUM CCW (COUNTER CLOCKWISE) BEFORE APPLYING DRIVE. KEY THE UNIT, APPLY DRIVE, AND SLOWLY TURN R21 CW (CLOCKWISE) FOR SPECIFIED OUTPUT POWER.

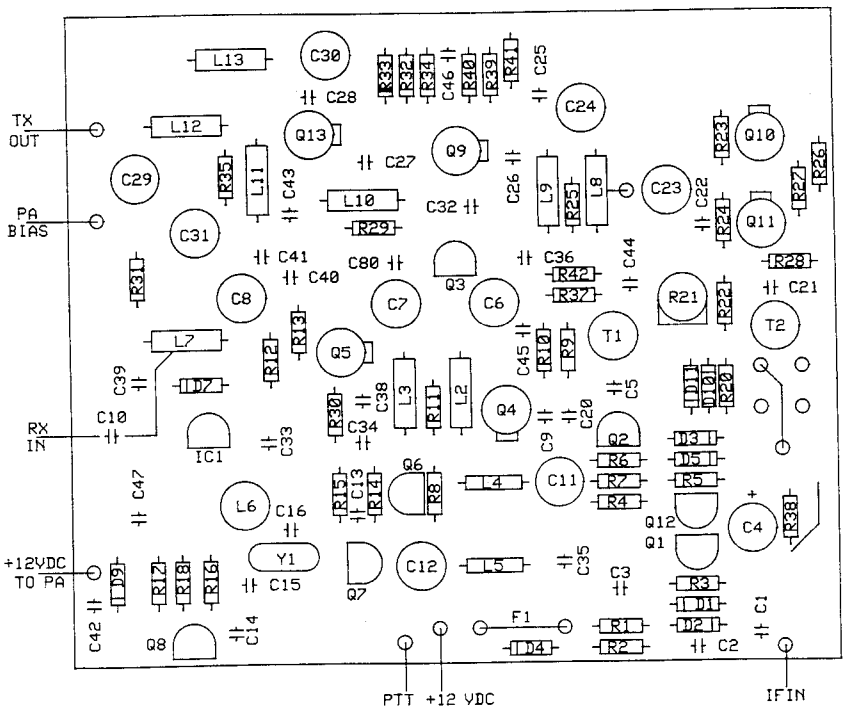
CAUTION: INPUT DRIVE LEVELS EXCEEDING 500mW MAY DAMAGE UNIT!

MODEL.....	ST144-28	ST220-28	REPLACEMENT PART NUMBER
SCHEMATIC DESIGNATION			
SEMICONDUCTORS:			
D1,D2	1N270		84A0276
D3	1N5231B(5.1V)		84A0251
D4,D9,D100,D104	1N4004		84A0275
D5,D7,D10,D11	1N4148		84A0274
D6	GREEN LED ASSEMBLY		92A0301
D8	RED LED ASSEMBLY		92A0300
D101,D102	UM9401		84A0358
D103	1N5237B(8.2V)		84A0252
IC1	78L08		85A0249
Q1,Q2,Q3,Q6,Q12	2N2222		83A0355
Q4,Q10,Q11	3N204		83A0270
Q5	NE25137/MRF966		83A0359
Q7,Q8	MPSH10		83A0250
Q9	2N2369	-	83A0272
	-	BFY90	83A0273
Q13	2N4427		83A0271
Q100	2N6080		83A0342
Q101	MRF239		83A0343
RESISTORS:			
R1,R106	12K		80A0324
R2,R14,R16, R104,R107,R108	470		80A0332
R3	47K		80A0326
R4	8.2K		80A0322
R5,R24,R29,R37	10		80A0335
R6,R8,R12,R13, R17,R26,R27, R34,R40	10K		80A0323
R7	390		80A0331
R9,R23,R41	1.5K		80A0319
R10,R42	15K		80A0325

