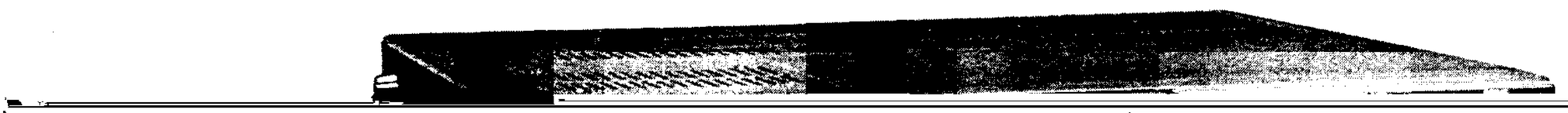
FT-102
HF ALL MODE TRANSCEIVER



~ CONTENTS ~

Pages 17-25 have been deleted from the Supplement, as they describe procedures for band conversions that are not authorized in certain countries. This material is available from Yaesu representatives in those countries where such operation and modifiction of the FT-102 is legal. Contact you nearest authorized Yaesu dealer for details.

ERRATA
FOR THE FT-102 INSTRUCTION MANUAL

These errata apply to early printings of the Instruction Manual, up to the present. Only those of possible technical significance are listed here, although there were a few other minor typographical errors. The following pages 3 and 4 are completely updated replacements for pages 15 and 44, respectively, in all early editions of the FT-102 Instruction Manual.

Page 30, line 4:

Q2011 should be noted as a type 2SC1815Y transistor.

Page 30, fifth paragraph:

Only D6004 should be mentioned as a noise detector. Also, the DC squelch control signal from the SQL control is passed to the squelch control

Page 40, Upper left photo:

The title of this photo, RECT. A UNIT, was inadvertently omitted from earlier printings of the manual.

Also on this page, in step 2 of the PO Meter Adjustment, VR7 appeared as the adjustment potentiometer number. This should read VR5, indicating the PO ADJ potentiometer.

Page 41, Carrier Balance Procedure:

Step 3 should read, "Press the MOX switch." (only).

Pages 42 and 43, SSB Carrier Point Procedure:

This procedure has been revised from that appearing

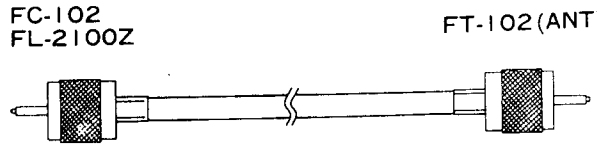
6. Retune the AG to 1 kHz, and switch the HEATER on, 14 MHz band. Tune up the transmitter for 100 watts output, adjusting [redacted]

Page 47, AM/FM UNIT (photo):

This photo was replaced from the second printing of the manual with the photo of the updated Unit

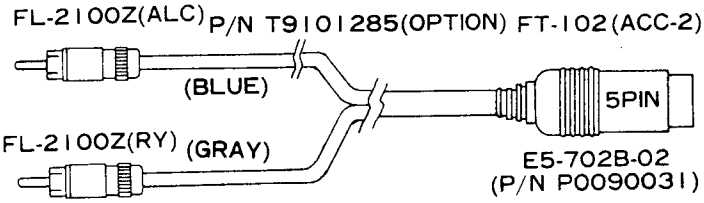
INTERCONNECTION CABLE INFORMATION

A



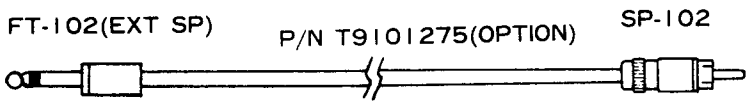
P/N T9100160A (65 cm)
T9100161 (1 m)

B

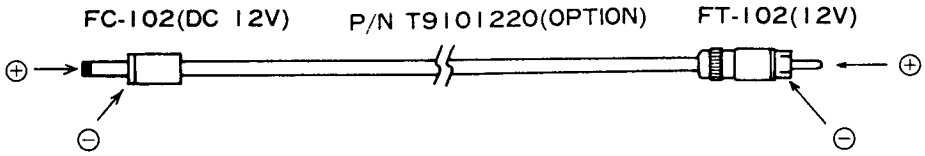


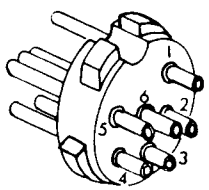
1. ALC inner conductor
2. ALC/RY outer conductor
3. RY inner conductor
4. ALC/RY outer conductor
5. —

C



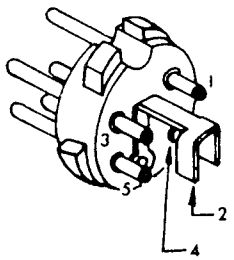
D





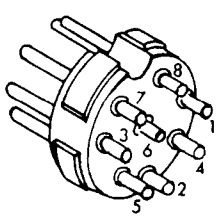
PIN No.
1. TX GND
2. KEY-1
3. 100kHz(REF) OUT
4. N.C.
5. RX GND
6. GND
Shell GND

ACC-1



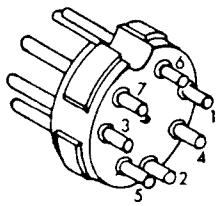
PIN No.
1. ALC
2. GND
3. TX GND
4. GND
5. RX GND
Shell GND

ACC-2



PIN No.
1. +8V
2. +12V
3. +500kHz
4. TX 12V
5. CW 8V
6. EXT VFO IN
7. GND
8. SAMPLE IN

EXT VFO/RCVR A



PIN No.
1. UP
2. FAST
3. GND
4. DWN
5. MUTE
6. SIDE TONE OUT
7. 100kHz (REF) OUT

EXT VFO/RCVR B

RF UNIT ALIGNMENT (PB-2342)

Bandpass Filters

1. Connect the sweep generator output to J_{1001} (TX IN), and connect the oscilloscope to RF OUT jack J_5 on the rear panel. Turn the HEATER switch OFF.

2. Key the transmitter and adjust the appropriate transformer for each band according to the following chart to obtain the correct 3 dB bandwidth with minimum ripple, as displayed on the scope. Ripple should not exceed 3 dB.

Band	Adjust	Passband (-3 dB)
1.8	T_{1011}, T_{1022}	1.8– 2.0 MHz
3.5	T_{1013}, T_{1014}	3.5– 4.0 MHz
7.0	T_{1015}, T_{1016}	7.0– 7.3 MHz
10.0	T_{1017}, T_{1018}	10.0–10.5 MHz
14.0	T_{1019}, T_{1020}	14.0–14.5 MHz
18.0	T_{1021}, T_{1022}	18.0–18.5 MHz
21.0	T_{1023}, T_{1024}	21.0–21.5 MHz
24.5	T_{1025}, T_{1026}	24.5–25.5 MHz
28/29	T_{1027}, T_{1028}	28.0–29.9 MHz

Preselector

PRESELECT control to the position indicated. Switch the RF AMP ON.

3. Adjust the transformer indicated in the chart for maximum S-meter reading.

Band	Frequency	Preselect	Transformer	S-meter Reading
3.5	4.000 MHz	8	T_{1004}	Maximum
7.0	7.000 MHz	5	T_{1005}	
10.0	10.000 MHz	6	T_{1006}	
14.0	14.500 MHz	8	T_{1007}	
21.0	21.500 MHz	8	T_{1008}	

4. Remove the SSG and connect the dummy load to the ANT terminal. Set to 29.5 MHz band, 30.000 MHz, PRESELECT to 8, key the transmitter and adjust T_{1009} for maximum power output.

5. Reconnect the SSG to the ANT terminal and adjust TC_{1001} for maximum RX S-meter indication.

6. Remove the SSG and connect the dummy load to the ANT terminal. Set to 28.5 MHz band, 28.500 MHz, and key the transmitter

SOLDERING AND DESOLDERING TECHNIQUE ON PRINTED CIRCUIT BOARDS

The FT-102 circuit boards are tough, but mishandling during soldering can cause circuit traces to "lift." While this does not cause permanent damage to the board, much servicing trouble can result, because of the tendency for this lifted trace to break. A few simple precautions will keep your circuit boards in A-1 condition.

1. Use only a 12 to 30-watt chisel-tip soldering iron, with the tip arounded or isolated from AC and DC potential. Voltage at the tip can easily destroy CMOS components.

2. Use only the minimum amount of heat necessary to remove a component, or to cause the solder to "flow" when installing a new component.

3. USE ONLY 60/40 ROSIN CORE SOLDER.

4. Use solder removing braid and flux to absorb excess solder before installing a new component. A solder sucker can also be used, but most be handled with care to avoid lifting traces.

NOTES ON USE OF CMOS COMPONENTS:

As CMOS devices are extremely sensitive to damage from static electricity, special precautions must be observed.

In storage, use only conductive sponge specially designed for CMOS components.

When installing a CMOS part in a socket, or on a circuit board, be certain that the power is off. In addition, the technician should rest his hand on the chassis as the component is inserted, so as to place his hand at the same potential as the chassis (better to discharge small amounts of static electricity through your fingers than through a $5 IC !).

When soldering a CMOS part onto a circuit board, use a low-wattage iron, and be sure to ground the tip with a clip lead, if the tip is not grounded through a three-wire power cord.

BASIC SOLDERING PRACTICE

EXAMPLES OF POOR SOLDERING PRACTICE

TYPICAL PART FAILURES, CAUSES AND SYMPTOMS

PARTS	CAUSE OF TROUBLE	SYMPTOMS
Semiconductors (IC, FET, TR)	High supply voltage Open circuit Excessive drive High temperature	Short or open circuit Output decreases to 1/2 at 80°C Internal noise Instability
MOS FET MOS IC	Static electricity	Total failure Short or open circuit
Crystal Crystal filter	Shock High temperature Aging	No oscillation Off frequency Frequency drift Filter bandpass change
Resistor	Excessive power High temperature	Component burned Value changed Open circuit
Potentiometer	Excessive power Shock Dust or oil Wear	Component burned Open circuit Noise Unsmooth rotation
Capacitor	Excess voltage High temperature Aging	Shorted Leakage Open/decreased capacitance
Variable capacitor Trimmer capacitor	Ratings exceeded Dust between plates Shock, forced rotation	Shorted Leakage Unsmooth rotation
Coils	Ratings exceeded Misadjusted Core or bobbin broken	Open or short circuit Leakage or shorted turns Detuned
Switch	Ratings exceeded Aging Dust or oil	Poor contact Unsmooth operation Open circuit
Relay	Ratings exceeded Humidity Dust or oil on contacts	Coil open Poor or intermittent contact Noise

MODIFICATION PROCEDURES

This section includes modifications that were developed for the FT-102 for special operating requirements, as well as for improved transceiver performance. Also included are modifications that must be made in accessory equipment for use with the FT-102.

RF Unit Access (Solder side)

Disconnect and remove the optional AM/FM Unit, if installed. Referring to page 38 of the Instruction Manual for Unit locations, remove the four screws from the AF Unit (PB-2344), and gently fold it over the VFO. Then remove the two machine screws affixing the shield panel that was behind the

Keyclick

This modification is provided to remedy possible keyclick trouble with FT-102s having serial numbers between XX030001 and XX069999. Keyclicks were not a problem in the first two production lots, but appeared after certain other modifications were carried out in production. This modification has already been incorporated in later production lots (after Lot 6).

1. On the component side of the RF Unit, install a 1 μF, 50 WV electrolytic capacitor, as shown in Figures 1 and 2. The positive lead of the capacitor is soldered to the lead of R1045, and the negative lead to the TEST PIN (G1).

2. Referring to Figures 3 and 4, cut the white wire connected to J4017 on the Local Unit, and wrap the end of the white wire with insulating tape to prevent it from shorting to other parts.

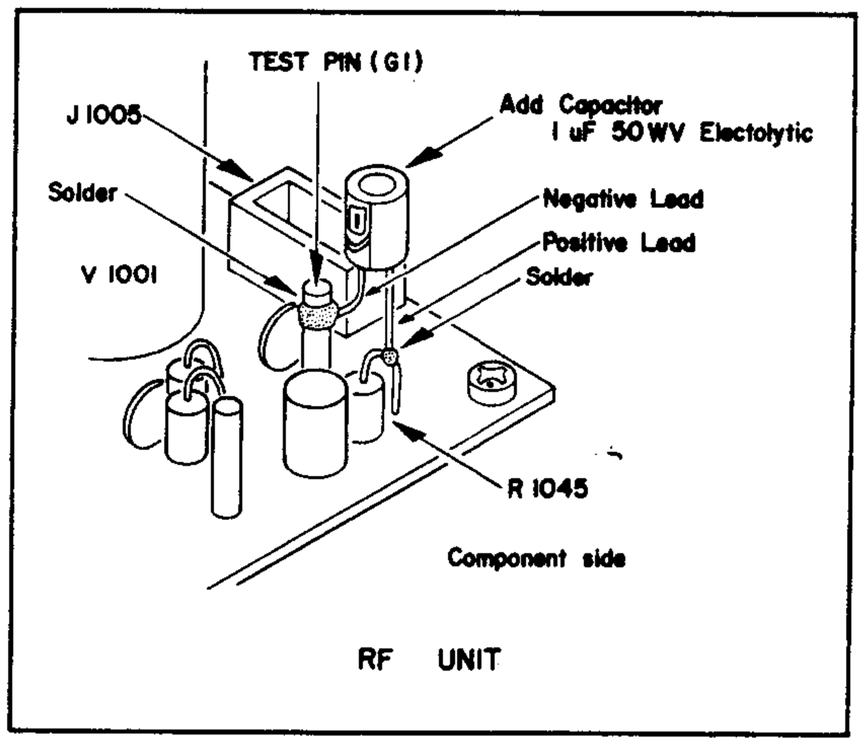


Figure 2

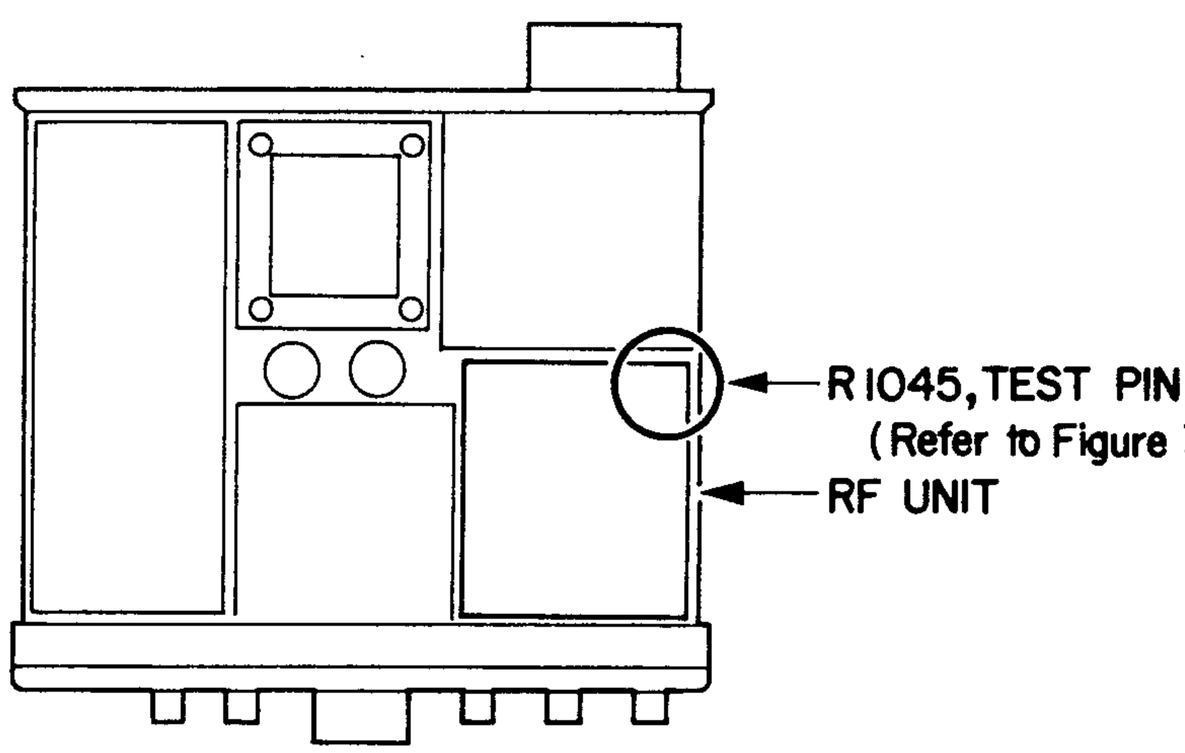


Figure 1

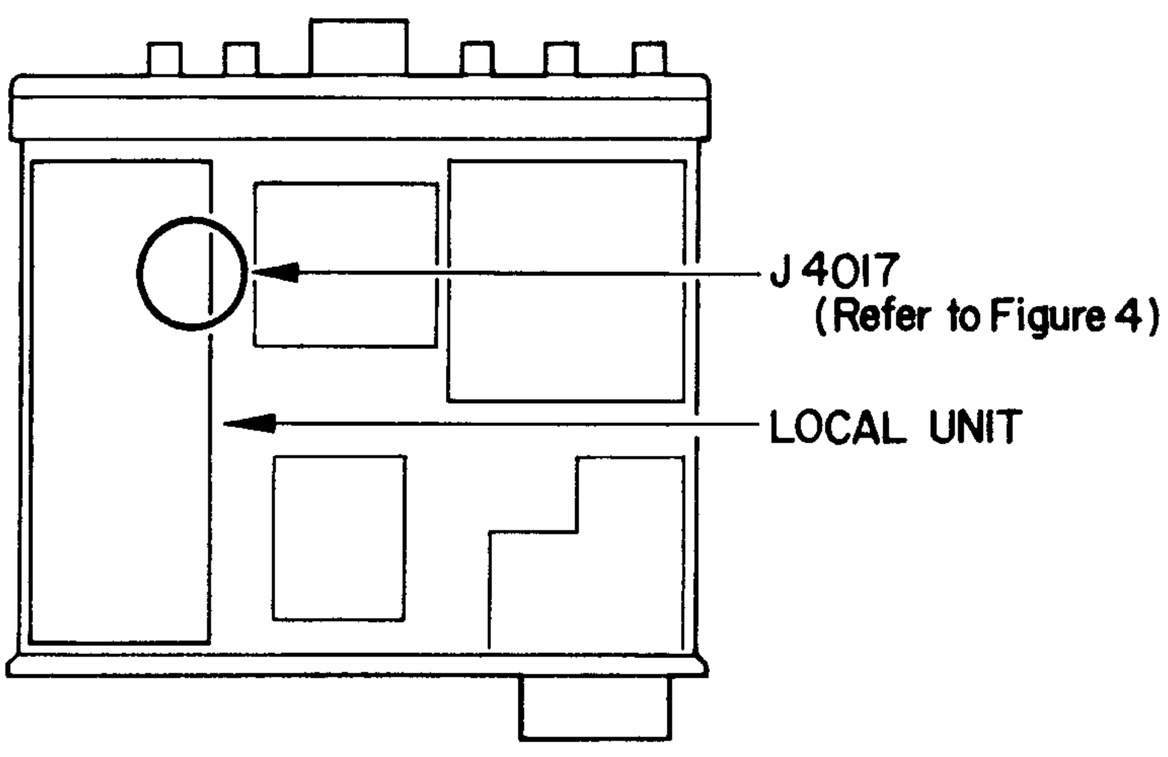


Figure 3

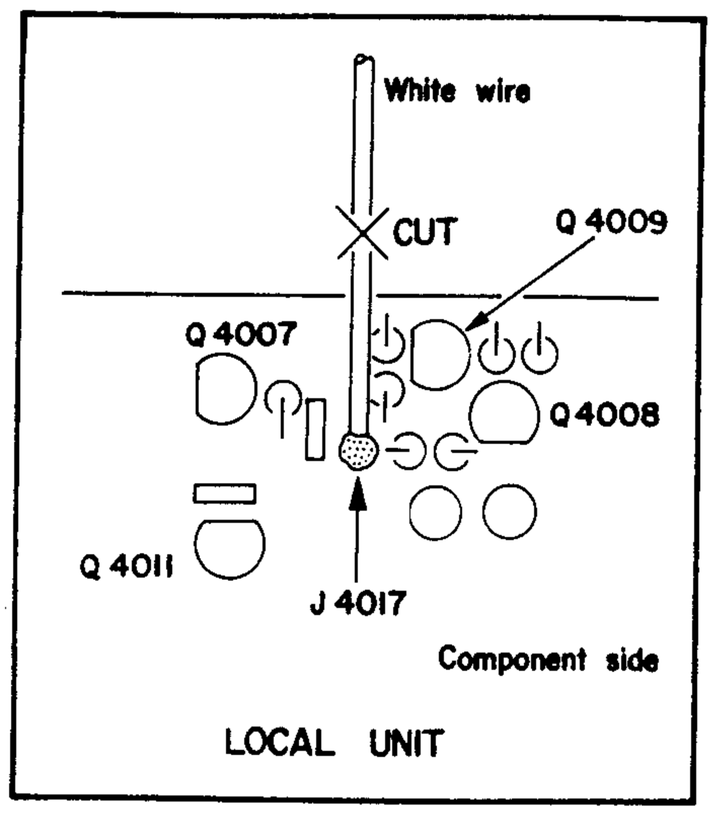


Figure 4

FM Unit Protection

This modification can be adopted in the early models of the FM Unit in the FT-102, in order to prevent damage to the TC5081AP used in the

3. On the solder side of the Unit, cut the copper pattern connected to pin 5 of Q6013, and solder a 470-ohm resistor across the cut.

4. Solder a 0.047 μF disc ceramic capacitor be-

24.5 MHz ALC Reduction

This modification increases the drive level during transmission on the 24.5 MHz band in those transceivers having serial numbers under XX-080001. Later sets have this modification already incorporated.

