

Introduction and Precautions

The Yaesu System 600 is carefully designed to allow the knowledgeable operator to make nearly all adjustments required for various station conditions, modes and operator preferences simply from the controls on the front and rear panels, without opening the case of the transceiver. These adjustments, plus certain internal settings, are described in the Yaesu System 600 Operating Manual.

The following procedures cover the sometimes critical and tedious adjustments that are not normally required once the transceiver has left the factory. However, if damage occurs and some parts are subsequently replaced, realignment may be required. If a sudden problem occurs during normal operation, it is likely due to component failure; realignment should not be done until after the faulty component has been replaced.

We recommend that servicing be performed only by authorized Yaesu service technicians, experienced with the circuitry and fully equipped for repair and alignment. So if a fault is suspected, you should contact the selling dealer for instructions regarding repair. Authorized Yaesu service technicians have the latest modification information, and realign all circuits and make complete performance checks to ensure compliance with factory specifications after replacing faulty components.

Those who do undertake any of the following alignments are cautioned to proceed at their own risk. Problems caused by unauthorized attempts at realignment are not covered by the warranty policy. Also, Yaesu reserves the right to change circuits and alignment procedures in the interest of improved performance, without notifying owners.

Under no circumstances should any alignment be attempted unless the normal function and oper-

ation of the transceiver are clearly understood, the cause of the malfunction has been clearly pinpointed and any faulty components replaced, and the need for realignment determined to be absolutely necessary.

The following test equipment (and thorough familiarity with its correct use) is necessary for complete realignment. Correction of problems caused by misalignment resulting from use of improper test equipment is not covered under the warranty policy. While most steps do not require all of the equipment listed, the interactions of some adjustments may require that more complex adjustments be performed afterwards. Do not attempt to perform only a single step unless it is clearly isolated electrically from all other steps. Rather, have all test equipment ready before beginning, and follow all of the steps in a section in the order they are presented.

Required Test Equipment

- Digital DC Voltmeter
(high-Z, >1 M ohm/V)
- DC Ammeter
- AC Voltmeter
- RF Voltmeter
- RF Standard Signal Generator w/calibrated output and dB scale, 0 dBμ = 0.5μV
- AF Signal Generator with calibrated output
- AF Voltmeter
- Frequency Counter
- 50-ohm Dummy Load (150 - 250 watts)
- 16.6-ohm Dummy Load (150 watts)
- In-Line Wattmeter (150 - 250 watts, 50-ohm)
- RF Attenuator (150 watts, 40-dB) or Coupler

Alignment

Alignment Preparation & Precautions

A 50-ohm dummy load and in-line wattmeter must be connected to the antenna jack in all procedures that call for transmission, except where specified otherwise. Correct alignment is not possible with an antenna.

Except where specified otherwise, the transceiver should be tuned to 14.200 MHz,

USB mode, and these controls set as indicated:

- SQL & VOL fully ccw (minimum)
- CLARIFIER to 12 o'clock

After completing one step, read the following step to determine whether the same test equipment will be required. If not, remove the test equipment (except the dummy load and wattmeter, if connected) before proceeding.

Correct alignment requires that the ambient temperature be the same as that of the transceiver and test equipment, and that this temperature be held constant between 20

and 30 °C (68 - 86 °F). If the transceiver is brought into the shop from hot or cold air it

should be allowed some time for thermal equalization with the environment before alignment.

Alignments must only be made with oscillator shields and circuit boards firmly affixed in place. Only one extender board should be installed at a time for access to the board being aligned. Also, the test equipment must be thoroughly warmed up before beginning.

Alignment values assume a DC supply voltage of 13.5V DC.

Note: Signal levels in dB referred to in alignment are based on 0 dBμ = 0.5 μV.

Local Unit

Refer to the Local Unit Alignment Diagram on page 2-11. To prevent PLL unlock from interfering with the Local Unit alignment process, connect TP2004 to ground. Remember to disconnect TP2004 when finished with the alignment!

Reference Oscillator

- ☐ Connect the frequency counter to JP2001, and the voltmeter to TP2005.
- ☐ If the counter frequency differs by more than 3 Hz from 5.242880 MHz, adjust the TCXO-4 trimmer (if the TCXO is installed) or TC2701.
- ☐ Confirm a level of at least 900 mVrms on the RF voltmeter.

DDS 1 Check

- ☐ Tune the transceiver to 7.045.1 MHz, and select LSB mode.
- ☐ Connect the voltmeter to Q2036, pin 2, and confirm that the RF voltmeter indicates at least 110 mVrms.

DDS 2 Check

- ☐ Tune the transceiver to 7.045.1 MHz, and select LSB mode.
- ☐ Connect the RF voltmeter to Q2044, pin 2, and confirm an indication of at least 65 mVrms.

PLL BPF

- ☐ Connect the RF voltmeter to TP2001.
- ☐ Tune the transceiver to 7.005.6 MHz, and select LSB mode.
- ☐ Adjust T2001, T2002 and T2003 alternately several times for peak indicated RF voltage (at least 190 mVrms).

Carrier Level Adjust & Frequency Check

- ☐ Connect RF voltmeter to TP2015.
- ☐ Alternately adjust T2004 and T2005 several times for peak indicated RF voltage (at least 320 mVrms).
- ☐ Replace the voltmeter with a frequency counter.
- ☐ Select the indicated mode and frequency, according to the following table. Press the PTT-button to transmit.

Frequency	Mode
8.213.50 MHz	J3E (LSB)
8.216.50 MHz	J3E (USB)
8.215.80 MHz	A1A
8.215.80 MHz	A3E
8.213.00 MHz	J2B (LSB)
8.217.00 MHz	J2B (USB)

- ☐ Confirm that the carrier frequency is within ± 20 Hz of the displayed counter frequency.

PLL Main Loop VCO

- ☐ Connect the DC voltmeter to TP2013, then adjust and check the VCO voltage according to Table 1 as shown below.

Table 1. VCO Voltage Alignment

Tune to:	Adjust:	for Indicated voltage of:
30.000.0 MHz	L2027	7.9 to 8.1 V
21.500.0 MHz	confirm	2.0 to 3.0 V
21.499.9 MHz	L2019	7.9 to 8.1 V
14.500.0 MHz	confirm	2.0 to 3.0 V
14.499.9 MHz	L2017	7.9 to 8.1 V
7.500.0 MHz	confirm	2.0 to 3.0 V
7.499.9 MHz	L2011	7.9 to 8.1 V
0.100.0 MHz	confirm	2.0 to 3.0 V

- ☐ Tune the transceiver to 30.000.0 MHz, USB mode, connect the voltmeter to L2005, and confirm a level of more than 60 mVrms.

1st L.O. Output Level Check

- ☐ Connect the RF voltmeter to TP2014.
- ☐ Tune the transceiver to 30.000.0 MHz, and select USB mode. Confirm a level of at least 600 mVrms.

Receiver Circuits

Refer to the Main Unit Alignment Diagram on page 2-12 for location of components.

IF Interstage Transformers (1)

(coarse alignment - Rx Carrier Balance)

- ☐ Connect the RF signal generator to the ANT jack, and an AF voltmeter with speaker to the EXT-SPKR jack.
- ☐ Set VR1003 & IF SHIFT to the 12 o'clock position, then set VR1004 and VR1007 fully clockwise. Inject a +100 dB signal at 14.200.0 MHz, then adjust transformers, T1001 to T1008 and T1010 to T1012 in succession several times for peak indication on the voltmeter.
- ☐ Reduce the SG output level for an S-meter indication of 3 to 5-meter, then adjust VR1006 for peak AF output or max. 3-meter indication.

IF Interstage Alignment

- ☐ Inject a +0 dB μ Signal at 14.200.0 MHz. Connect the AF voltmeter across an 4-ohm load to the EXT-SPKR jack on the rear panel.
- ☐ Preset VR1004 fully clockwise, and adjust transformers T1001 to T1008 and T1010 to T1012 in succession several times for peak AF output or S-meter indication (adjust the SG

Alignment

level as necessary to keep the meter approximately mid-scale).

1st Mixer Balance

- ☐ Preset VR1003 fully clockwise, then, in LSB mode, tune to the internal heterodyne around 15.310 MHz, and adjust VR1003 alternately several times for a null in AF output.

IF Gain

- ☐ Inject a +8 dBμ signal at 14.200.0 MHz to the antenna jack and adjust VR1004 for an S-1 meter deflection.

Squelch Threshold

- ☐ In the USB mode, with no signal at the antenna jack, set the SQL control to the 10 o'clock position, and adjust VR1005 so that the squelch just closes.

NB

- ☐ Inject a +20 dBμ signal at 14.200.0 MHz, then connect a voltmeter to TP1001. Press the NB key, then adjust T1022 and T1023 alternately several times for a minimum indication on the DC voltmeter.

Cellcall Tone Decord

- ☐ In the USB mode, with no signal at the antenna jack, connect a Frequency Counter to the VR1022 center pin.
- ☐ Adjust VR1022 on the Main Unit for 1850 Hz $\pm$ 10 Hz.

Transmitter

Connect the 50-ohm dummy load to the antenna jack for all procedures. Refer to the Main

Unit Alignment Diagram on page 2-12 for location of components.

PA Unit Idling Current

- ☐ Connect a DC Ammeter to TP5001(-) and TP5002(+), and select USB mode.
- ☐ Key the transceiver and adjust VR5001 for 400 mA $\pm$ 50 mA.

Transmitter IF Interstage Transformers (2)

- ☐ Connect an in-line wattmeter and 50-ohm RF dummy load to the ANT jack.
- ☐ Tune to 14.200.0 MHz, and select the USB mode. Key the transceiver and adjust transformers, T1016 to T1021 several times for peak indication on the wattmeter (approx. 100 W).

CM Coupler Balance

- ☐ With the 50-ohm dummy load connected to the antenna jack, tune the transceiver to 14.200.0 MHz, and select the USB mode. Connect the DC voltmeter between pins 2 (-) and 3 (+) of J1022, key the transmitter and adjust TC4001 on the LPF Unit for minimum indication on the DC voltmeter.

RF Power Output Adjust

- ☐ With the in-line wattmeter and dummy load still connected, set the VR1010 fully counter clockwise .
- ☐ Select A1A mode and tune to 14.200.0 MHz. Key the transmitter and adjust VR1010 for 100 W $\pm$ 5 W as indicated on the in-line wattmeter.

50W RF Power Output Adjust

- ☐ Set switch S1001 to the 50 W position, then set the RF PWR control fully clockwise .
- ☐ Select A1A mode and tune to 14.200.0 MHz.

Key the transmitter and adjust VR1016 for 50 W ± 2.5 W as indicated on the in-line wattmeter.

