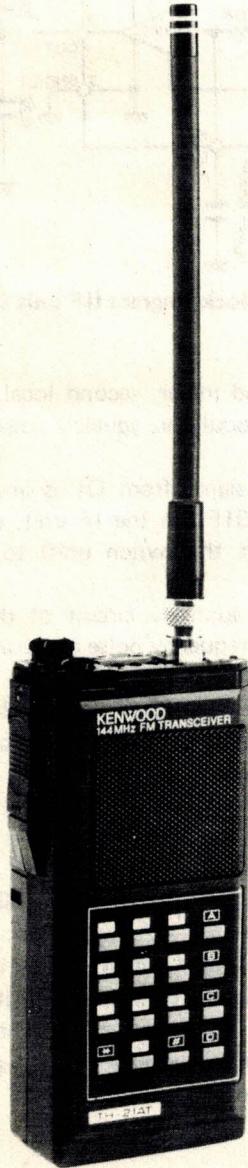


KENWOOD

SERVICE MANUAL

TH-21A/AT/E BT-2, DC-21, EB-2, PB-21, SC-8/8T, SMC-30, TU-6

2m FM HAND-HELD TRANSCEIVER



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Photograph shows TH-21AT type.

CIRCUIT DESCRIPTION

| Model | Destination | Frequency range (MHz) | RPT:SHIFT Freq' (kHz) | TONE | Ref' |
|---------|-------------|-----------------------|-----------------------|----------------------|---------------------|
| TH-21A | K1,M1,M2 | 144.00–147.995 | ± 600 | Option (TU-6) | |
| | X | 144.00–145.995 | | | DTMF System used |
| TH-21AT | K2,M3,M4 | 144.00–147.995 | | | |
| TH-21E | T | 144.00–145.995 | –600/REV | 1750Hz TONE BURST | TRIO Brand |
| | W | | | 1750 Hz TONE | |

K : U.S.A. M : Gen. T : England W : Europe X : Australia/Newzealand

Table 1 Destination chart

RX Section

The TH-21A/AT/E uses a double super-heterodyne type receiver with a IF frequency of 16.3MHz and a second IF frequency of 455kHz.

The received signal from the antenna is amplified by RF amplifiers Q1 : 2SC2176(H) and Q2 : 2SC2668(Y), which are in connected cascade, and applied to BPF L6–L8. The RF signal is then applied to the first mixer, Q3 : 2SK192A, where it is mixed with the first local oscillator signal from the PLL. The first mixer output passes through a 16.3MHz MCF (F1) and becomes the first IF signal. This signal is amplified by IF amplifier Q4 : 2SC2714(Y) and is applied to IF unit Q1 : MC3359P

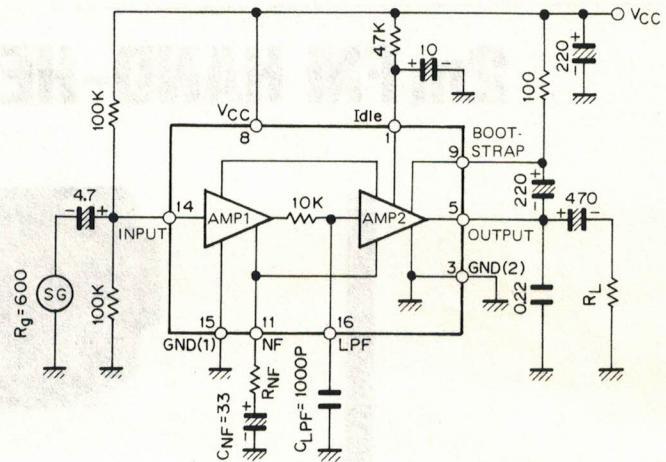


Fig. 1 TA7331F Block diagram (IF unit Q2)

| Item | Rating |
|-------------------------------|---|
| Noninal center frequency (fo) | 16.3MHz |
| Pass bandwidth | fo \pm 7.5kHz or more at 3dB |
| Attenuation bandwidth | fo \pm 25kHz or more at 18dB |
| Guaranteed attenuation | 30dB or more within fo \pm 1MHz Spurious : 15dB or more at fo \sim fo +500kHz. |
| Ripple | 0.5dB or less |
| Insertion loss | 1.0dB or less |
| Terminal impedance | 1k Ω /1.5pF |

Table 2 MCF (L71-0426-05) (RF unit F1)

| Item | Rating |
|--|-------------------------------------|
| Center frequency of 6dB bandwidth (fo) | 455kHz \pm 1.5kHz |
| 6dB bandwidth | \pm 7.5kHz or more |
| 40dB bandwidth | \pm 15kHz or less |
| Ripple | 1.5dB or less (455 \pm 5kHz) |
| Guaranteed attenuation | 27dB or more within fo \pm 100kHz |
| Insertion loss | 6dB or less at 455kHz |
| Terminal impedance | 1.5k Ω |

Table 3 Ceramic filter (L72-0335-05) (IF unit F1)

Q1 consists of the second mixer, second local oscillator, second IF amp, FM demodulator, squelch noise amp and control circuits.

The demodulated audio signal from Q1 is amplified by AF amplifier Q2 : TA7331F, on the IF unit, via the AF volume control (VR1 on the switch unit) to drive the speaker.

The squelch circuit, (an auxiliary circuit of the receiver section) detects the high frequency noise component of the demodulated audio output from Q1.

This signal is applied to pin 12 of Q1 via the squelch control, (VR2 on the switch unit). The noise component applied to pin 12, is amplified and then output at pin 13. The output at pin 13 is rectified by D1 and D2 : 1N60As and fed to pin 14. When this rectified voltage is applied to pin 14, the squelch trigger circuit functions, pin 16 is grounded, and Q4 : 2SC2412K and Q3 : 2SB698(E,F) turn OFF. When Q3 turns OFF, AF amp IC Q2 : TA7331F is muted and no audio is output. When a signal is received, the noise level contained in the demodulated output of Q1 reduced, and the squelch trigger circuit does not function. Therefore, Q4 and Q3 turn ON, the AF amp IC is powered, and audio output is obtained.

CIRCUIT DESCRIPTION

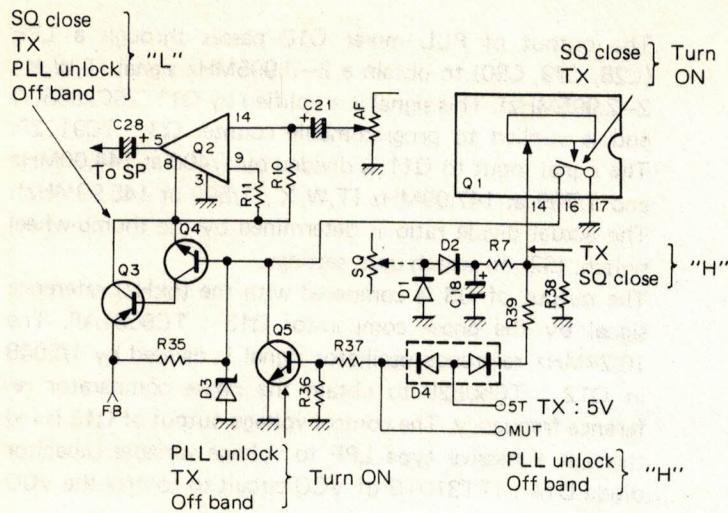


Fig. 2 Squelch-mute circuit

TX Section

The VCO local oscillator Q14 : 2SC2714(Y) frequency in transmit is one half the actual TX frequency. The output of VCO buffer amp Q16 : 2SC2671(H) is doubled by Q5 : 2SC2668(Y) and fed through a BPF to obtain the TX frequency. The output of the BPF is fed to pre-driver, Q6 : 2SC2347, driver Q7 : 2SC2053, and is then amplified by the final amplifier Q8 : 2SC1947.

| | VCBO | VEBO | VCEO | IC | PC | PC | T _J | T _{stg} | T _a |
|-----------------|------|------|-----------------------------------|----|-----------------------|-----------------------|----------------|------------------|----------------|
| Test Conditions | | | R _{BE} = $\times \Omega$ | | T _c = 25°C | T _a = 25°C | | | 25 ± 3°C |
| Maximum Rating | 35V | 4V | 17V | 1A | 10W | 1W | +175°C | -65 ~ +175°C | |

Table 4 2SC1947 Max. rating (RF unit Q8)

Signals from the microphone and the tone circuits are amplified by mic amp Q6 : NJM4558M. The signal is then applied to voltage variable capacitor diode D16 : 1S2208 of the VCO circuit to modulate the VCO signal. The transmitter section also consists of the power selector circuit and the tone circuit.

To select the power, the emitter resistor R23 (10Ω) of driver Q7 is controlled by the HI/LO switch (S1) on the IF unit. When R23 is grounded, the output power is about 1W. When R23 is opened, the output power becomes about 150mW.

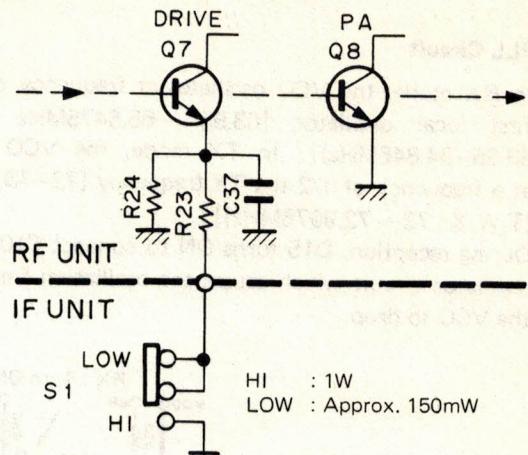


Fig. 3 Power select circuit

Several different tone circuits are available to provide access to repeaters. Circuits vary depending on country of destination.

- 1) In E (W) type models (for European countries), when the TONE switch (a non-locking type) is held depressed, the radio enters TX mode and a tone signal of 1750Hz is emitted.
- 2) In E (T) type models (for the United Kingdom), when the TONE switch is pressed, the radio will enter TX mode and a tone burst of 1750Hz is transmitted.
- 3) The optional tone encoder (TU-6) may be installed in A/AT versions. With the TU-6, any one of 37 frequencies between 67.0–250.3Hz can be transmitted. When the TONE switch is pressed, the tone signal is continuously transmitted.
- 4) In AT type models, a DTMF (Dual-Tone Multi Frequency) system is also used. When a key is pressed, the unit enters TX mode and transmits a dual tone signal as long as the key is held depressed.

CIRCUIT DESCRIPTION

PLL Circuit

In RX mode, the VCO oscillates at frequency of 1/2 the first local oscillator [63.85 – 65.8475MHz (T,W,X ; 63.85–64.845MHz)]. In TX mode, the VCO oscillates at a frequency of 1/2 the TX frequency [72–73.9975MHz (T,W,X ; 72 – 72.9975MHz)].

During reception, D15 turns ON to connect C104 into the oscillator circuit which causes the oscillation frequency of the VCO to drop.

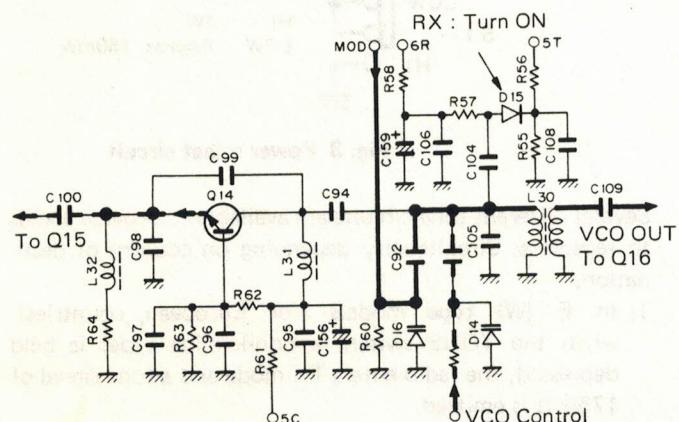


Fig. 4 VCO circuit

The output of the VCO is amplified by Q15 : 2SC2714(Y) and mixed with the HET oscillator Q9 : 2SC2714(Y) signal by PLL mixer Q10 : 2SC2668(Y).

The frequency of the HET oscillator is determined by the crystal selected by the OFFSET switch. Q9 in connection with BPF L25 and L26 acts as a frequency doubler.

The output of PLL mixer Q10 passes through a LPF (L28, C79, C80) to obtain a 2–3.995MHz signal (T,W,X ; 2–2.995MHz). This signal is amplified by Q11: 2SC2668(Y) and is applied to programmable counter Q3 : TC9122P. The signal input to Q11 is divided by 1/400 at 144.00MHz and 1/799 at 147.99MHz (T,W,X ; 1/599 at 145.99MHz). The actual divide ratio is determined by the thumb-wheel switch, (S2) on switch unit, settings.

The output of Q3 is compared with the (5kHz) reference signal by the phase comparator Q13 : TC5081AP. The 10.24MHz reference oscillator signal is divided by 1/2048 in Q12 : TC5082P to obtain the phase comparator reference frequency. The control voltage output of Q13 is fed through a passive type LPF to voltage variable capacitor diode D14 : ITT310TE of VCO circuit to control the VCO frequency.