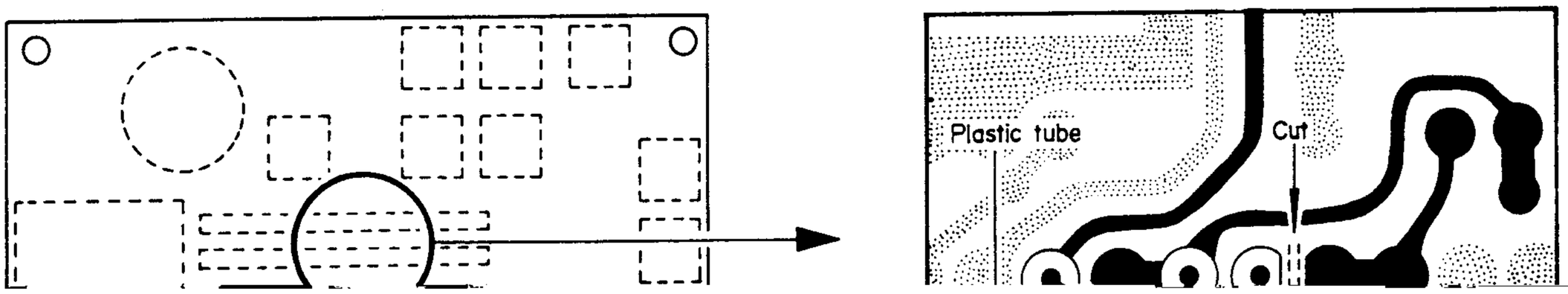
1. Referring to the diagrams below, locate the places on the solder side of the RF Unit where the terminals from the stationary contacts of bandswitch wafers S11b-3 and S11b-4 are soldered to the RF Unit. Carefully cut the foil pattern to isolate the 24.5 MHz pad of wafer S11b-3 as shown. Make sure it is the right place before cutting.

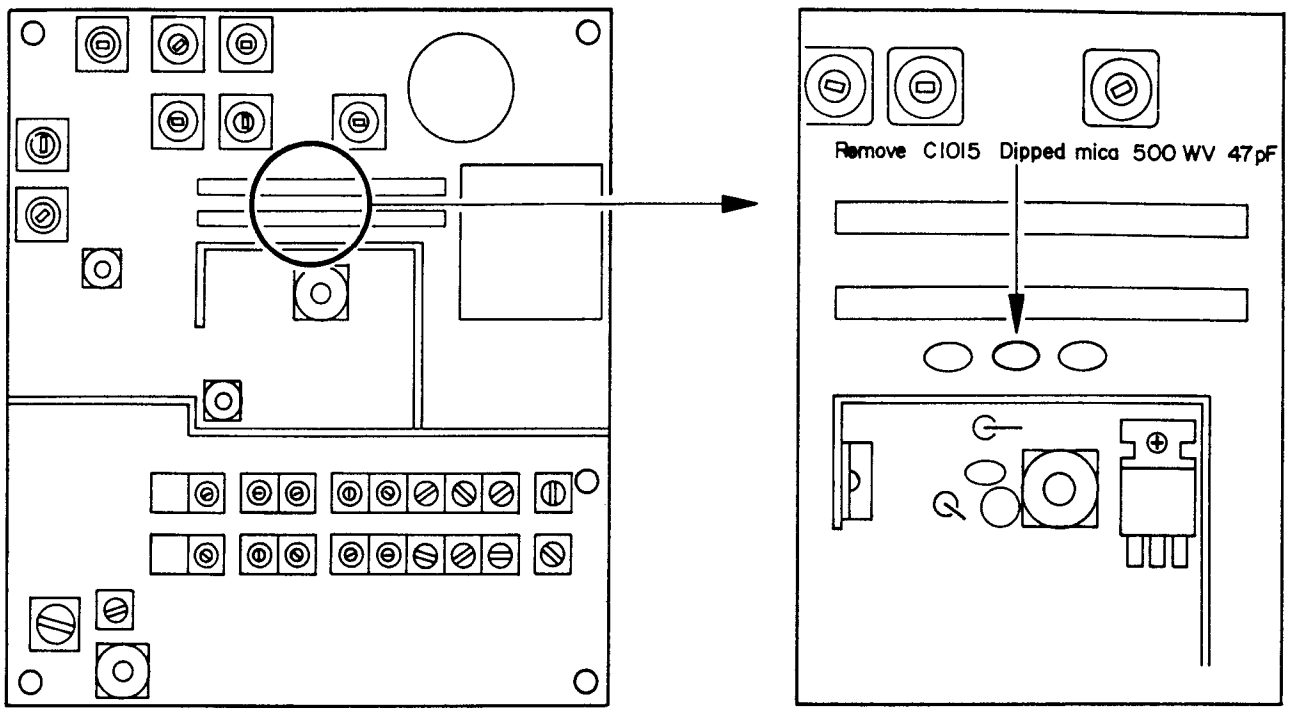
2. Install a small jumper between the 24.5 MHz pad isolated in the previous step and the 21 MHz pad on the opposite side from the cut.

3. Now locate C1015 on the component side of the board, and C1104 on the solder side (connected in parallel to the same pads). Remove both of these capacitors to isolate the 24.5 MHz pad of wafer S11b-4.

4. Install plastic insulating sleeves over both leads of an 82 pF, 500 WV dipped mica capacitor, and connect from the 14 MHz pad of S11b-3 to the 24.5 MHz pad of S11b-4 on the solder side of the RF Unit, as shown in the diagram. This new capacitor is designated C1108.

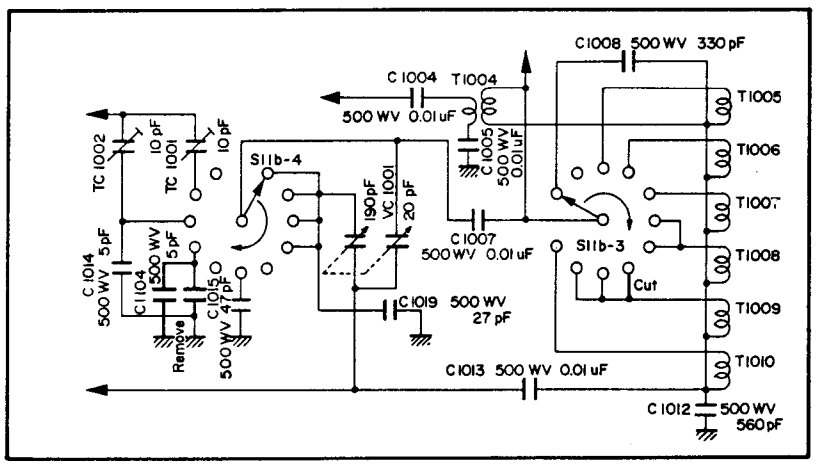
This completes the modification.



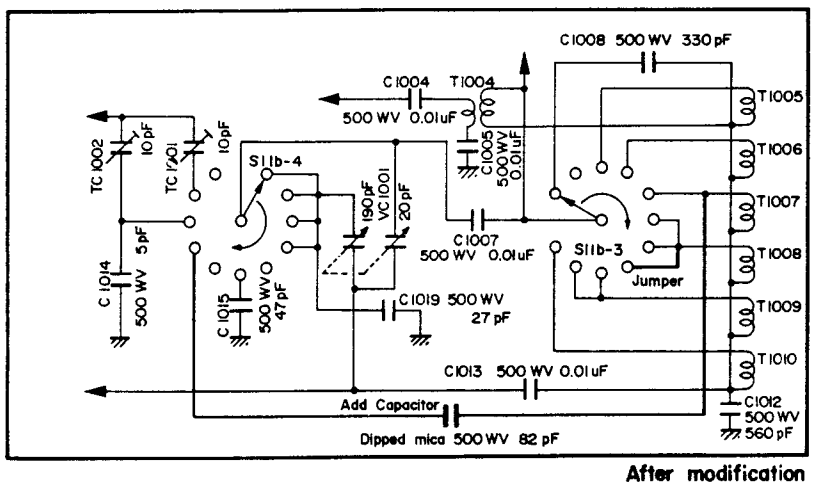


Component side

RF UNIT



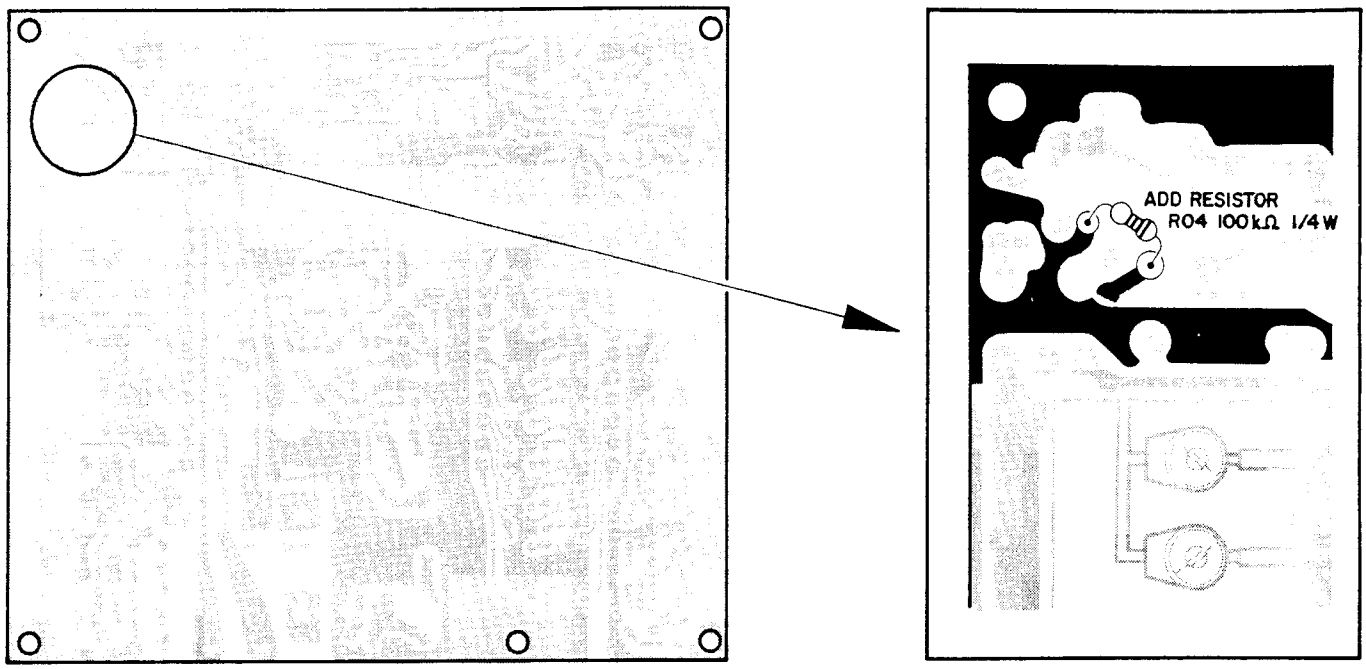
Original



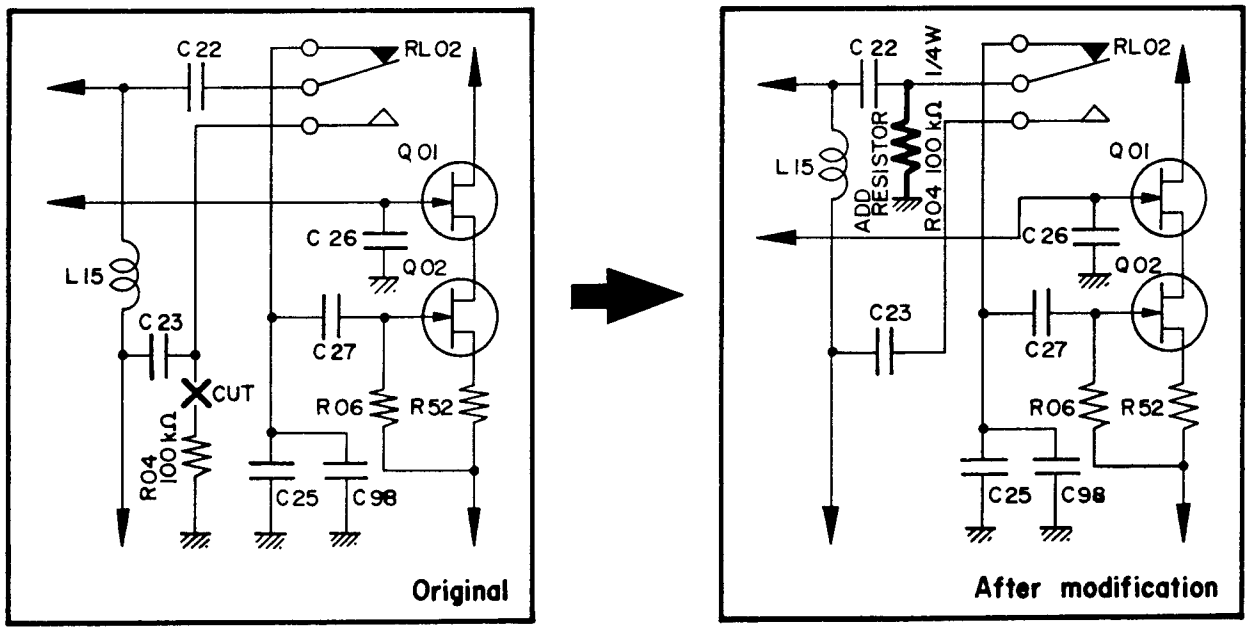
After modification

Receiver RF Amplifier Protection

This modification provides better protection for the RF amplifier FETs from spikes that may appear at the input for those FT-102s having serial numbers below XX040000. It has been incorpo-


ADD RESISTOR
R04 100kΩ 1/4W
Solder side

RF UNIT


C22
RL02
Q01
C26
Q02
L15
C23
C27
CUT
R06
R52
R04
100kΩ
C25
C98
Original
C22
1/4W
RL02
L15
ADD
RESISTOR
R04 100kΩ
Q01
C26
Q02
C23
C27
R06
R52
C25
C98
After modification

Receiver Spurious Reduction

This modification serves to reduce the spurious signals of the receiver in the amateur bands in those FT-102s having serial numbers below XX040000.

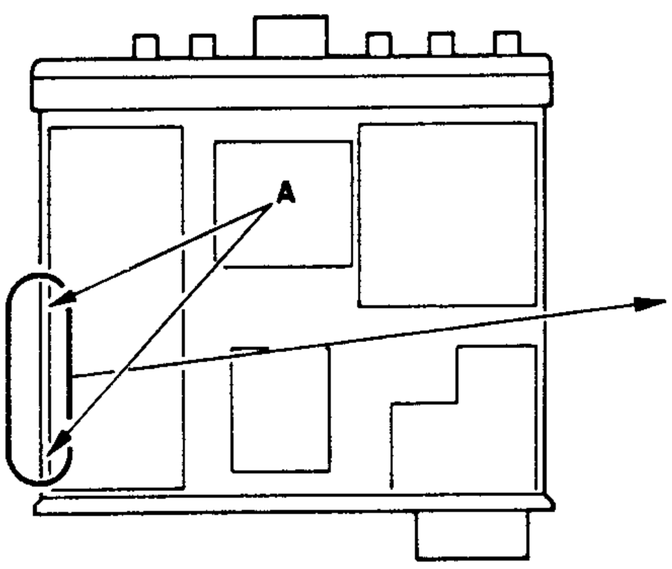
1. Lay the transceiver upside down on the work surface, and remove the bottom cover.

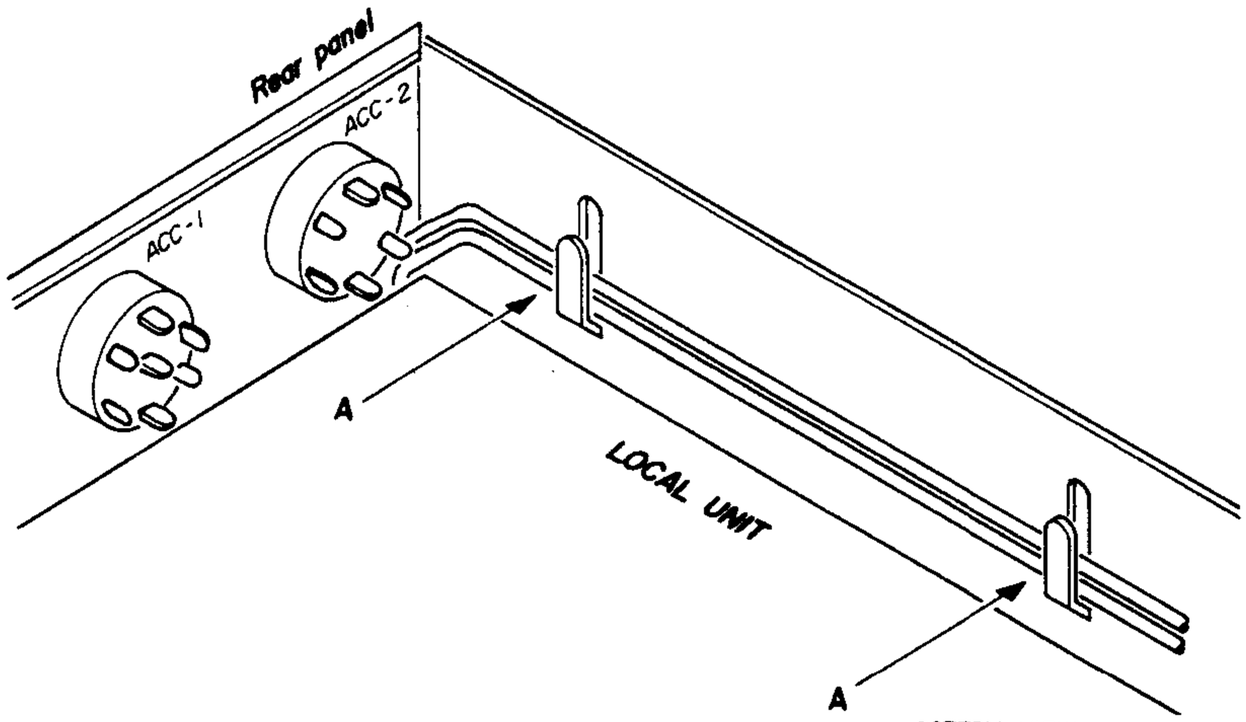
2. Referring to the diagrams below, carefully bend the two chassis clips (marked A) slightly inwards about 5 mm, so that the two gray shielded cables can be removed from the clips. It is not necessary to disconnect these cables from the pc-board.

3. Remove the seven screws affixing the Local Unit (PB-2345), and carefully lift the outer edge of the board, folding it towards the middle of the transceiver so that the solder side is exposed.

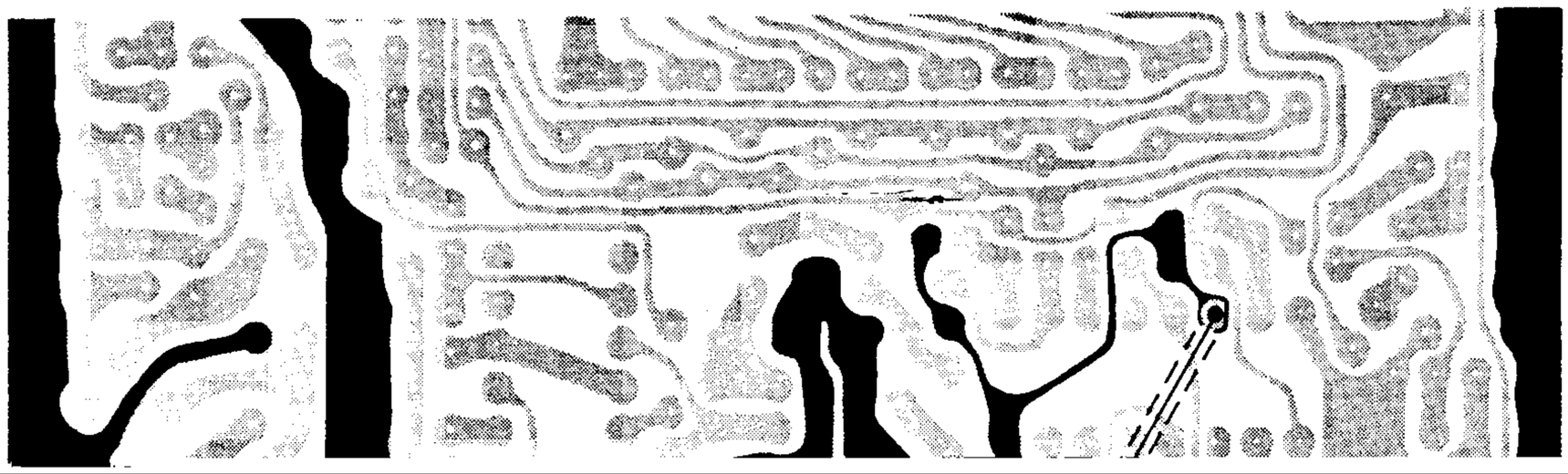
4. Referring to the local unit diagram below, install heavy wire or copper straps insulated with plastic sleeving in the three locations shown, connecting the ground patterns on the Local Unit.

5. Replace the Local Unit and its screws, reinstall the gray cables in the chassis clips and bend them back into place, and replace the cover.