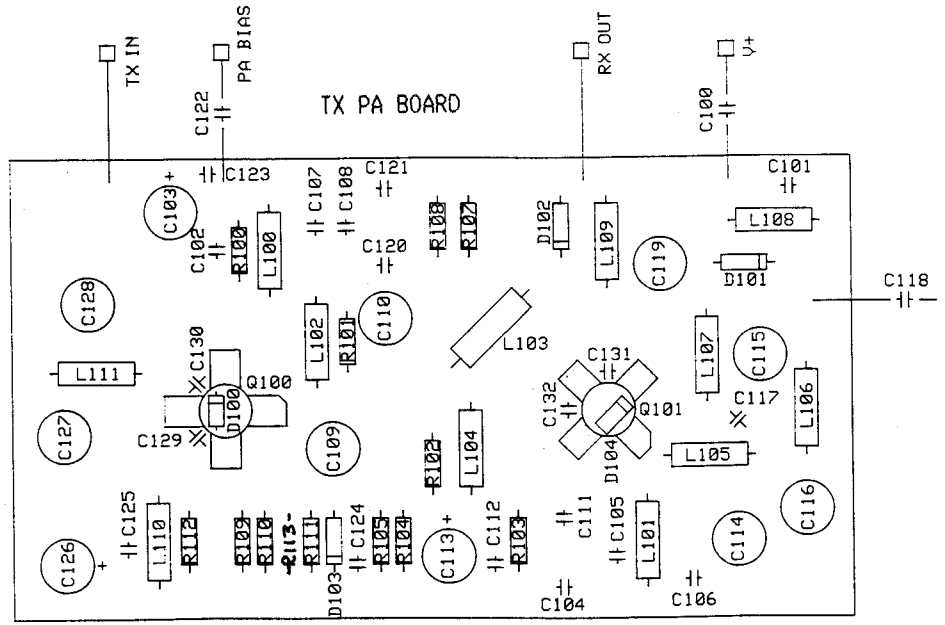
MODEL.....	ST144-28	ST220-28	REPLACEMENT PART NUMBER
SCHEMATIC DESIGNATION			
R11,R15,R19,R22, R31,R32,R36, R111	1K		80A0318
R18,R28	3.3K		80A0321
R20	100, 1/2W		80A0327
R21	100 VARIABLE		80A0293
R25,R101	100, 1/2W		80A0330
R30	82		80A0329
R33,R103	33		80A0282
R35	2.2K		80A0320
R38	750		80A0283
R39	47		80A0328
R100,R102,R112	220		80A0344
R105, R113	SELECTED		--
R109,R110	22		80A0380
CAPACITORS:			
C1,C5,C13,C14, C106,C108	10PF		81A0313
C2,C102,C104	.05UF		81A0279
C3,C18,C19,C22,C26,C28, C33-C47,C101,C105,C107, C111,C112,C117,C120, C121,C123,C124,C125	1000PF		81A0356
C4,C103,C113,C126	33UF,ELECT		81A0280
C6,C7,C8,C11,C12,C23, C24,C32,C116	10PF,VARIABLE		81A0278
C9,C16,C20,C129,C130	4.7PF		81A0314
C10,C118,C131,132	47PF		81A0312
C15	2.2PF		81A0315
C21,C25,C27	10PF -	- 8.2PF	81A0313 81A0316
C29,C30,C31,C119	22PF,VARIABLE		81A0277
C48,C49	220PF		81A0368
C50	15PF		81A0369
C100,C122	1000PF,FEED THRU		81A0295
C109,C110,C114,C115, C127,C128	60PF,VARIABLE		81A0336

MODEL.....	ST144-28	ST220-28	REPLACEMENT PART NUMBER
SCHEMATIC DESIGNATION			
FUSE: F1	30AWG, WIRE		
CRYSTAL:Y1	116.00000MHZ -	- 96.00000MHZ	93A0311 93A0310
TRANSFORMER:			
T1	23:4, TURNS		
T2	22:4, TURNS		
COILS:			
L1	CHOKE,0.22UH		82A0367
L2,L108,L109	COIL,4 TURNS -	- COIL,3 TURNS	
L3,L7	COIL,5 TURNS -	- COIL,3 TURNS	
L4	COIL,6 TURNS -	- COIL,3 TURNS	
L5	COIL,7 TURNS -	- COIL,3 TURNS	
L6	COIL,6 TURNS -	- COIL,7 TURNS ON FORM	
L8	COIL,6 TURNS -	- COIL,4 TURNS	
L9	COIL,4 TURNS -	- COIL,2 TURNS	
L10	COIL,7 TURNS -	- COIL,4 TURNS	
L11	COIL,7 TURNS -	- COIL,4 TURNS	
L12,L111	COIL,3 TURNS -	- COIL,2 TURNS	
L13	COIL,9 TURNS -	- COIL,7 TURNS	
L100,L104,L107,L110	CHOKE,10UH		82A0341
L101,L102	COIL,7 TURNS -	- COIL,7 TURNS	
L103	COIL,3 TURNS -	- COIL,1/2 TURN	
L105	COIL,2 TURNS -	- COIL,1 TURN	
L106	COIL,3 TURNS -	- COIL,2 TURNS	