Ext. Antenna Tuner RF Power Adjust

- ☐ Turn the transceiver off, then jumper TP1002 to chassis ground.
- ☐ Set switch S1001 to the "100 W" position, tune to 14.200.0 MHz, A1A mode.
- ☐ Turn the transceiver on, key the transmitter and adjust VR1011 for 10 W.

TX IF Gain

- ☐ Connect an AF signal generator and voltmeter to the MIC jack, and inject a 0.5 mV signal at 1kHz, and tune to 14.200.0 MHz, USB mode.
- ☐ Key the transmitter and adjust VR1007 for 50 W (increase AF SG level to 1 mVrms, if necessary, to permit deflection).

PO Meter Calibration

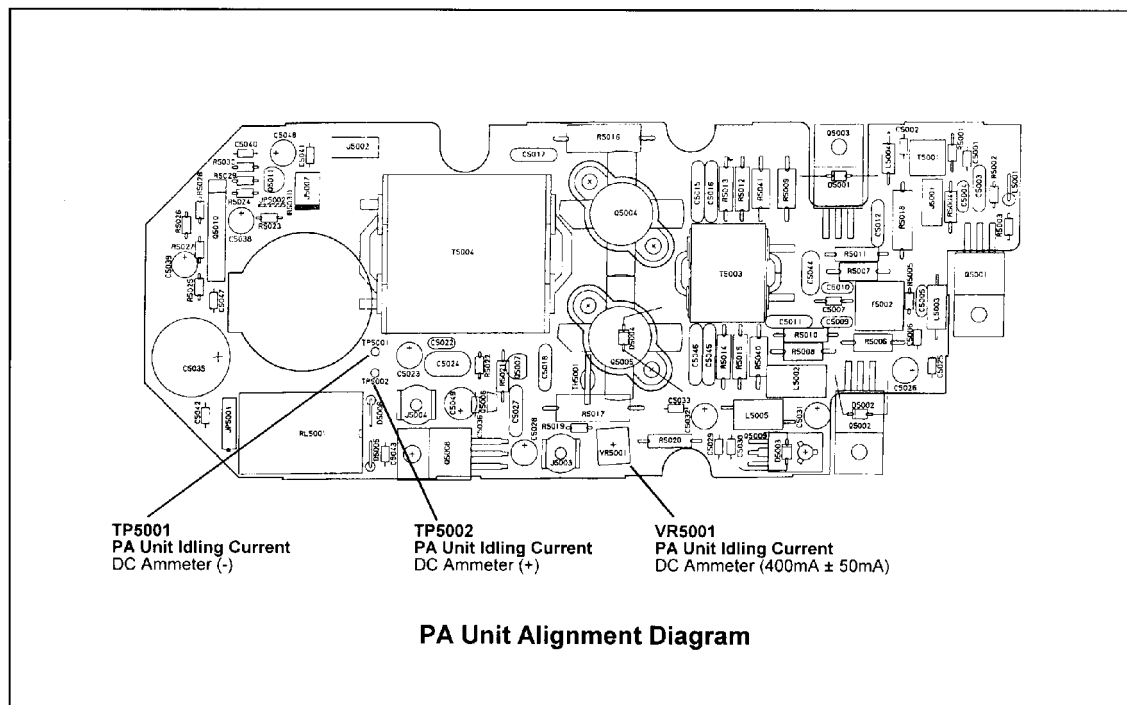
- ☐ With the in-line wattmeter and dummy load connected to the antenna jack, tune to 14.200.0 MHz, USB mode.
- ☐ Then adjust VR1019 so the PO meter also indicates 10 position.

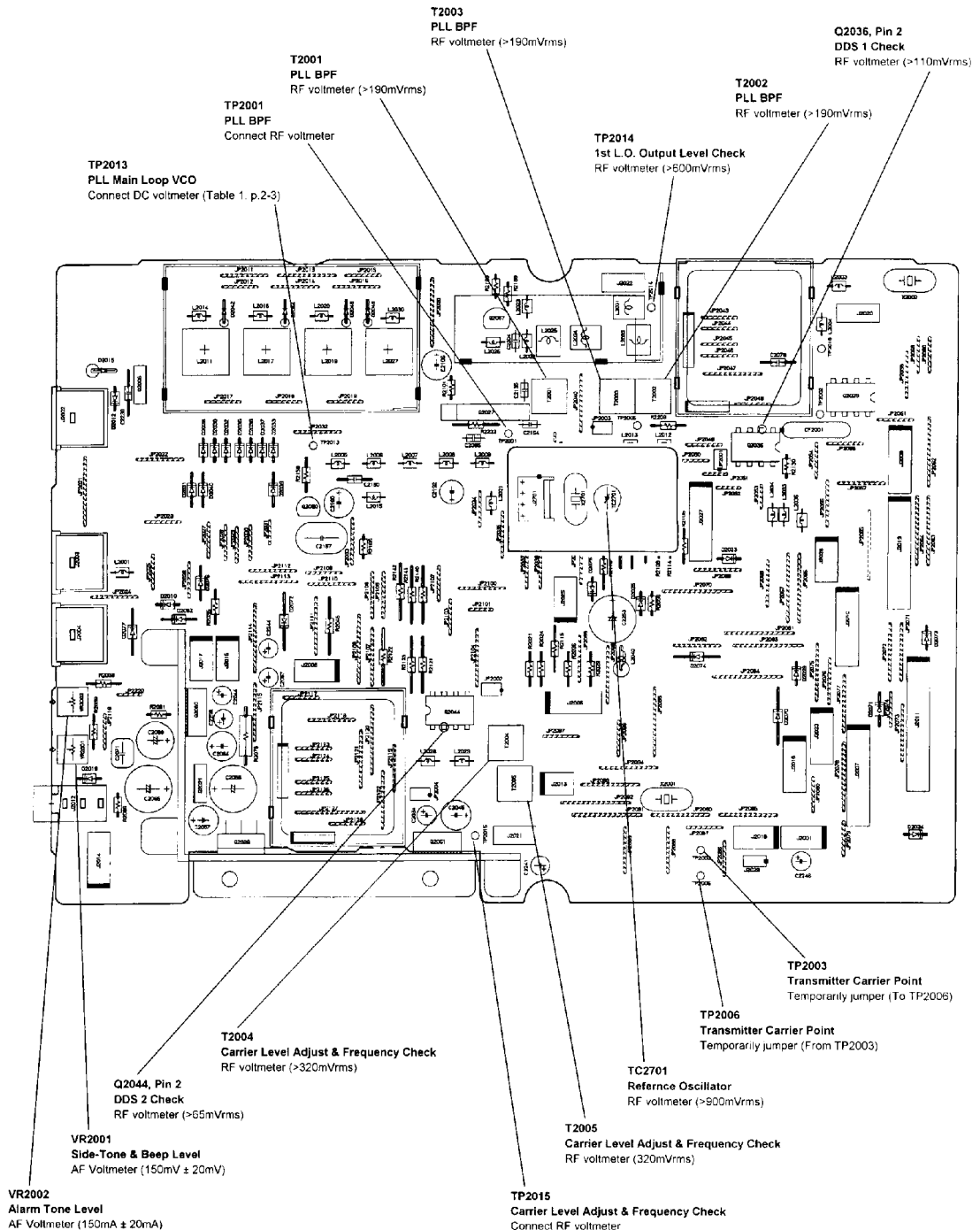


S-Meter Reverse PO Indication

Reverse ALC (SWR Turndown)

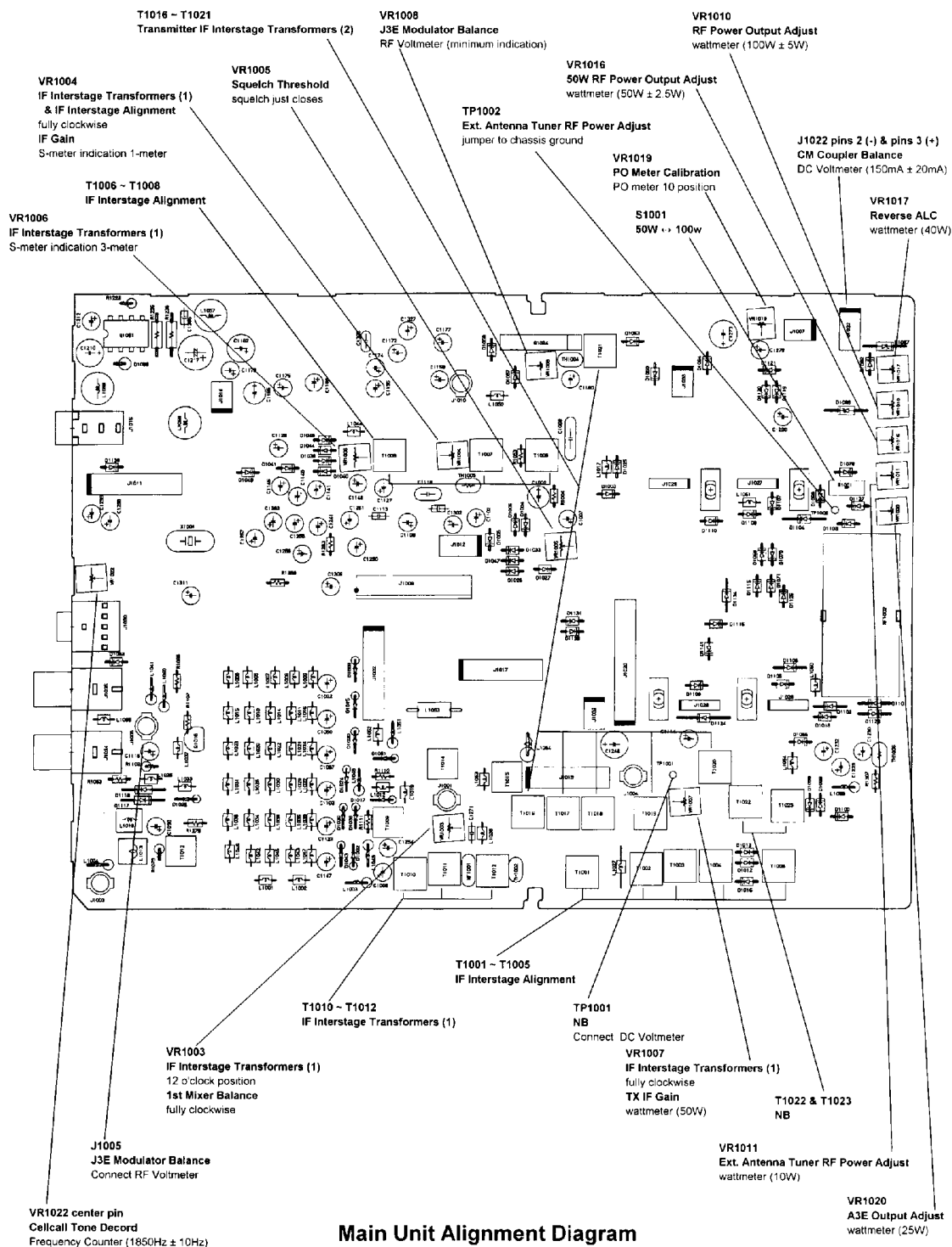
- ☐ Connect the in-line wattmeter and a 16.6-ohm dummy load (or three 50-ohm loads in parallel) to the antenna jack.
- ☐ With the transceiver set to the A1A mode on 14.200.0 MHz, key the transmitter and adjust VR1017 for 40 W on the wattmeter.