BOTTOM VIEW



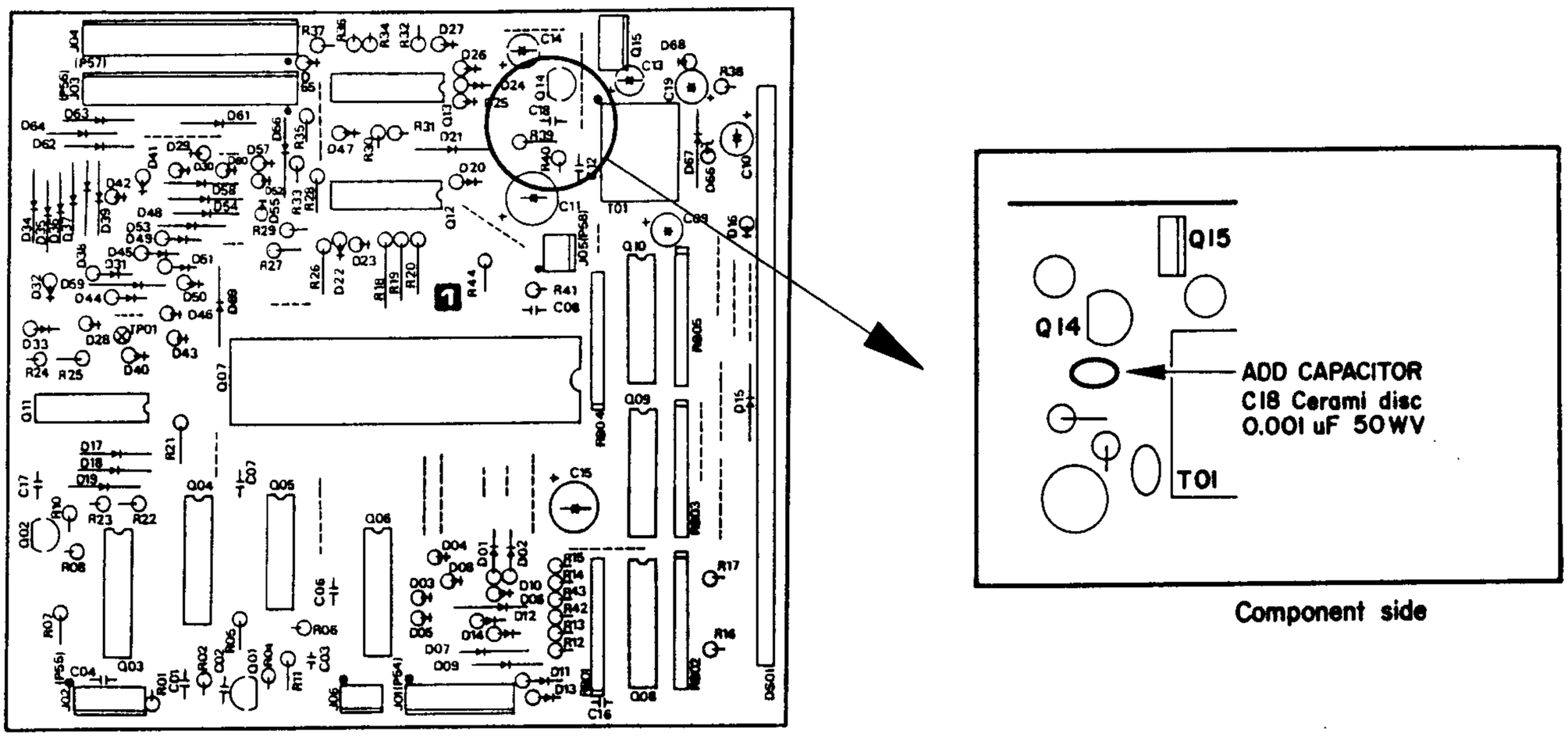
Counter Noise Reduction

This modification will reduce drifting counter noise that may appear on the lower frequency bands in those FT-102s having serial numbers below XX040000. It has been incorporated into production from Lot 4.

1. Remove the top cover, and without pulling on the wires, remove P57, the 13-pin connector plug nearest the edge of the Counter Unit (PB-2346A). Then remove the four screws affixing the Unit, and slide the pc-board back so that it can be tipped up to expose the solder side.

2. Referring to the drawing below, install a 0.001 μF, 50 WV ceramic capacitor between the collector of Q14 and ground.

3. Gently replace the pc-board in its original position. Replace the display-backing bracket with the two front mounting screws, and then replace the two rear screws. Reconnect P57 to J04, and replace the top cover.



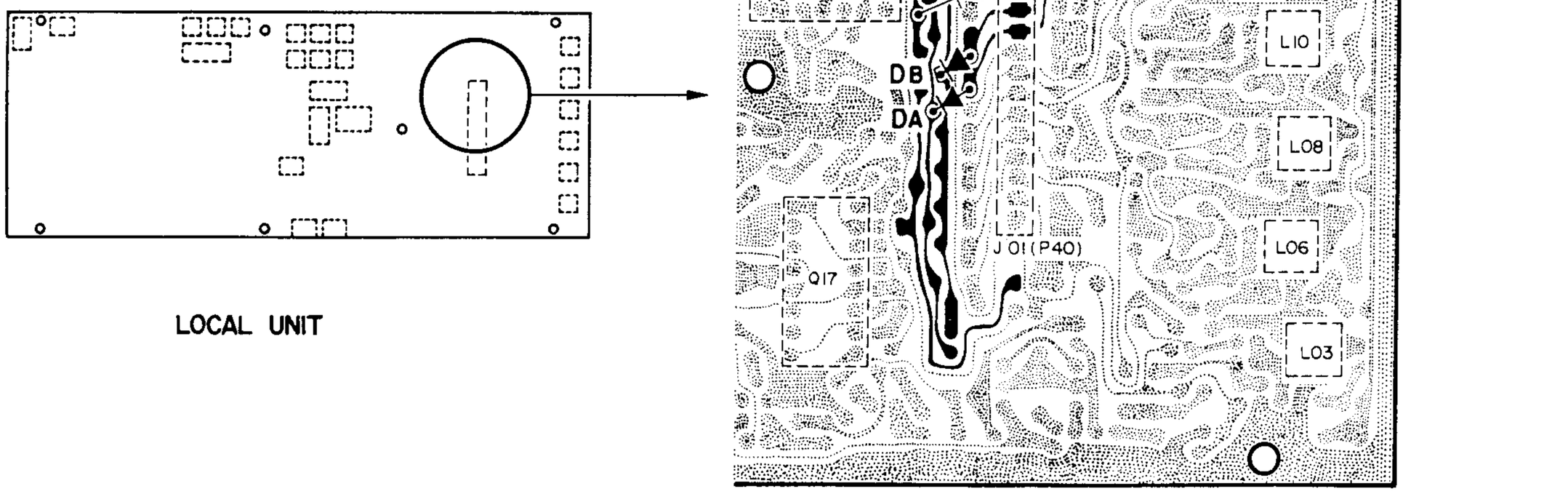
COUNTER UNIT

B. 10-meter Band Modification

The procedure for this modification is the same for all models. DO NOT perform this modification if Modification A has been performed.

It requires the sacrifice of all but one existing 10-meter 500 kHz segment. The new segment will be selected when the BAND selector and switch are set to the same position as used for the 10-meter segment being replaced.

1. Perform steps 1, 2 and 3 of the previous modification procedure.
2. Install 1SS53 diodes (white band) on the solder side of the Local Unit at the locations shown in Figure 5, making sure that the banded ends of the diodes are aligned as indicated. Install D_D for 28.0–28.5 MHz, or D_E for 28.5–29.0 MHz (DO NOT INSTALL BOTH). Then perform step 5 of the previous modification procedure.



— MEMO —

MODIFICATION OF THE FTV-901R TRANSVERTER FOR USE WITH THE FT-102 TRANSCEIVER

This modification enables the FTV-901R to be used with those FT-102s having serial numbers above 030000 for VHF and/or UHF operation. Earlier FT-102s should first be modified by an authorized Yaesu agent.

Parts required:

One ALC AMP Unit, Part No. C022940
One Connection Cable E, Part No. T9101282, shown in Fig.
One 24-centimeter length of hookup wire

1. Remove the twelve screws affixing the top and bottom covers of the FTV-901R, and remove the covers (Figure 1).

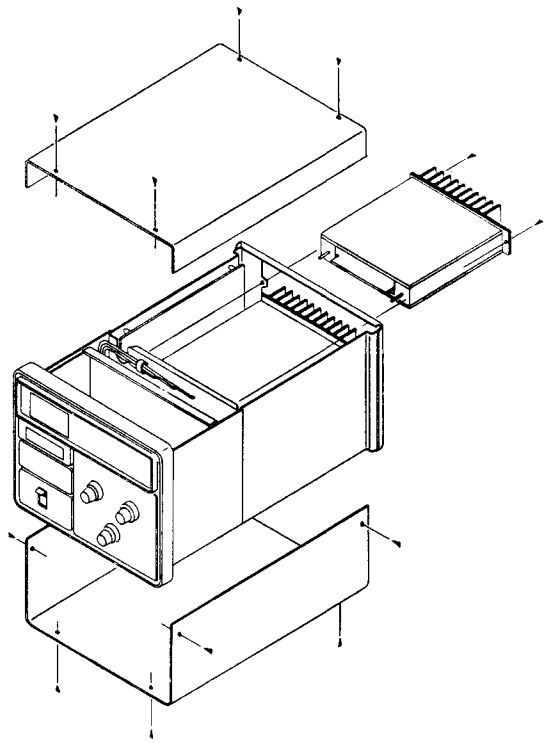


Figure 1

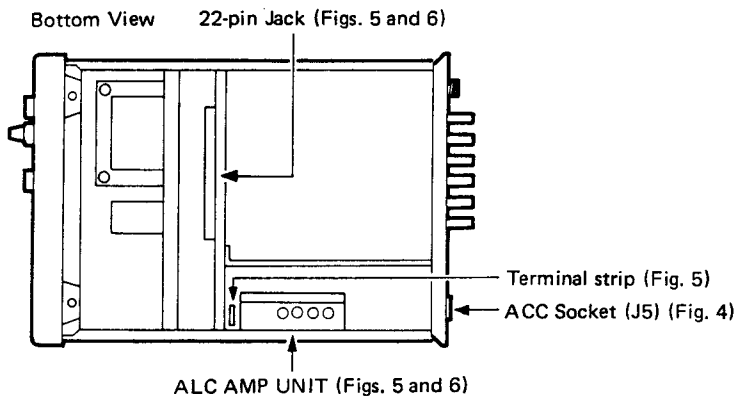


Figure 2

2. On POWER switch S2a, disconnect the blue wire from the OFF terminal, and reconnect this wire to the ON terminal, as shown in Figure 3.

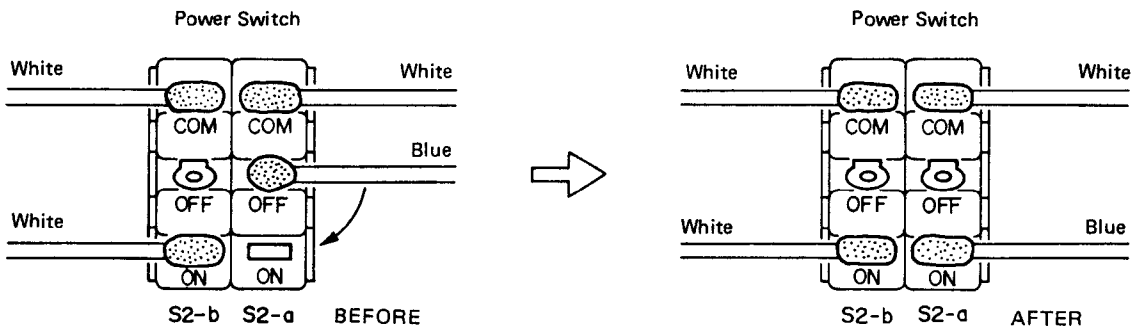


Figure 3

3. On the ACC socket (J5), disconnect the large white wire from pins 2 and 5, and reconnect this wire to the ground terminal at the socket, as shown in Figure 4. Also, if a diode is connected to pins 1 and 4 of the ACC socket (early models), remove this diode from the transverter.

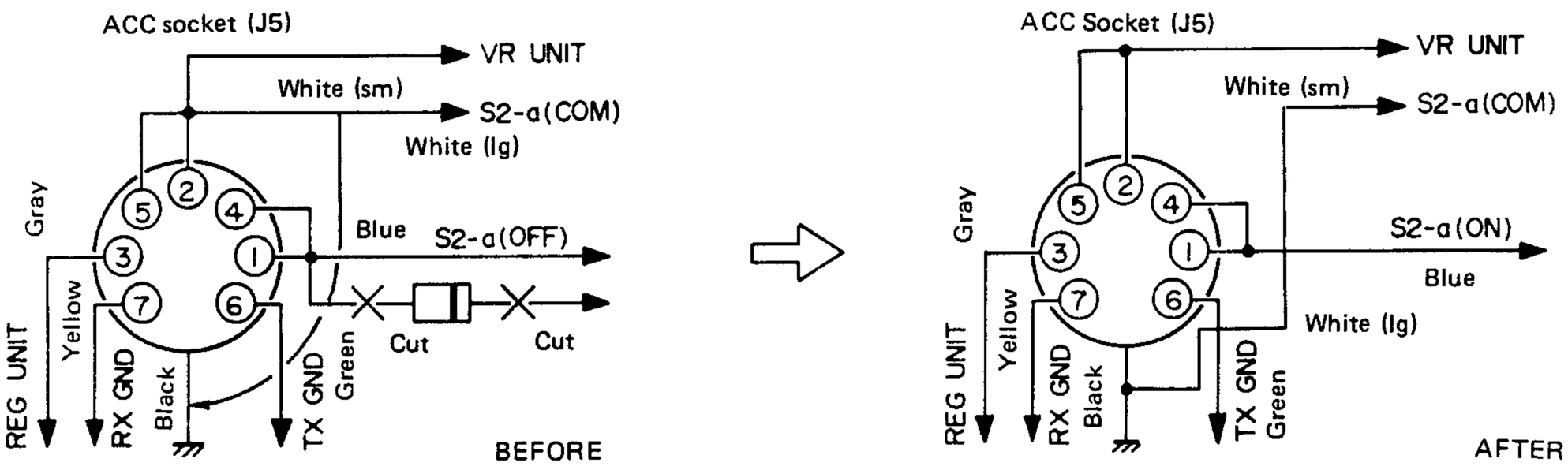


Figure 4

4. If the serial number of the FTV-901R is below 030000, perform the following procedure and skip part 5. Otherwise, skip this part and proceed directly to part 5.

   a. Note on tags the connection point of each red wire connecting to the ALC AMP Unit and tape a tag to each of these wires. Then disconnect all wires (two shielded, three red, and one each orange, white/green and white/red).

   b. Remove the four screws in the side of the chassis affixing the ALC AMP Unit, and replace the original Unit with the new ALC AMP Unit (Part No. C022940).

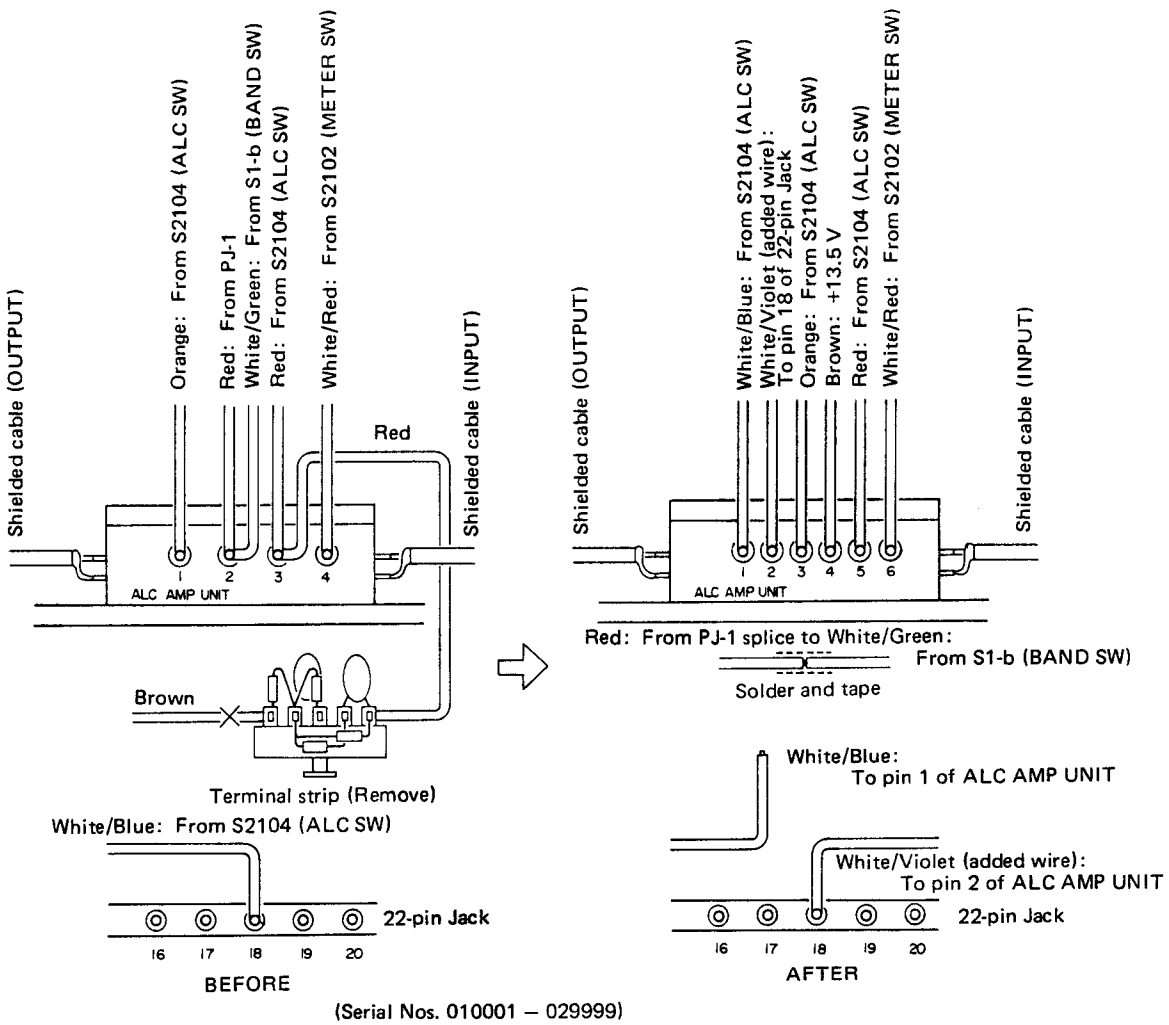
   c. Reconnect the wires to the new Unit as shown in Figure 5 and described below:

      1. Connect the inner shielded wire to the

4. Disconnect the white/blue wire from pin 18 of the blue 22-pin connector jack, and connect this wire to pin 1 of the ALC AMP Unit.

5. Connect the 24-centimeter length of hookup wire from pin 18 of the blue 22-pin connector jack to pin 2 of the ALC AMP Unit.

6. Connect the orange wire, removed from pin 1 of the old ALC AMP Unit, to pin 3 of the new Unit. Then connect the red wire removed from pin 3 of the old Unit to pin 5 of the new Unit. Finally, connect the white/red wire, removed from pin 4 of the old Unit, to pin 6 of the new ALC AMP Unit. Skip the next part and proceed to part 6.



(Serial Nos. 010001 – 029999)

Figure 5

5. For those FTV-901Rs with serial number above 030000, perform the following procedure.
   a. Disconnect all wires from the ALC AMP

3. Disconnect the white/blue wire from pin 18 of the blue 22-pin connector jack, and carefully insulate the end of this wire with plastic tape.

T)

e: From S2104 (ALC SW)
From S2104 (ALC SW)
13.5 V
m S2104 (ALC SW)
d: From S2102
SW)

)T)

ue: From S2104 (ALC SW)
olet (added wire):
8 of 22-pin Jack
From S2104 (ALC SW)
+13.5 V
om S2104 (ALC SW)
ed: From S2102
SW)

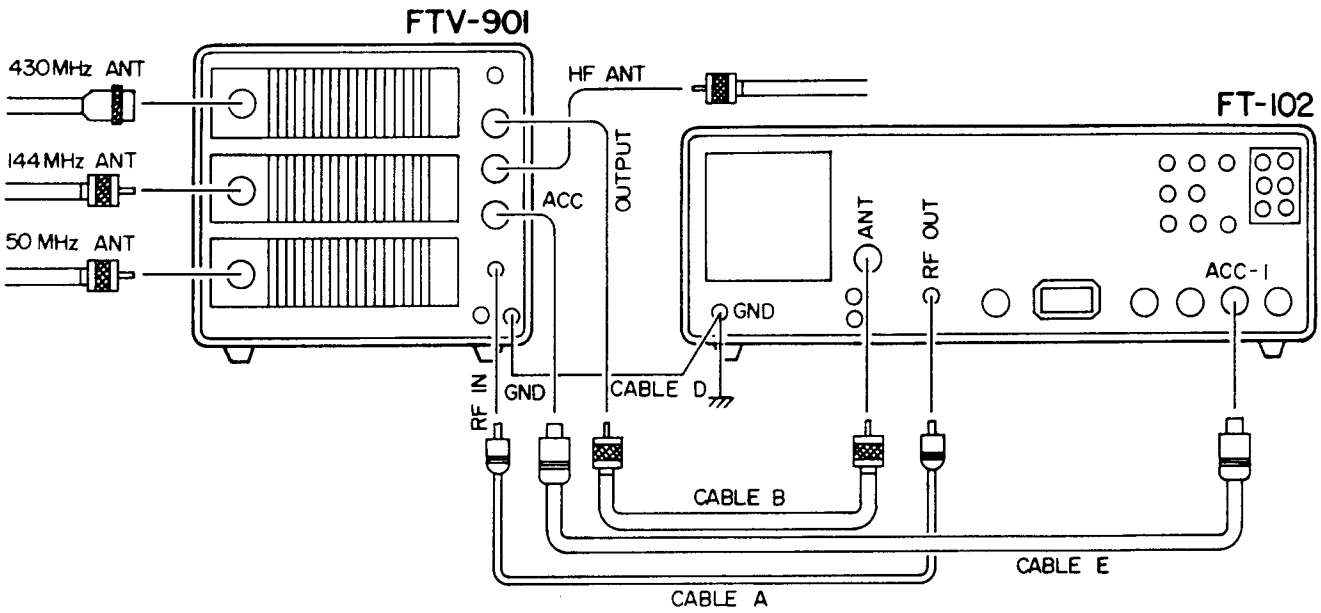
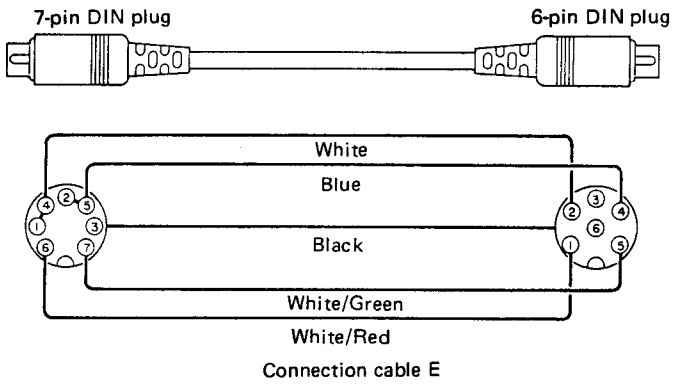