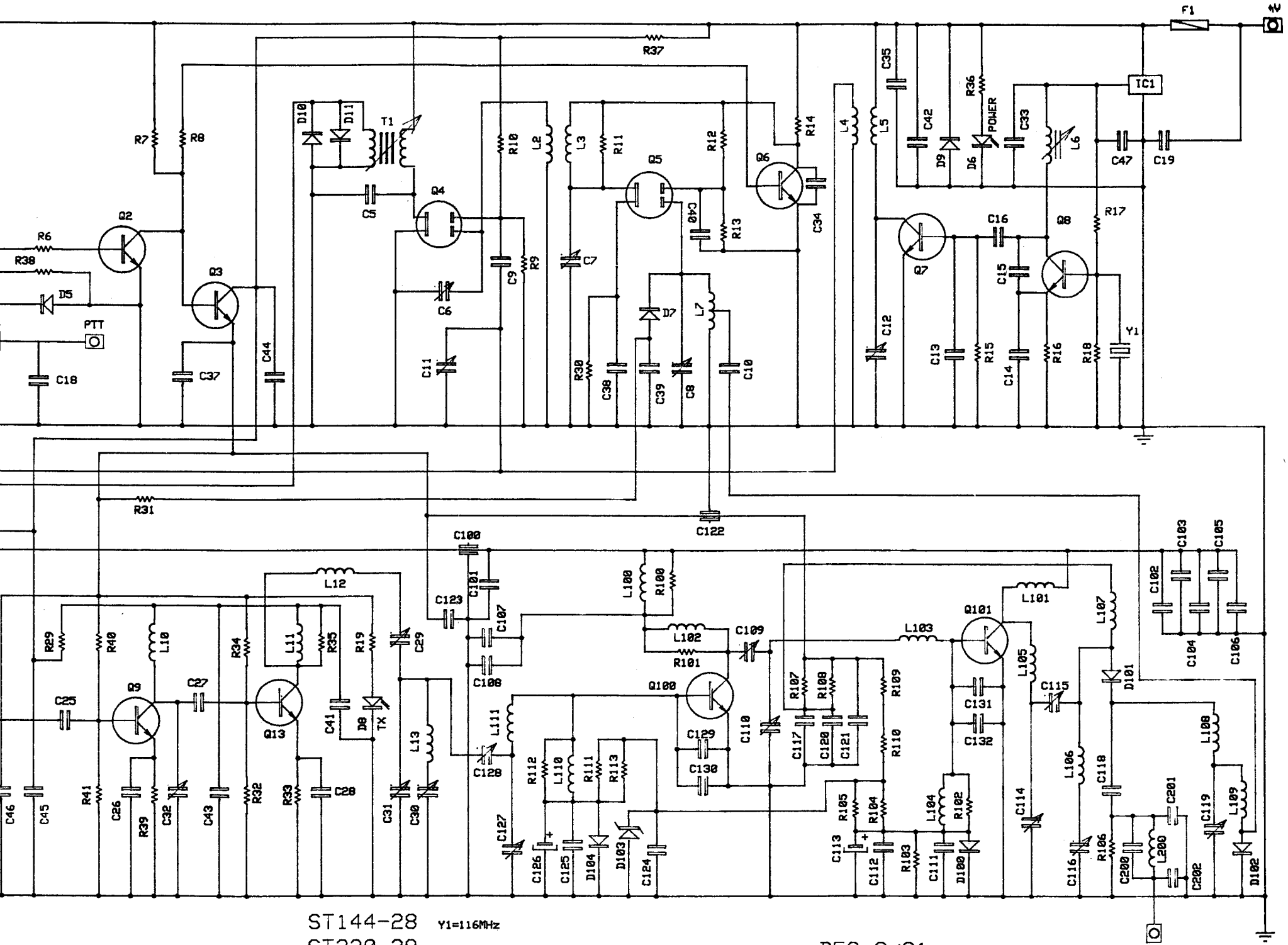
MAIN BOARD