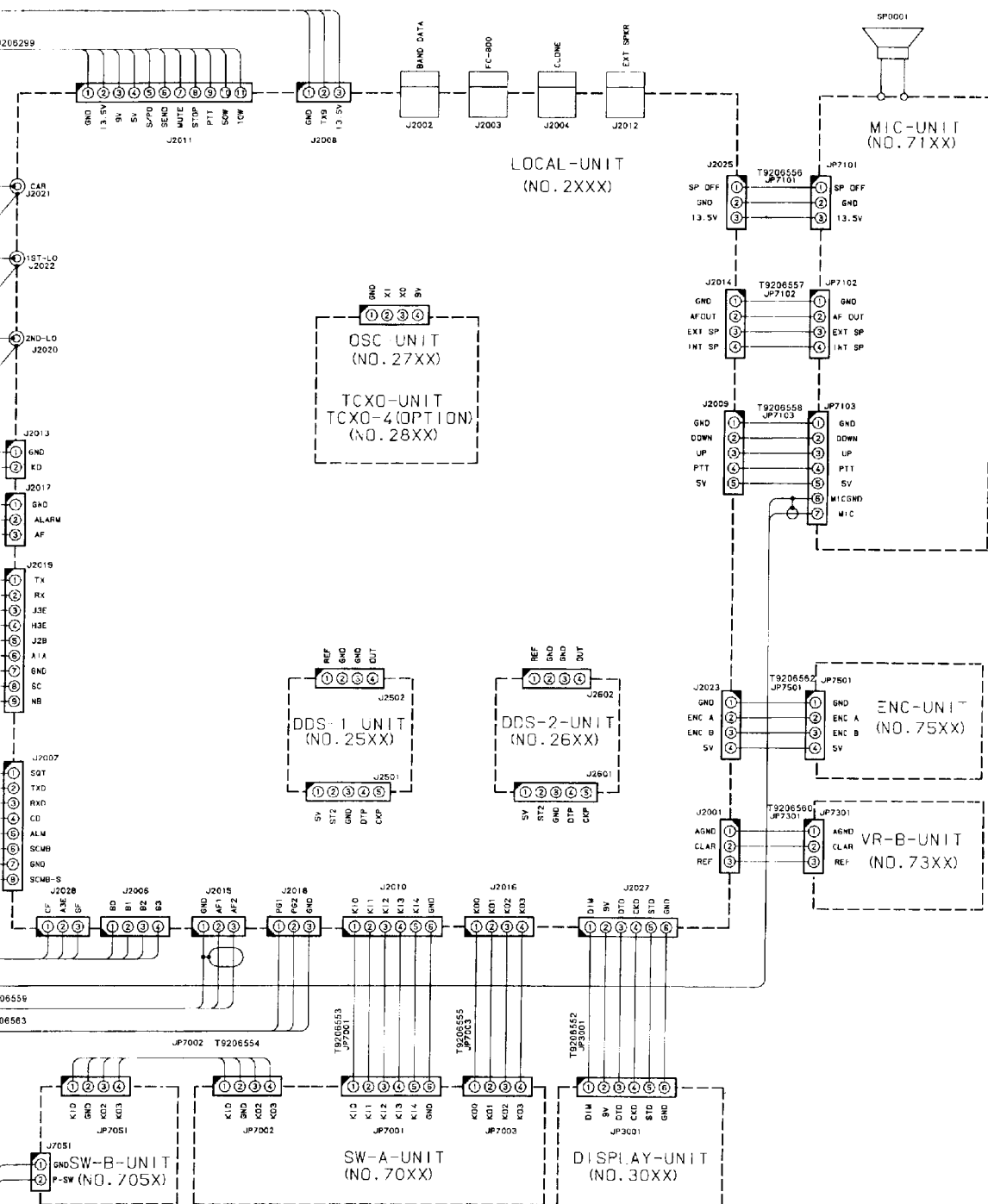


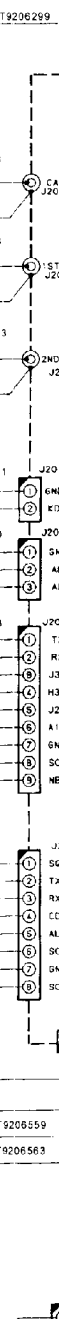
Local Unit Alignment Diagram

Alignment

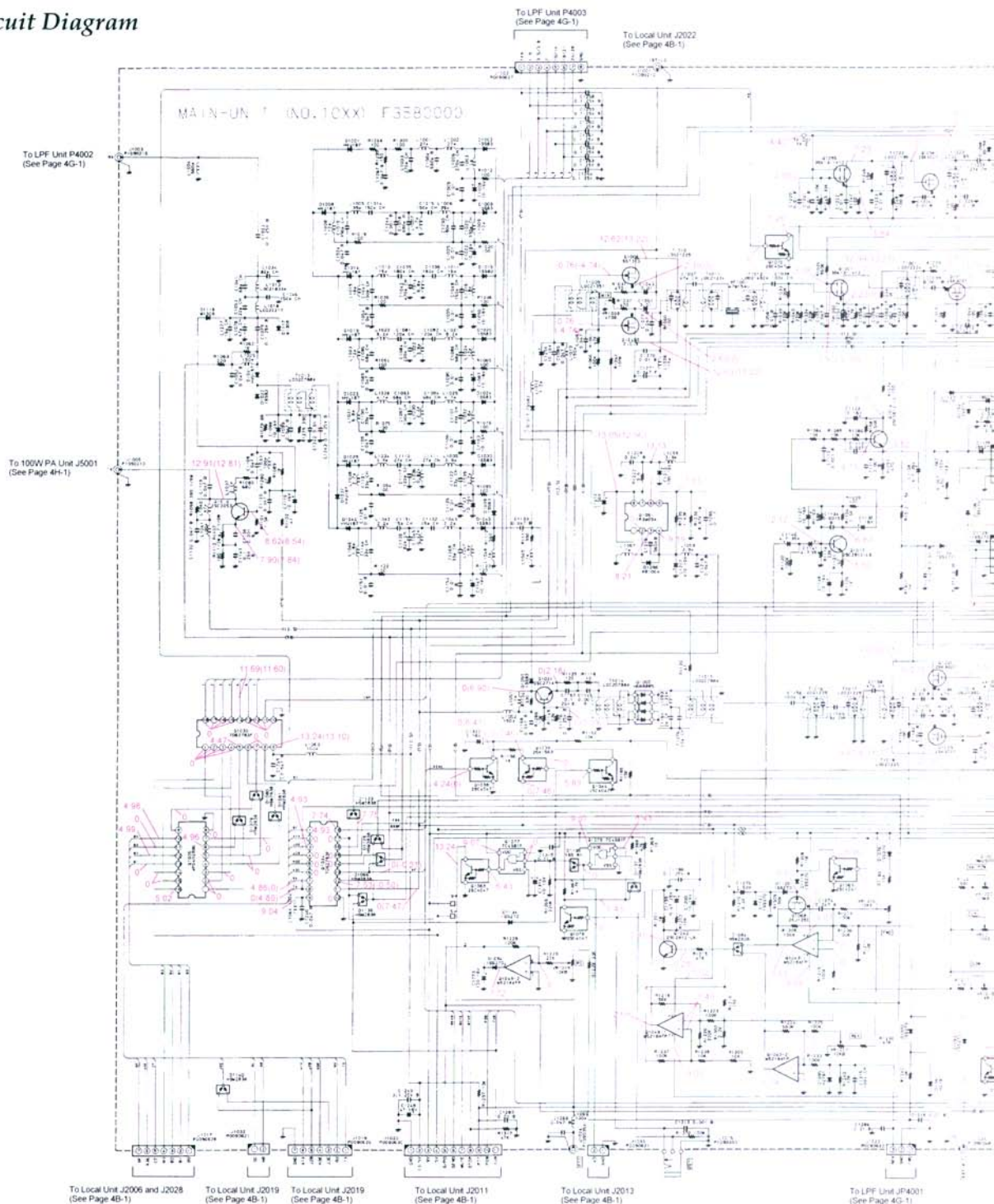


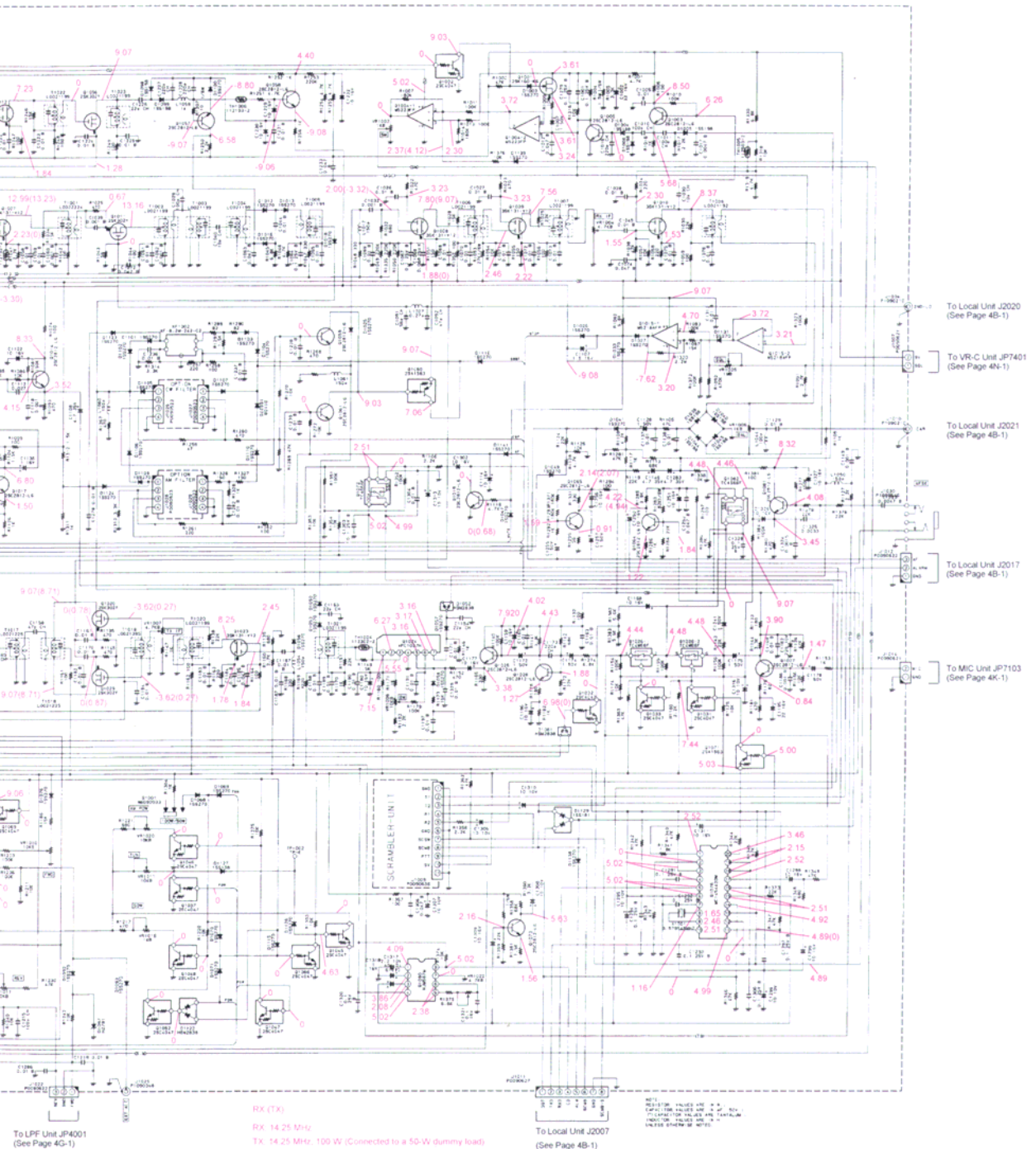
Main Unit Alignment Diagram





Circuit Diagram

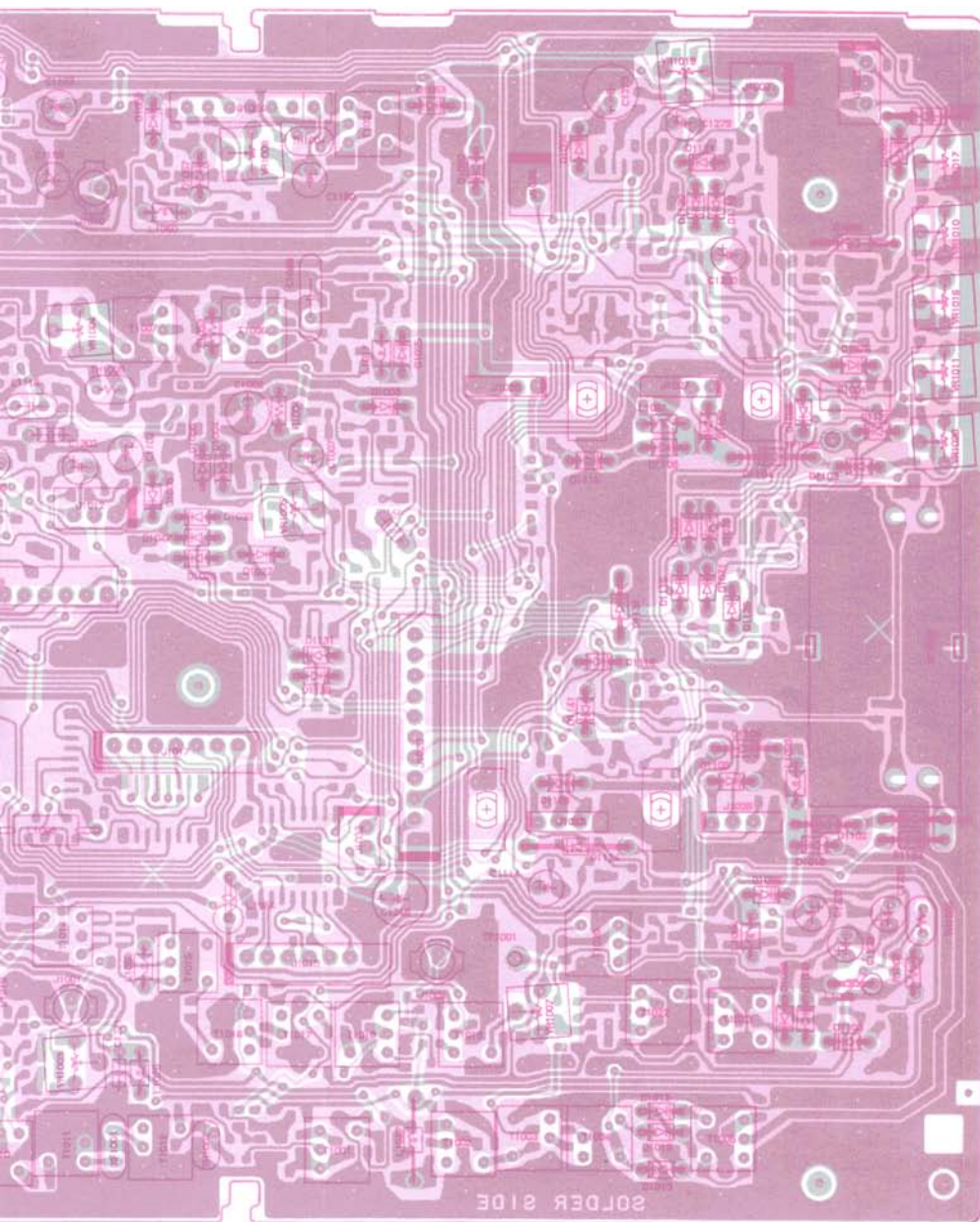




D

E

F



SOLDER SIDE

1ST-LO

J1001

2ND-LO

J1004

Component Side

SQL

9V

J1007

GND

K3

J1033

GND

GND

RFG

J1029

AF

ALARM

GND

J1012

GND

T1

T2

R1

R2

GND

SCSW

SCMB

PTT

9V

J1009

SC

NB

J1032

I/O

RFG

GND

J1028

I/O

RFG

GND

J1002

TXG

1.9

3.5

7

10/14

18/28

24/28

GND

J1002

FWD

GND

REV

J1022

GND

GND

RFG

J102

GND

GND

RFG

J102

GND

GND

RFG

J102

GND

GND

RFG

J102