Peripheral circuits of the PLL are the +5kHz circuit, and PLL unlock circuits. The +5kHz circuit is used to obtain the 5kHz TX and RX frequencies. In RX mode, when the 5k switch, S3 on switch unit, is set to off, D6 of the PLL HET oscillator circuit is forward biased effectively by passing. When the 5k switch is set to ON, the D6 turns off, which connects TC4 and C61 to crystal (X2) in series.

When a capacitor is connected to the crystal in series, the frequency of oscillation increases. Use TC4 to adjust the +5kHz frequency. The PLL unlock circuit is described in the control circuit section.

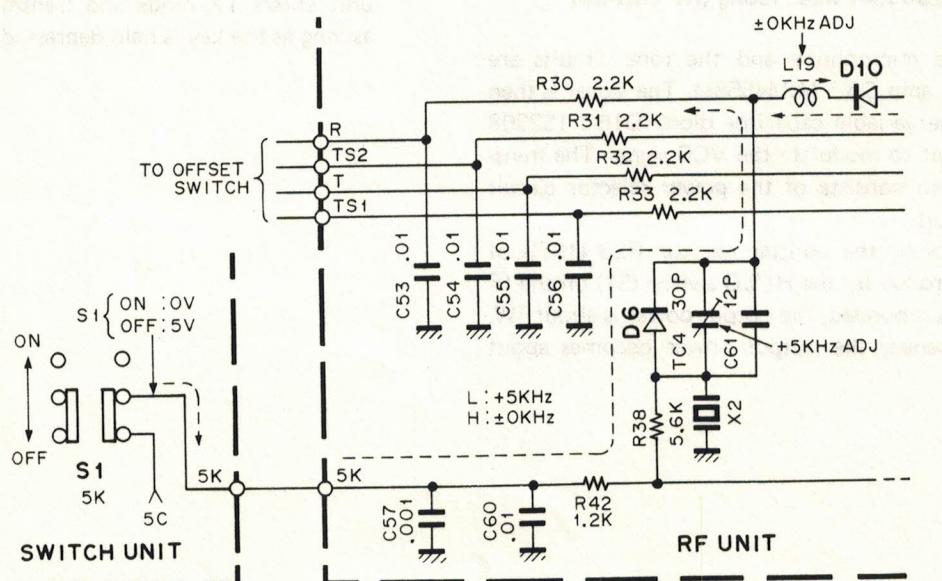
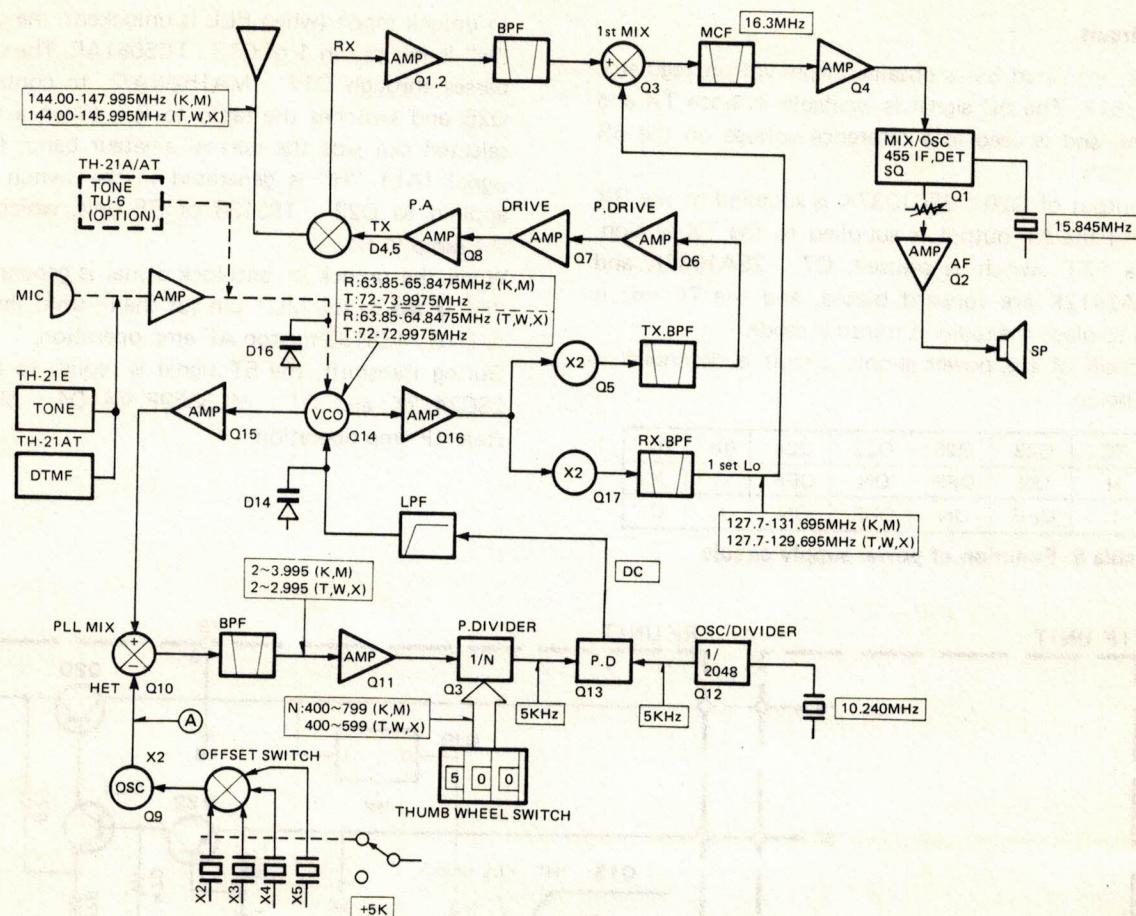


Fig. 5 +5kHz shift circuit

CIRCUIT DESCRIPTION



(A) TH-21A/AT

K,M,X Type

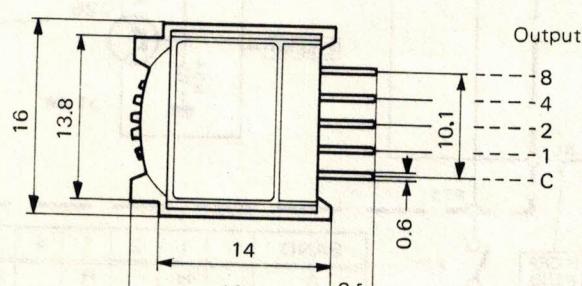
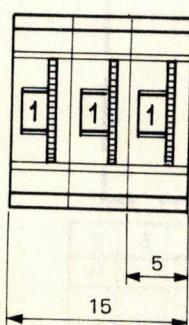
TH-21E

T,W Type

| OFF SET Switch | | | Crystal | |
|----------------|---------------|---------|---------|-----------------|
| | - (600kHz) | S X2 | + | (600kHz) |
| RX | X2 | X2 | X2 | X2 61.850MHz |
| TX | X5 | X4 | X3 | X3 70.300MHz |

| OFF SET Switch | | | Crystal | |
|----------------|---------------|---------|-----------|-----------------|
| | - (600kHz) | S X2 | REV X2 | X3 61.850MHz |
| RX | X2 | X2 | X3 | X3 61.550MHz |
| TX | X5 | X4 | X4 | X4 70.000MHz |

Fig. 6 Frequency configuration



| Dial | Output | ● : Connect to the common pin | | | |
|------|--------|-------------------------------|---|---|---|
| | | 8 | 4 | 2 | 1 |
| 0 | | | | | |
| 1 | | | | | ● |
| 2 | | | | ● | |
| 3 | | | | ● | ● |
| 4 | | | ● | | |
| 5 | | ● | | | ● |
| 6 | | ● | ● | ● | |
| 7 | | ● | ● | ● | ● |
| 8 | ● | | | | |
| 9 | ● | | | | ● |

Fig. 7 Thumb wheel switch (S59-3401-05) (Switch unit S2)

CIRCUIT DESCRIPTION

Control circuit

A constant regulated 5V is obtained from voltage regulator Q19 : LV517. The 5C signal is available in both TX and RX modes, and is used as a reference voltage on the 6R and 5T AVR's.

The 6R output of Q20 : 2SC1037K is supplied to the RX section and the 5T output is supplied to the TX section. When the PTT switch is pressed, Q7 : 2SA1037K and Q8 : 2SA2412K are forward biased, and the TC line is grounded to place the radio in transmit mode.

The function of the power supply circuit is described in the table below.

| | TC | Q23 | Q26 | Q22 | Q24 | 6R | 5T |
|----|----|-----|-----|-----|-----|----|----|
| RX | H | ON | OFF | ON | OFF | O | X |
| TX | L | OFF | ON | OFF | ON | X | O |

Table 5 Function of power supply circuit

In unlock mode (when PLL is unlocked), the unlock signal "H" is fed at pin 1 of Q13 : TC5081AP. The unlock signal passes through D17 : MA152WA/2, to control Q23 and Q26 and switches the radio to RX. When a frequency is selected out side the normal amateur band, the anti-lock signal (AL) "H" is generated in the switch unit and is applied to D22 : 1SS133 of RF unit, which also places the radio in RX.

When the unlock or anti-lock signal is generated, an logic "H" is fed to the MUT pin (of the IF unit) through D17/2 or D18 : 1SS133 to stop AF amp operation.

During transmitt, the 5T signal is replies to IF unit Q5 : 2SC2412K and Q1 : MC3359P via D4 : MA152WA to stop AF amp operation.

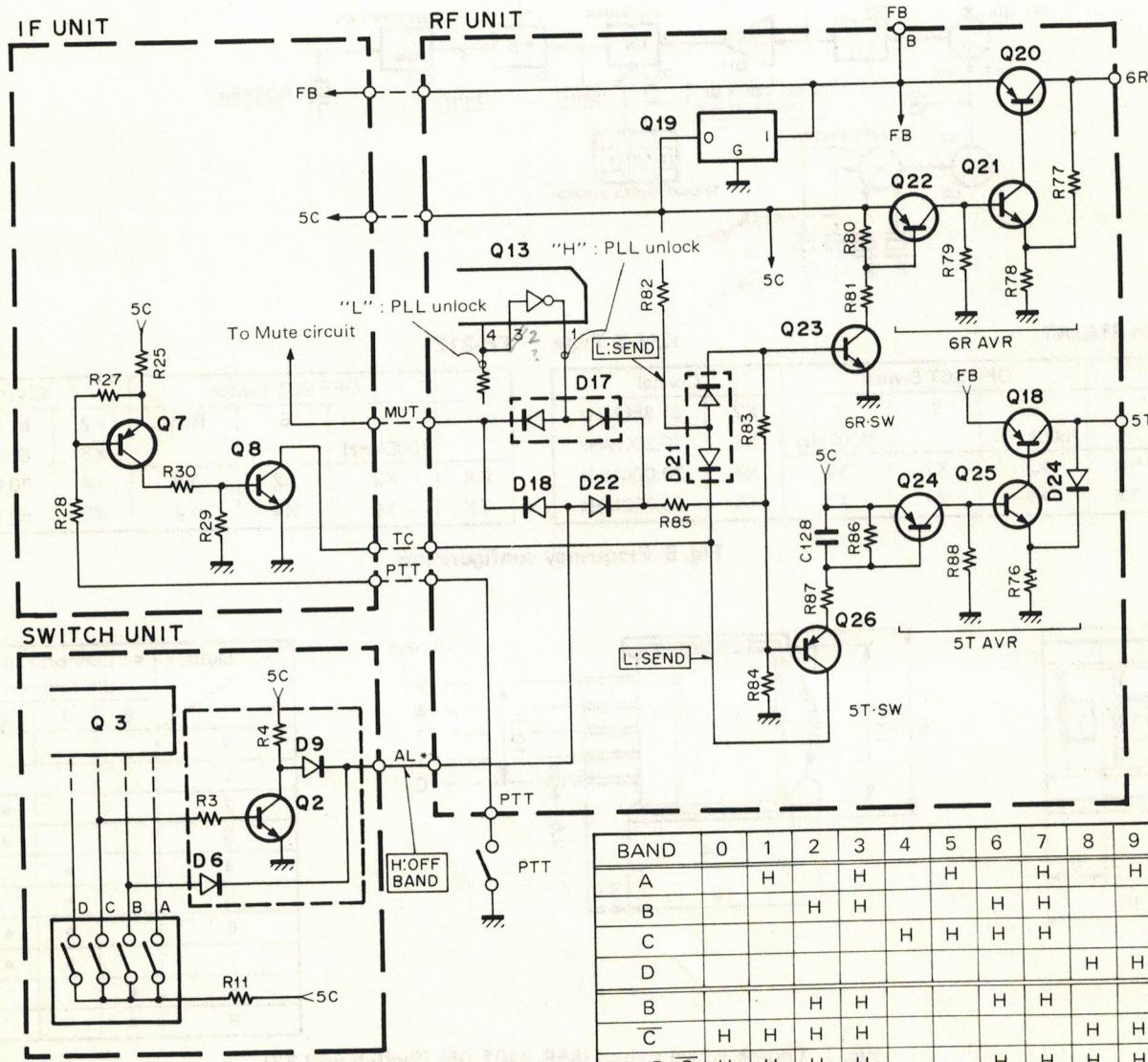


Fig. 8 Control circuit

CIRCUIT DESCRIPTION/PACKING

| Parts No. | W09-0334-05 | W09-0335-05 | W09-0336-05 | W09-0339-05 |
|-------------|--------------------------------------|-------------------------------|----------------------------|-------------------------------|
| Input power | AC 120V 60Hz 3W or less | AC 220V 50/60Hz 3W or less | AC 240V 50Hz 3W or less | AC 240V 50/60Hz 3W or less |
| Output | DC 8.7V 32mA at 0mA/13.5V or less | | | |
| Weight | Approx. 120g | Approx. 210g | | |
| Destination | U.S.A | Europe/Gen. M1—4 | United Kingdom | Australia/ Newzealand |
| Ref' | | | TRIO Brand | |