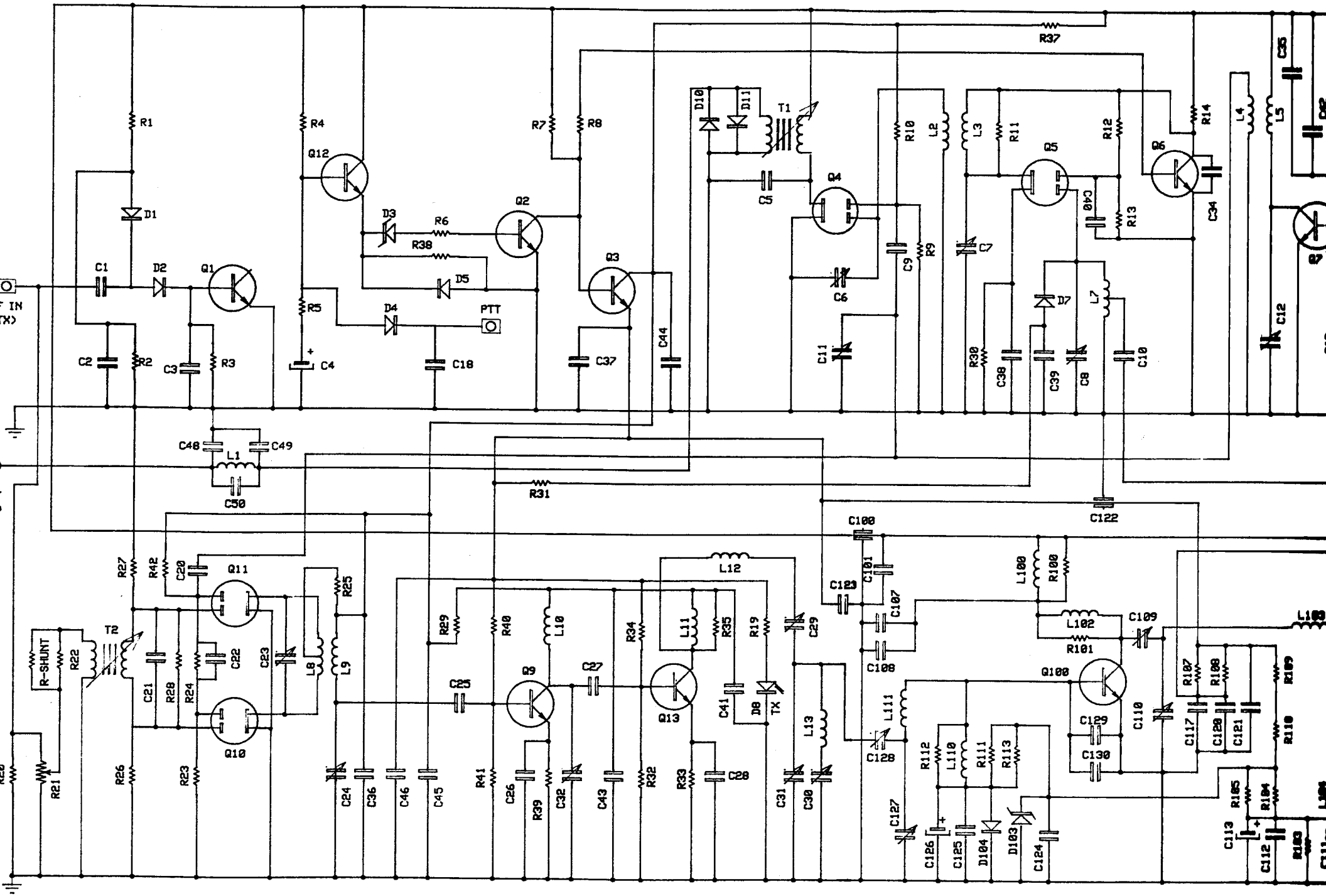
TX PA BOARD



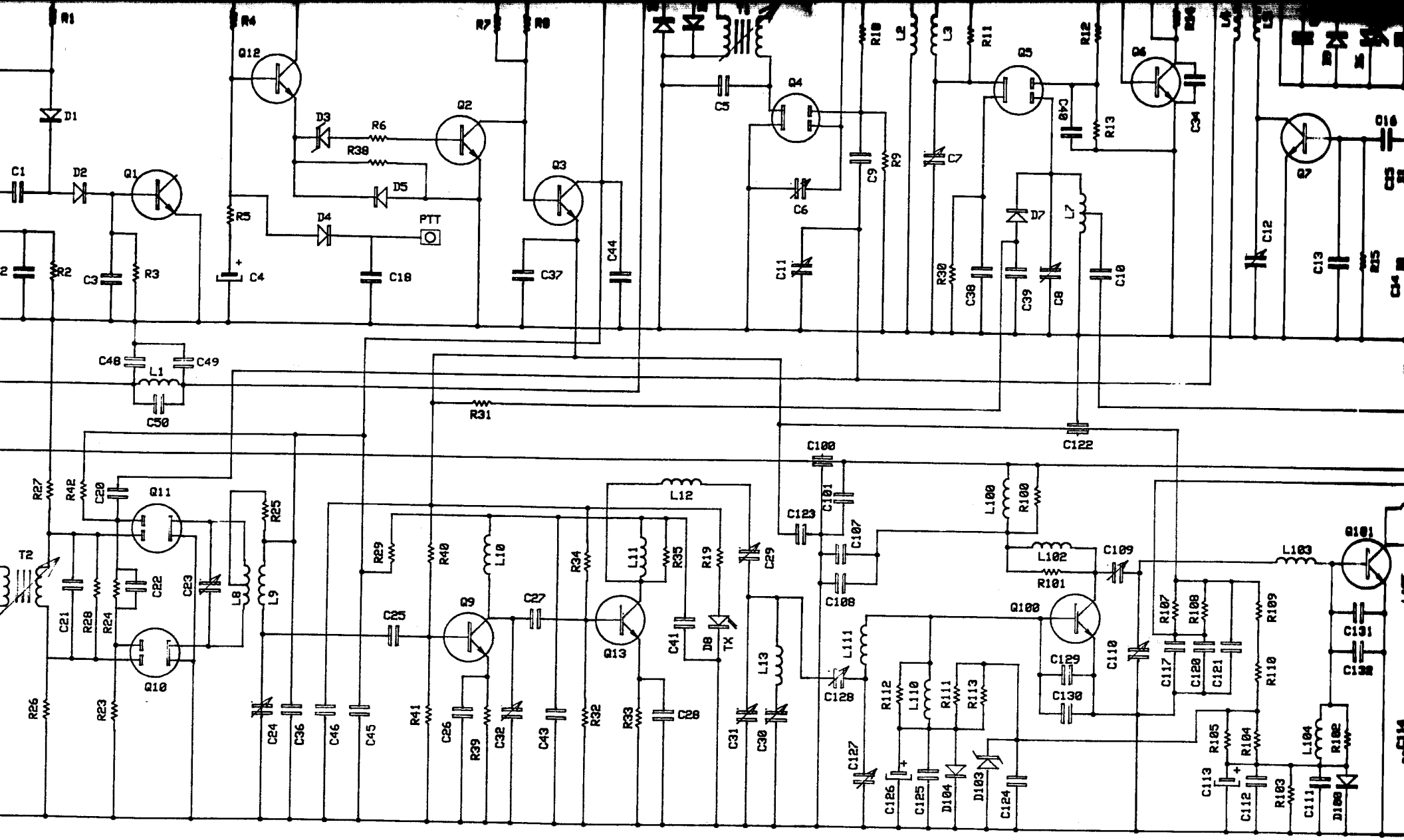
TRANSVERTER MODELS ST144-28, ST220-28, ST220-28A