GND

GND

RFG

J102

GND

GND

RFG

J102

GND

GND

RFG

J102

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J102

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RFG

J102

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RFG

J102

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J102

GND

GND

RFG

J102

GND

GND

RFG

J102

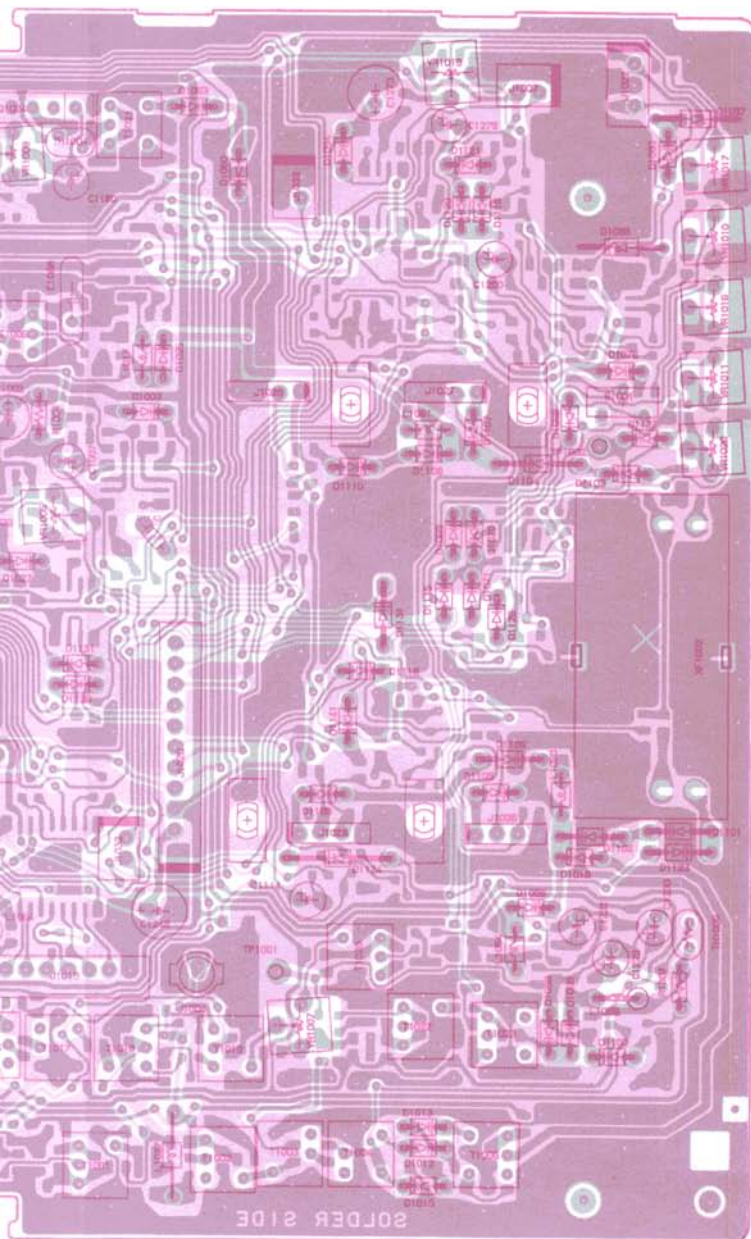
GND

GND

RFG

E

F



2ND-LO

J1004

Component Side

SOL
9V
J1007GND
K0
J1033GND
GND
RFG
I/O
J1029AF
ALARM
GND
J1012GND
T1
T2
R1
R2
GND
SCSW
SCMB
PTT
9V
GND
J1009SC
NB
J1032I/O
RFG
GND
GND
J1028I/O
RFG
GND
GND
J1026B0
B1
B2
B3
CF
ASE
SF
J1017TX9
1.9
3.5
7
10/14
18/21
24/28
GND
J1002TX
RX
JDE
HSE
J28
ATA
GND
J1019FWD
GND
REV
J1022