Table 6 Charger specifications

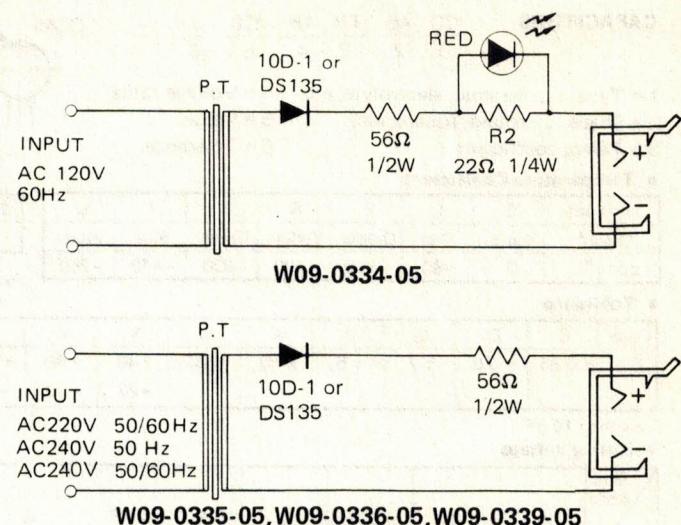
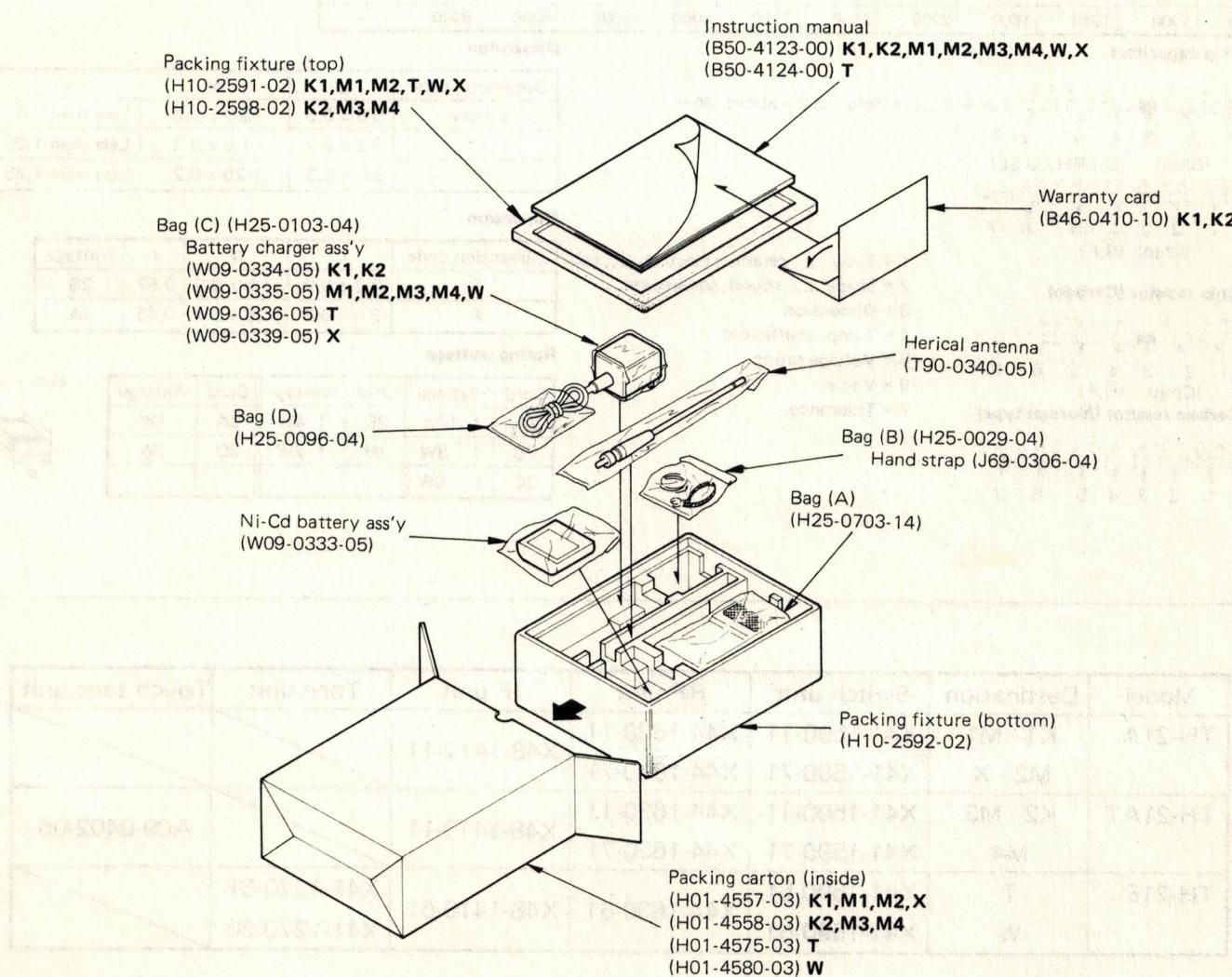


Fig. 9 Charger schematic diagram

PACKING

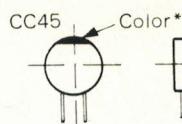


PARTS LIST

CAPACITORS

| | | | | | |
|----|----|----|----|-----|---|
| CC | 45 | TH | 1H | 220 | J |
| 1 | 2 | 3 | 4 | 5 | 6 |

1 = Type ceramic, electrolytic, etc.
 2 = Shape round, square, etc.
 3 = Temp. coefficient
 4 = Voltage rating
 5 = Value
 6 = Tolerance



• Capacitor value

1 0 3 = 0.01μF

$$\begin{array}{c} 2 \\ \hline 2 \\ \hline 0 \end{array} = 22\text{pF}$$

1st number | Multiplier
2nd number

• Temperature Coefficient

| 1st Word | C | L | P | R | S | T | U |
|----------|-------|-----|--------|--------|-------|------|--------|
| Color* | Black | Red | Orange | Yellow | Green | Blue | Violet |
| ppm/°C | 0 | -80 | -150 | -220 | -330 | -470 | -750 |

| 2nd Word | G | H | J | K | L |
|----------|------|------|-------|-------|-------|
| ppm/°C | ± 30 | ± 60 | ± 120 | ± 250 | ± 500 |

Example CC45TH = -470 ± 60 ppm/°C

• Tolerance

| Code | C | D | G | J | K | M | X | Z | P | No code |
|------|--------|-------|-----|-----|------|------|------|------|-------|-------------------------|
| (%) | ± 0.25 | ± 0.5 | ± 2 | ± 5 | ± 10 | ± 20 | + 40 | + 80 | + 100 | More than 10μF -10~+50 |
| | | | | | | | -20 | -20 | -0 | Less than 4.7μF -10~+75 |

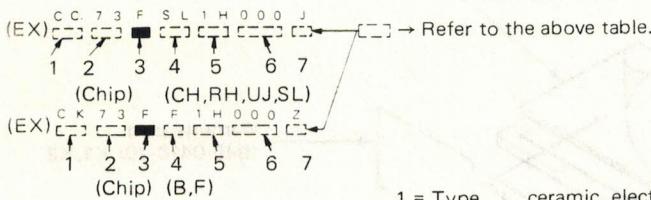
| Code | B | C | D | F | G |
|------|-------|--------|-------|-----|-----|
| (pF) | ± 0.1 | ± 0.25 | ± 0.5 | ± 1 | ± 2 |

Less than 10 pF

• Rating voltage

| 2nd word | A | B | C | D | E | F | G | H | J | K | V |
|----------|------|------|------|------|------|------|------|------|------|------|----|
| 1st word | | | | | | | | | | | |
| 0 | 1.0 | 1.25 | 1.6 | 2.0 | 2.5 | 3.15 | 4.0 | 5.0 | 6.3 | 8.0 | - |
| 1 | 10 | 12.5 | 16 | 20 | 25 | 31.5 | 40 | 50 | 63 | 80 | 35 |
| 2 | 100 | 125 | 160 | 200 | 250 | 315 | 400 | 500 | 630 | 800 | - |
| 3 | 1000 | 1250 | 1600 | 2000 | 2500 | 3150 | 4000 | 5000 | 6300 | 8000 | - |

• Chip capacitors



→ Refer to the above table.

Dimension

| Dimension code | L | W | T |
|----------------|-----------|------------|----------------|
| Empty | 5.6 ± 0.5 | 5.0 ± 0.5 | Less than 2.0 |
| E | 3.2 ± 0.2 | 1.6 ± 0.2 | Less than 1.25 |
| F | 2.0 ± 0.3 | 1.25 ± 0.2 | Less than 1.25 |

Dimension

| Dimension code | L | W | T | Wattage |
|----------------|-----------|------------|------|---------|
| E | 3.2 ± 0.2 | 1.6 ± 0.2 | 0.57 | 2B |
| F | 2.0 ± 0.3 | 1.25 ± 0.2 | 0.45 | 2A |

Rating wattage

| Cord | Wattage | Cord | Wattage | Cord | Wattage |
|------|---------|------|---------|------|---------|
| 2A | 1 10W | 2E | 1 4W | 3A | 1W |
| 2B | 1 8W | 2H | 1 2W | 3D | 2W |
| 2C | 1 6W | | | | |

Dimension



| Model | Destination | Switch unit | RF unit | IF unit | Tone unit | Touch tone unit |
|---------|-------------------|----------------------------|----------------------------|-------------|----------------------------|-----------------|
| TH-21A | K1 · M1 M2 · X | X41-1590-11 X41-1590-71 | X44-1630-11 X44-1630-71 | X48-1410-11 | | |
| TH-21AT | K2 · M3 M4 | X41-1590-11 X41-1590-71 | X44-1630-11 X44-1630-71 | X48-1410-11 | | A09-0402-05 |
| TH-21E | T W | X41-1590-51 X41-1590-61 | X44-1630-61 | X48-1410-61 | X41-1270-51 X41-1270-60 | |

TH-21A/AT/E GENERAL

N : New parts

* : Please note that parts are sometimes not in stock and it takes much time to deliver.