Figure 7



Connection cable E

Figure 8

MODIFICATION OF THE FTV-107 TRANSVERTER FOR USE WITH THE FT-102 TRANSCEIVER

This modification enables the FTV-107 to be used with those FT-102s having serial numbers above 030000 for VHF and/or UHF operation. Earlier FT-102 should first be modified by an authorized

CAUTION

ONCE THE FTV-107 HAS BEEN MODIFIED IT MUST NOT BE USED WITH THE FT-107, FT

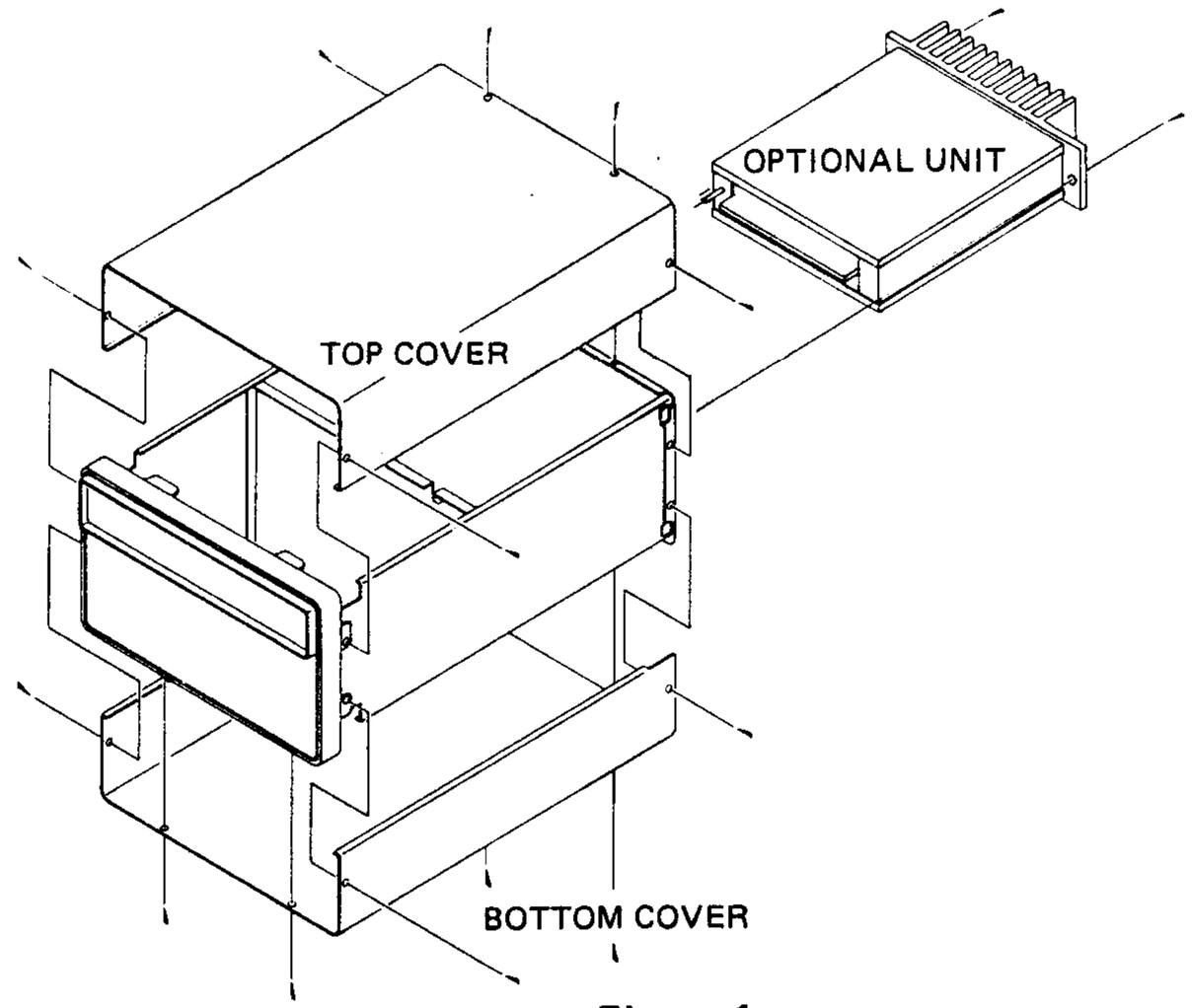
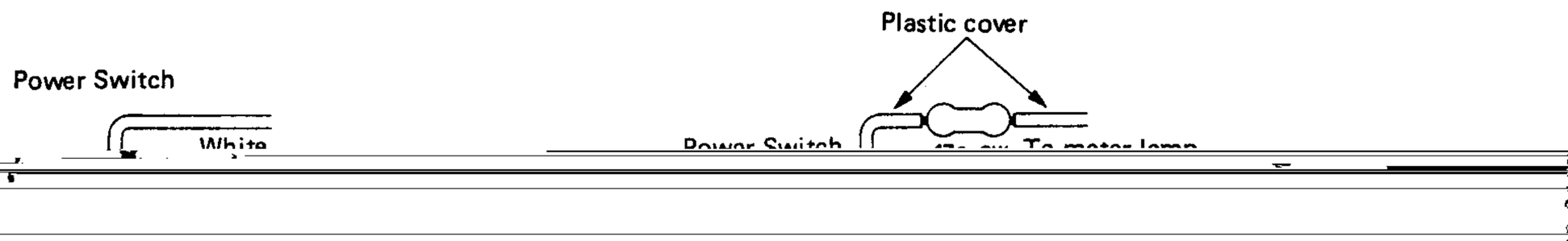
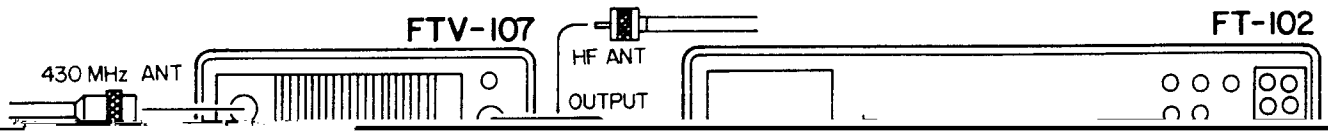

OPTIONAL UNIT
TOP COVER
BOTTOM COVER

Figure 1


Power Switch
White
Plastic cover
Power Switch


FTV-107
FT-102
430 MHz ANT
HF ANT
OUTPUT

MODIFICATION OF THE FTV-707 TRANSVERTER FOR USE WITH THE FT-102 TRANSCEIVER

This modification enables the FTV-707 to be used with those FT-102s having serial numbers above 030000 for VHF or UHF operation. Earlier FT-102s should first be modified by an authorized Yaesu dealer.

Parts required:

One 6-pin DIN plug, Part No. P0090032
One Power Cord (1 meter), (Figure 7, not needed if FP-707 is used)

1. Remove the eight screws affixing the top cover of the FTV-707, and remove the cover (Figure 1).

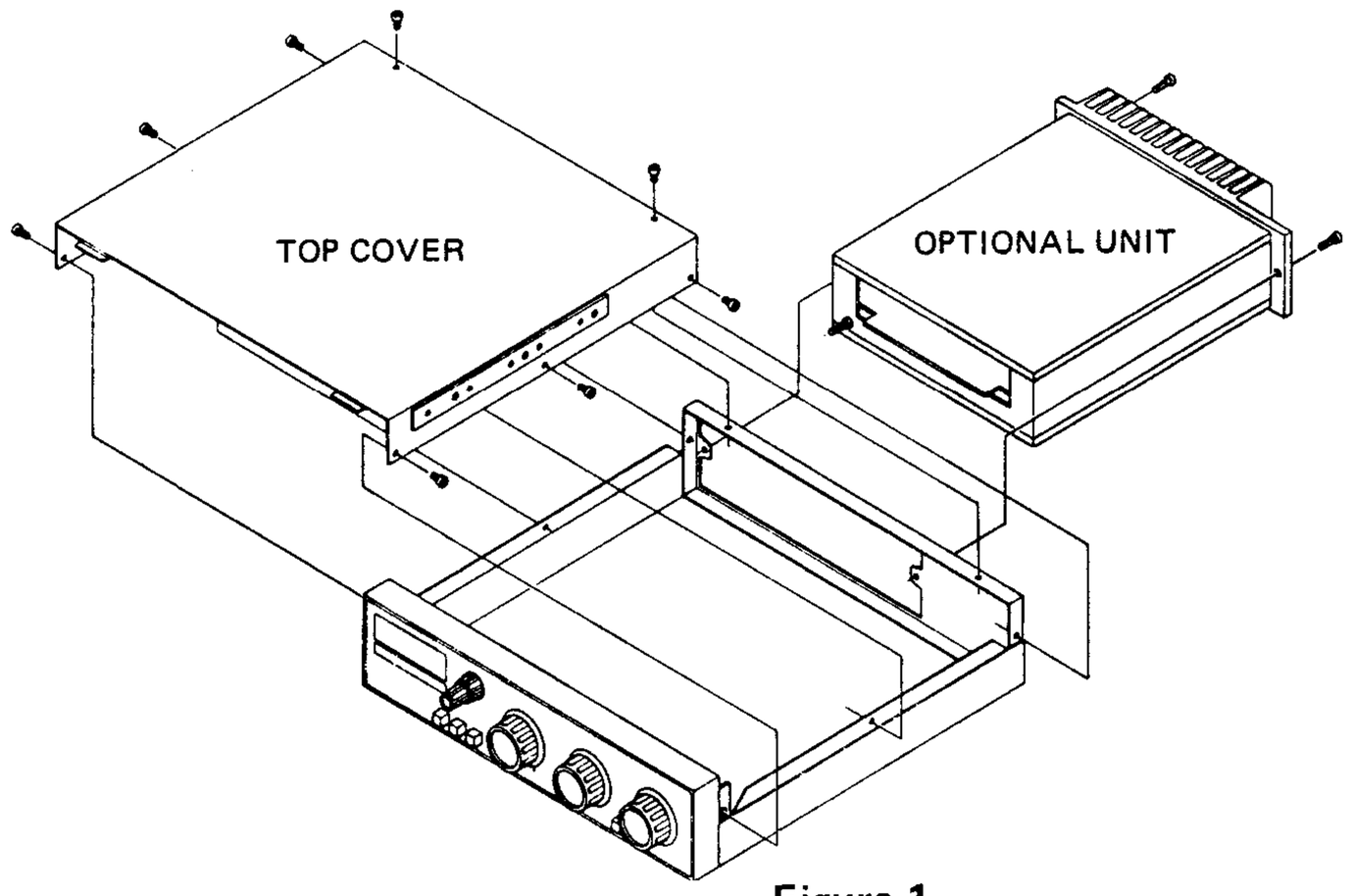


Figure 1

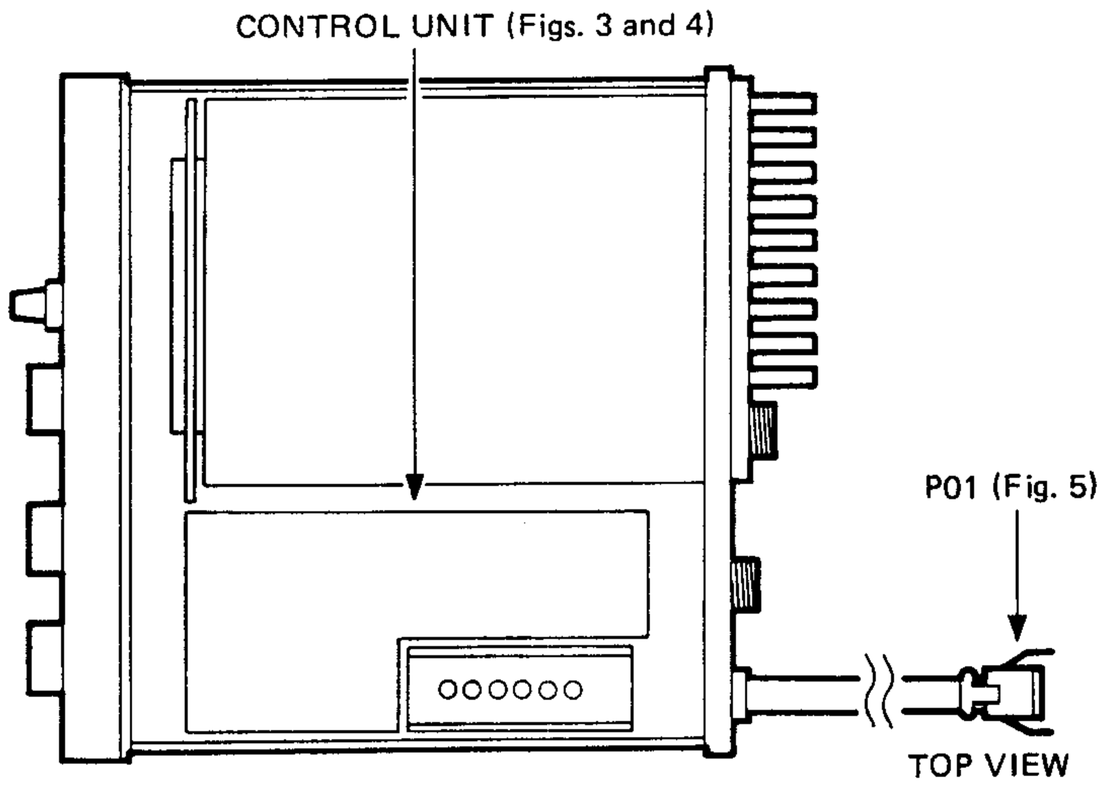


Figure 2

2. Referring to Figures 2 and 3, disconnect all wires and connectors from the Control Unit as described in the following steps:

   a. Disconnect 8-pin connector P02 from J01, and 9-pin connector P03 from J02.

   b. Disconnect the following wires by carefully sliding their connectors off of the contact pins on the Control Unit:

      1. the orange wire at the DC 13.5 V OUT terminal
      2. the small red wire at the S3 terminal
      3. the large red wire at pin 3
      4. the white/brown wire at the PO SW terminal
      5. the brown wire at the Sla terminal
      6. the white/orange wire at the RX HF terminal

   c. Disconnect the next set of wires by unsoldering their connections at the Control Unit:

      1. the white/brown wire at the TX 13.5 V IN terminal
      2. the yellow wire at the TX 13.5 V OUT terminal
      3. the center conductor of the coax at the RX OUT terminal
      4. the bare solid wire at the 10 m OUT terminal
      5. the bare solid wire at the HF ANT terminal

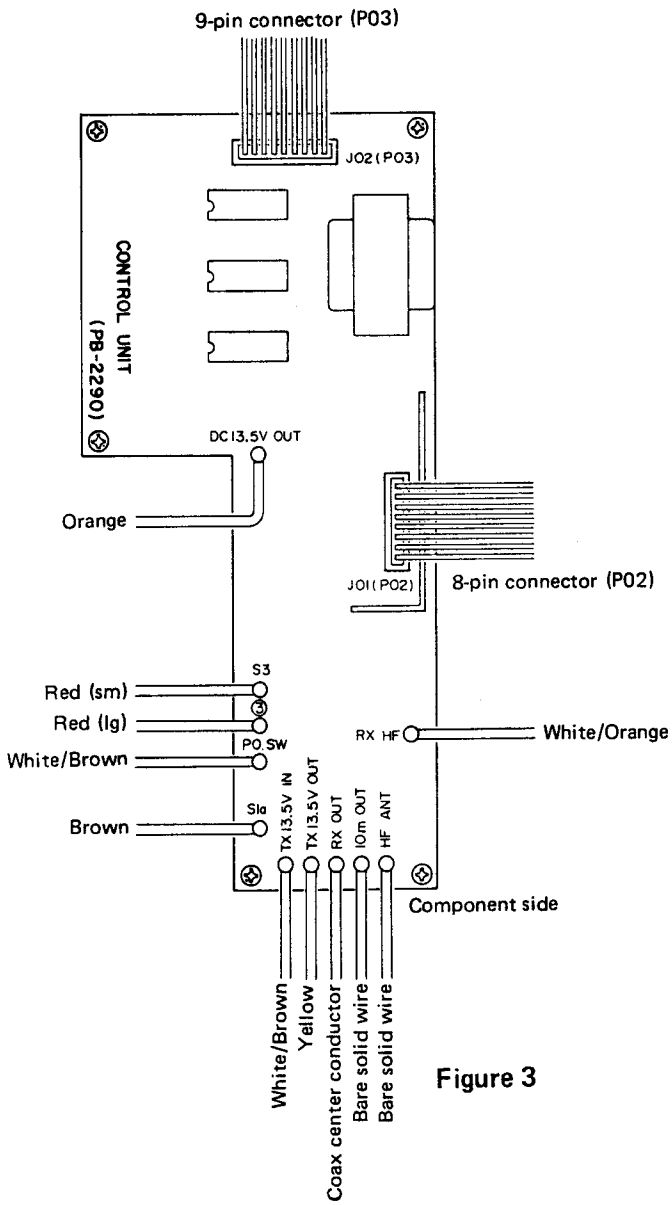
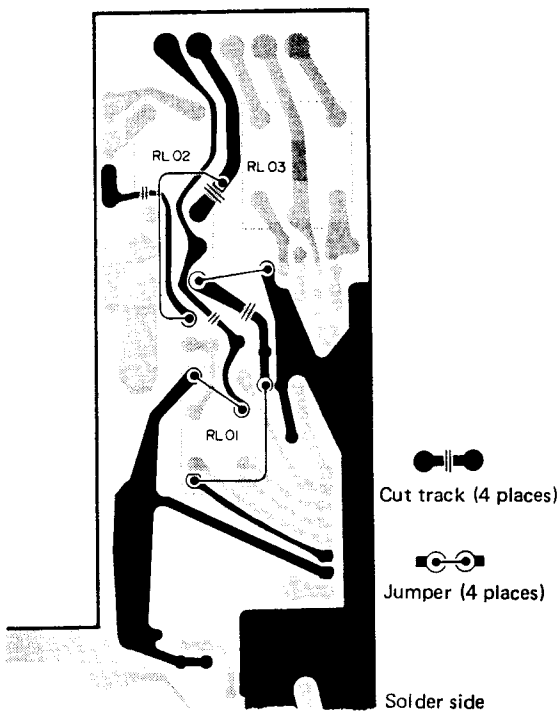


Figure 3



CONTROL UNIT (PB-2290)

Figure 4

3. Now remove the five screws from the Control Unit, and remove the Unit from the transverter.

4. Referring to Figure 4, carefully cut the four tracks on the solder side of the Control Unit, and install four jumpers as illustrated.

5. Replace the Control Unit and its five screws, and reconnect each connector and wire in the same order that they were removed in part 2, above; i.e. connect P02 to J01 first, and solder the bare wire to the HF ANT terminal last.