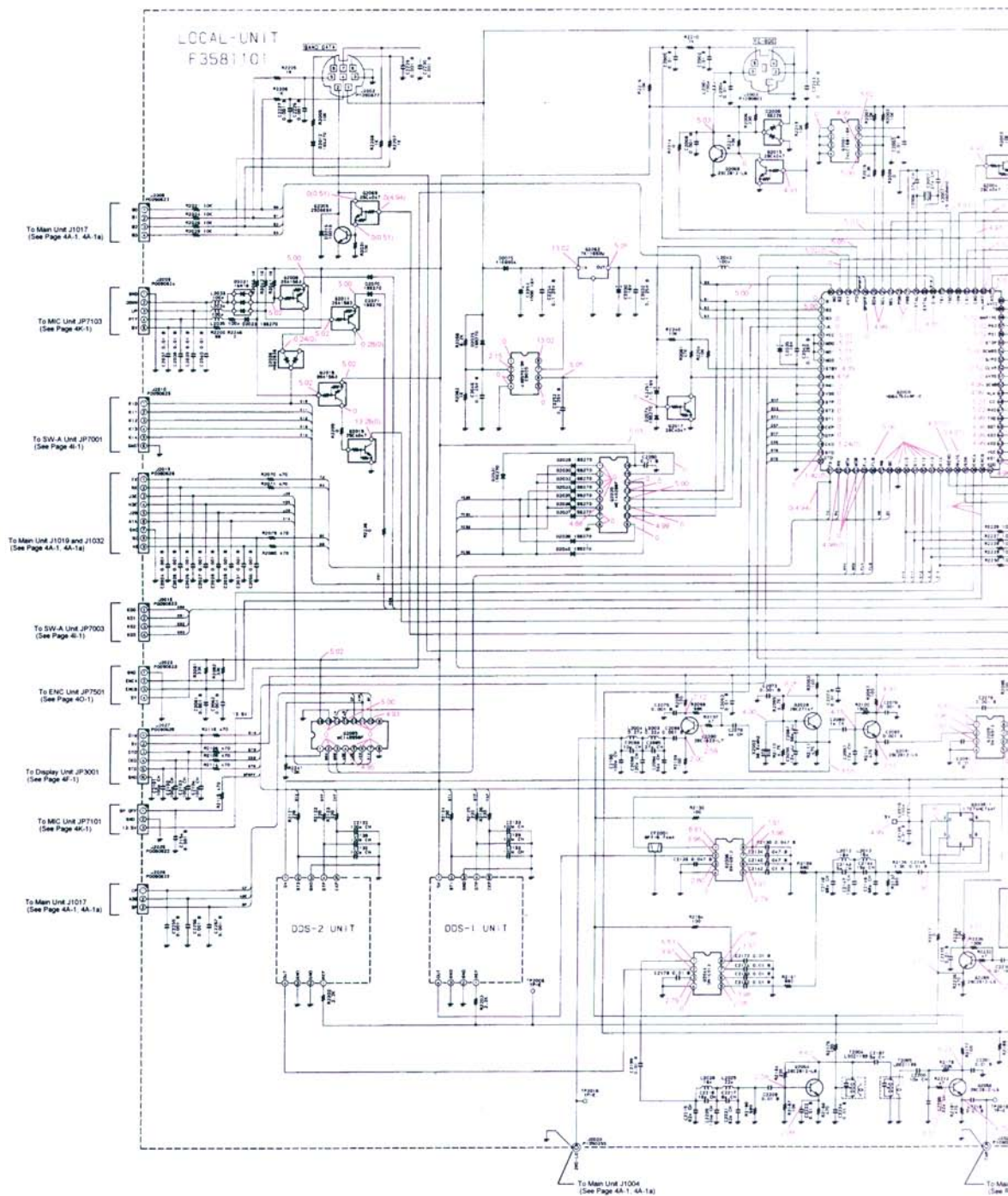
2SC2053
(Q1016)

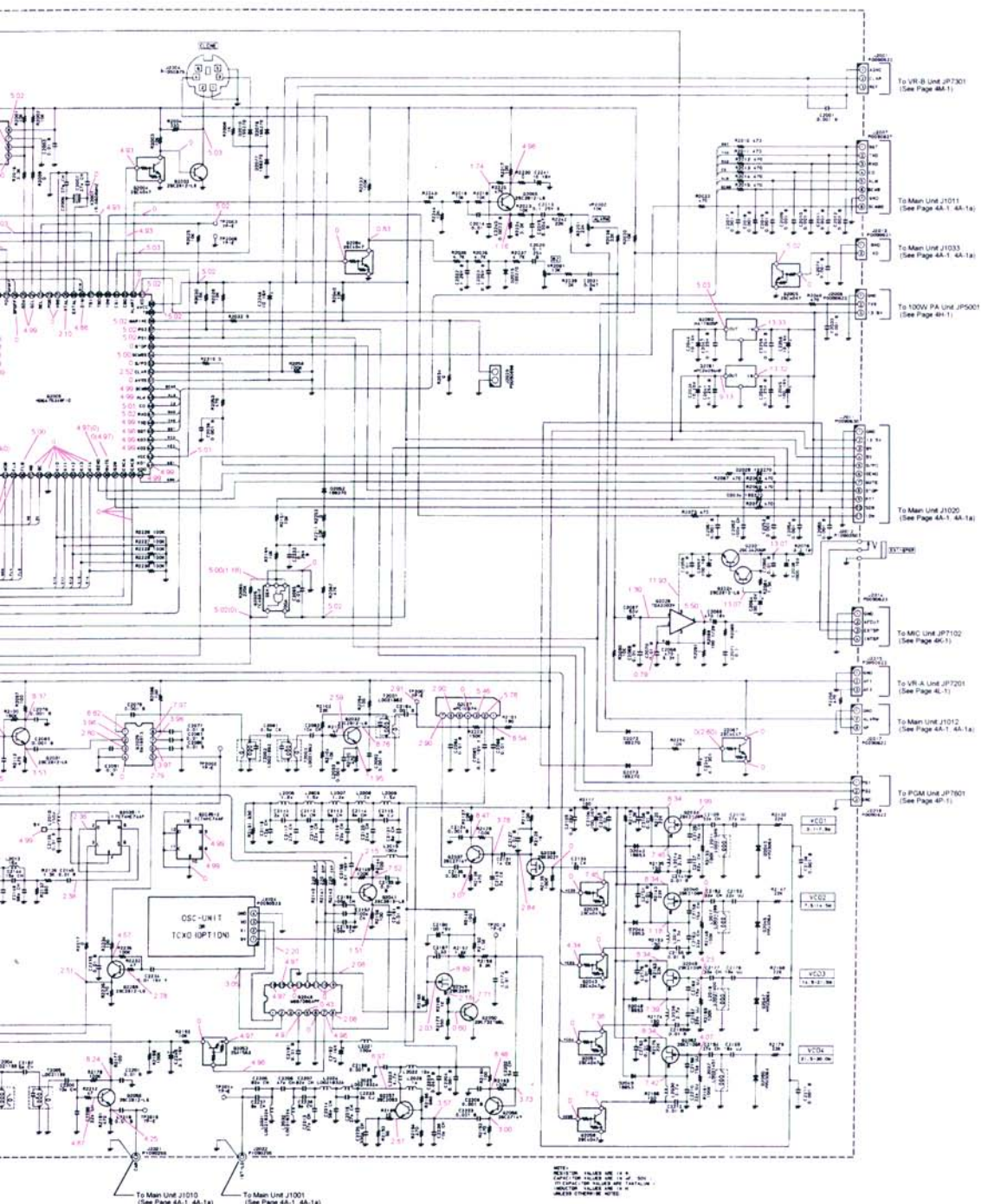
µPC1037H
(Q1024)

IR3M03A
(Q1051)

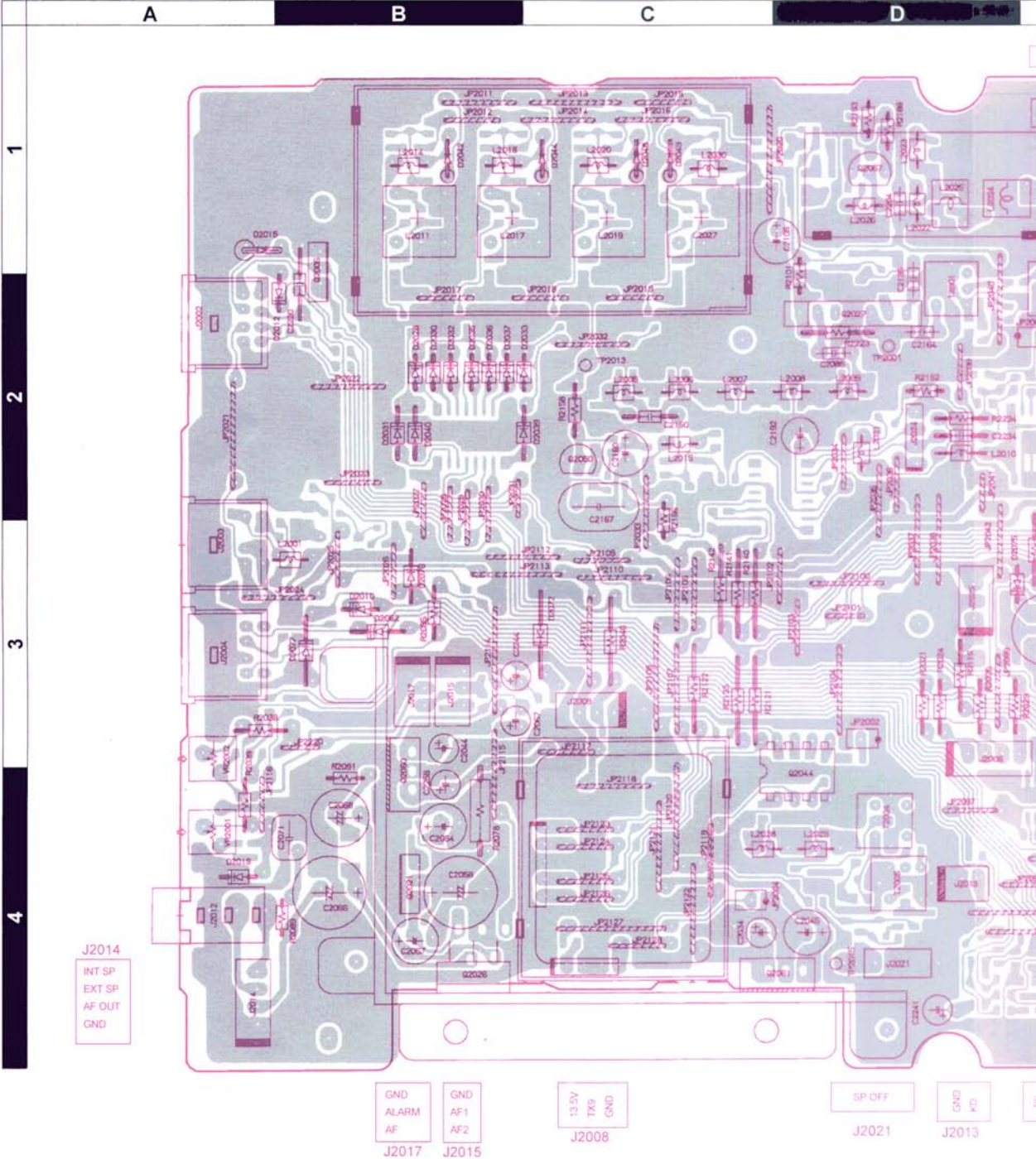
10W
50W
PTT
STOP
MUTE
SEND
S/P/O
5V
9V
13.5V
GND
J1020