PARTS LIST

Gardina, CA
 Pacific Coast Parts Distribution, Inc.
 1-800-421-5080 x135 Roberto

| PART NO | NOTE | NAME & DESCRIPTION | DISTINCTION | | | QUANTITY | REFERENCE NO |
|---------------|-----------|--------------------------------|-------------|-----|-----|----------|--------------|
| | | | 011 | 012 | 021 | | |
| A02-0670-02 | N* | CASE (TOP) 144MHZ-KENWOOD | 1 | 1 | 1 | 1 | K1 - 011 |
| A02-0671-02 | N* | CASE (TOP) 144MHZ-TRIO | | | | 1 | K2 - 012 |
| A02-0670-02 | N* | CASE (TOP) 144MHZ-KENWOOD | | | | 1 | M1 - 021 |
| A02-0672-01 | N* | CASE (TOP) 146MHZ-KENWOOD | 1 | 1 | 1 | 1 | M2 - 022 |
| A02-0675-02 | N* | CASE (TOP) ASSY 144MHZ-KENWOOD | 1 | 1 | 1 | 1 | M3 - 023 |
| A09-0407-03 | N* | CASE (TOP) ASSY * WITH DMF | 1 | 1 | 1 | 1 | M4 - 024 |
| A09-0402-05 | N* | CASE (TOP) ASSY * WITH DMF | | | | | T - 051 |
| A09-0402-05 | N* | CASE (TOP) ASSY 144MHZ-TRIO | | | | 1 | W - 061 |
| A09-0408-03 | N* | CASE (TOP) ASSY 144MHZ-KENWOOD | 1 | 1 | 1 | 1 | X - 071 |
| A09-0408-03 | N* | ORNAMENTAL PANEL | 1 | 1 | 1 | 1 | |
| A21-0768-02 | N* | | | | | | |
| B04-0408-04 | N* | SP METAL | 1 | 1 | 1 | 1 | |
| B04-0409-04 | N* | SP METAL | 1 | 1 | 1 | 1 | |
| B04-0409-04 | N* | SP METAL | | | | 1 | |
| B04-0408-04 | N* | SP METAL | | | | 1 | |
| B05-0733-04 | N* | SP GRILLE | 1 | 1 | 1 | 1 | |
| B40-3510-04 | N* | MODEL NAME PLATE TH-21A | 1 | 1 | 1 | 1 | |
| B40-3533-04 | N* | MODEL NAME PLATE TH-21AT | 1 | 1 | 1 | 1 | |
| B40-3510-04 | N* | MODEL NAME PLATE TH-21A | | | | 1 | |
| B40-3534-04 | N* | MODEL NAME PLATE TH-21AT | | | | 1 | |
| B40-3535-04 | N* | MODEL NAME PLATE TH-21E | | | | 1 | |
| B40-3510-04 | N* | MODEL NAME PLATE TH-21A | | | | 1 | |
| B42-2343-04 | N* | FCC PLATE | 1 | 1 | 1 | 1 | |
| B42-2352-04 | N* | FCC PLATE | 1 | 1 | 1 | 1 | |
| B42-2343-04 | N* | FCC PLATE | | | | 1 | |
| B42-2352-04 | N* | FCC PLATE | | | | 1 | |
| B42-1745-04 | N* | SERIAL NO. LABEL | 1 | 1 | 1 | 1 | |
| B42-2366-04 | N* | PLATE HI/LO,- S + | 1 | 1 | 1 | 1 | |
| B42-2379-04 | N* | PLATE HI/LO,- S REV | | | | 1 | |
| B42-2366-04 | N* | PLATE HI/LO,- S + | | | | 1 | |
| B43-1025-04 | N* | BADGE TH-21A | 1 | 1 | 1 | 1 | |
| B43-1029-04 | N* | BADGE TH-21AT | | | | 1 | |
| B43-1025-04 | N* | BADGE TH-21A | | | | 1 | |
| B43-1027-04 | N* | BADGE TH-21AT | | | | 1 | |
| B43-1032-04 | N* | BADGE TH-21E | | | | 1 | |
| B43-1025-04 | N* | BADGE TH-21A | | | | 1 | |
| B50-4423-00 | N | INSTRUCTION MANUAL | 1 | 1 | 1 | 1 | |
| B50-4424-00 | N | INSTRUCTION MANUAL | | | | 1 | |
| B50-4423-00 | N | INSTRUCTION MANUAL | | | | 1 | |
| CC45SL11560J | CERAMIC | 56P 50V | 1 | 1 | 1 | 1 | C - 101 |
| CC73FCH1H300J | CHIP CAP. | 30P 50V | 1 | 2 | 2 | 2 | C - 6, 7 |
| CE04CWJ100M | ELECTRO | 10 6.3V | 2 | 2 | 2 | 2 | C - 2, 4 |
| CEO4CW14R7M | ELECTRO | 4.7 16V | 1 | 1 | 1 | 1 | C - 5 |
| CK73FB1E103K | CHIP CAP. | 0.01 25V | 2 | 2 | 2 | 2 | C - 1, 3 |
| E23-0432-04 | N | TERMINAL FOR JUNCTION | | | | 2 | |
| E23-0432-04 | N | TERMINAL FOR JUNCTION | | | | 2 | |
| E23-0432-04 | N | TERMINAL (INSIDE) | | | | 2 | |
| F10-1314-04 | N* | SHIELDING PLATE | 1 | 1 | 1 | 1 | |
| F19-0637-04 | N* | SWITCH MASK(A) HI/LO | | | | 1 | |
| F19-0638-04 | N* | SWITCH MASK(B) OFFSET | 1 | 1 | 1 | 1 | |

PARTS LIST

| PART. NO | NOTE | NAME & DESCRIPTION | DISTINCTION & QUANTITY | | | | | | | | REFERENCE. NO |
|--------------|------|-----------------------------------|------------------------|-----|-----|-----|-----|-----|-----|-----|---------------|
| | | | 011 | 012 | 021 | 022 | 023 | 024 | 051 | 061 | |
| F20-0520-04 | * | CUSHION(B) SP INSULATING BOARD | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
| F20-0538-04 | N* | | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
| GL9PR24 | N | LED RED | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
| G10-0633-04 | N* | TAPE RF UNIT | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 |
| G13-0802-04 | N* | CUSHION FOR JUNCTION | | | | | | | | | |
| G13-0626-04 | * | CUSHION MIC | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
| G13-0802-04 | N* | CUSHION FOR JUNCTION | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 |
| G13-0803-04 | N* | CUSHION(B) FOR PTT | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
| H01-4557-13 | N* | CARTON(INSIDE) | 1 | | | | | | | | |
| H01-4558-13 | N* | CARTON(INSIDE) | 1 | | | | | | | | |
| H01-4557-13 | N* | CARTON(INSIDE) | 1 | | | | | | | | |
| H01-4575-13 | N* | CARTON(INSIDE) | | | | | | | | | |
| H01-4580-13 | N* | CARTON(INSIDE) | | | | | | | | | |
| H01-4557-13 | N* | CARTON(INSIDE) | | | | | | | | | |
| H10-2591-02 | N* | PACKING FIXTURE(TOP) | | | | | | | | | |
| H10-2592-02 | N* | PACKING FIXTURE(BOTTOM) | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
| H10-2598-02 | N* | PACKING FIXTURE(TOP) | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
| H25-0703-14 | * | BAG(TH-21 BODY) 140X190 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
| H25-0029-04 | * | BAG(ACS) 60X110 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
| H25-0103-04 | * | BAG(CHARGER) 125X250 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
| H25-0096-04 | * | BAG(BATTERY) 100X110 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
| J25-3251-05 | N | FLEXIBLE PC BOARD RF-IF | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
| J32-0785-04 | N | ROUND BOSS M2X6 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 |
| J39-0409-14 | * | MIC SPACER | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
| J69-0306-04 | N | HAND STRAP (ACS) | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
| J69-0309-05 | N | O RING AF.SQL | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 |
| K27-0468-04 | N | PUSH KNOB(A) TONE | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
| K27-0469-04 | N | PUSH KNOB(B) +5KHZ | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
| K29-3011-04 | N | KNOB(A) AF | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
| K29-3013-04 | N | KNOB(B) SQL | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
| K29-3011-04 | N | PTT LEVER | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
| LR40872 | N | IC | 1 | | | | | | | | |
| L78-0010-05 | N | CRYSTAL 3.58MHZ | 1 | | 1 | 1 | | | | | |
| N09-0683-05 | N | SPECIAL SCREW M2 X4 | | | | | | | | | |
| N30-2004-41 | | PAN HD SCREW(SWITCH PC BOARD) | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 |
| N33-2005-45 | | ROUND FLAT SCREW(CASE:TOP) | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
| N33-2008-45 | | ROUND FLAT SCREW(CASE:TOP) | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 |
| N35-2005-45 | | BIND SCREW(CASE:BOTTOM) | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
| RD73FB2A473J | | CHIP RES. 47K OHM 1/10W | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 |
| RD73FB2A154J | | CHIP RES. 150KOHM 1/10W | 1 | | | | | | | | |
| R12-3449-05 | | TRIM.POT 10K | 1 | | 1 | 1 | | | | | |
| T07-0235-05 | N | SPEAKER | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
| T18-0054-05 | N | EARPHONE (ACS) | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
| T90-0340-05 | N | HERICAL ANTENNA(ACS) | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
| T91-0312-15 | | ELECTRIC CONDENSER MIC | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
| W09-0334-05 | N | BATTERY CHARGER ASS'Y 120V | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
| W09-0335-05 | N | BATTERY CHARGER ASS'Y 220V | | | | | | | | | |

PARTS LIST

| PART. NO. | NOTE | NAME & DESCRIPTION | DISTINCTION & QUANTITY | | | | | | REFERENCE. NO |
|-------------|------|-----------------------|------------------------|-----|-----|-----|-----|-----|---------------|
| | | | 011 | 012 | 021 | 022 | 023 | 024 | |
| W09-0336-05 | N | BATTERY CHARGER ASS'Y | 240V | | | | | 1 | |
| W09-0335-05 | N | BATTERY CHARGER ASS'Y | 220V | | | | | 1 | |
| W09-0339-05 | N | BATTERY CHARGER ASS'Y | 240V | | | | | 1 | |
| W09-0333-05 | N | NI-CD BATTERY ASS'Y | | | | | | 1 | |
| X41-1590-11 | N* | SWITCH UNIT | | 1 | 1 | 1 | 1 | 1 | |
| X41-1590-71 | N* | SWITCH UNIT | | 1 | 1 | 1 | 1 | 1 | |
| X41-1590-11 | N* | SWITCH UNIT | | | 1 | 1 | 1 | 1 | |
| X41-1590-71 | N* | SWITCH UNIT | | | 1 | 1 | 1 | 1 | |
| X41-1590-51 | N* | SWITCH UNIT | | | | | | 1 | |
| X41-1590-61 | N* | SWITCH UNIT | | | | | | 1 | |
| X41-1590-71 | N* | SWITCH UNIT | | | | | | 1 | |
| X44-1630-11 | N* | RF UNIT | | | 1 | 1 | 1 | 1 | |
| X44-1630-71 | N* | RF UNIT | | | | | | 1 | |
| X44-1630-11 | N* | RF UNIT | | | | | | 1 | |
| X44-1630-71 | N* | RF UNIT | | | | | | 1 | |
| X44-1630-71 | N* | RF UNIT | | | | | | 1 | |
| X44-1630-61 | N* | RF UNIT | | | | | | 1 | |
| X44-1630-71 | N* | RF UNIT | | | | | | 1 | |
| X48-1410-11 | N* | IF UNIT | | 1 | 1 | 1 | 1 | 1 | |
| X48-1410-61 | N* | IF UNIT | | | | | | 1 | |
| X48-1410-11 | N* | IF UNIT | | | | | | 1 | |
| X52-1270-51 | N* | TONE UNIT | | | | | 1 | 1 | |
| X52-1270-60 | N* | TONE UNIT | | | | | | 1 | |
| 2SA1037K(Q) | | CHIP TR. | | 1 | | 1 | 1 | | |
| 2SA1162(Y) | | CHIP TR. | | | 1 | 1 | | | |
| 2SC2412K(Q) | | CHIP TR. | | | | 1 | | | |
| 2SC2712(Y) | | CHIP TR. | | | | | 1 | | |

SEMICONDUCTOR

| Item | Re. marks | Part No. |
|-------------|-----------|----------------------------|
| Diode | | 1S1555 1S2588 1SS133 |
| Vari-cap | | BA282 MA856 MI301 |
| Zener Diode | | 1S2208 ITT310TE |
| LED | | MT26.8JB GL9PR24 |
| Chip Diode | | MA152WA MA152WK |

| Item | Re. marks | Part No. |
|---------|-----------|--|
| TR | | 2SB698(E,F) 2SC1947 2SC2053 2SC2347 2SC2668(Y) 2SC2671(H) |
| Chip TR | | 2SA1037K(Q) 2SA1037K(R) 2SA1162(G) 2SA1162(Y) |
| FET | | 2SC2412K(Y) 2SC2712(Y) 2SC2714(Y) |
| | | 2SK192A(Y) |

| Item | Re. marks | Part No. |
|------|-----------|---------------------|
| IC | | LR40872 LVC517 |
| | | MC3359P |
| | | NJM555M NJM4558M |
| | | TA7331F TC5081AP |
| | | TC5081P TC5082P |
| | | TC9122P |