6. Replace the top cover of the transverter, and

CAUTION

ONCE THE FTV-707 HAS BEEN MODIFIED IT MUST NOT BE USED WITH ANY MODEL TRANSCEIVER OTHER THAN THE FT-102, OR SEVERE DAMAGE TO THE EQUIPMENT MAY RESULT.
WHENEVER USING THE FTV-707 WITH THE FT-102, BE ABSOLUTELY CERTAIN THAT THE HEATER SWITCH ON THE FT-102 IS OFF, AND THAT THE TUBES HAVE HAD AT LEAST 30 SECONDS TO COOL.
WHEN USING THE FTV-707 WITH THE FT-102, THE IF MONITOR OF THE FT-102 WILL NOT

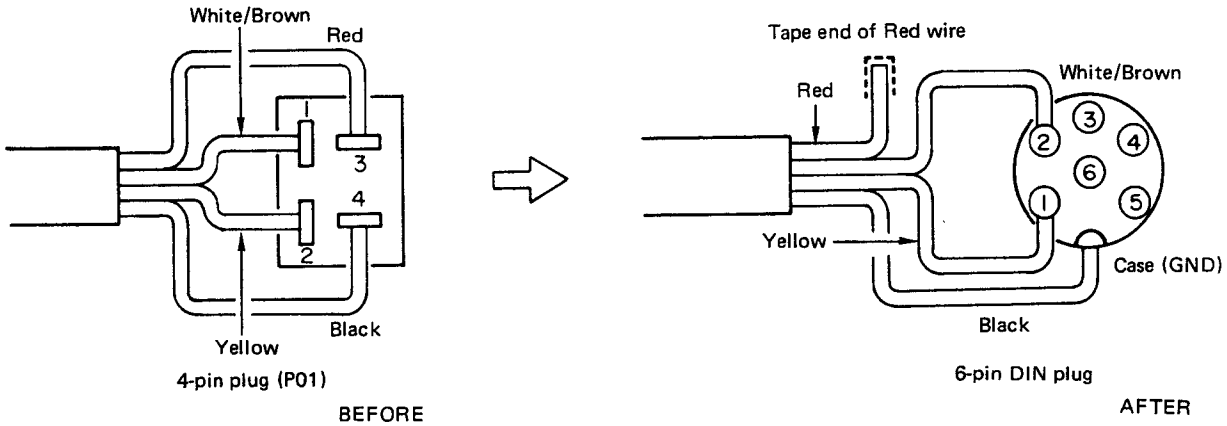


Figure 5

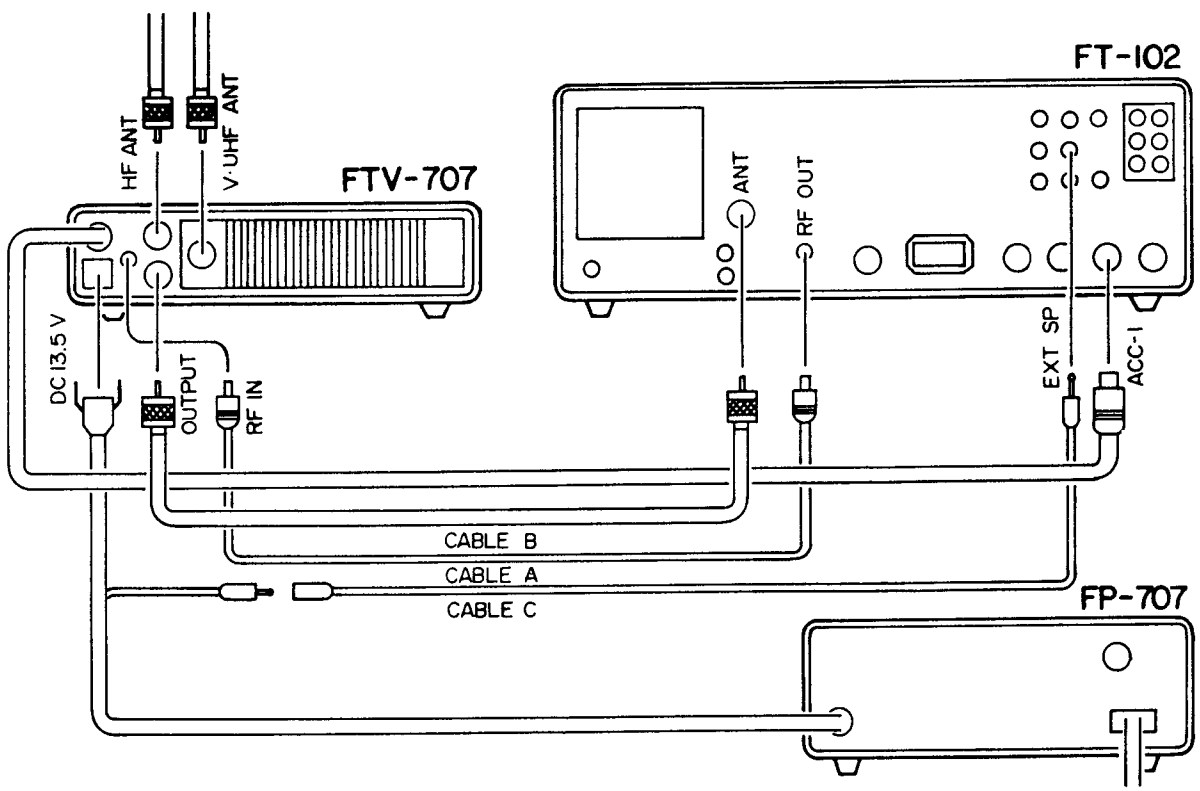
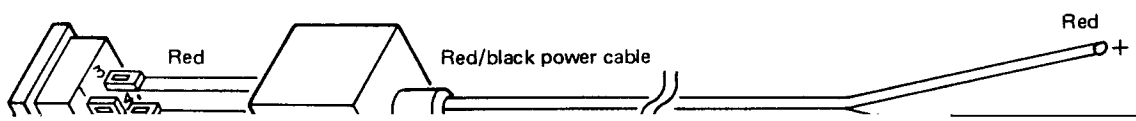
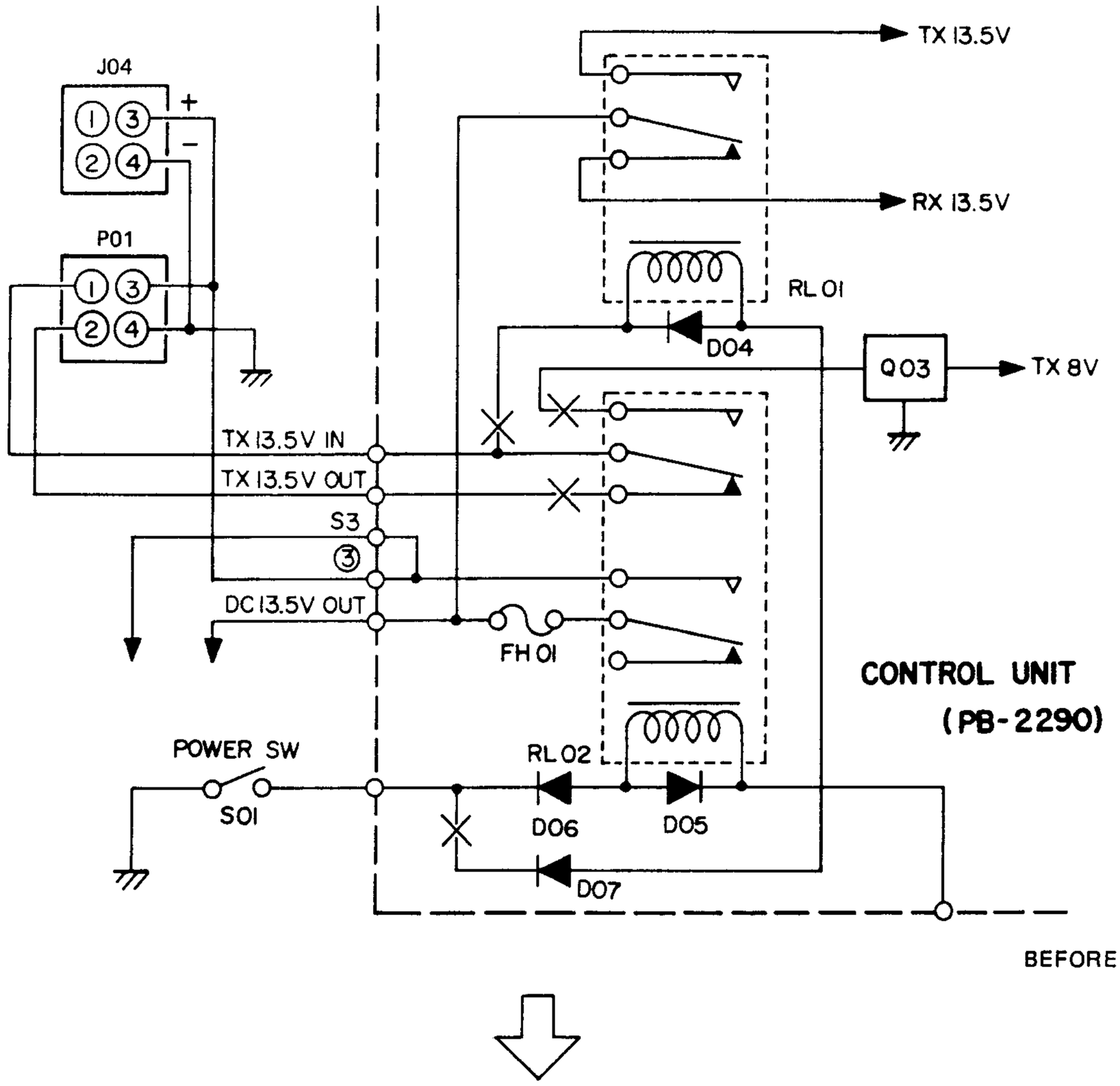
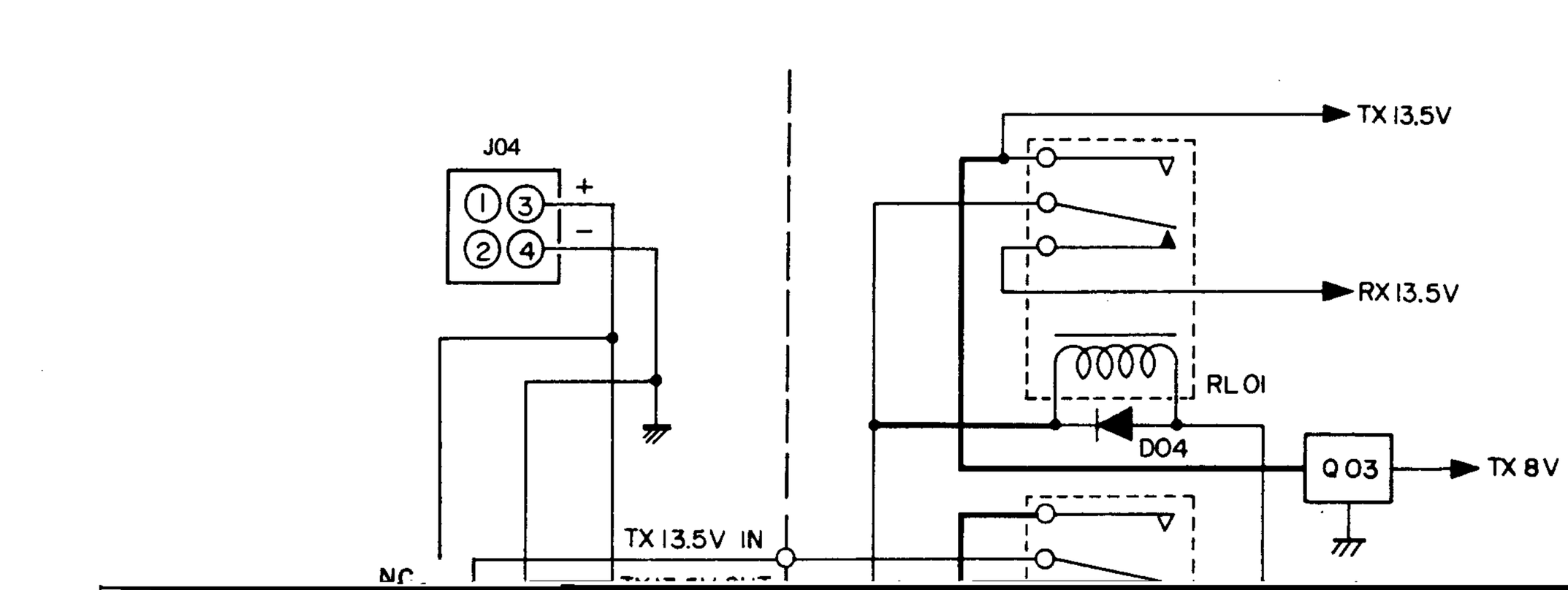


Figure 6




J04
+
−
P01
TX 13.5V IN
TX 13.5V OUT
S3
③
DC 13.5V OUT
FH 01
POWER SW
S01
RL 02
D06
D05
D07
TX 13.5V
RX 13.5V
RL 01
D04
Q 03
TX 8V
CONTROL UNIT
(PB-2290)
BEFORE


J04
+
−
TX 13.5V IN
TX 13.5V
RX 13.5V
RL 01
D04
Q 03
TX 8V

COMPONENT APPLICATIONS

MAIN CHASSIS

PART NO.	DEVICE	TYPE	FUNCTION
Q1	2SB705R	Transistor	Regulator
Q2	μPC7808H	IC	〃
Q3	μPC7812H	〃	〃
Q4	〃	〃	〃
D1	S4V10	Si Diode Bridge	Rectifier
D2	1S1555	Si Diode	Switch
⟨	⟨	⟨	⟨
D5	1S1555	Si Diode	Switch
D6	Not Used		
D7	〃		
D8	1S1555	Si Diode	Switch
D9	〃	〃	〃
D10	Not Used		
D11	1S1555	Si Diode	Switch
D12	〃	〃	〃
D13	〃	〃	〃
D14	10D1	〃	Back Pulse Canceling Diode
D15	1S1555	Si Diode	Switch
⟨	⟨	⟨	⟨
D19	1S1555	Si Diode	Switch
D20	10D1	〃	〃
D21	1S1555	〃	〃

RF UNIT

PART NO.	DEVICE	TYPE	FUNCTION
Q1001	2SK125Y	Junction FET	RX RF Amplifier
Q1002	〃	〃	〃
Q1003	2SC1815Y	Transistor	RX Buffer Amplifier (for IF OUT-2)
Q1004	2SK125Y	Junction FET	RX Buffer Amplifier (for FM, N.B)
V1001	12BY7A	Vacuum Tube	TX Driver Amplifier
XF1001	8.2M20A	Monolithic Filter	RX 1st IF Filter

IF UNIT

PART NO.	DEVICE	TYPE	FUNCTION
Q2001	2SK125Y	Junction FET	RX 1st IF Amplifier
Q2002	〃	〃	〃
Q2003	3SK73GR	Dual Gate MOS FET	RX 1st IF Amplifier TX 2nd IF Amplifier (for CW, AM, FM)
Q2004	〃	〃	RX 2nd Mixer
Q2005	2SK19TM-GR	Junction FET	TX 1st IF Buffer Amplifier (for SSB)
Q2006	2SC1815Y	Transistor	RX Q Multiplier
Q2007	〃	〃	〃
Q2008	〃	〃	RX 2nd IF Buffer Amplifier
Q2009	〃	〃	Regulator
Q2010	3SK73GR	Dual Gate MOS FET	RX 2nd IF Amplifier TX 1st IF Amplifier (@ Processor ON)
Q2011	2SC1815Y	Transistor	RX 2nd IF Buffer Amplifier (for IF OUT-1)
Q2012	2SC1815GR	〃	RX AGC Amplifier
Q2013	2SK19TM-GR	Junction FET	RX S-Meter Amplifier
Q2014	2SA564AR	Transistor	〃
Q2015	2SC1815Y	〃	TX 1st IF Amplifier (@ Processor ON)
Q2016	TA7060AP	IC	TX RF Speech Processor Amplifier
Q2017	3SK73GR	Dual Gate MOS FET	TX 1st Mixer
Q2018	2SC1815GR	Transistor	RX N.B. Controller
Q2019	2SC1583	〃	RX N.B. Amplifier
Q2020	〃	〃	〃
Q2021	2SC380Y	〃	〃
Q2022	2SC1815GR	〃	RX N.B. AGC Amplifier

D2001	1SS97	Schottky Barrier Di.	RX N.B. GATE
D2002	〃	〃	〃
D2003	FC63	Varactor Diode	〃
D2004	1S1555	Si Diode	Switch
⋮	⋮	⋮	⋮
D2010	1S1555	Si Diode	Switch
D2011	1SS97	Schottky Barrier Di.	Switch
⋮	⋮	⋮	⋮
D2020	1SS97	Schottky Barrier Di.	Switch
D2021	1S1555	Si Diode	〃
D2022	1SS97	Schottky Barrier Di.	〃
D2023	1S1555	Si Diode	〃
D2024	1SS97	Schottky Barrier Di.	Switch
⋮	⋮	⋮	⋮
D2028	1SS97	Schottky Barrier Di.	Switch
D2029	1S1555	Si Diode	〃
D2030	〃	〃	〃
D2031	FC-53M-4	Varactor Diode	RX Notch Filter Rejection Frequency Controller
D2032	1S1555	Si Diode	Switch
⋮	⋮	⋮	⋮
D2036	1S1555	Si Diode	Switch
D2037	Not Used		
D2038	1N60	Ge diode	RX AM Detector
D2039	1N270	〃	RX AGC Detector
D2040	〃	〃	〃
D2041	1S1555	Si Diode	Switch
⋮	⋮	⋮	⋮
D2045	1S1555	Si Diode	Switch
D2046	1SS97	Schottky Barrier Di.	TX ALC Detector
D2047	1S1555	Si Diode	Back Pulse Canceling Diode
D2048	HZ9C1	Zener Diode	〃
D2049	1S1555	Si Diode	Switch
D2050	〃	〃	〃
D2051	〃	〃	〃
D2052	〃	〃	〃
D2053	1N60	Ge Diode	RX N.B. Noise Detector
D2054	〃	〃	〃
D2055	〃	〃	RX N.B. AGC Detector
D2056	〃	〃	〃
D2057	1S1555	Si Diode	TX COMP M Detector
D2058	〃	〃	〃
D2059	1SS97	Schottky Barrier Di.	Logarithmic Compensator
D2060	1S1555	Si Diode	Switch
D2061	〃	〃	〃
D2062	1N60	Ge Diode	TX MONI. AM Detector
D2063	Not Used		
D2064	1S1555	Si Diode	Back Pulse Canceling Diode
D2065	Not Used		
D2066	1S1555	Si Diode	Switch
D2067	1S1555	Si Diode	Switch
D2068	〃	〃	Threshold Level Compensator
D2069	Not Used		
D2070	〃		
D2071	1S1555	Si Diode	Switch
D2072	〃	〃	〃
D2073	BZ090	Zener Diode	Regulator
D2074	〃	〃	〃
D2075	1S1555	Si Diode	Switch
D2076	1S1555	Si Diode	Switch
⋮	⋮	⋮	⋮
D2078	1S1555	Si Diode	Switch
D2079	Not Used		
D2080	1N60	Ge Diode	RX AM Detector
D2081	1S1555	Si Diode	Switch
D2082	〃	〃	〃
TH2001	D33A	Thermistor	Temperature Compensator
XF2001	XF-8.2HS	Crystal Filter	RX 1st IF Filter (for SSB, CW) TX SSB Filter
XF2002	XF-8.2GA	〃	RX 1st IF Filter (for AM; Option)
XF2003	XF-8.2HC	〃	RX 1st IF Filter (for CW(W); Option)
XF2003	XF-8.2HCN	〃	RX 1st IF Filter (for CW(N); Option)
XF2004	XF-8.2HSN	〃	RX 1st IF Filter (for SSB(N); Option)
XF2005	XF-455C	〃	RX 2nd IF Filter (for CW(W); Option)
XF2005	XF-455CN	〃	RX 2nd IF Filter (for CW(N); Option)
CF2001	CFM-455J1	Ceramic Filter	RX 2nd IF Filter (for SSB(W), (N), CW(W)) TX SSB Filter

AF UNIT

PART NO.	DEVICE	TYPE	FUNCTION
Q3001	2SC732TM-GR	Transistor	TX MIC Amplifier
Q3002	2SC1815GR	〃	〃
Q3003	2SC1815BL	〃	〃
Q3004	2SC732TM-GR	〃	TX MIC Tone Controlle
Q3005	2SC1815Y	〃	TX CW Side Tone Oscillator
Q3006	〃	〃	TX ANTI-TRIP Amplifier
Q3007	〃	〃	TX ANTI-TRIP DC Amplifier
Q3008	2SA733AQ	〃	〃
Q3009	〃	〃	Switch
Q3010	2SC1815Y	〃	TX VOX Amplifier
Q3011	〃	〃	TX VOX DC Amplifier
Q3012	2SA733AQ	〃	Switch
Q3013	2SC1815Y	〃	Relay Driver
Q3014	〃	〃	〃
Q3015	2SA496Y	〃	Relay Controller
Q3016	2SC1815Y	〃	TX AF OUT Buffer Amplifier
Q3017	〃	〃	TX Carrier Buffer Amplifier
Q3018	〃	〃	RX Carrier Buffer Amplifier

Q3019	MC14066B	IC	Switch
Q3020	2SC1815Y	Transistor	RX AF Active L.P.F. (for CW)
Q3021	〃	〃	RX AF Buffer Amplifier (for CW)
Q3022	2SC1815GR	〃	RX AF Active L.P.F. (for AM, SSB)
Q3023	〃	〃	RX AF Buffer Amplifier (for AM, SSB)
Q3024	AN6551	IC	RX AF A.P.F.
Q3025	μPC2002V	〃	RX Audio Amplifier
Q3026	2SK19TMY	Junction FET	Carrier Oscillator (for CW, AM, FM)
Q3027	2SC380Y	Transistor	Carrier Buffer Amplifier (for CW)
Q3028	〃	〃	Carrier Frequency Controller
Q3029	〃	〃	Carrier Buffer Amplifier (for AM, FM)
Q3030	2SC1815Y	〃	MUTE Switch
D3001	1S1555	Si Diode	Switch
D3002	1SS97	Schottky Barrier Di.	TX Balanced Modulator
⎜	⎜	⎜	⎜
D3005	1SS97	Schottky Barrier Di.	TX Balanced Modulator
D3006	1S1555	Si Diode	Switch
D3007	1N270	Ge Diode	〃
D3008	HZ3C1	Zener Diode	〃
D3009	1N270	Ge Diode	〃
D3010	1S1555	Si Diode	〃
D3011	1N60	Ge Diode	TX ANTI-TRIP Detector
D3012	1S1555	Si Diode	Switch
D3013	〃	〃	〃
D3014	1N60	Ge Diode	TX VOX Detector
D3015	10D1	Si Diode	Back Pulse Canceling Diode
D3016	1S1555	Si Diode	Switch
⎜	⎜	⎜	⎜
D3020	1S1555	Si Diode	Switch
D3021	1N60	Ge Diode	RX Balanced Demodulator
⎜	⎜	⎜	⎜
D3024	1N60	Ge Diode	RX Balanced Demodulator
D3025	1S1555	Si Diode	Switch
⎜	⎜	⎜	⎜
D3028	1S1555	Si Diode	Switch
D3029	Not Used		
D3030	1S1555	Si Diode	Switch
D3031	〃	〃	〃
D3032	〃	〃	〃
D3033	Not Used		
D3034	〃		
D3035	1S1555	Si Diode	Switch
X 3001	8.2159 MHz	Crystal	Carrier Oscillator (for CW, AM, FM)

LOCAL UNIT

PART NO.	DEVICE	TYPE	FUNCTION
Q4001	2SC945AQ	Transistor	RX 1st Local VCO. TX 2nd Local VCO. (for 1.9, 3.5 MHz)
Q4002	〃	〃	RX 1st Local VCO. TX 2nd Local VCO. (for 7, 10 MHz)
Q4003	〃	〃	RX 1st Local VCO. TX 2nd Local VCO. (for 14 MHz)
Q4004	〃	〃	RX 1st Local VCO. TX 2nd Local VCO. (for 18 MHz)
Q4005	〃	〃	RX 1st Local VCO. TX 2nd Local VCO. (for 21, 24.5 MHz)
Q4006	〃	〃	RX 1st Local VCO. TX 2nd Local VCO. (for 28 MHz, AUX)
Q4007	2SC535B	〃	RX 1st Local Buffer Amplifier, TX 2nd Local Buffer Amplifier
Q4008	2SC2407	〃	〃
Q4009	2SC945AQ	〃	PLL UNLOCK Switch
Q4010	〃	〃	〃
Q4011	2SC535B	〃	RX 1st Local Buffer Amplifier, TX 2nd Local Buffer Amplifier
Q4012	SN76514N	IC	PLL Mixer
Q4013	2SC535B	Transistor	PLL IF Buffer Amplifier
Q4014	〃	〃	〃
Q4015	〃	〃	〃
Q4016	2SA733AQ	〃	PLL UNLOCK Amplifier
Q4017	SN74LS192	IC	PLL Programmable Divider
Q4018	MC4044	〃	PLL Phase Detector
Q4019	SN74LS90	〃	PLL Reference 1/5, 1/10 Divider
Q4020	MC14518BCP	〃	PLL Reference 1/2, 1/40 Divider
Q4021	2SC945AQ	Transistor	PLL Reference Buffer Amplifier
Q4022	2SC732GR	〃	PLL Active L P F.
Q4023	〃	〃	〃
Q4024	SN76514N	IC	PLL Mixer
Q4025	3SK73GR	Dual Gate MOS FET	〃
Q4026	2SC945AQ	Transistor	PLL Reference Oscillator
Q4027	〃	〃	PLL Reference Buffer Amplifier
Q4028	〃	〃	〃
Q4029	〃	〃	PLL Reference Doubler
Q4030	3SK73GR	Dual Gate MOS FET	PLL Mixer
Q4031	2SC945AQ	Transistor	PLL Buffer Amplifier
Q4032	〃	〃	RX 2nd, TX 1st Local Frequency Controller
Q4033	〃	〃	RX 2nd, TX 1st Local VCXO
Q4034	〃	〃	RX 2nd, TX 1st Local Buffer Amplifier
Q4035	〃	〃	〃
Q4036	〃	〃	Carrier VCXO (for CW, SSB)
Q4037	〃	〃	VCXO Buffer Amplifier
Q4038	3SK73GR	Dual Gate MOS FET	RX 2nd, TX 1st Local Mixer
Q4039	2SC945AQ	Transistor	RX 2nd, TX 1st Local Buffer Amplifier
Q4040	3SK73GR	Dual Gate MOS FET	Carrier Mixer
Q4041	2SC945AQ	Transistor	Carrer Buffer Amplifier
Q4042	〃	〃	Switch