System 600 Service Manual

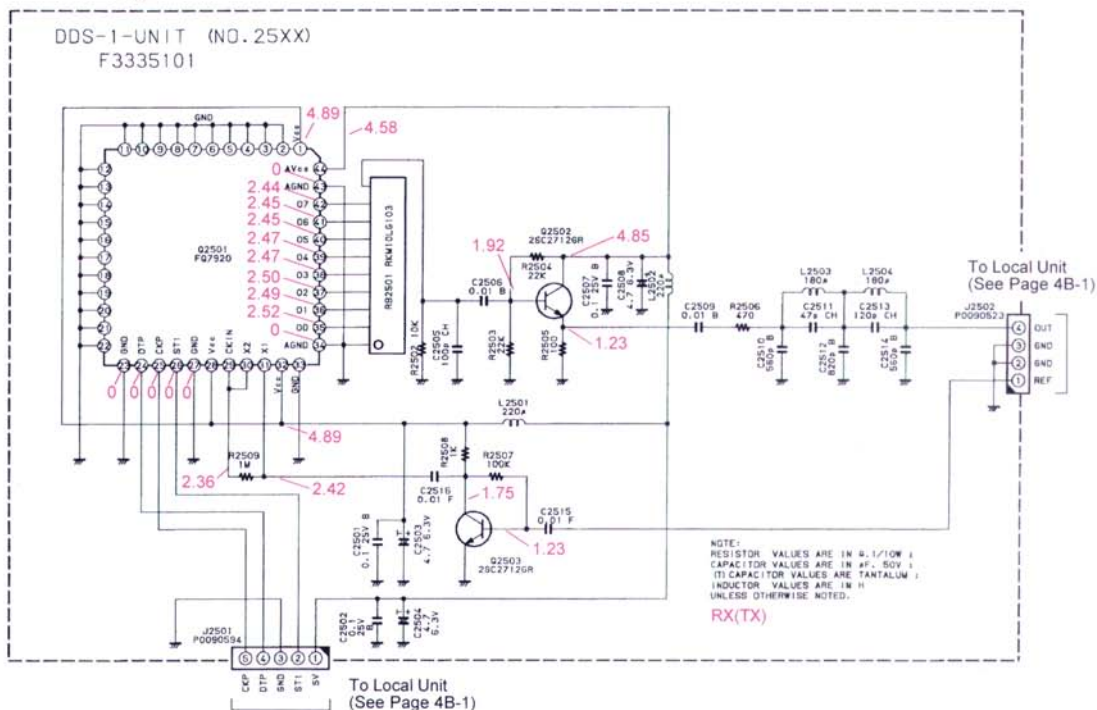




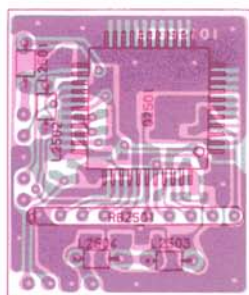
Parts Layout



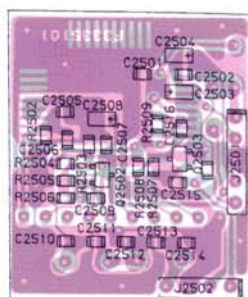
Circuit Diagram



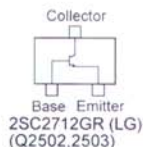
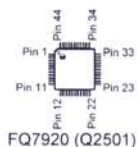
Parts Layout



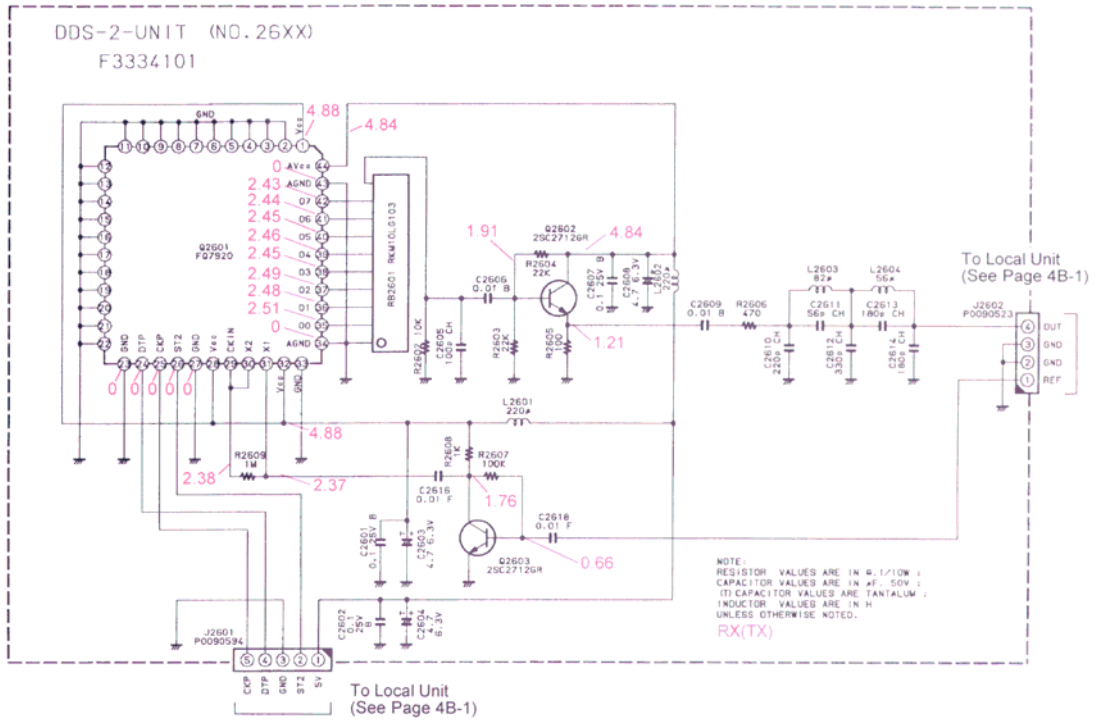
Component Side



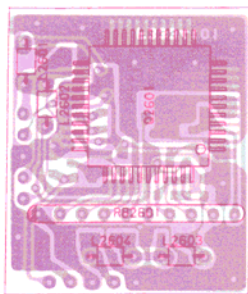
Connector Side



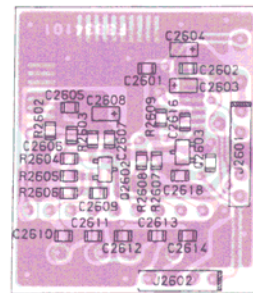
Circuit Diagram



Parts Layout



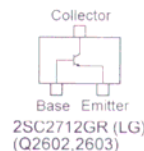
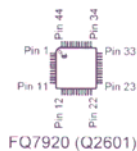
Component Side



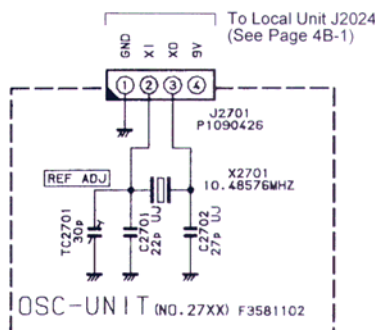
Connector Side

5V
ST2
GND
DTP
CKP

OUT
GND
GND
REF

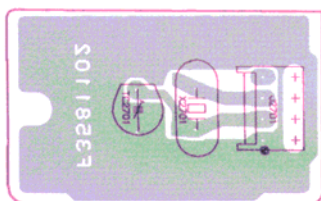


Circuit Diagram

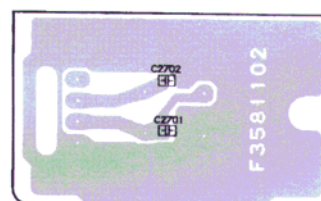


NOTE:
CAPACITOR VALUES ARE IN μ F. 50V ;
UNLESS OTHERWISE NOTED.