TRANSVERTER MODELS ST144-28, ST220-28, ST220-28A



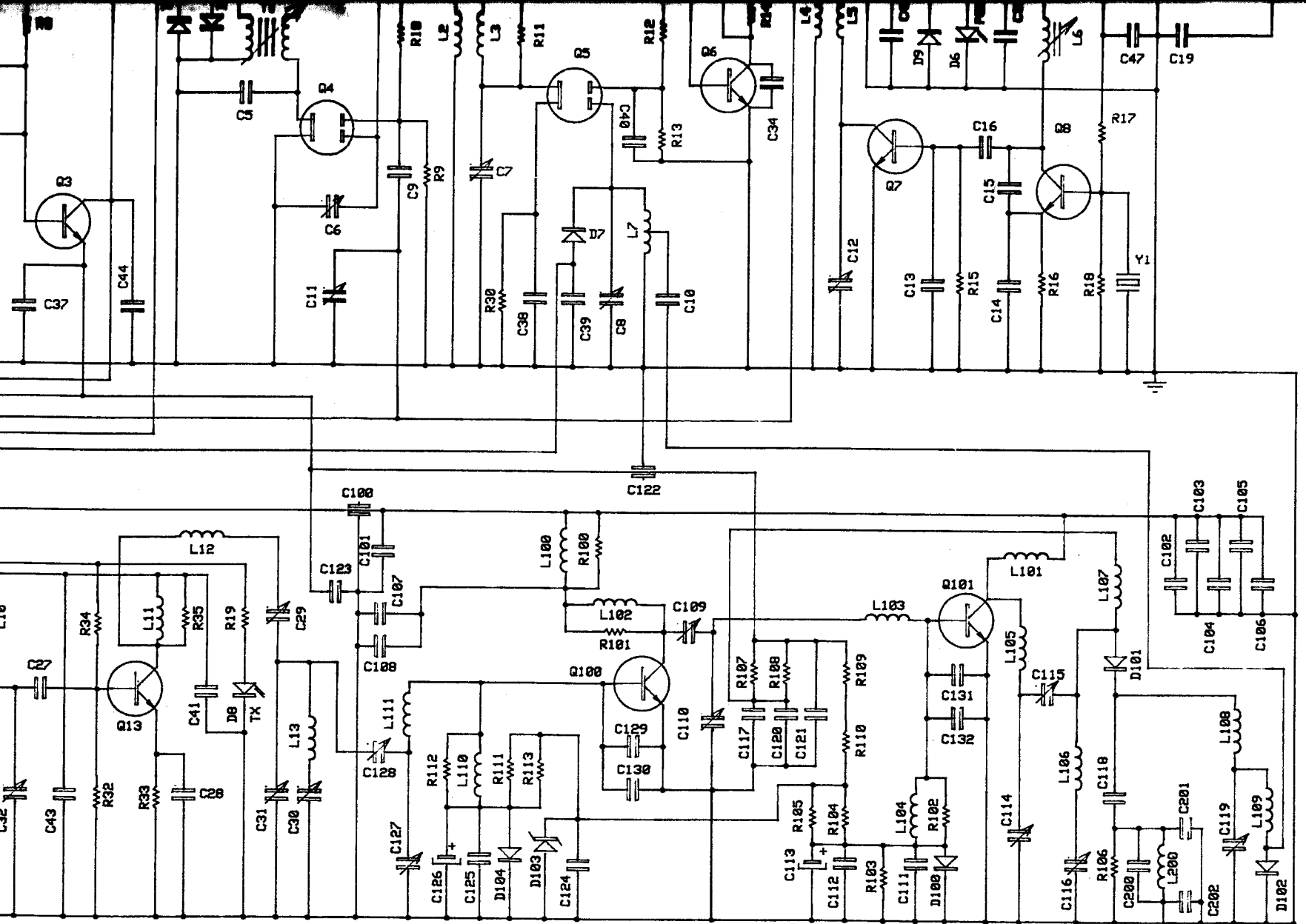
ST144-28 Y1=116MHz



-SHUNT: SEE I.F. DRIVE REQUIREMENTS

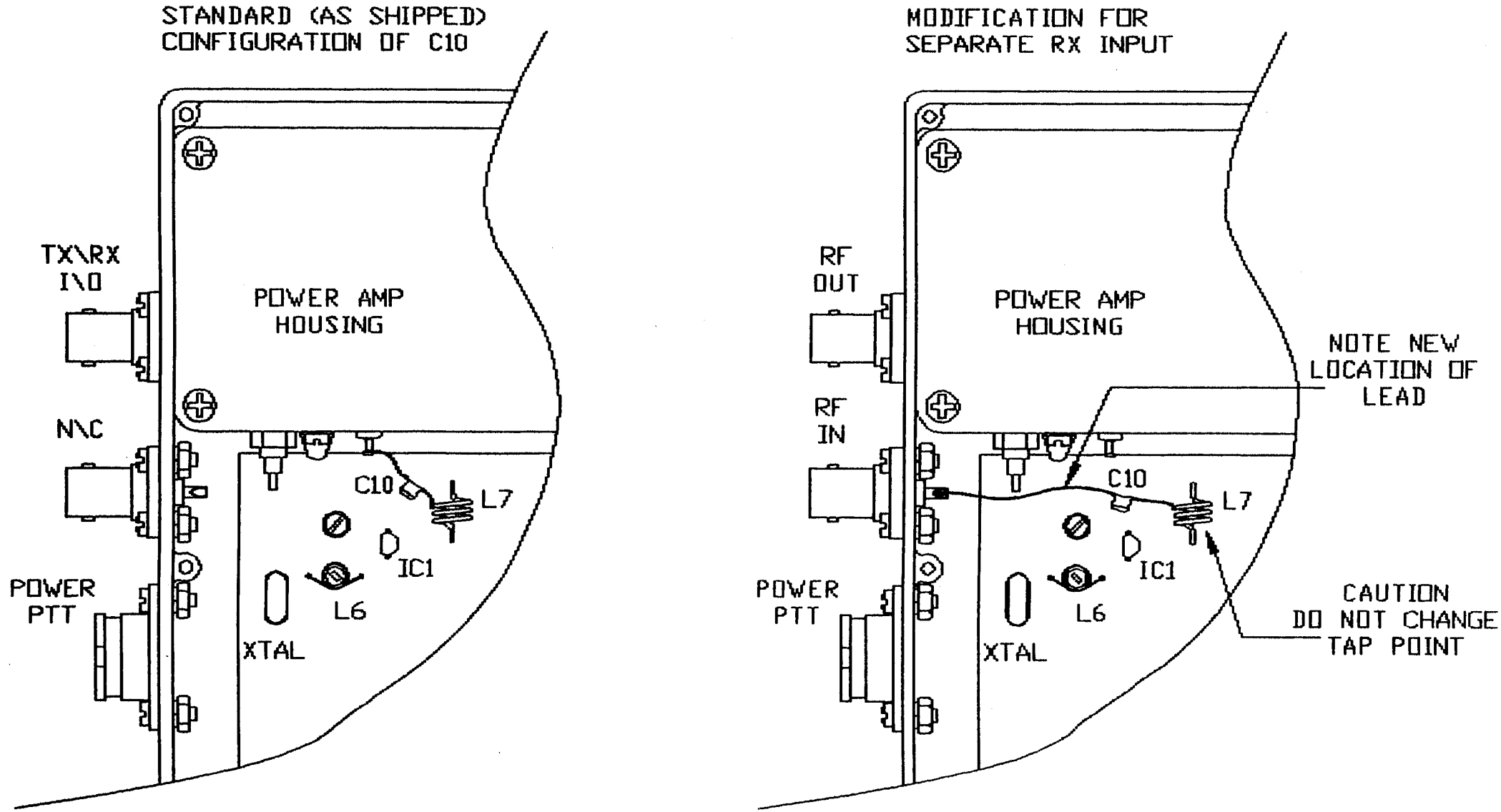
ST144-28 Y1=116MHz
ST220-28 Y1=96MHz
ST220-28A Y1=97MHz

DEC 8/91



ST144-28 Y1=116MHz
ST220-28 Y1=96MHz
ST220-28A Y1=97MHz

DEC 8/91



-VIEW-
TOP, WITH TRANSVERTER
COVER REMOVED