D4001	1SS53	Si Diode	Switch
D4041	1SS53	Si Diode	Switch
D4042	FC-52M	Varactor Diode	RX 1st Local VCO. TX 2nd Local VCO. (for 1.9, 3.5 MHz)
D4043	1SS53	Si Diode	Switch
D4044	〃	〃	〃
D4045	〃	〃	〃
D4046	FC-52M	Varactor Diode	RX 1st Local VCO. TX 2nd Local VCO. (for 7, 10 MHz)
D4047	1SS53	Si Diode	Switch
D4048	FC-52M	Varactor Diode	RX 1st Local VCO. TX 2nd Local VCO. (for 14 MHz)

COUNTER UNIT

PART NO.	DEVICE	TYPE	FUNCTION
Q5001	2SC1815Y	Transistor	Counter Buffer Amplifier
Q5002	〃	〃	〃
Q5003	MC14518B	IC	Counter Divider
Q5004	〃	〃	〃
Q5005	MC14011B	〃	Counter Mixer
Q5006	MC14022	〃	Counter Divider
Q5007	TC5070	〃	Counter
Q5008	TC5066	〃	Frequency Display Driver
Q5009	〃	〃	Frequency Display Digit Driver
Q5010	〃	〃	Frequency Display

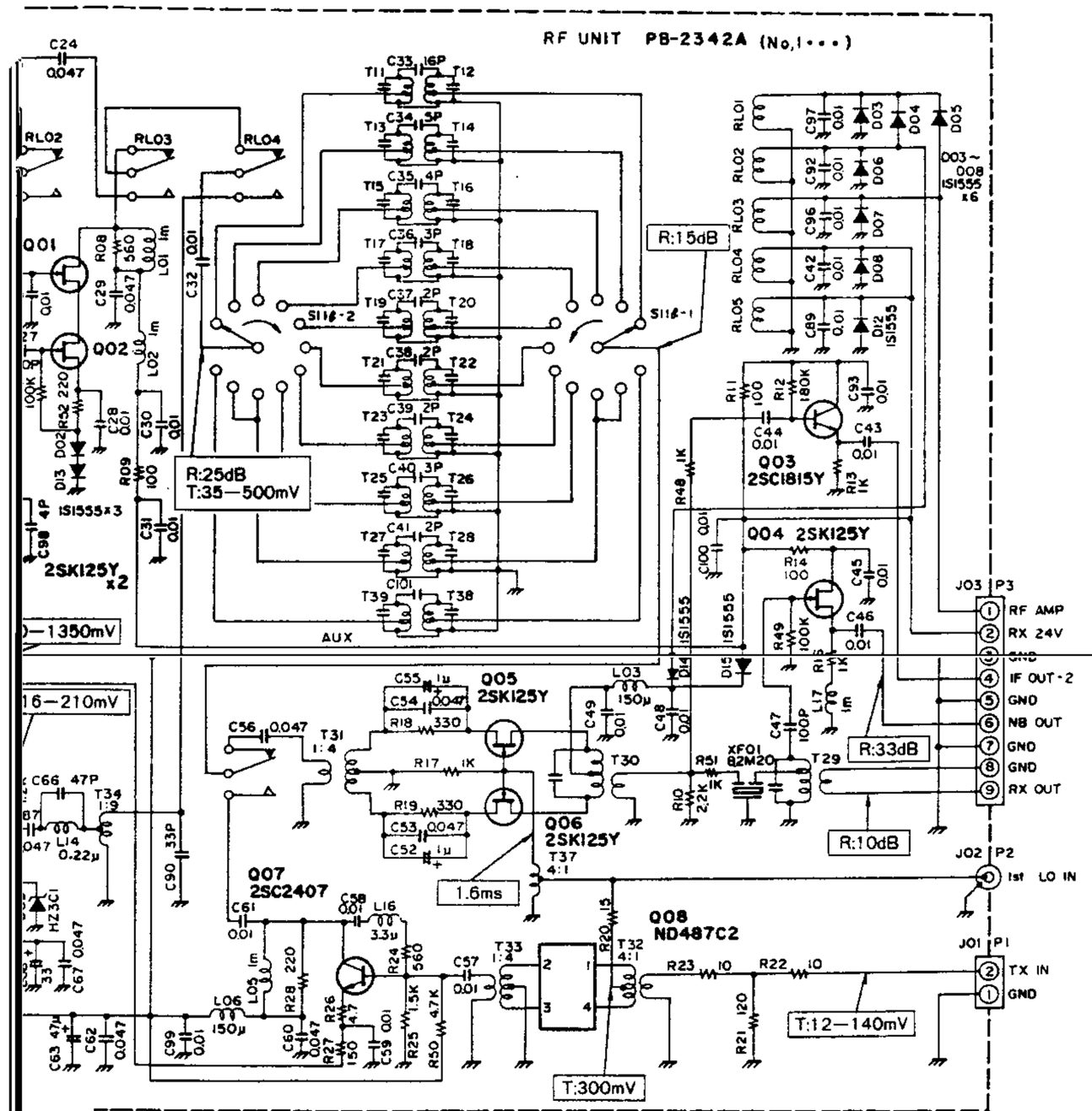
D6006	1S1555	Si Diode	TX IDC.
D6007	"	"	"
XF6001	8.2M20A	Crystal Filter	RX FM 1st IF Filfter
CF6001	CFX455D	Ceramic Filter	RX FM Discriminator
TH6001	Not Used		

D8501	10D10	Si Diode	Rectifier
⌇	⌇	⌇	⌇
D8504	10D10	Si Diode	Rectifier
D8505	V06B	"	"
D8506	HZ6C1	Zener Diode	Regulator
D8507	AW01-24	"	"

— MEMO —

TER

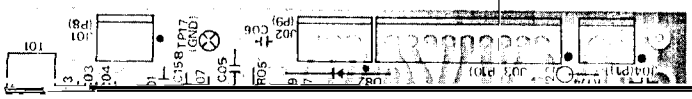
RF UNIT

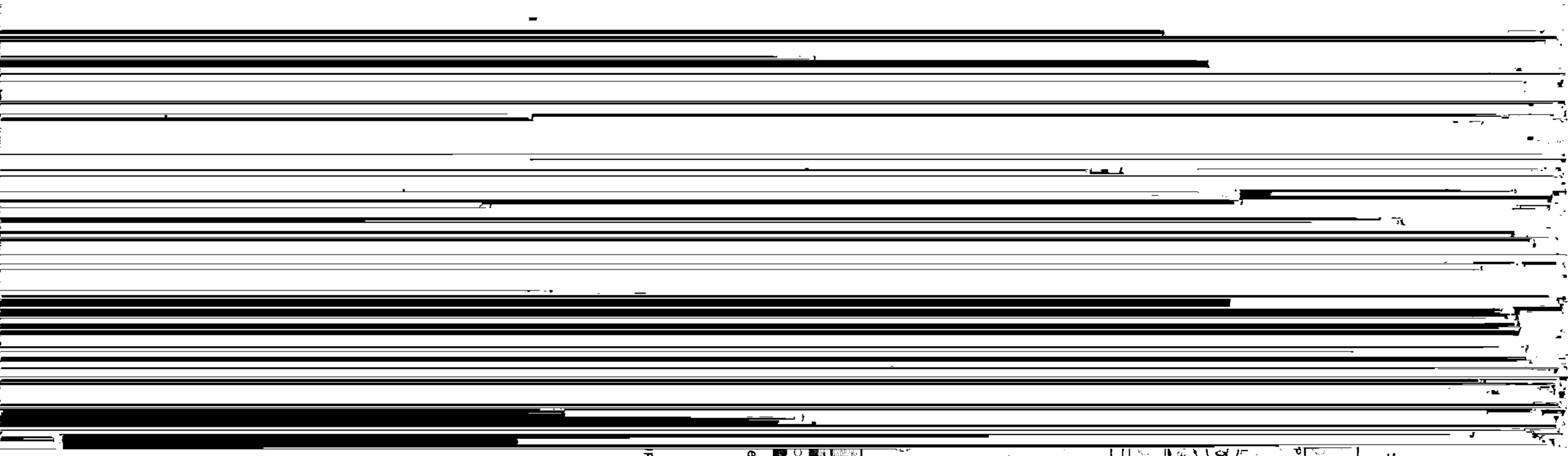


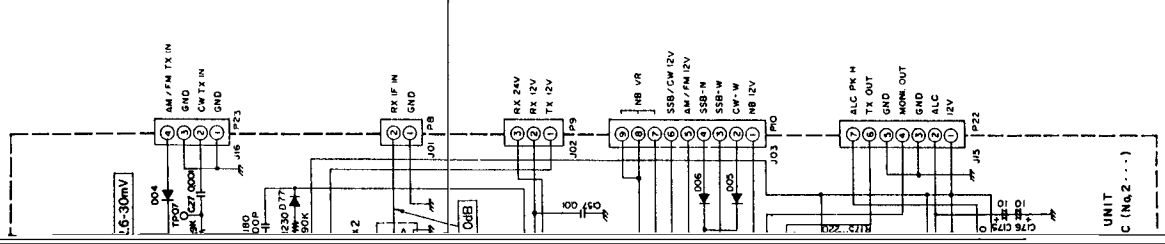
CAPACITOR VALUES ARE IN uF, 50wv; RESISTOR VALUES ARE IN Ω, 1/4W;
AND INDUCTOR VALUES ARE IN HENRIES UNLESS OTHERWISE NOTED.

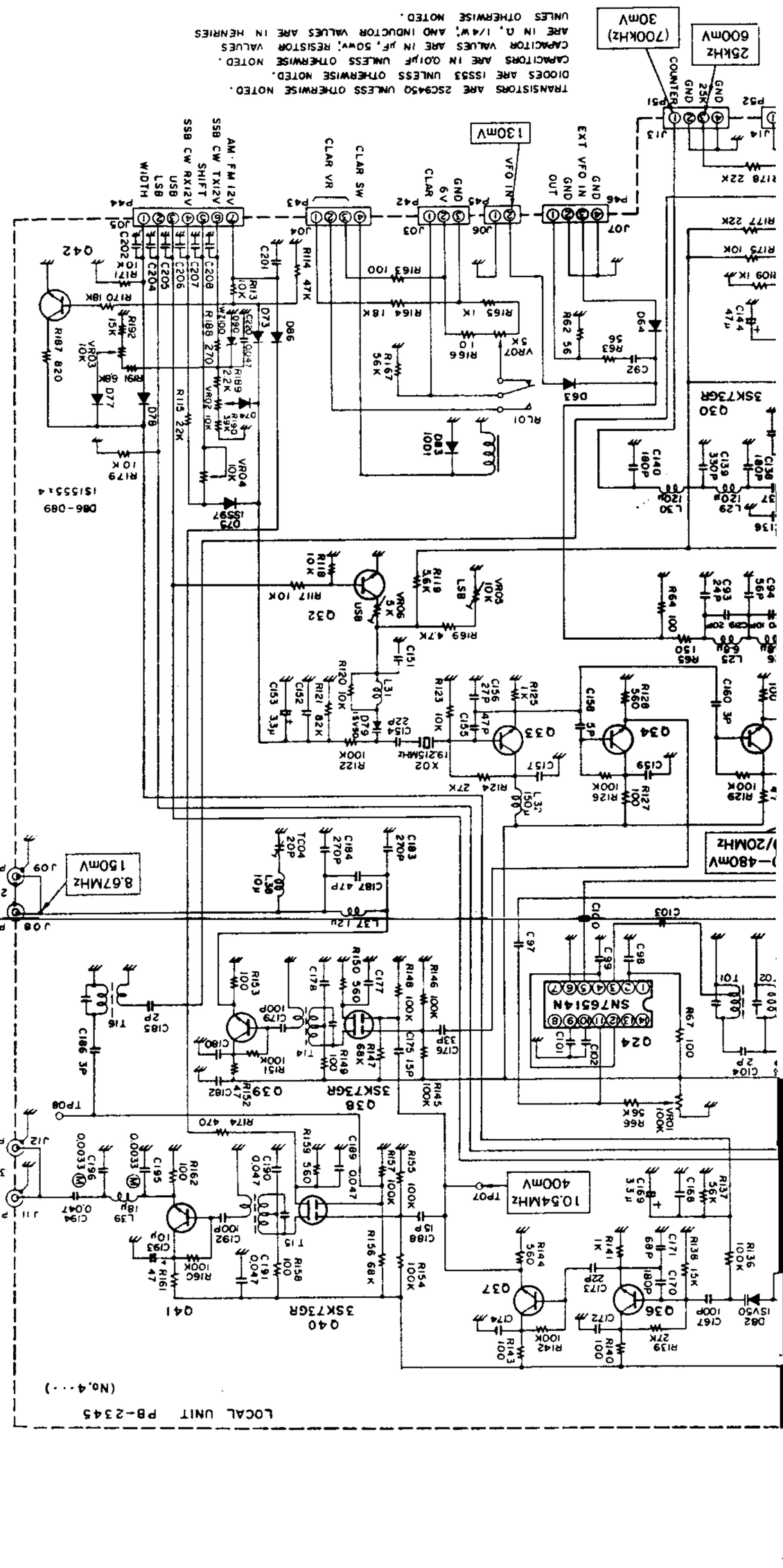
REM
TX

	1	2	3	4	5	6	7	8	9
V_{1001}	0	−19/0	0	H	H	H	300	235/180	0

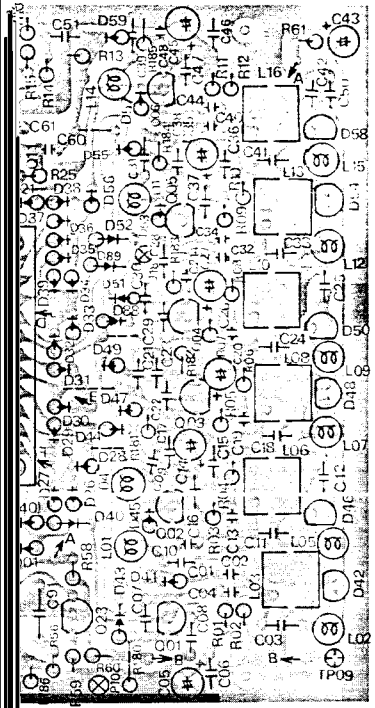



IRCE
er Side
X606 (CW)
J13(P20)
P211
44

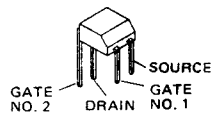

AM/FM TX IN
GND
CW TX IN
GND
P23
J16
RX IF IN
GND
P8
J01
RX 24V
RX 12V
TX 12V
P9
J02
NB VR
SSB/CW 12V
AM/FM 12V
SSB-N
SSB-W
CW-W
NB 12V
P10
J03
ALC PK H
TX OUT
GND
MONI. OUT
GND
ALC
12V
P22
J15
0.5-30mV
D04
TP07
0.27
0.001
180
100P
D3
D77
90K
x2
0dB
100
0.1
D06
D05
C176
C174
C172
C173
0.22
UNIT
C (No.2---)


TRANSISTORS ARE 2SC945Q UNLESS OTHERWISE NOTED.
DIODES ARE 1SS53 UNLESS OTHERWISE NOTED.
CAPACITORS ARE IN 0.01μF UNLESS OTHERWISE NOTED.
CAPACITOR VALUES ARE IN μF, 50WV; RESISTOR VALUES
ARE IN Ω, 1/4W; AND INDUCTOR VALUES ARE IN HENRIES
UNLESS OTHERWISE NOTED.
25kHz 600mV
(700kHz) 30mV
130mV
480mV
8.67MHz 150mV
10.54MHz 400mV
LOCAL UNIT PB-2343
(No.4···)

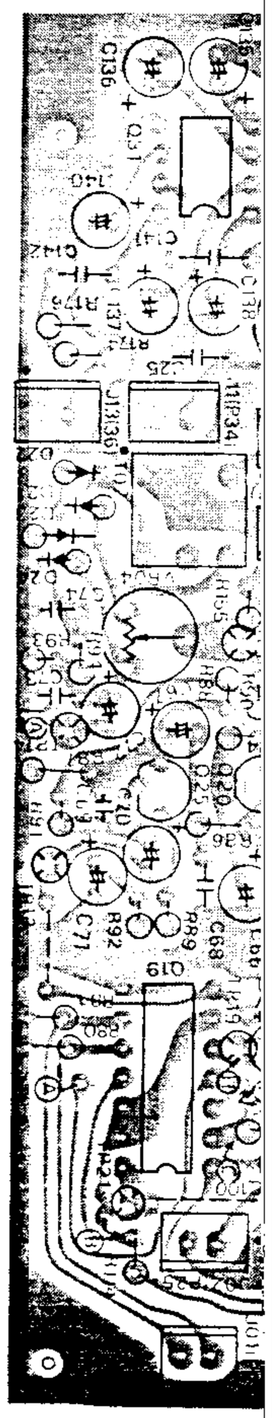

R62
VR06
R159
R38
R117
TP12
C198
C184
C187
C181
L37
L40
C156
C163
TC02
X03
Side



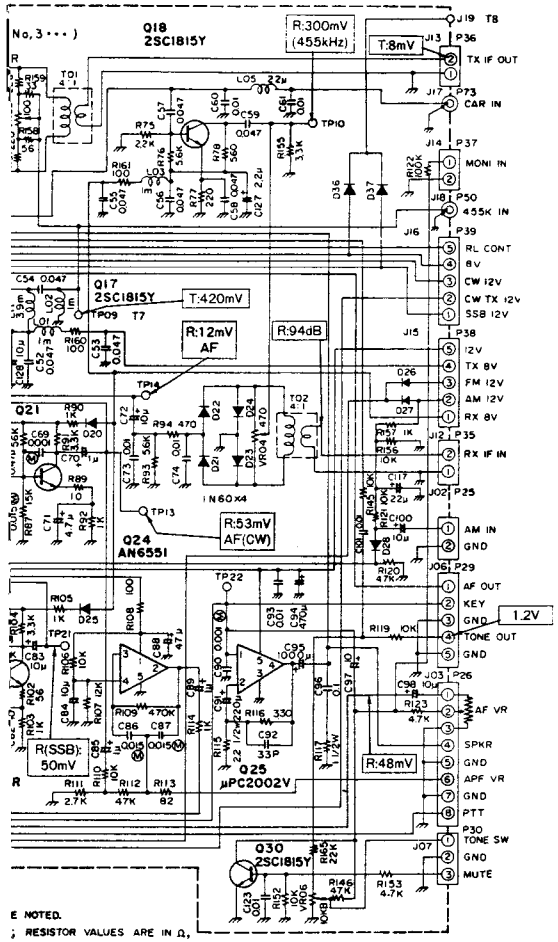
Viewed from Solder Side



3SK73GR

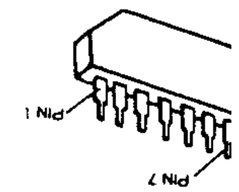


Viewed from Solder Side

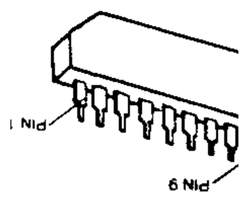


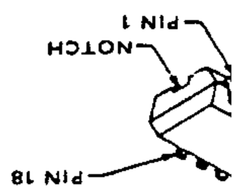
	REM		E / S	C / D	B/G_1	REM
		Q3021	0.7	3.9	1.3	
		Q3022	1.8	5.3	2.5	
		Q3023	0.6	3.9	1.3	
		Q3024	⑤ 0	①⑨12.0	④ 6.2	CW
3	R / T	Q3025	③ 0	⑤ 12.0		
		Q3026	0.8	7.8	0	CW
	T	Q3027	8.4	12.0	9.5	CW
		Q3028	0	8.0	0.7	AM
		Q3029	7.2	10.5	7.8	AM
		Q3030	0	0	0	