Parts Layout



Component Side

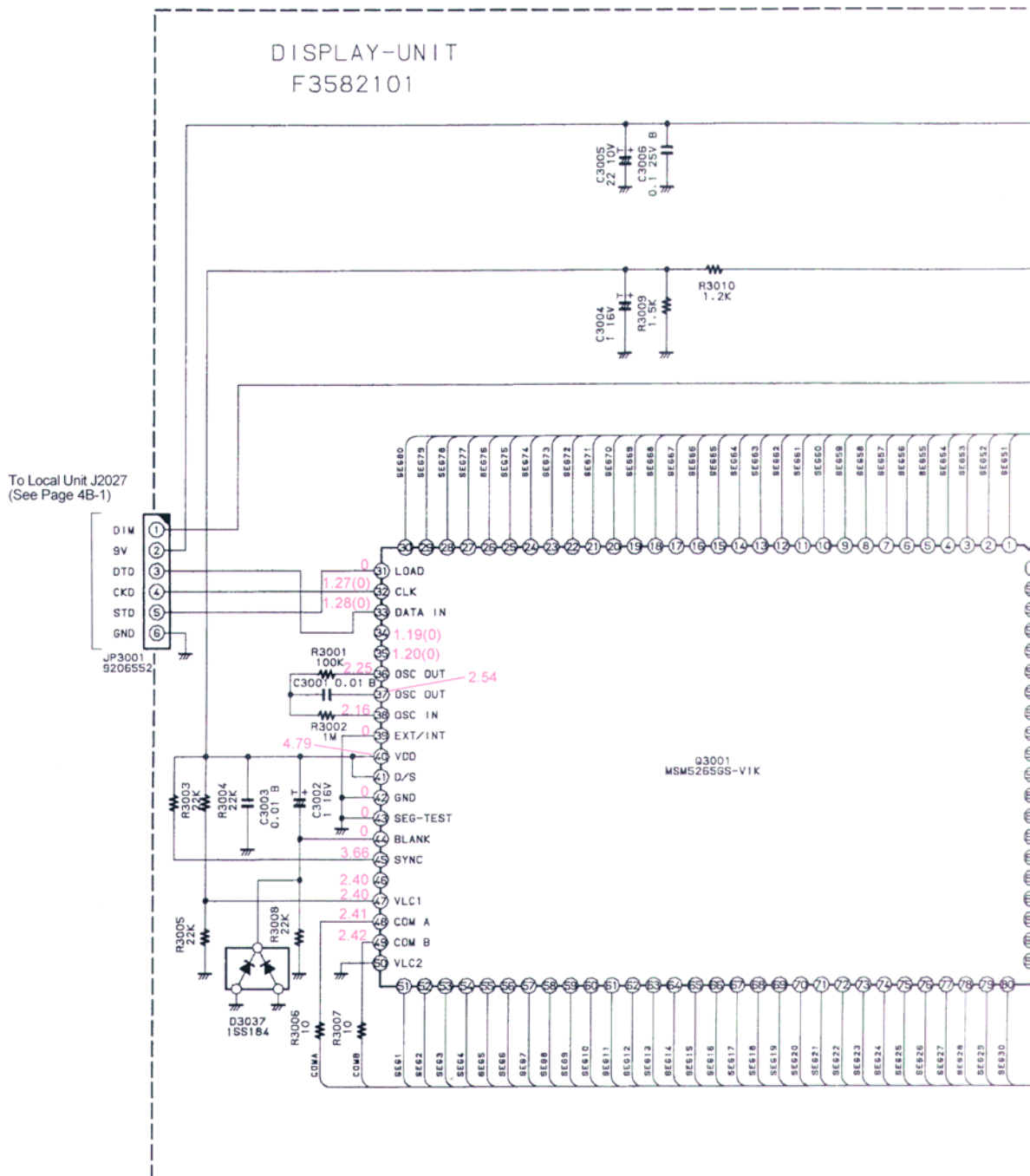


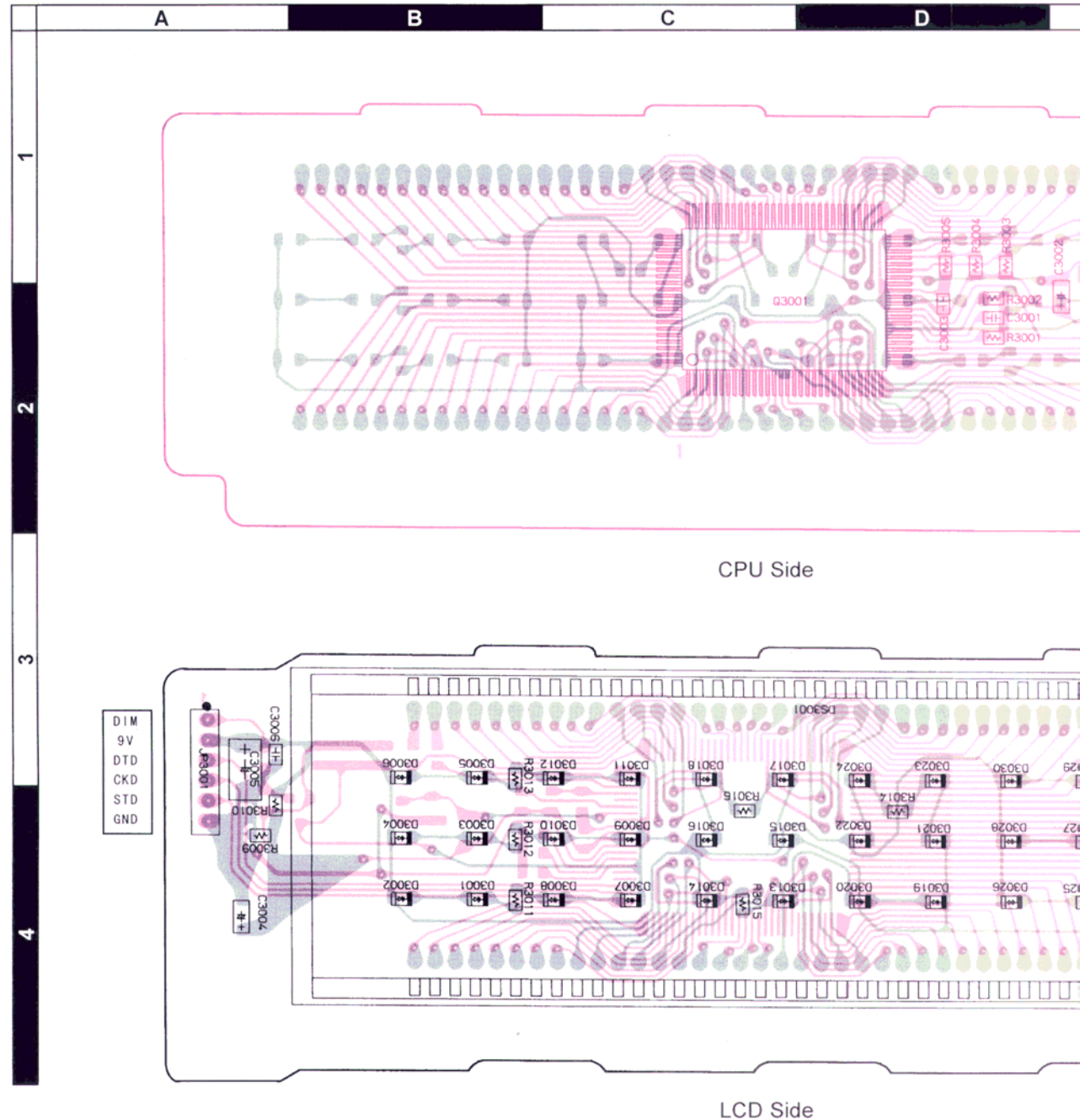
Chip Side

Parts List

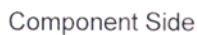
REF.	DESCRIPTION	VALUE	WV	TOL.	MFGR'S DESIG	YAESU P/N	VERS.	LOT.	LAY ADR
*** OSC UNIT ***									
PCB with Components						CA1583001			
Printed Circuit Board						F3581102			
C 2701	CHIP CAP.	22pF	50V	UJ	GRM40UJ220J50PT	K22170319			
C 2702	CHIP CAP.	27pF	50V	UJ	GRM40UJ270J50PT	K22170321			
J 2701	CONNECTOR				5124-04BHPB	P1090426			
TC2701	TRIMMER CAP.	30pF			VCT51F	K91000093			
X 2701	XTAL	10.48576MHz				H0102990			

Circuit Diagram

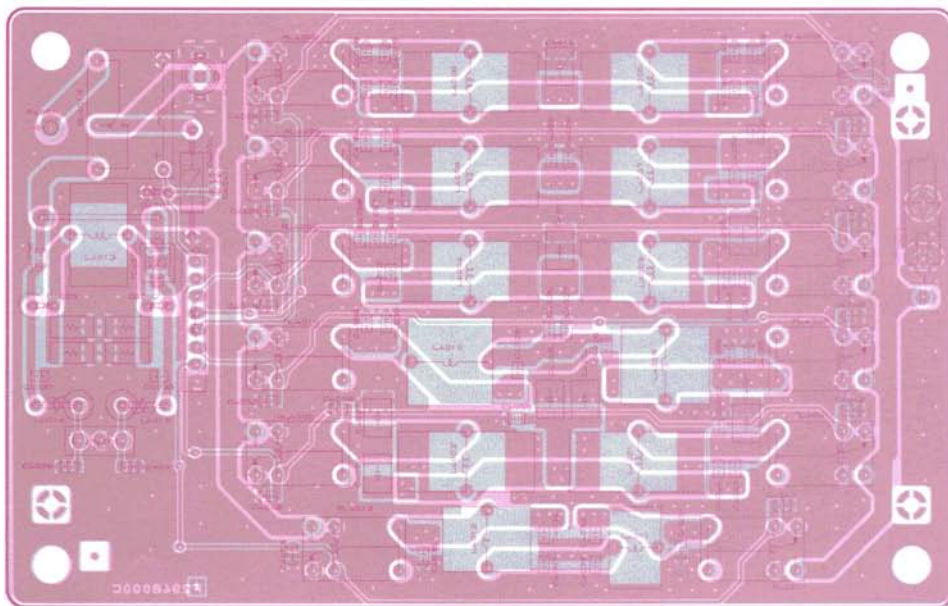




Circuit Diagram

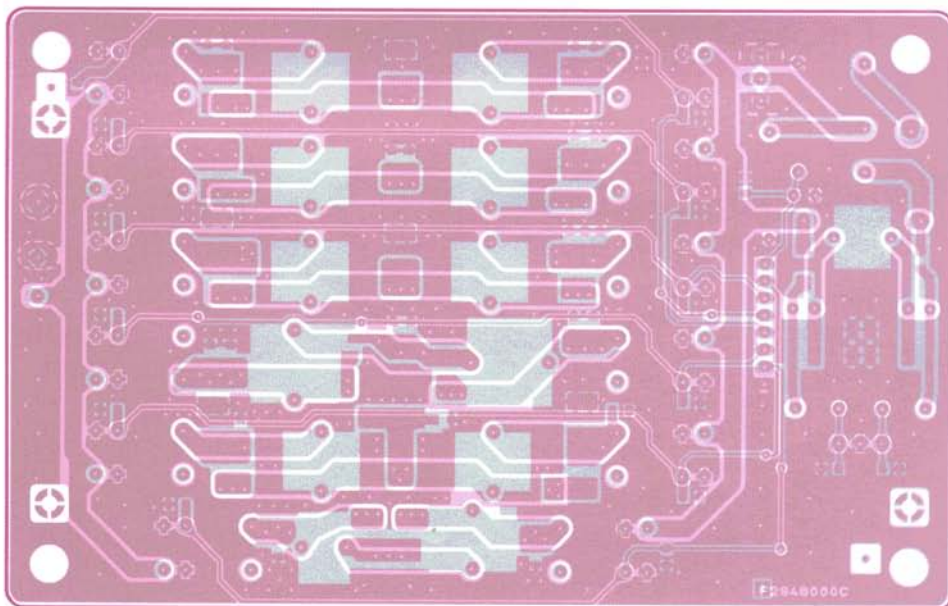


Parts Layout



OUT
GND
REF

Component Side



Solder Side

100W-PA-UNIT (NO. 50XX)