PARTS LIST

SWITCH UNIT (X41-1590-XX) (-11 : K1,K2,M1,M3 -51 : T -61 : W -71 : M2,M4,X)

| PART. NO | NOTE | NAME & DESCRIPTION | DISTINCTION & QUANTITY | | | | | | REFERENCE NO |
|--------------|------|------------------------|------------------------|-----|-----|-----|--|--|--------------------|
| | | | 011 | 051 | 061 | 071 | | | |
| CK73FB1H102K | | CHIP CAP. 1000P 50V | 14 | 14 | 14 | 14 | | | R / 1, 2, 8, 9, |
| L33-0682-05 | N | CHOKE COIL | 1 | 1 | 1 | 1 | | | 3, 4, 10, 11, |
| L92-0110-05 | | FERRITE CORE | 1 | 1 | 1 | 1 | | | 5, 6, 12, 13, |
| MA152WK | | CHIP DIODE | 2 | 2 | 2 | 2 | | | 7 1, 14 |
| RD14CB2C101J | | RES. CARBON | 100 OHM 1/6W | 1 | 1 | 1 | | | L / 1, 2 |
| RD14CB2C101J | | RES. CARBON | 100 OHM 1/6W | 1 | 1 | 1 | | | D / 4, 5 |
| RD14CB2C103J | | RES. CARBON | 10K OHM 1/6W | 1 | 2 | 2 | | | R / 11 |
| RD14CB2C103J | | RES. CARBON | 10K OHM 1/6W | 1 | 2 | 2 | | | R / 5 |
| RD73FB2A473J | | CHIP RES. | 47K OHM 1/10W | 1 | 2 | 2 | | | R / 2, 4 |
| RD73FB2A473J | | CHIP RES. | 47K OHM 1/10W | 1 | 2 | 2 | | | R / 1 |
| RD73FB2A102J | | CHIP RES. | 1K OHM 1/10W | 1 | 1 | 1 | | | R / 3 |
| R05-3427-15 | N | POTENTIOMETER | 10K (B) WITH SW | 1 | 1 | 1 | | | R / 6 |
| R05-3428-05 | N | POTENTIOMETER | 10K (B) | 1 | 1 | 1 | | | VR / 1 |
| R92-0670-05 | | CHIP RES. | 0 OHM | 3 | 1 | 1 | | | VR / 2 |
| R92-0670-05 | | CHIP RES. | 0 OHM | 4 | 4 | 4 | | | R / 7, 8, 9 |
| S40-2445-05 | | PUSH SWITCH(SELF LOCK) | | 2 | 2 | 2 | | | R / 10 |
| S40-2445-05 | | PUSH SWITCH(SELF LOCK) | | 2 | 2 | 2 | | | S / 3, 4 |
| S40-2446-05 | | PUSH SWITCH(NON LOCK) | | 1 | 1 | 1 | | | S / 3 |
| S59-3401-05 | N | THUMB WHEEL SWITCH | | 1 | 1 | 1 | | | S / 4 |
| TC9122P | | I C | | 1 | 1 | 1 | | | S / 2 |
| 1SS133 | | DIODE | | 2 | 2 | 2 | | | Q / 3 |
| 1SS133 | | DIODE | | 2 | 2 | 2 | | | D / 3 |
| 2SC2412K(Q) | | CHIP TR. | | 1 | 2 | 2 | | | Q / 6, 7 |
| 2SC2412K(Q) | | CHIP TR. | | 1 | 2 | 2 | | | Q / 1, 2 |
| 2SC2712(Y) | | CHIP TR. | | 1 | 2 | 2 | | | Q / 1, 2 |
| 2SC2712(Y) | | CHIP TR. | | 1 | 2 | 2 | | | |

PARTS LIST

RF UNIT (X44-1630-XX) (-11 : K1,K2,M1,M3 -61 : T,W -71 : M2,M4,X)

| PART. NO | NOTE | NAME & DESCRIPTION | DISTINCTION & QUANTITY | | | REFERENCE. NO |
|---------------|------|--------------------|------------------------|-------------------|-------------------|--|
| | | | 011 | 061 | 071 | |
| BA282 | | DIODE DIODE | 4 | 4 | | L / 10, 11, 12, L / 10, 12, 13, 23 |
| CC45CH1H090D | | CERAMIC CERAMIC | 9P 15P 33P | 50V 50V 50V | 1 1 1 1 2 2 | C / 51 C / 52 C / 28, 48 |
| CC45CH1H150J | | CHIP CAP. | | | | C / 8, 12, 22, 25, C / 63, 64, 109, 113, 18 |
| CC73FCH1H330J | | CHIP CAP. | 10P | 50V | 12 12 | C / 8, 12, 22, 25, C / 8, 12, 22, 25, |
| CC73FCH1H100D | | CHIP CAP. | 10P | 50V | 11 | C / 8, 12, 22, 25, C / 8, 12, 22, 25, |
| CC73FCH1H100D | | CHIP CAP. | 39P | 50V | 3 3 | C / 64, 109, 113, 118 |
| CC73FCH1H390J | | CHIP CAP. | 1P | 50V | 4 4 | C / 42, 79, 80 |
| CC73FCH1H010C | | CHIP CAP. | 1.5P | 50V | 2 2 | C / 26, 33, 92, 117 |
| CC73FCH1H1R5C | | CHIP CAP. | 4.7P | 50V | 2 2 | C / 11, 13 |
| CC73FCH1H470J | | CHIP CAP. | 12P | 50V | 2 2 | C / 35, 74 |
| CC73FCH1H120J | | CHIP CAP. | 56P | 50V | 3 3 | C / 99, 116 |
| CC73FCH1H560J | | CHIP CAP. | 3P | 50V | 1 1 | C / 70, 72, 103 |
| CC73FCH1H030C | | CHIP CAP. | 68P | 50V | 2 2 | C / 49 |
| CC73FCH1H680J | | CHIP CAP. | 5P | 50V | 5 5 | C / 40, 69 |
| CC73FCH1H050C | | CHIP CAP. | 15P | 50V | 2 2 | C / 73, 75, 76, 100, 105 |
| CC73FCH1H150J | | CHIP CAP. | 120P | 50V | 3 3 | C / 104, 158 |
| CC73FSL1H121J | | CHIP CAP. | 7P | 50V | 2 2 | C / 3, 5, 119 |
| CC73FCH1H070D | | CHIP CAP. | 18P | 50V | 3 3 | C / 4, 14 |
| CC73FCH1H180J | | CHIP CAP. | 9P | 50V | 1 1 | C / 86, 87, 98 |
| CC73FCH1H090D | | CHIP CAP. | 22P | 50V | 1 1 | C / 34 |
| CC73FCH1H220J | | CHIP CAP. | 27P | 50V | 2 2 | C / 94 |
| CE04CN1A330M | | ELECTRO | 33 | 10V | 1 1 | C / 39, 50 |
| CE04CN1A101M | | ELECTRO | 100 | 10V | 2 2 | C / 133 |
| CE04CN1C100M | | ELECTRO | 10 | 16V | 1 1 | C / 132, 155 |
| CE04CW1C4R7M | | ELECTRO | 4.7 | 16V | 2 2 | C / 88 |
| CE04CW1C470M | | ELECTRO | 4.7 | 16V | 1 1 | C / 45, 159 |
| CE04CW1E3R3M | | ELECTRO | 3.3 | 25V | 1 1 | C / 120 |
| CE04CW1V2R2M | | ELECTRO | 2.2 | 35V | 1 1 | C / 134 |
| CE04CW1H010M | | ELECTRO | 10 | 6.3V | 1 1 | C / 156 |
| CE04CW1H0470M | | ELECTRO | 1 | 50V | 1 1 | C / 91 |
| CE04CW1E4R7M | | ELECTRO | 4.7 | 6.3V | 1 1 | C / 121 |
| CK73FB1H102K | | CHIP CAP. | 1000P | 50V | 64 64 | C / 122 |
| CK73FB1H102K | | CHIP CAP. | 1000P | 50V | | C / 128 |
| CK73FB1H102K | | CHIP CAP. | 1000P | 50V | | C / 1, 7, 9, 10, C / 23, 24, 29, 30, C / 31, 36, 37 |
| CK73FB1H102K | | CHIP CAP. | 1000P | 50V | | C / 38, 41, 44, 46, C / 68, 71, 77, 78, C / 82, 84, 85 |
| CK73FB1H102K | | CHIP CAP. | 1000P | 50V | | C / 89, 90, 93, 95, C / 125, 126, 129, 130, 131, 135, 136 |
| CK73FB1H102K | | CHIP CAP. | 2200P | 50V | 1 1 | C / 137, 138, 139, 140, 141, 142, 144 |
| CK73FB1H222K | | CHIP CAP. | 4700P | 50V | 4 4 | C / 145, 146, 147, 148, 149, 152, 153 |
| CK73FB1H472K | | CHIP CAP. | 0.022 | 25V | 2 2 | C / 157 |
| CK73FB1H103K | | CHIP CAP. | 0.01 | 25V | 10 10 | C / 83 |
| C05-0327-05 | | TRIMMER | 20P | | | C / 6, 81 |
| C05-0320-05 | | TRIMMER | 30P | | | TG / 2, 3 |
| C90-0891-05 | | TANTALUM | 4.7 | 16V | 1 1 | TG / 1, 4, 5, 6, 7 |
| | | | | | | C / 151, 155 |

TH-21A/AT/E PARTS LIST

| PART. NO. | NOTE | NAME & DESCRIPTION | DISTINCTION & QUANTITY | | | | REFERENCE. NO |
|--------------|------|---------------------------------|------------------------|-----|-----|--|---------------------------------|
| | | | 011 | 061 | 071 | | |
| E13-0165-05 | N | RCA RECEPTACLE ANT.J | 1 | 1 | 1 | | J / 1 |
| F11-0873-04 | N* | SHIELD COVER (VCO) | 1 | 1 | 1 | | L / 33 |
| ITT310TE | | VOLTAGE VARIABL | 1 | 1 | 1 | | L / 19, 20, 21, 22 |
| LVC517 | | IC | 1 | 1 | 1 | | L / 30, 6, 7, 8, 10, 11, 12, 13 |
| L19-0354-05 | N | WIDE BAND TRANS 12T OSC COIL | 1 | 1 | 1 | | L / 25, 26, 35, 36 |
| L32-0672-05 | N | TUNING COIL VCO 70MHZ | 4 | 4 | 4 | | L / 9 |
| L34-2226-05 | N | TUNING COIL 140MHZ | 11 | 11 | 11 | | L / 5 |
| L34-2223-05 | N | TUNING COIL 140MHZ | 1 | 1 | 1 | | L / 4 |
| L34-2224-05 | N | TUNING COIL 16.3MHZ | 1 | 1 | 1 | | L / 2 |
| L34-2225-05 | N | TUNING COIL 14.0MHZ | 2 | 10T | 1 | | L / 16, 17 |
| L34-0892-05 | | COIL | 3 | 4T | 1 | | L / 14 |
| L34-0893-05 | | COIL | 3 | 5T | 1 | | L / 15 |
| L34-0894-05 | | COIL | 3 | 6T | 1 | | L / 1 |
| L34-0895-05 | | COIL | 3 | 2T | 2 | | L / 34 |
| L34-1061-05 | | COIL | 3 | 4T | ANT | | L / 3, 18 |
| L34-11105-05 | N | INDUCTOR 0.33UH | 1 | 1 | 1 | | L / 32 |
| L60-3382-17 | | INDUCTOR 1UH | 2 | 2 | 2 | | L / 31 |
| L40-3391-17 | | INDUCTOR 3.3UH | 1 | 1 | 1 | | L / 28, 40, 41, 42, 43 |
| L40-5691-17 | | INDUCTOR 5.6UH | 1 | 1 | 1 | | L / 27, 37 |
| L40-1501-17 | | INDUCTOR 15UH | 1 | 1 | 1 | | F / 1 |
| L40-4701-17 | | INDUCTOR 47UH | 5 | 5 | 5 | | X / 1 |
| L40-1011-17 | | INDUCTOR 100UH | 2 | 2 | 2 | | X / 2 |
| L71-0246-05 | N | MCF 16.3MHZ | 1 | 1 | 1 | | X / 4 |
| L77-1234-05 | N | XTAL 10.24MHZ | 1 | 1 | 1 | | X / 3 |
| L77-1235-05 | N | XTAL 30.925MHZ | RX(S) | 1 | 1 | | X / 5 |
| L77-1236-05 | N | XTAL 35.000MHZ TX(S) | 1 | 1 | 1 | | X / 1 |
| L77-1239-05 | N | XTAL 35.150MHZ TX(+) | 1 | 1 | 1 | | X / 2 |
| L77-1237-05 | N | XTAL 30.775MHZ RX(-) | 1 | 1 | 1 | | X / 3 |
| L77-1239-05 | N | XTAL 35.150MHZ TX(+) | 1 | 1 | 1 | | X / 3 |
| L77-1238-05 | N | XTAL 34.850MHZ TX(-) | 1 | 1 | 1 | | X / 5 |
| L92-0110-05 | | FERRITE CORE | 2 | 2 | 2 | | L / 38, 39 |
| MA152WA | | CHIP DIODE | 2 | 2 | 2 | | D / 17, 21 |
| MA856 | | DIODE | 5 | 5 | 5 | | D / 6, 7, 8, 9, 15 |
| MI301 | | | 1 | 1 | 1 | | D / 4 |
| RD14CB2C220J | | RES. CARBON 22 OHM 1/6W | 1 | 1 | 1 | | R / 26 |
| RD14CB2C470J | | RES. CARBON 47 OHM 1/6W | 1 | 1 | 1 | | R / 22 |
| RD14BB2C560J | | RES. CARBON 56 OHM 1/6W | 2 | 2 | 2 | | R / 9, 47 |
| RD14CB2C223J | | RES. CARBON 22K OHM 1/6W | 1 | 1 | 1 | | R / 58 |
| RD14BB2C822J | | RES. CARBON 8.2KOHM 1/6W | 1 | 1 | 1 | | R / 13 |
| RD14CB2C103J | | RES. CARBON 10K OHM 1/6W | 1 | 1 | 1 | | R / 56 |
| RD14BB2C222J | | RES. CARBON 2.2KOHM 1/6W | 1 | 1 | 1 | | R / 34 |
| RD14BB2C592J | | RES. CARBON 3.9KOHM 1/6W | 1 | 1 | 1 | | R / 35 |
| RD14BB2C223J | | RES. CARBON 22K OHM 1/6W | 1 | 1 | 1 | | R / 16 |
| RD14CB2C412J | | RES. CARBON 4.7KOHM 1/6W | 2 | 2 | 2 | | R / 99,100 |
| RD14BB2C104J | | RES. CARBON 100KOHM 1/6W | 1 | 1 | 1 | | R / 93 |
| RD14BB2C334J | | RES. CARBON 330KOHM 1/6W | 1 | 1 | 1 | | R / 14 |
| RD73FB2A330J | | CHIP RES. | 33 OHM 1/10W | 1 | 1 | | R / 20 |
| RD73FB2A271J | | CHIP RES. | 270 OHM 1/10W | 1 | 1 | | R / 27 |
| RD73FB2A222J | | CHIP RES. | 2.2KOHM 1/10W | 6 | 6 | | R / 3, 8, 12, 49, 57, 66 |
| RD73FB2A103J | | CHIP RES. | 10K OHM 1/10W | 8 | 8 | | R / 48, 55, 62, 63, 78, 79, 85 |