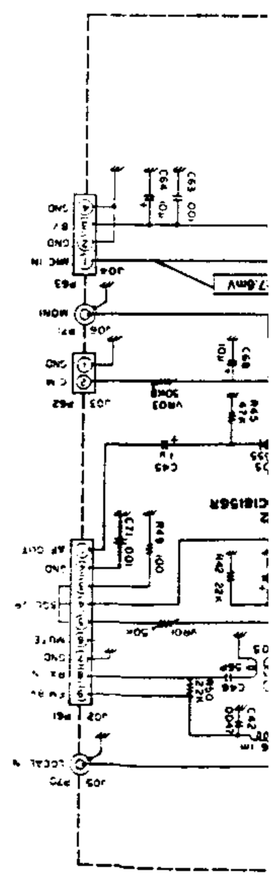
TA7069P
μPC577H

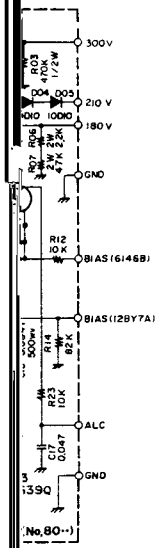


TC5081P
TC5082P





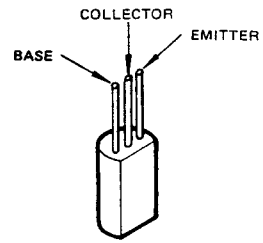




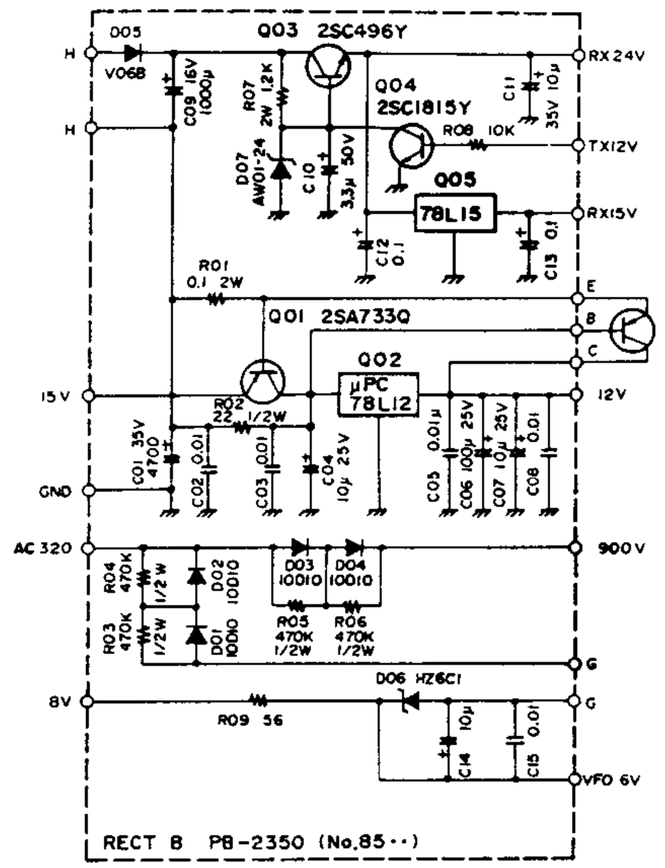
VALUES
IN

REM	
	R / T CW
	〃
	〃
	〃

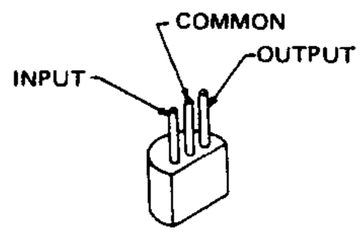
REM	
N	T CW
	〃
	〃
	〃



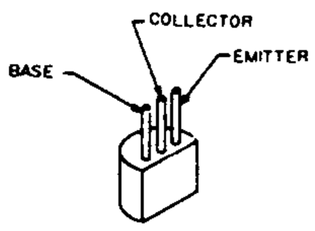
2SC2229



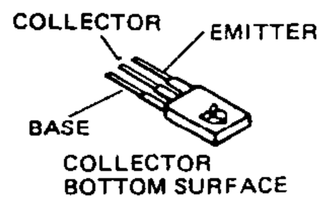
	E	C	B
Q8501	24.0	23.3	24.0
Q8502	IN 13.3	OUT 12.0	—
Q8503	24.0	32.0	24.5
Q8504	0	24.5	0.7



μPC78L12
μPC78L15

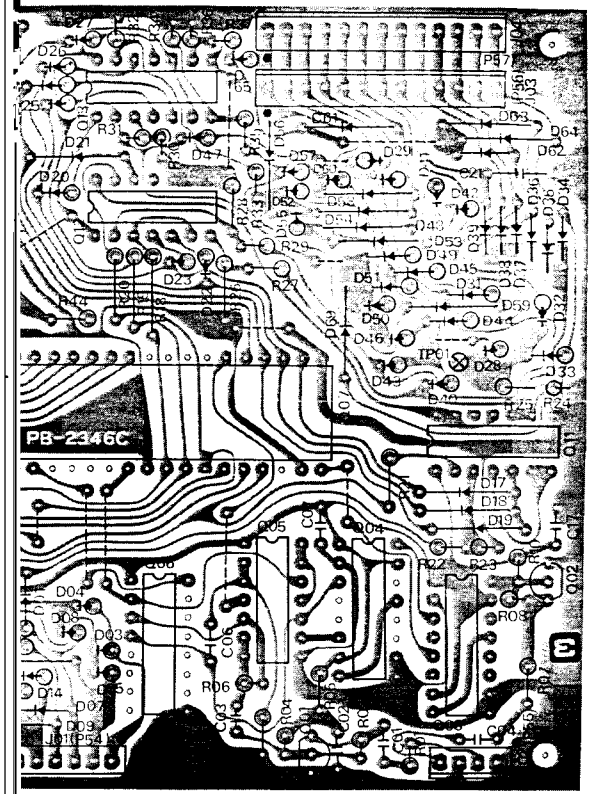


2SA733Q
2SC1815Y

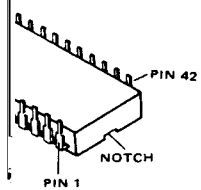


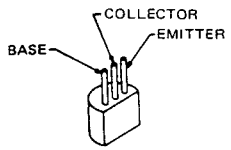
2SC496Y

R UNIT PARTS LAYOUT



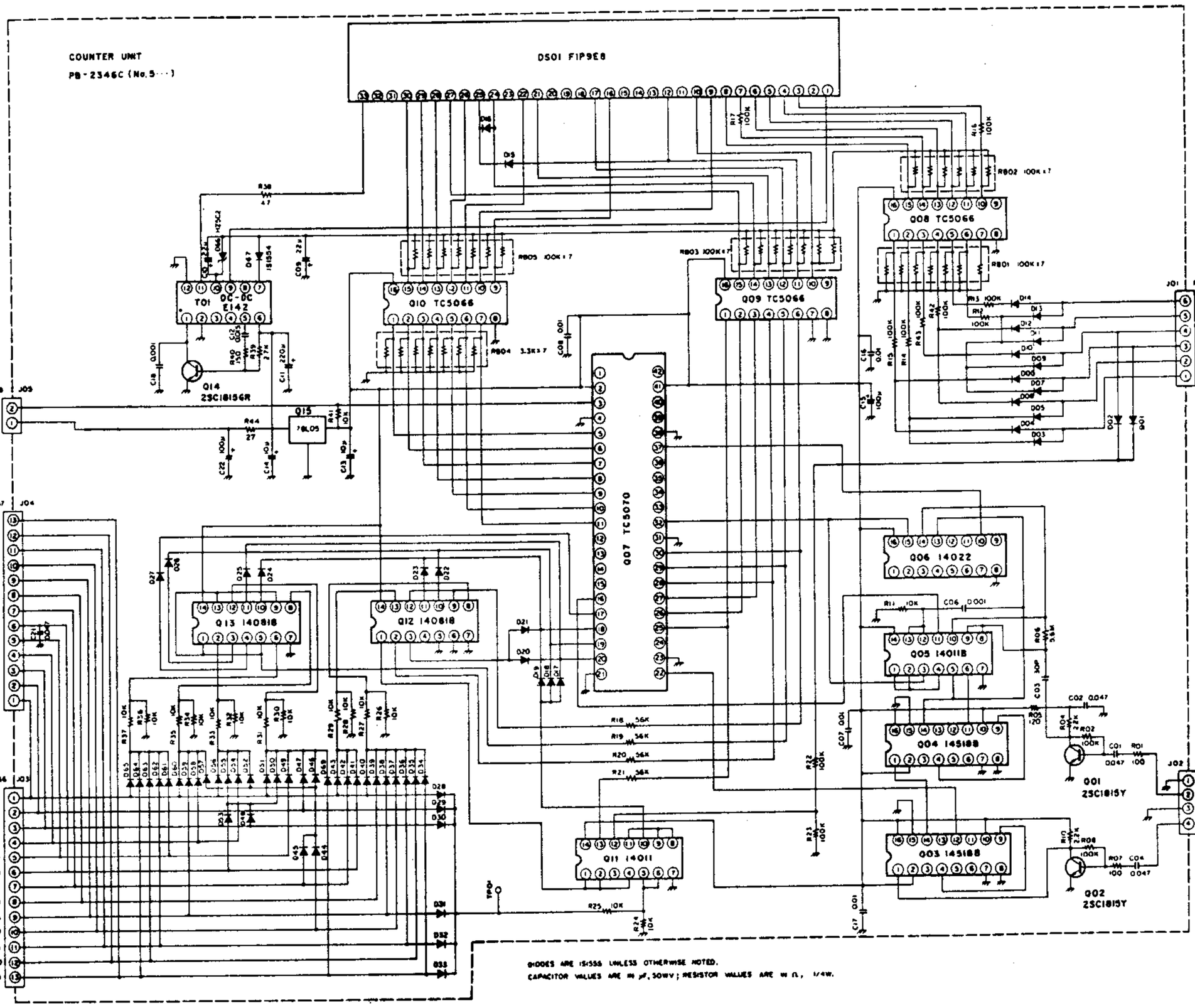
Viewed from Solder Side





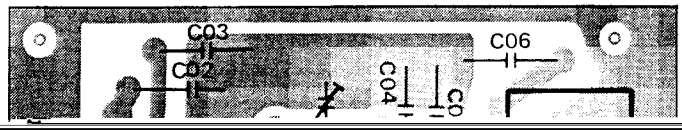
2SC1815GR
2SC1815Y

COUNTER UNIT

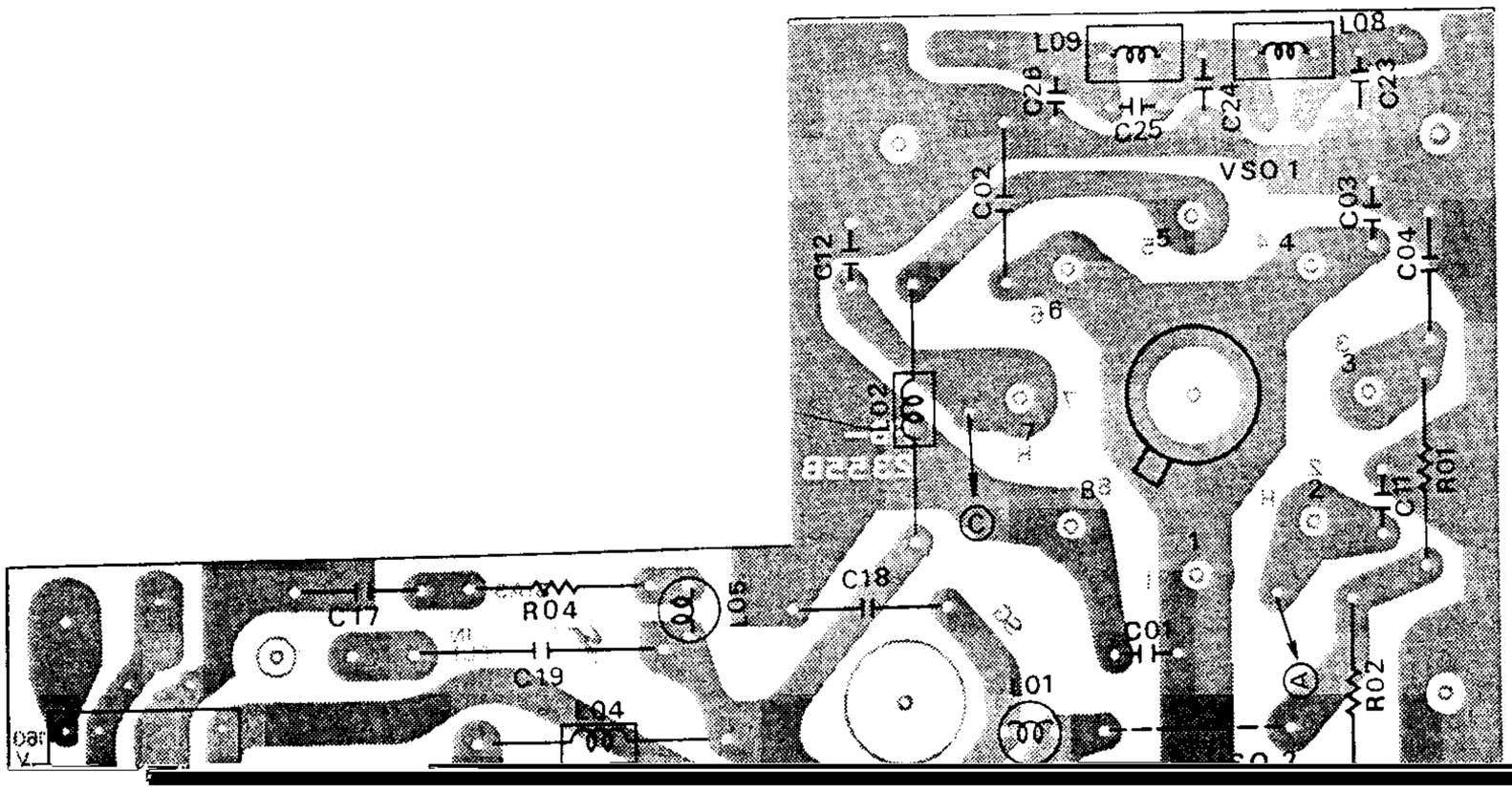


	E/S	C/D	B/G
Q5001	0	1.8	0.6
Q5002	0	1.8	0.6

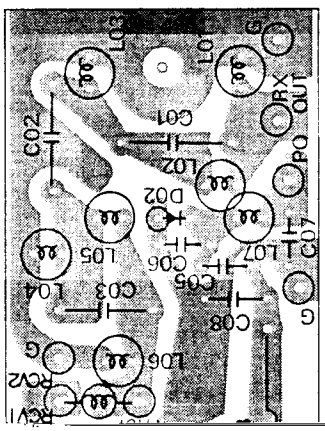
VFO UNIT PARTS LAYOUT

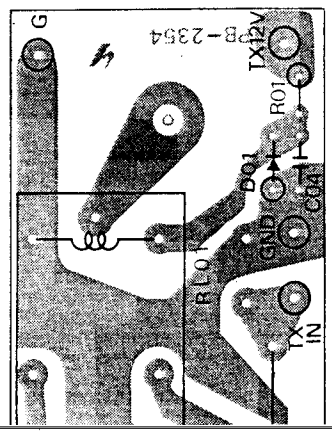


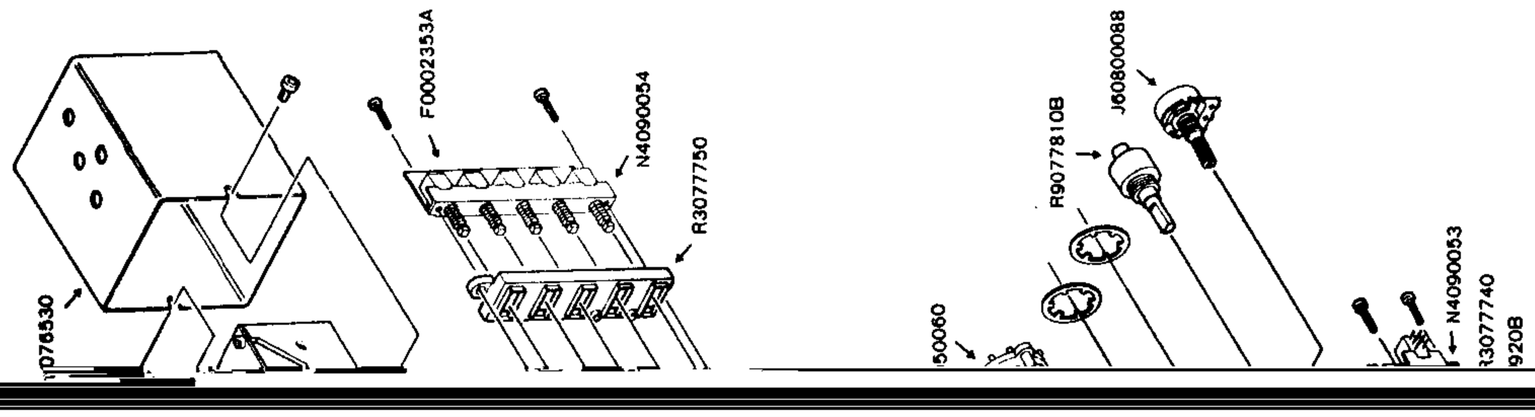
FINAL UNIT PARTS LAYOUT



RELAY UNIT PARTS LAYOUT







PARTS LIST

[redacted]	C23, 25	K09259001	Ceramic Disc	3KWV 100 pF

		METER	P24 (with wire)	T9204377	
M1	M0290030	Y38-01	P26 (")	T9204382B	
M2	M0290031	Y38-02	P29 (")	T9204378A	
			P30 (")	T9204401	
			P34 (")	T9204390	
		SPEAKER	P40 (")	T9204380	
SP1	M4090044	SE-92BYM2 8Ω 2W	P41 (")	T9302301A	
			P42 (")	T9204381B	
			P46 (")	T9204383A	
		RELAY	P51 (")	T9204384A	
RL1, 2	M1190004	FRC-203D012/04CS01 DC 12V	P52 (")	T9204385	
			P53 (")	T9204386A	
			P54 (")	T9204393	

RF UNIT

Symbol No.	Part No.	Name & Description
PB-2342D	F0002342D	Printed Circuit board
	C0023420	PCB with Components
		VACUUM TUBE
V1001	G6090002	12BY7A
		VACUUM TUBE SOCKET
VS1001	P3090022	SB-9403
		IC
Q1008	G2090135	ND487C2-3R
		TRANSISTOR
Q1009	G3315890	2SC1589
[illegible]	[illegible]	[illegible]

R1033, 1038 1050	J02245122	" " " SJ 1.2kΩ
R1025	J02245152	" " " " 1.5kΩ
R1010, 1054	J02245222	" " " " 2.2kΩ
R1046	J02245472	" " " " 4.7kΩ
R1053	J01215103	" " 1/8W TJ 10kΩ
R1006, 1049	J02245104	" " 1/4W SJ 100kΩ
R1004	J01215104	" " 1/8W TJ 100kΩ
R1012	J02245184	" " 1/4W SJ 180kΩ
R1001	J02245225	" " " " 2.2MΩ
		CAPACITOR
C1037–1040	K02179003	Ceramic Disc 50WV CH 2 pF (DD104CH020C50V02)
C1036, 1041 1102	K02179004	" " " " 3 pF (DD104CH030C50V02)
C1035	K02172040	" " " " 4 pF (DD104CH040C50V02)
C1098	K00172040	" " " SL 4 pF

C1086	K30276102	Dipped Mica 500WV 1000 pF (LCQ21102K5)			**TRANSFORMER**
C1003	K30279095	" " " 1200 pF (DM19D122J5)	T1001	L0020294	
C1002	K10179016	Ceramic Disc 50WV 0.001μF (DB201YB102K5L5)	T1002	L0020418	
C1004, 1005 1007, 1013 1021, 1022 1023, 1077 1078, 1084	K12279007	" " 500WV 0.01μF (CD110E103P500)	T1003	L0020789A	
			T1004	L0020170	
			T1005	L0021169A	
			T1006, 1007	L0021170A	
			T1008	L0021172A	
			T1009	L0021173A	
			T1011	L0021175	BPF 160B
			T1012	L0021174	BPF 160A
C1026, 1028 1030–1032	K13179008	" " 50WV 0.01μF (DD106F103Z50V)	T1013	L0021177	BPF 80B
			T1014	L0021176	BPF 80A

IF UNIT

Symbol No.	Part No.	Name & Description
PB-2343C	F0002343C	Printed Circuit Board
	C00023430	PCB with Components
		IC
Q2016	G1090381	TA7060AP
		TRANSISTOR
Q2014, 2032 2034, 2035	G3105641R	2SA564AR
Q2021, 2024 2027, 2028	G3303800Y	2SC380Y
Q2019, 2020	G3315830	2SC1583
Q2012, 1018 2022, 2023	G3318150G	2SC1815GR
Q2006–2009 2011, 2015 2030, 2033	G3318150Y	2SC1815Y
		FET
Q2029	G3800190G	2SK19GR
Q2005, 2013 2031	G3090035	2SK19GR-1
Q2025, 2026	G3090034	2SK19Y
Q2001, 2002	G3801250Y	2SK125Y
Q2003, 2004	G4800730G	3SK73GR

		CRYSTAL FILTER
XF2001	H1102051	XF-8.2HS
		CERAMIC FILTER
CF2001	H3900290	CFJ-455K13
		RESISTOR
R2172	J02245010	Carbon Film 1/4W SJ 1Ω
R2007, 2094	J02245100	〃 〃 〃 〃 10Ω
R2226, 2229	J02245330	〃 〃 〃 〃 33Ω
R2003	J02245470	〃 〃 〃 〃 47Ω
R2051	J02245560	〃 〃 〃 〃 56Ω
R2149	J02245680	〃 〃 〃 〃 68Ω
R2020, 2021 2055, 2218	J01245101	〃 〃 〃 TJ 100Ω
R2030, 2034 2046, 2058 2068, 2072 2088, 2091 2095, 2102 2110–2113 2123, 2028 2133, 2140 2151, 2154 2160, 2174 2197, 2198	J02245101	〃 〃 〃 SJ 100Ω
R2216	J01245151	〃 〃 〃 TJ 150Ω
R2186	J02245151	〃 〃 〃 SJ 150Ω
R2122, 2221	J02245181	〃 〃 〃 〃 180Ω

2168, 2187 2200						2150, 2169 2192, 2227			
R2236	J01245102	Carbon Film	1/4W	TJ	1kΩ	R2084	J02245124	Carbon Film	1/4W SJ 120kΩ
R2011, 2013 2022	J02245122	" "	"	SJ	1.2kΩ	R2090, 2189	J02245154	" "	" " 150kΩ
						R2076, 2180	J02245224	" "	" " 220kΩ
R2014, 2015 2067, 2101	J01245152	" "	"	TJ	1.5kΩ	R2230	J02245394	" "	" " 390kΩ
						R2039, 2105	J02245564	" "	" " 560kΩ