F3395000

013.021

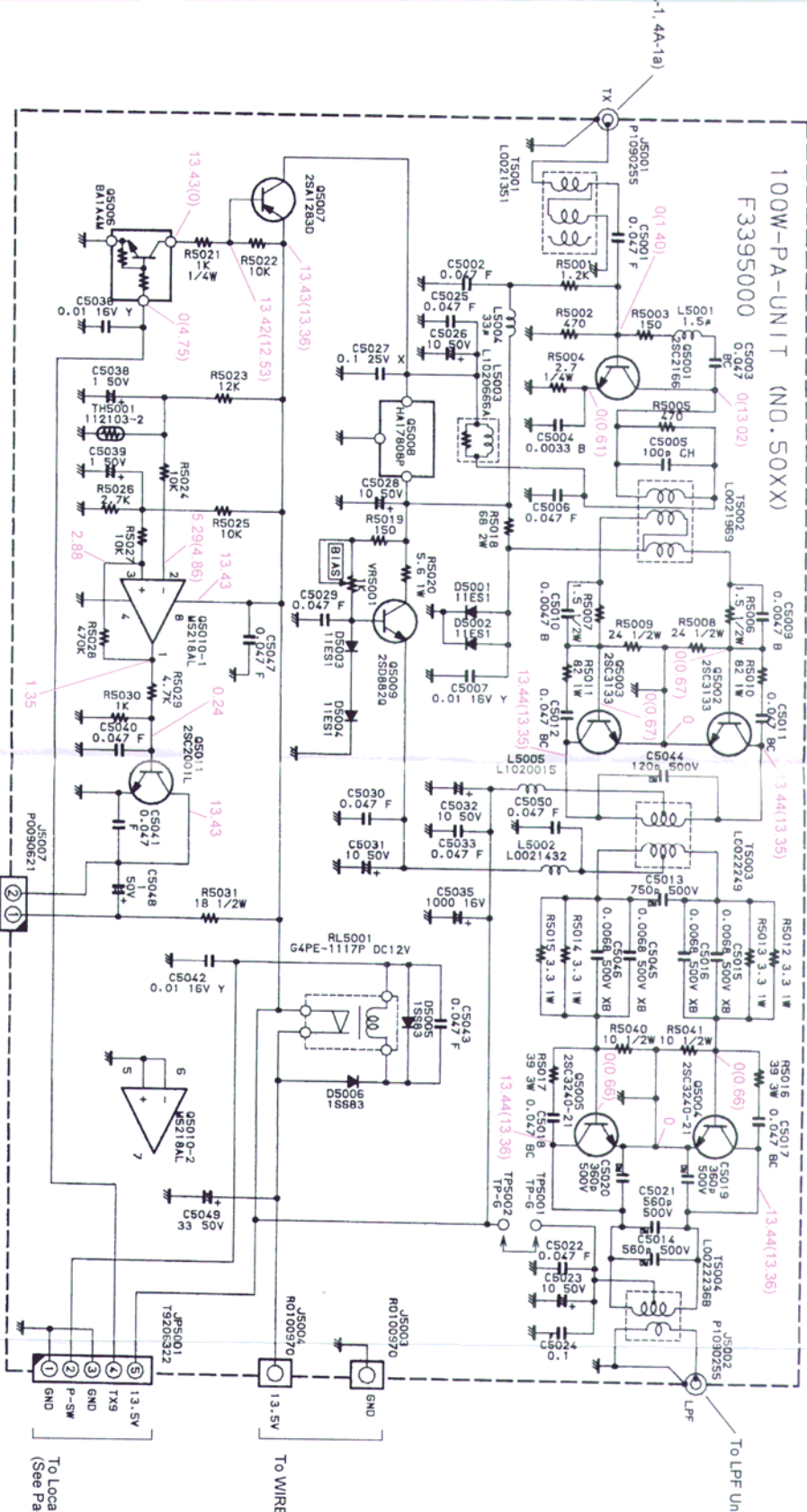
010.671

3.44(13.35)

010.661

13.44(13.36)

To LPF Un



NOTE:
RESISTOR VALUES ARE IN Ω, kΩ, MΩ;
CAPACITOR VALUES ARE IN pF, nF, μF;
INDUCTOR VALUES ARE IN nH, μH, mH;
UNLESS OTHERWISE NOTED.

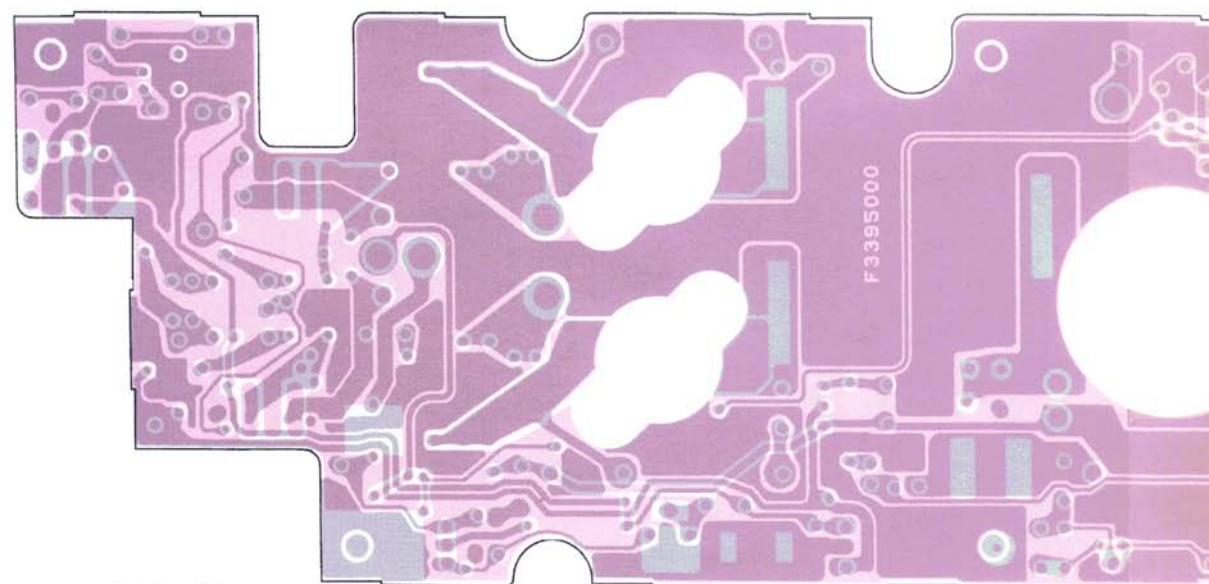
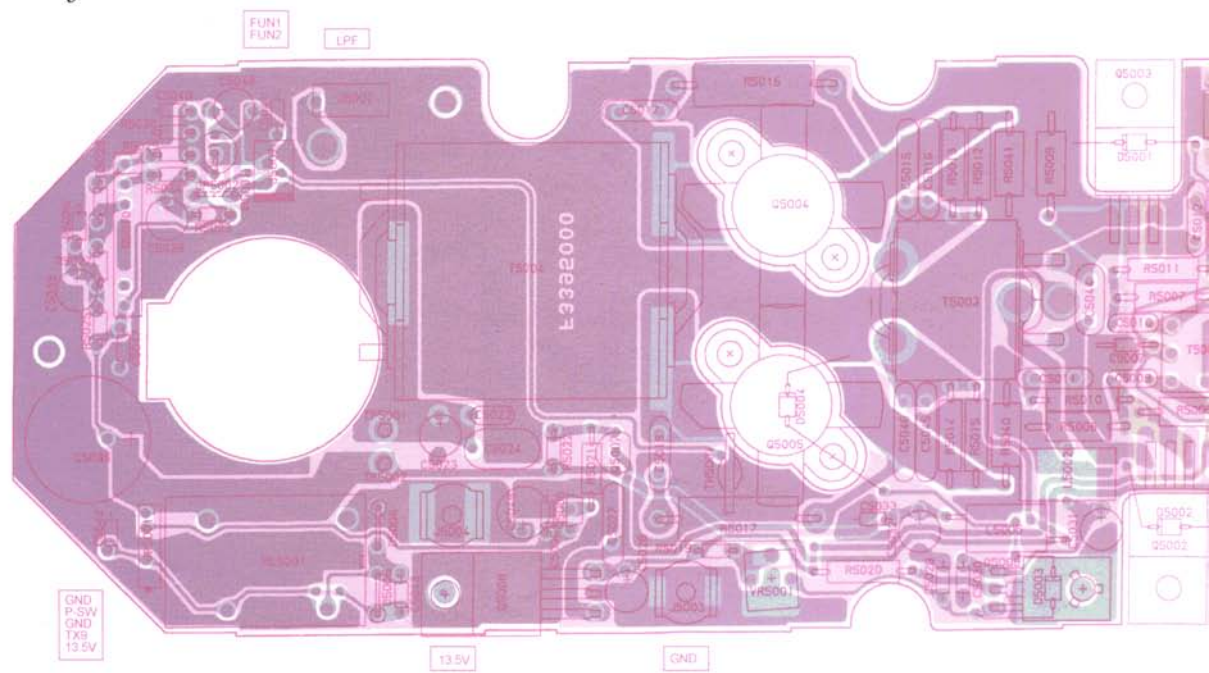
RX(TX)

To FAN ASSY

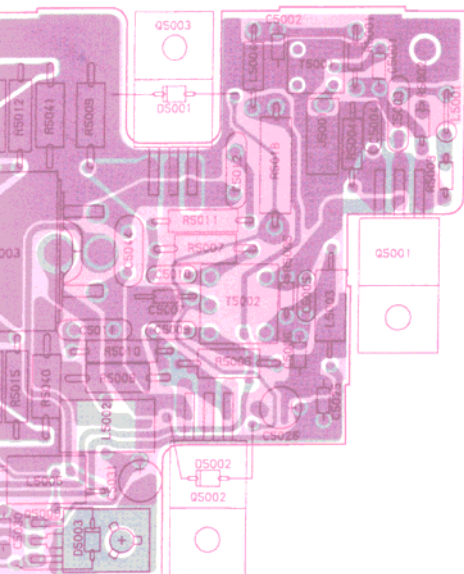
To Loca

To WIRE

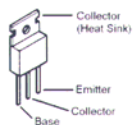
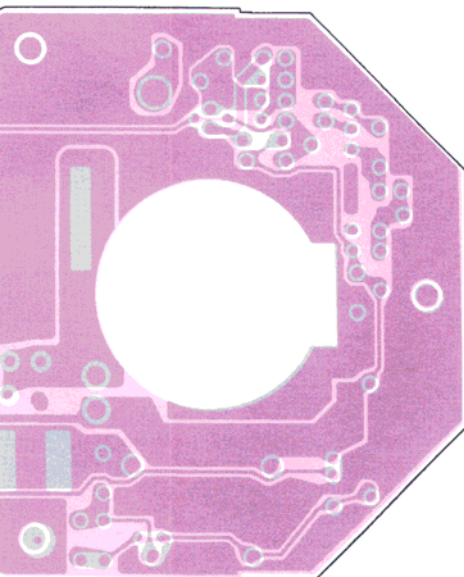
Parts Layout



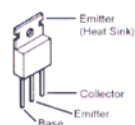
Solder Side



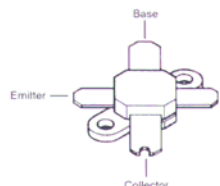
Component Side



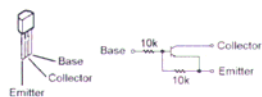
2SC2166
(Q5001)



2SC3133
(Q5002, 5003)



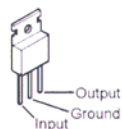
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(Q5004, 5005)



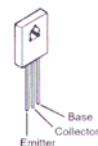
BA1A4M
(Q5006)



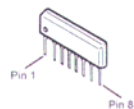
2SA1283D
(Q5007)
2SC2001
(Q5011)



μPC7808H
(Q5008)



2SD882Q
(Q5009)



M5218AL
(Q5010)

Circuit Diagram