PARTS LIST

| PART. NO. | NOTE | NAME & DESCRIPTION | DISTINCTION & QUANTITY | | REFERENCE. NO |
|---------------|------|--------------------|------------------------|-----|---------------|
| | | | 011 | 061 | |
| RD73FB2A473J | | CHIP RES. | 47K OHM 1/10W | 4 | 4 |
| RD73FB2A331J | | CHIP RES. | 330 OHM 1/10W | 2 | 2 |
| RD73FB2A563J | | CHIP RES. | 56K OHM 1/10W | 1 | 1 |
| RD73FB2A470J | | CHIP RES. | 47 OHM 1/10W | 1 | 1 |
| RD73FB2A123J | | CHIP RES. | 12K OHM 1/10W | 2 | 2 |
| RD73FB2A560J | | CHIP RES. | 56 OHM 1/10W | 1 | 1 |
| RD73FB2A471J | | CHIP RES. | 470 OHM 1/10W | 4 | 4 |
| RD73FB2A104J | | CHIP RES. | 100KOHM 1/10W | 1 | 1 |
| RD73FB2A272J | | CHIP RES. | 2.7KOHM 1/10W | 2 | 2 |
| RD73FB2A123J | | CHIP RES. | 15K OHM 1/10W | 2 | 2 |
| RD73FB2A154J | | CHIP RES. | 150KOHM 1/10W | 1 | 1 |
| RD73FB2A332J | | CHIP RES. | 3.3KOHM 1/10W | 1 | 1 |
| RD73FB2A101J | | CHIP RES. | 100 OHM 1/10W | 7 | 7 |
| RD73FB2A681J | | CHIP RES. | 680 OHM 1/10W | 1 | 1 |
| RD73FB2A821J | | CHIP RES. | 820 OHM 1/10W | 2 | 2 |
| RD73FB2A183J | | CHIP RES. | 18K OHM 1/10W | 1 | 1 |
| RD73FB2A224J | | CHIP RES. | 220KOHM 1/10W | 2 | 2 |
| RD73FB2A722J | | CHIP RES. | 4.7KOHM 1/10W | 3 | 3 |
| RD73FB2A334J | | CHIP RES. | 330KOHM 1/10W | 1 | 1 |
| RD73FB2A2223J | | CHIP RES. | 22K OHM 1/10W | 2 | 2 |
| RD73FB2A2R2J | | CHIP RES. | 2.2 OHM 1/10W | 1 | 1 |
| RD73FB2A122J | | CHIP RES. | 1.2KOHM 1/10W | 3 | 3 |
| RD73FB2A562J | | CHIP RES. | 5.6KOHM 1/10W | 7 | 7 |
| RD73FB2A121J | | CHIP RES. | 120 OHM 1/10W | 2 | 2 |
| RD73FB2A151J | | CHIP RES. | 150 OHM 1/10W | 1 | 1 |
| RD73FB2A100J | | CHIP RES. | 10 OHM 1/10W | 1 | 1 |
| RD73FB2A220J | | CHIP RES. | 22 OHM 1/10W | 1 | 1 |
| RD73FB2A822J | | CHIP RES. | 8.2KOHM 1/10W | 3 | 3 |
| R92-0670-05 | | CHIP RES. | 0 OHM | 2 | 2 |
| R92-0150-05 | | JUMPER WIRE | | 1 | 1 |
| S50-1425-05 | N | TACT SWITCH | PTT | 1 | 1 |
| TC5082P | | IC | | 1 | 1 |
| TC5081AP | N | IC | | 1 | 1 |
| 1SS133 | | DIODE | | 4 | |
| 1SS133 | | DIODE | | 1 | 1 |
| 1S1555 | | DIODE | | 1 | 1 |
| 1S2588 | | DIODE | | 1 | 1 |
| 1S2208 | | VOLTAGE VARIABLE | | 1 | 1 |
| 2SA1037K(Q) | N | CHIP TR. | | 2 | 2 |
| 2SA1162(Y) | | CHIP TR. | | 1 | 1 |
| 2SA1037K(R) | | CHIP TR. | | 2 | 2 |
| 2SA1162(GR) | | CHIP TR. | | 5 | 5 |
| 2SB698(E,F) | | TR | | 2 | 2 |
| 2SC2714(Y) | | CHIP TR. | | 4 | 4 |
| 2SC1947 | | TR | | 1 | 1 |
| 2SC2053 | | TR | | 1 | 1 |
| 2SC2347 | | TR | | 1 | 1 |
| 2SC2668(Y) | | TR | | 5 | 5 |
| 2SC2671(H) | | TR | | 2 | 2 |
| 2SC2412(Q) | | CHIP TR. | | 4 | 4 |
| 2SC2712(Y) | | CHIP TR. | | 2 | 2 |
| 2SK192A(Y) | | FET | | 1 | 1 |

(A) ? →

TH-21A/AT/E PARTS LIST

IF UNIT (X48-1410-XX) (-11 : K1,K2,M1,M2,M3,M4,X -61 : T,W)

| PART. NO | NOTE | NAME & DESCRIPTION | DISTINCTION & QUANTITY | | REFERENCE. NO |
|---------------|------|--------------------|------------------------|-------|--------------------------------|
| | | | 011 | 061 | |
| CC73FCH1H270J | | CHIP CAP. | 27P 50V | 1 1 | C / 3 |
| CC73FSL1H101J | | CHIP CAP. | 100P 50V | 5 5 | C / 2, 16, 36, 37, 38 |
| CC73FSL1H151J | | CHIP CAP. | 150P 50V | 1 1 | C / 9 |
| CC73FSL1H391J | | CHIP CAP. | 390P 50V | 1 1 | C / 47 |
| CE04CWOJ330M | | ELECTRO CAP. | 33 6.3V | 1 1 | C / 43 |
| CE04CWL1A100M | | ELECTRO CAP. | 10 10V | 2 2 | C / 40, 52 |
| CE04CW1C4R7M | | ELECTRO CAP. | 4.7 16V | 1 1 | C / 33 |
| CE04CW1VR2M | | ELECTRO CAP. | 2.2 35V | 4 4 | C / 19, 21, 34, 44 |
| CK45FB1H102K | | CERAMIC CAP. | 1000P 50V | 1 1 | C / 1 |
| CK73FB1H102K | | CHIP CAP. | 1000P 50V | 20 20 | C / 7, 12, 14, 15, 20, 29, 30 |
| CK73FB1E273K | | CHIP CAP. | 0.027 25V | 1 1 | C / 31, 32, 35, 42, 49, 50, 51 |
| CK73FB1H272K | | CHIP CAP. | 2700P 50V | 1 1 | C / 53, 54, 55, 56, 57, 58 |
| CK73FF1E473Z | | CHIP CAP. | 0.047 25V | 3 3 | C / 23 |
| CK73FB1H682K | | CHIP CAP. | 6800P 50V | 1 1 | C / 45 |
| CK73FB1E223K | | CHIP CAP. | 0.022 16V | 2 2 | C / 4, 8, 11 |
| C90-0888-05 | | TANTALUM | 0.1 16V | 1 1 | C / 46 |
| C90-0889-05 | | TANTALUM | 0.22 16V | 1 1 | C / 13, 17 |
| C90-2006-05 | N | TANTALUM | 0.33 16V | 1 1 | C / 39 |
| C90-0894-05 | | TANTALUM | 0.47 16V | 1 1 | C / 10 |
| C90-2007-05 | N | TANTALUM | 3.3 16V | 1 1 | C / 48 |
| C90-2012-05 | | ELECTRO | 100 10V | 3 3 | C / 18 |
| C90-0891-05 | | TANTALUM | 4.7 16V | 1 1 | C / 22 |
| C91-0488-05 | | CERAMIC CAP. | 0.1 | 2 2 | C / 25, 26, 28 |
| C91-0430-05 | | LAYER CAP. | 0.047 | 1 1 | C / 24 |
| C91-1035-05 | | FILM CAP. | 0.22 63V | 1 1 | C / 5, 6 |
| E11-0420-05 | N | MIC JACK | | 1 1 | C / 41 |
| E11-0421-05 | N | PHONE JACK | | 1 1 | C / 27 |
| L34-2217-05 | | TUNING COIL | 455KHZ | 1 1 | J / 2 |
| L72-0335-05 | N | CERAMIC FILTER | CFU-455E | 1 1 | J / 1 |
| L77-1240-05 | N | CRYSTAL | 15.845MHZ | 1 1 | F / 1 |
| MA152WA | N | CHIP DIODE | | 1 1 | X / 1 |
| MC3359P | IC | ZENER DIODE | 6.8V | 1 1 | D / 4 |
| MTZ6.8JB | | | | 1 1 | Q / 1 |
| NJM4558M | IC | | | 1 1 | D / 3 |
| RD14CB2C472J | | RES. CARBON | 4.7KOHM 1/6W | 2 2 | Q / 6 |
| RD14CB2C103J | | RES. CARBON | 10K OHM 1/6W | 2 2 | R / 30, 31 |
| RD14CB2C104J | | RES. CARBON | 100KOHM 1/6W | 1 1 | R / 15, 17 |
| RD14CB2C684J | | RES. CARBON | 680KOHM 1/6W | 1 1 | R / 9 |
| RD73FB2A102J | | CHIP RES. | 1K OHM 1/10W | 3 3 | R / 20 |
| RD73FB2A152J | | CHIP RES. | 1.5KOHM 1/10W | 1 1 | R / 14, 16, 19 |
| RD73FB2A473J | | CHIP RES. | 1.7K OHM 1/10W | 4 4 | R / 29 |
| RD73FB2A222J | | CHIP RES. | 2.2KOHM 1/10W | 4 4 | R / 18, 36, 38, 39 |
| RD73FB2A823J | | CHIP RES. | 82K OHM 1/10W | 1 1 | R / 4, 26, 33, 34 |
| RD73FB2A223J | | CHIP RES. | 27K OHM 1/10W | 1 1 | R / 13 |
| RD73FB2A470J | | CHIP RES. | 47 OHM 1/10W | 1 1 | R / 35 |
| RD73FB2A104J | | CHIP RES. | 100KOHM 1/10W | 1 1 | R / 12 |
| RD73FB2A822J | | CHIP RES. | 8.2KOHM 1/10W | 1 1 | R / 10 |
| RD73FB2A334J | | CHIP RES. | 330KOHM 1/10W | 1 1 | R / 5 |
| RD73FB2A103J | | CHIP RES. | 10K OHM 1/10W | 4 4 | R / 6 |
| RD73FB2A101J | | CHIP RES. | 100 OHM 1/10W | 1 1 | R / 1, 7, 8, 27 |