2130, 2131 2137, 2157– 2159, 2161 2162, 2166 2169, 2170 2172		
C2005, 2010 2012, 2014 2016, 2018 2020, 2022 2024, 2026 2039, 2058 2097, 2114 2115, 2147 2179	K13179009	Ceramic Disc 50WV 0.047μF (DD110F473Z50V)
C2139	K50177222	Mylar 50WV 0.0022μF (50F2U222M)
C2132	K50177223	" " 0.022μF (50F2U223M)
C2030, 2032 2038, 2041–2046 2048 2050, 2052 2066, 2070 2084, 2085 2088, 2096 2150, 2167 2171	K19149021	Semiconductor Ceramic " 0.047μF (UAT08X473–L45AE)
C2057, 2101 2102, 2132	K19149025	" " 25WV 0.1μF (UAT13X104K-L46AE)
C2047, 2049 2051, 2053–2055 2060, 2067 2069, 2071 2072, 2074 2076, 2083 2090–2095 2100, 2103 2133, 2149 2153, 2165 2168	K40179013	Electrolytic 50WV 1μF (50RL1)
	K40179001	" " 1μF (50RC21)
C2151, 2157	K40179009	" " 2.2μF (50RL2R2)
C2126, 2129 2140, 2142 2143	K40179011	" " 3.3μF (50RE3R3)
C2008, 2087 2119, 2122 2144, 2155 2163, 2164	K40129004	" 16WV 10μF (16RE10)
C2059	K40129016	" " 22μF (16RL22)
C2134, 2141	K40129002	" " 47μF (16RE47)

C2148	K40129007	" " 100μF (16RE100)
C2182	K70167334	Tantalum 35WV 0.33μF (CS15E1VR33M)
C2154	K70140008	" 25WV 1μF (489D105X0025A1)
	K70120001	" 16WV 4.7μF (489D475X0016B1)
C2175, 2176 2182	K70120002	" " 10μF (489D106X0016C1)
		INDUCTOR
L2001–2006 2016–2018 2023, 2024	L1190020	FL5H151K 150μH
L2007–2011 2022	L1190035	FL7H392J 3.9 mH
L2014, 2019–2021 2026–2029	L1190017	FL5H102K 1 mH
	L1190090	LAL04102K-NA 1 mH
L2015	L1190023	FL5H220K 22μH
L2012	L0021196	250μH
		TRANSFORMER
T2001, 2005	L0021192	
T2002–2004 2013–2015	L0021199	
T2006–2008 2010–2012 2016	L0020422	R12-7947
T2009	L0020420	R12-7943
T2017, 2018	L0021294	
		RELAY
RL2001	M1190002	FBR211AD012
		TP TERMINAL
	Q5000037	TP-H

AF UNIT

Symbol No.	Part No.	Name & Description
PB-2344D	F0002344D	Printed Circuit Board
	C0023440	PCB with Components
		IC
Q3024	G1090248	AN6551
Q3019	G1090257	MC14066B
Q3025	G1090284	μPC2002V
Q3031	G1090012	SN16913P
		TRANSISTOR
Q3015	G3104960Y	2SA496Y
Q3008, 3009 3012	G3107331Q	2SA733Q
Q3027–3029	G3303800Y	2SC380Y (2SC380 TMY)
Q3001, 3004	G3307320G	2SC732TM-GR
Q3003	G3318150B	2SC1815BL
Q3022, 3023	G3318150G	2SC1815GR
Q3002, 3005– 3007, 3010 3011, 3013 3014, 3016– 3018, 3020	G3318150Y	2SC1815Y

3021, 3030		
		FET
Q3026	G3090034	2SK19Y
		DIODE
D3015	G2090001	Si 10D1
D3011, 3014 3021–3024	G2090029	Ge 1N60
D3007, 3009	G2090093	" 1N270
D3001, 3006 3010, 3012 3013, 3016 3020, 3025– 3028, 3030– 3032, 3034 3036, 3037	G2015550	Si 1S1555
	G2090118	Schottky 1SS97
D3008	G2090217	Zener HZ3C1
		CRYSTAL
X3001	H0102449	8.2159MHz
		RESISTOR
R3115	J01275229	Carbon Film 1/2W TJ 2.2Ω
	J00245330	" " 1/4W VJ 33Ω
R3102	J02245560	" " " SJ 56Ω
R3016, 3113	J02245820	" " " " 82Ω
R3005, 3018 3026, 3070 3079, 3089 3108, 3132 3135, 3140 3160, 3161 3173	J02245101	" " " " 100Ω
R3072, 3077 3127	J02245221	" " " " 220Ω
R3027, 3116	J02245331	" " " " 330Ω
R3154	J02245391	" " " " 390Ω
R3064, 3094	J02245471	" " " " 470Ω
R3078, 3150 3174, 3177	J02245561	" " " " 560Ω
R3009, 3025 3034, 3046 3056, 3060 3069, 3085 3090, 3092 3098, 3103 3105, 3114 3129–3131 3133, 3134 3137, 3149 3168	J02245102	" " " " 1kΩ
R3157	J00215102	" " 1/8W VJ 1kΩ
R3175	J02245122	" " 1/4W SJ 1.2kΩ
R3037	J02245152	" " 1/4W SJ 1.5kΩ
R3017	J02245182	" " " " 1.8kΩ
R3011, 3021 3059, 3071 3075, 3121	J02245222	" " " " 2.2kΩ
R3111	J02245272	Carbon Film 1/4W SJ 2.7kΩ
R3001, 3010 3040, 3047 3057, 3066 3091, 3104 3125, 3155	J02245332	" " " " 3.3kΩ
R3039	J02245392	" " " " 3.9kΩ
R3004, 3012 3033, 3035 3038, 3042 3050, 3051 3063, 3065 3120, 3123	J02245472	" " " " 4.7kΩ
R3153	J01245472	" " " TJ 4.7kΩ
R3073, 3076 3093	J02245562	" " " SJ 5.6kΩ
R3082, 3083 3086, 3095 3096, 3099	J02245682	" " " " 6.8kΩ
R3006	J02245822	" " " " 8.2kΩ
R3013, 3019 3020, 3022 3028, 3048 3052, 3053 3061, 3080 3081, 3082 3106, 3110 3119, 3121 3138, 3139 3145, 3147 3152, 3162– 3164, 3172	J02245103	" " " " 10kΩ
R3156	J00215103	" " 1/8W VJ 10kΩ
R3007, 3015 3045, 3054 3107	J02245123	" " 1/4W SJ 12kΩ
R3003, 3023 3062, 3068 3087, 3100	J02245153	" " " " 15kΩ
R3067	J02245183	" " " " 18kΩ
R3036, 3165 3167	J02245223	" " " " 22kΩ
R3008, 3044 3055, 3084	J02245333	" " " " 33kΩ
R3002, 3014 3112, 3128 3136, 3144 3146	J02245473	" " " " 47kΩ
R3024, 3088 3101	J02245563	" " " " 56kΩ
R3122, 3126 3171	J02245104	" " " " 100kΩ
R3097	J02245334	" " " " 330kΩ
R3041, 3109	J02245474	" " " " 470kΩ
R3117	J31276010	Wire Wound 1/2W 1Ω

		POTENTIOMETER				(50F2U103M)		
VR3003	J51727103	CR19R101	10kΩ	C3064, 3068	K50177153	"	"	0.015μF
VR3004	J51723471	SR19R471	470Ω	3077, 3086		(50F2U153M)		
VR3005	J51752502	RGS6FAN	5kΩ	3087				
			10kΩ	C3014, 3015	K50177223	Mylar	50WV	0.022μF

		INDUCTOR	
L3001, 3003 3006, 3010	L1190017	FL5H102K 1 mH	
L3005, 3007	L1190023	FL5H220 22μH	
	L1190035	FL7H392J 3.9 mH	
L3002	L1190040	S-4 1 mH	
L3009	L1190090	LAL04-102K 1 mH	
		TRANSFORMER	
T3002	L0020883		
		CONNECTOR	
	P0090191	B2B-XH-A 2P	
	P0090194	B5B-XH-A 5P	
	P0090197	B8B-XH-A 8P	
	P0090192	B3B-XH-A 3P	
		TP TERMINAL	

		DIODE
D4083	G2090001	Si 10D1
D4086–4089 4093, 4094	G2015550	" 1S1555
D4001–4041 4043–4045 4047, 4049 4051–4053 4055–4057 4059–4061 4063–4074 4077, 4078 4080, 4081 4085, 4092	G2090027	" 1SS53
D4075, 4084	G2090118	Schottky 1SS97
D4079, 4082	G2090023	Varactor 1SV50
D4042, 4046 4048, 4050 4054, 4058	G2090073	" FC52M

4106, 4128 4144, 4150 4159					R4121	J02245823	" " " " 82kΩ
R4056	J02245681	Carbon Film	1/4W	SJ 680Ω	R4025, 4037 4071, 4097 4100, 4103 4122, 4126 4129, 4136 4142, 4145 4146, 4148 4151, 4154 4155, 4157 4160	J02245104	" " " " 100kΩ
R4187	J01245821	" "	"	TJ 820Ω			
R4014, 4022 4031, 4041– 4048, 4053 4060, 4068 4069, 4076 4105, 4109 4125, 4141 4165, 4172	J02245102	" "	"	SJ 1kΩ			
R4049	J01245102	" "	"	TJ 1kΩ	R4101, 4102	J02245224	Carbon Film 1/4W SJ 220kΩ
R4058	J02245152	" "	"	SJ 1.5kΩ	R4186	J00215224	" " 1/8W VJ 220kΩ
	J00215222	" "	1/8W	VJ 2.2kΩ	R4070	J02245334	" " 1/4W SJ 330kΩ
R4134	J02245272	" "	1/4W	SJ 2.7kΩ	R4168	J20306330	Metallic Film 1W 33Ω
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]			**POTENTIOMETER**
					VR4006, 4007	J51724502	PN822H502H 5kΩB

C4173, 4214	K00175220	" " " SL 22 pF (DD104SL220J50V02)	C4183, 4184	K00175271	" " " " 270 pF (DD107SL271J50V02)
C4093	K00179006	Ceramic Disc 50WV SL 24 pF (DD104SL240J50V02)	C4076, 4070 4139	K00175331	" " " " 330 pF (DD107SL331J50V02)
C4019	K02179010	" " " CH 24 pF (DD104CH240J50V02)	C4056, 4058	K00175471	Ceramic Disc 50WV SL 470 pF (DD109SL471J50V02)
C4013, 4026	K06179010	" " " UJ 24 pF (DD104UJ240J50V02)	C4109	K30176331	Dipped Mica 50WV 330 pF (LCQ17331K05)
C4048, 4156	K02179011	" " " CH 27 pF (DD105CH270J50V02)	C4216	K30176681	" " " 680 pF (LCQ18681K05)
C4113, 4114	K00175270	" " " SL 27 pF (DD104SL270J50V02)	C4001, 4006 4009, 4012 4015, 4021 4025, 4030 4031, 4036 4039, 4042 4046, 4051– 4055, 4061– 4068, 4078 4080, 4081 4083, 4092 4097–4103 4106, 4107 4111, 4112 4115, 4116 4119–4126	K13179008	Ceramic Disc " 0.01μF (DD106F103Z50V)
C4003	K02179013	" " " CH 33 pF (DD105CH330J50V02)			
C4079, 4176	K00175330	" " " SL 33 pF (DD107SL330J50V02)			
C4038	K02175390	" " " CH 39 pF (DD105-257CH390J50V02)			
C4070, 4075	K00175390	" " " SL 39 pF (DD104SL390J50V02)			
C4028, 4155	K02175470	" " " CH 47 pF (DD106CH470J50V02)			
C4165,4223	K06175470	" " " UJ 47 pF (DD104UJ470J50V02)			
C4187	K00175470	" " " SL 47 pF (DD104SL470J50V02)			

4193			
C4224	K40129008	" " 33μF (16RE33)	
C4144, 4149	K40129002	" " 47μF (16RE47)	
C4085	K40129007	Electrolytic 16WV 100μF (16RE100)	
C4091	K5420000	MKH 100WV 0.15μF ((32560A1154K)	
C4225	K70127225	Tantalum 16WV 2.2μF (CS15E1C2R2M)	

COUNTER UNIT

Symbol No.	Part No.	Name & Description
PB-2346C	F0002346C	Pinted Circuit Board
	C0023460	PCB with Components
		IC
Q5015	G1090084	78L05
Q5005, 5011	G1090068	MC14011
Q5006	G1090385	MC14022
Q5012, 5013	G1090053	MC14081B

		CAPACITOR			CRYSTAL FILTER
C5003	K06179006	Ceramic Disc 50WV UJ 30 pF (DD104UJ300J50V02)	XF6001	H1102050	8.2M20A
C5007, 5008 5016, 5017	K13179008	" " " 0.01μF (DD106F103Z50V)			CERAMIC FILTER
			CF6001	H3900270	CFX455D 455kHz
C5001, 5002 5004, 5021	K13179009	" " " 0.047μF (DD110F473Z50V)			
					RESISTOR
C5006, 5018	K50177102	Mylar " 0.001μF (50F2U102M)	R6006, 6021 6033, 6056 6057	J02245560	Carbon Film 1/4W SJ 56Ω
C5012	K50177153	" " 0.015μF (50F2U153M)			
			R6007, 6009 6012, 6017 6049	J02245101	" " " " 100Ω
C5010	K40179009	Electrolytic " 2.2μF (50RE2R2)			
C5013, 5014	K40129004	" 16WV 10μF (16RE10)	R6058	J02245471	" " " " 470Ω
			R6004, 6018	J02245561	" " " " 560Ω
C5009	K40129016	" " 22μF (16RE22)	6035		
			R6054	J02245561	" " " " 560Ω

C6046	K02175560	Ceramic Disc 63WV CH 56 pF (DD106CH560J50V02)			**TRANSFORMER**
C6065, 6066	K00175680	" " " " 68 pF (DD104SL680J50V02)	T6001, 6002	L0020892	
C6003, 6022	K00175101	" " " " 100 pF (DD105SL101J50V02)	T6003	L0021212	
C6030	K02175151	" " " " 150 pF (DD109CH151J50V02)	T6004	L0020422	R12-7947
C6019, 6021	K05185151	" " " RH 150 pF (RD8742N220151J63V)	T6005	L0021199	
C6024, 6051	K10176102	" " " 0.001μF (DD104B102K50V02)			**VFO UNIT**
C6001, 6002 6005, 6006 6009–6011 6013–6016 6018, 6026 6060, 6063 6067, 6069–6071	K13179008	" " " 0.01μF (DD106F103Z50V)	Symbol No.	Part No.	Name & Description
			PB-2348 A	F0002348 A	Printed Circuit Board
				C0023480	PCB with Components
					IC
			Q7001	G1090390	VFO-1
C6041, 6074	K13179009	" " " 0.047μF (DD110F473Z50V)			**DIODE**
			D7001	G2022360	Varactor 1S2236
C6061	K19149017	Semiconductor Ceramic 25WV 0.022μF (UAT06X223K)			**RESISTOR**
			R7002	J01245561	Carbon Film 1/4W TJ 560Ω
C6035, 6042	K19149021	" " " 0.047μF (UAT08X473-L45AE)	R7001	J01245103	" " " " 10kΩ
					CAPACITOR
C6028, 6029	K19149025	" " 50WV 0.1μF (UAT13X104L46AE)	C7017	K6172020	Ceramic Disc 50WV UJ 2 pF (DD104UF020C50V02)
C6036, 6037	K50177102	Mylar 50WV 0.001μF (50F2U102M)	C7016	K06172040	" " " " 4 pF (DD104UJ040C50V)
	K23140001	Ceramic Chip 25WV 0.01μF (GR42Y5V103Z25V)	C7001, 7004	K06179052	" " " " 8.2 pF (UP125UJ8R2K-NA)
	K50177223	Mylar 50WV 0.022μF (50F2U223)	C7013	K02179062	" " " CH 8.2 pF (UP125CH8R2-NA)
C6053, 6054	K50177473	" " 0.047μF (50F2U473)	C7015	K02173080	" " " " 8 PF (DD104CH080D50V02)
C6038	K40179002	Electrolytic " 0.1μF (50RC2-R1)	C7014	K02179065	" " " " 18 pF (UP125CH180-NA)
C6048, 6049	K40179010	" " 0.47μF (50RER47)	C7002	K06179053	" " " UJ 22 pF (UP125UJ220K-NA)
C6034, 6045 6052	K40179013	" " 1μF (50RE1)	C7003, 7005	K02179063	" " " CH 22 pF (UP125CH220J-NA)
C6050	K40179009	" " 2.2μF (50RE2.2)	C7006	K02179064	" " " " 33 pF (UP125CH330J-NA)
C6031, 6059	K40149001	" 25WV 4.7μF (25RE4R7)	C7010, 7012	K10179034	" " " 470 pF (UP125B471K-NA)
C6012, 6017 6023, 6040 6047, 6055–6057, 6062 6024, 6068	K40129004	" 16WV 10μF (16RE10)	C7011	K10179035	" " " 1000 pF (UP125SB102K-NA)
			C7007–7009	K15179001	" " " 0.01μF (TP125X103N-NA)
C6007	K40129002	" " 47μF (16RE47)			
					VARIABLE CAPACITOR
			VC7001	K90000024	C521R112
		INDUCTOR			**TRIMMER CAPACITOR**
L6001, 6003–6005	L1190016	FL5H101K 100μH	TC7002	K91000090	PS100 10 pF x 2
			TC7001	K91000103	PSS-100-10P 10 pF
L6006	L1190017	FL5H102K 1 mH	TC7003	K91000116	CTZ81F 30 pF
L6009	L1190102	S-104K			

		INDUCTOR			**POTENTIOMETER**
L7002, 7004	L1190132	LAL04NA221K 220μH	VR8001	J50753103	EVTJ6A505B14 10kΩB
L7003	L1190090	LAL04NA102K 1 mH			
L7005, 7006	L1190131	LAL04NA1R8M 1.8 mH			
					CAPACITOR
			C8003, 8006 8013, 8018	K12279004	Ceramic Disc 500WV 0.0047μF (ECK-D-2H-472-PE)
		CONNECTOR			
	P0090149	PI021-05M 5 pF	C8010, 8016 8019	K12279002	" " " 0.01μF (ECK-D-2H-103-PE)
			C8017, 8024	K19149021	Semiconductor Ceramic " 0.047μF
		VFO LAMP			

		DIODE
D8501–8504	G2090002	Si 10D10
D8505	G2090003	" V06B
D8507	G2090224	Zener AW01-24
D8506	G2090111	" HZ6C1
		RESISTOR
R8509	J02245560	Carbon Film 1/4W SJ 56Ω
R8508	J02245103	" " " " 10kΩ
R8503–8506	J10276474	Carbon Composition 1/2W GK470kΩ
R8502	J20336220	Matallic Film 2W 22Ω
R8507	J20336122	" " " 1.2kΩ
R8501	J31336019	Wire Wound " 0.1Ω
		CAPACITOR
C8502, 8503 8505, 8508 8515	K13179008	Ceramic Disc 50WV 0.01μF (DD106F103Z50V)
C8510	K40179011	Electrolytic " 3.3μF (50RE3R3)
C8504, 8507	K40149008	" 25WV 10μF (25RL10)
C8514	K40129004	" 16WV 10μF (16RE10)
C8506	K40149003	" 25WV 100μF (25RL100)
C8509	K40129021	" 16WV 1000μF (16R102S)
C8501	K41160478	" 35WV 4700μF (35TL4700)
C8512, 8513	K70160003	Tantalum " 0.1μF (35SC0.1μF)
		TP-TERMINAL
	Q5000038	TP-I

VR UNIT

Symbol No.	Part No.	Name & Description
PB-2351B	F0002351B	Printed Circuit Board
	C0023510	PCB with Components
		DIODE
D9001	G2015550	Si 1S1555
		RESISTOR
R9002	J02245223	Carbon Film 1/4W SJ 22kΩ
R9001	J02245104	" " " " 100kΩ

		POTENTIOMETER
VR9001, 9003 9004	J66800001	K1213000310KB 10KB
VR9005	J66800003	K12130004-10KA 10KA
VR9002	J66800002	K12130003500KB 500KB

SW UNIT A

Symbol No.	Part No.	Name & Description
PB-2353A	F0002353A	Printed Circuit Board
	C0023530	PCB with Components
		DIODE
D9201, 9202	G2015550	Si 1S1555
D9203, 9204	G2090060	LED GD-4-203SR-D
		RESISTOR
R9201, 9202	J02245182	Carbon Film 1/4W SJ 1.8kΩ
		SWITCH
S9201	N4090053	SUJ52A
		TP TERMINAL
	Q5000020	MS60121

SW UNIT B

Symbol No.	Part No.	Name & Description
PB-2352C	F0002352C	Printed Circuit Board
	C0023520	PCB with Components
		DIODE
D9401, 9403–9407	G2015550	Si 1S1555
		RESISTOR
R9403	J02245392	Carbon Film 1/4W SJ 3.9kΩ
R9401, 9402	J02245103	" " " " 10kΩ
		SWITCH
S9401	N4090055	SUJ62A

RELAY UNIT

Symbol No.	Part No.	Name & Description
PB-2354	F0002354	Printed Circuit Board
	C0023540	PCB with Components
		DIODE
D9602	G2090029	Ge 1N60
D9601	G2015550	Si 1S1555

		RESISTOR					**CAPACITOR**	
R9601	J02245100	Carbon Film	1/4W SJ	10Ω	C9820	K30275270	Dipped Mica 500WV (LCQ12270J5)	27 pF
					C9823	K02175121	" " 50WV CH (DD109CH121J50V02)	120 pF
		CAPACITOR						
C9605	K30273050	Dipped Mica	500WV (LCQ11050D5)	5 pF	C9824	K30175181	" " " (LCQ17181J05)	180 pF
C9608	K31306800	Mica	1KV (CML1-800K10)	80 pF	C9819	K02309003	Ceramic Disc 3KWV (CC45CH3F101KY)	100 pF
C9606	K92179010	Ceramic Disc	50WV SL	200 pF	C9825	K02175680	" " 50WV CH	68 pF