PARTS LIST

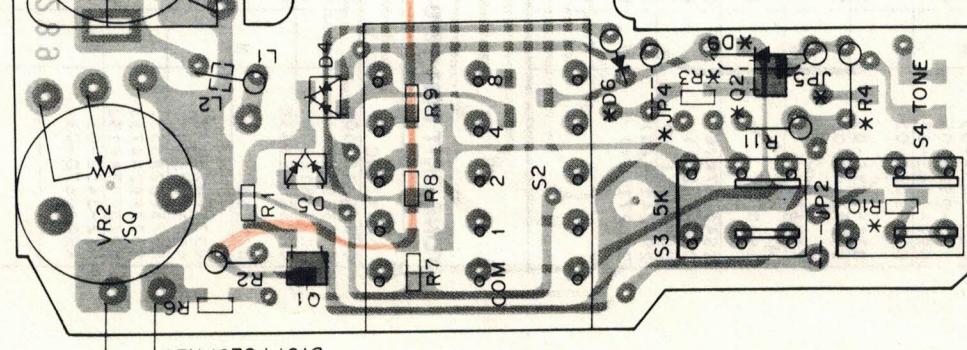
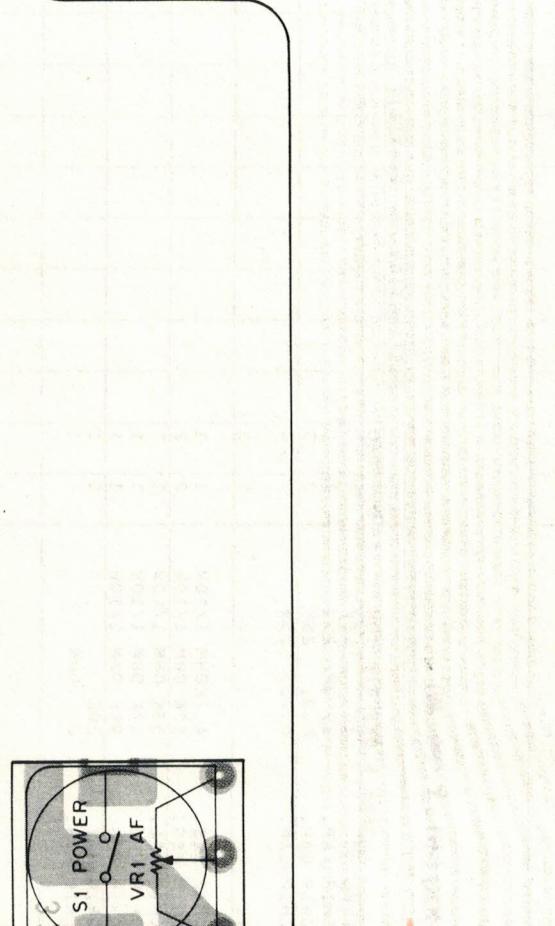
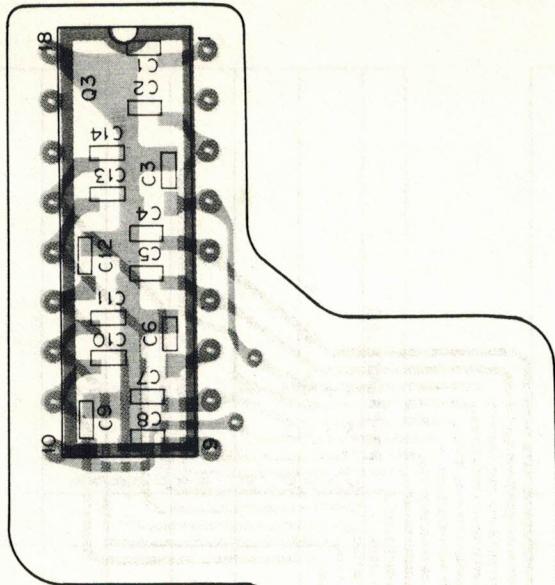
| PART. NO | NOTE | NAME & DESCRIPTION | DISTINCTION & QUANTITY | | REFERENCE NO |
|--------------|------|---------------------------|------------------------|-----|--------------------|
| | | | 011 | 061 | |
| RD73FB2A223J | | CHIP RES- 22K OHM 1/10W | 6 | 6 | R ' 2, 37 |
| RD73FB2A221J | | CHIP RES- 220 OHM 1/10W | 2 | 2 | R ' 25, 32 |
| RD73FB2A333J | | CHIP RES- 33K OHM 1/10W | 2 | 2 | R ' 21, 28 |
| R12-3449-05 | N | TRIM POT 10K | 1 | 1 | VR ' 1 |
| R90-0526-05 | N | RESISTOR BLOCK 27K OHM X4 | 1 | 1 | RB ' 1 |
| R92-1061-05 | | JUMPER WIRE | 5 | | JP ' 1, 2, 6, 7, 8 |
| R92-1061-05 | | JUMPER WIRE | 5 | | JP ' 3, 4, 6, 7, 8 |
| S31-1414-05 | | SLIDE SWITCH HI - LO | 1 | 1 | S ' 1 |
| S31-2409-05 | N | SLIDE SWITCH OFFSET | 1 | 1 | S ' 2 |
| TA7331F | N | IC | 1 | 1 | Q ' 2 |
| 1N60A | | DIODE | 2 | 2 | D ' 1, 2 |
| 2SA1037K(Q) | N | CHIP TR. | 1 | 1 | Q ' 7 |
| 2SA1162(Y) | | CHIP TR. | | | Q ' 7 |
| 2SB698(E,F) | | TR | 1 | 1 | Q ' 3 |
| 2SC2412K(Q) | N | CHIP TR. | 3 | 3 | Q ' 4, 5, 8 |
| 2SC2712(Y) | N | CHIP TR. | | | Q ' 4, 5, 8 |

TONE INIT (X41-1270-XX) (-51 : T -60 : W)

| PART. NO | NOTE | NAME & DESCRIPTION | DISTINCTION | | QUANTITY | REFERENCE . NO |
|--------------|------|--------------------|---------------|-------------|----------|----------------|
| | | | 051 | 060 | | |
| CE04CW1C100M | | ELECTRO CHIP CAP. | 10 3900P 0.01 | 16V 25V 25V | 1 1 3 | C ' 7 |
| CK73FB1H392K | | CHIP CAP. | | | | C ' 6 |
| CK73FB1E103K | | CHIP CAP. | | | | C ' 2, 4, 5 |
| CK73EB1E333K | | CHIP CAP. | 0.033 | 25V | 1 1 | C ' 3 |
| NJ M555M | N | IC | | | 1 1 | Q ' 1 |
| RD73FB2A472J | | CHIP RES. | 4.7KOHM | 1/10W | 1 1 | R ' 2 |
| RD73FB2A123J | | CHIP RES. | 12K OHM | 1/10W | 2 2 | R ' 4, 6 |
| RD73FB2A333J | | CHIP RES. | 33K OHM | 1/10W | 1 1 | R ' 7 |
| RD73FB2A473J | | CHIP RES. | 47K OHM | 1/10W | 1 1 | R ' 5 |
| RD73FB2A913J | | CHIP RES. | 91K OHM | 1/10W | 1 1 | R ' 3 |
| R12-3452-05 | N | TRIM.POT | 20K | | 1 1 | VR ' 1 |
| R92-0670-05 | | CHIP RES. | 0 OHM | | 1 | R ' 8 |

TH-21A/AT/E PC BOARD VIEW

SWITCH UNIT (X41-1590-XX) (-11 : K1,K2,M1,M3
-51 : T -61 : W -71 : M2,M4,X) Component side view



Flexible PC board

| | Q2 | D6,9 | R3,4,10 | JP4 | JP5 |
|-------------|----|------|---------|-----|-----|
| K1,K2,M1,M3 | X | X | X | X | X |
| M2,M4,X | O | X | O | O | O |
| T,W | O | O | O | O | X |

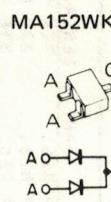
O : Used, X : Not used

Q2

: 2SC2412K(Q) or 2SC2712(Y) Q2 (M2,M4,X,T,W) : 2SC2412K(Q) or 2SC2712(Y) Q3 : TC9122P

D4,5 : MA152WK D6,9 (T,W) : 1SS133

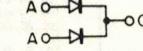
2SA1037
2SA1162
2SC2412
2SC2712



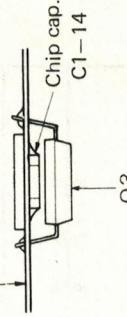
MA152WK



A O -> C

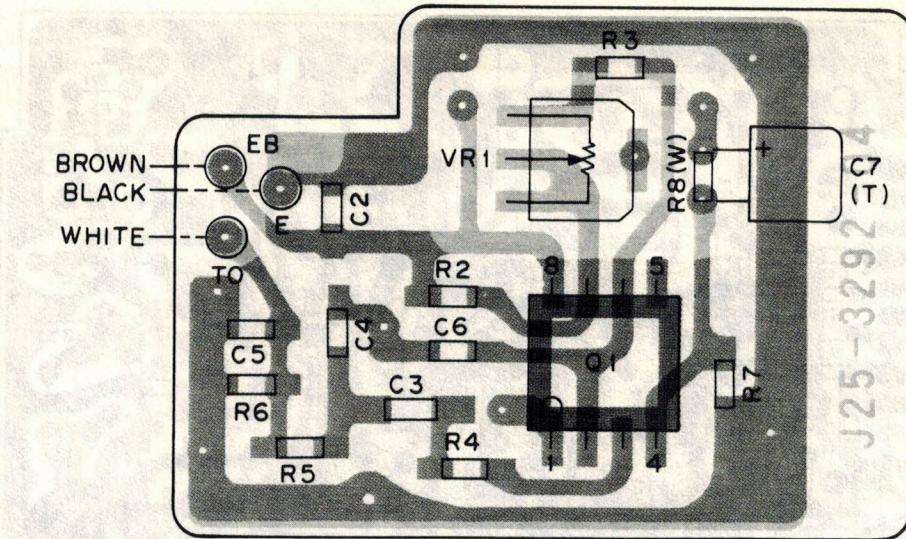


A O -> C



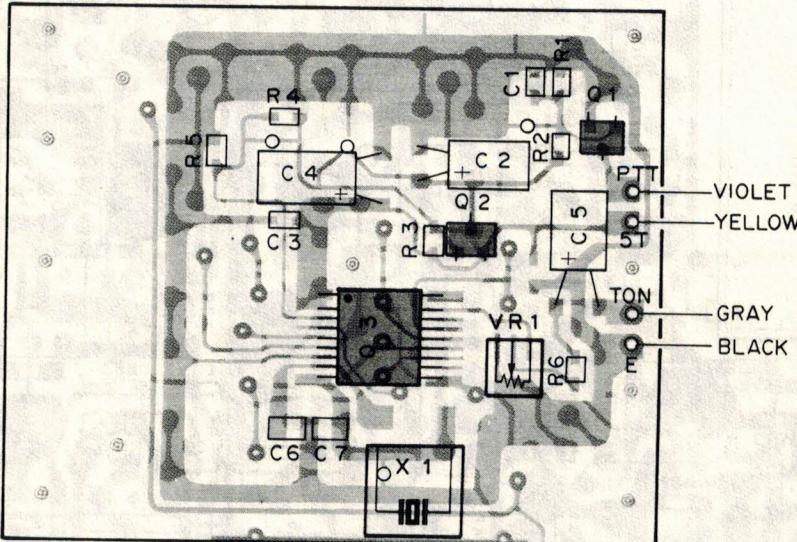
Chip cap.
C1-14

TONE UNIT (X52-1270-XX) (-51 : T -60 : W) Foil side view



Q1 : NJM555M

DTMF UNIT (TH-21AT ONLY) Foil side view



Q1 : 2SC2412K(Q) or 2SC2712(Y)

Q2 : 2SA1037K(Q) or 2SA1162(Y)

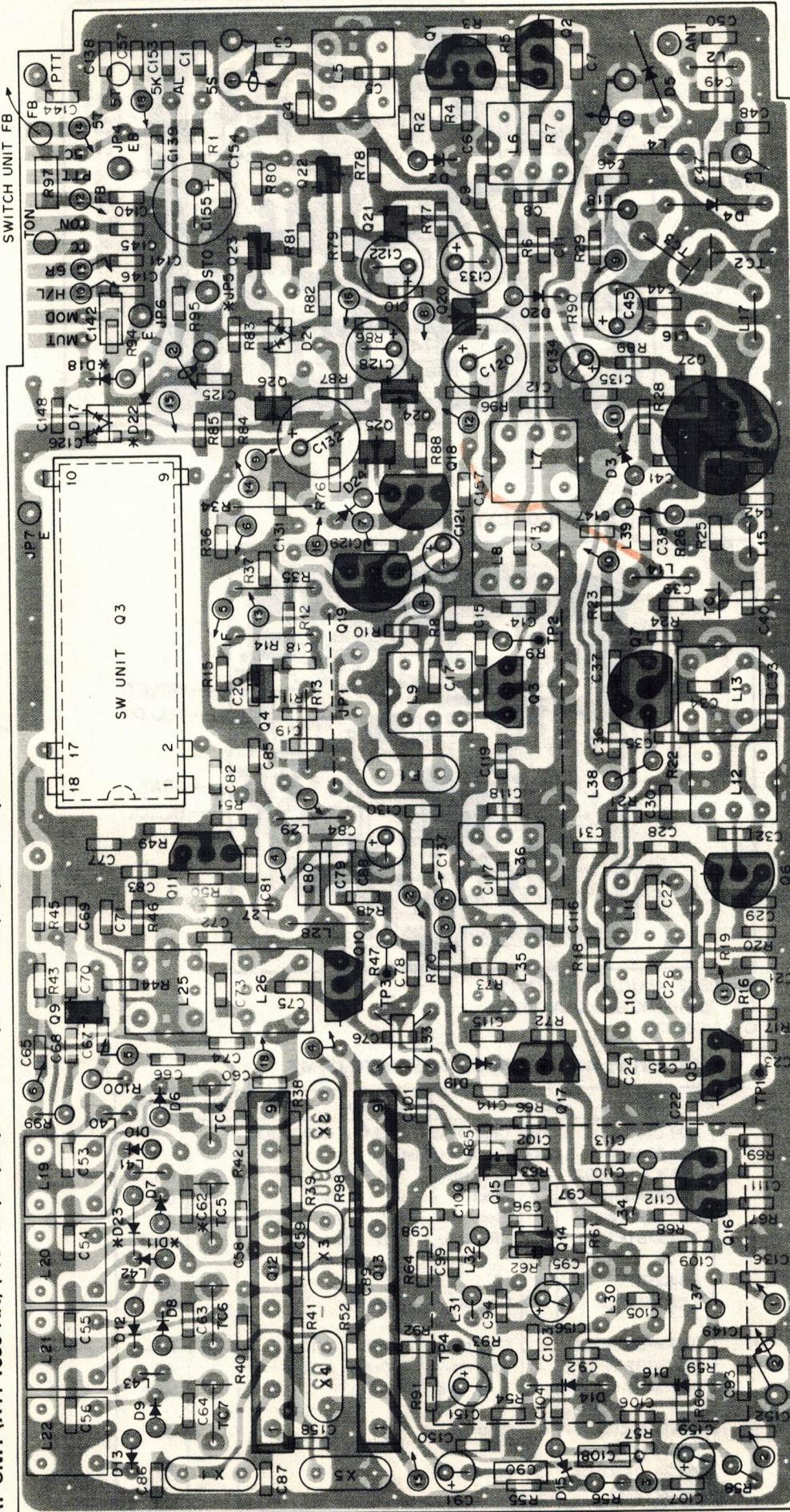
Q3 : LR40872

CASE (TOP) ASS'Y (A09-0402-05) WITH DTMF

| Parts No. | Re-marks | Description | | | Q'ty | Ref. No. |
|------------------------------|----------|-----------------|-----------------|--|------|----------|
| A09-0672-01 | N* | Case (Top) | 146MHz, KENWOOD | | | |
| B42-2344-08 | N* | Key board plate | | | | |
| CC73CH1H300J | | Chip cap. | 30P 50V | | 2 | C6,7 |
| CE04CW0J100M | | Electro | 10 6.3V | | 2 | C2,4 |
| CE04CE1C4R7M | | Electro | 4.7 16V | | 1 | C5 |
| CK73FB1E103K | | Chip cap. | 0.01 25V | | 2 | C1,3 |
| LR40872 | N | IC | | | 1 | Q3 |
| L78-0010-05 | N | Crystal | 3.58MHz | | 1 | X1 |
| RD73FB2A473J | | Chip res. | 47kΩ 1/10W | | 5 | R1-5 |
| RD73FB2A154J | | Chip res. | 150kΩ 1/10W | | 1 | R6 |
| R12-3449-05 | | Trim. pot. | 10kΩ | | 1 | VR1 |
| 2SA1037K(Q) or 2SA1162(Y) | | Chip TR. | | | 1 | Q2 |
| 2SC2412K(Q) or 2SC2712(Y) | | Chip TR. | | | 1 | Q1 |

TH-21A/AT/E PC BOARD VIEW

REINIT(X44-1630-XX)(-1) : K1,K2,M1,M3 -61 : T,W -71 : M2,M4,X) Component side view

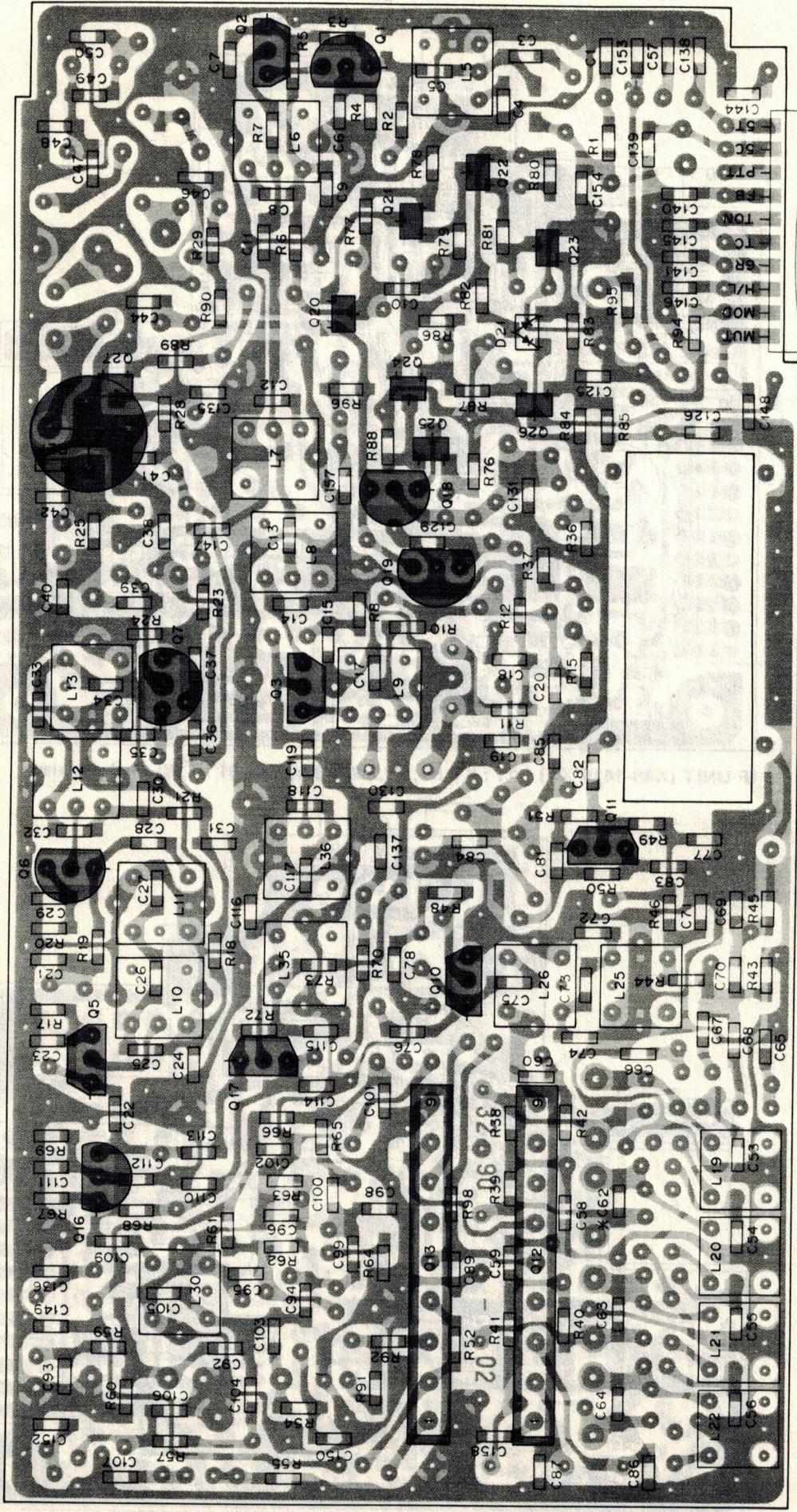


Q1,16 : 2SC2671(H) Q2,5,10,11,17 : 2SC2668(Y) Q3 : 2SK192A(Y) Q4,9,14,15 : 2SC2714(Y) Q6 : 2SC2347 Q7 : 2SC2053 Q8 : 2SC1947 Q12 : TC5082P
 Q13 : TC5081(AP Q18 : 2SB698(E,F) Q19 : LV517 Q20,26 : 2SA1037(K(Q) or 2SA1162(Y) Q21,23,25,27 : 2SC2412(K(Q) or 2SC2712(Y)
 Q22,24 : 2SA1037(K(R) or 2SA1162(G)
 D2,19,20 : 1S133 D3,24 : 1S1555 D4 : MI301 D5 : 1S2588 D6-9,15 : MA856 D10,12,13 : BA282 D11 (**K1,K2,M1,M2,M3,M4,X**) : BA282 D14 : ITT310
 D16 : 1S2208 D17,21 : MA152WA D18,22 (**M2,M4,X,T,W**) : ISS133 D23 (**T,W**) : BA282

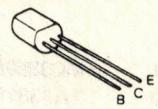
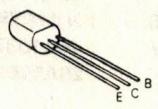
| | D11 | D18,22 | D23 | JPS5 | C62 |
|-------------|-----|--------|-----|------|-----|
| K1,K2,M1,M3 | o | x | x | o | o |
| M2,M4,x | o | o | x | o | o |
| T,W | x | o | o | x | x |

O : Used, X : Not used

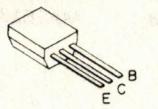
RF UNIT (X44-1630-XX) (-11 : K1,K2,M1,M3 -61 : T,W -71 : M2,M4,X) Foil side view



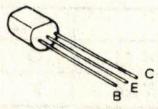
2SC2053

2SB698
2SC2347

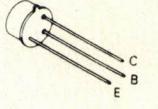
2SC2668



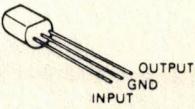
2SC2671



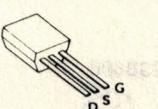
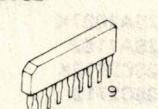
2SC1947



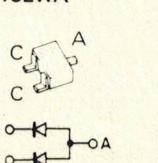
LVC517



2SK192A

TC5081AP
TC5082P2SA1037K
2SA1162
2SC2412K
2SC2712
2SC2714

MA152WA



TH-21A/AT/E PC BOARD VIEWS

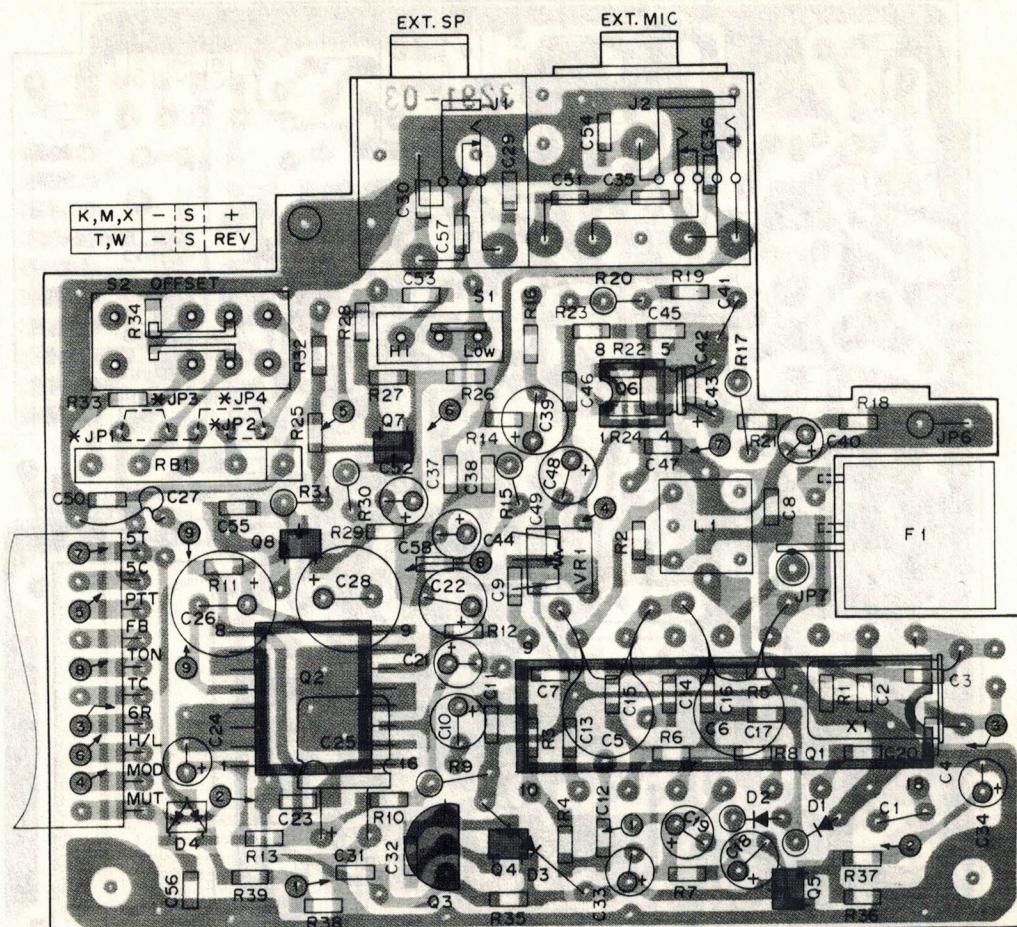
IF UNIT (X48-1410-XX) (-11 : K1,K2,M1,M2,M3,M4,X -61 : T,W) Component side view

Q1 : MC3359P
 Q2 : TA7331F
 Q3 : 2SB698(E,F)
 Q4,5,8 : 2SC2412k(Q) or
 2SC2712(Y)
 Q6 : NJM4558M
 Q7 : 2SA1037K(Q) or
 2SA1162(Y)

 D1,2 : 1N60A
 D3 : MTZ6.8JB
 D4 : MA152WA

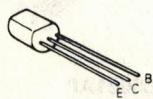
| | JP1,2 | JP3,4 |
|-------|-------|-------|
| K,M,X | O | X |
| T,W | X | O |

O : Used, X : Not used



IF UNIT (X48-1410-XX) (-11 : K1,K2,M1,M2,M3,M4,X -61 : T,W) Foil side view

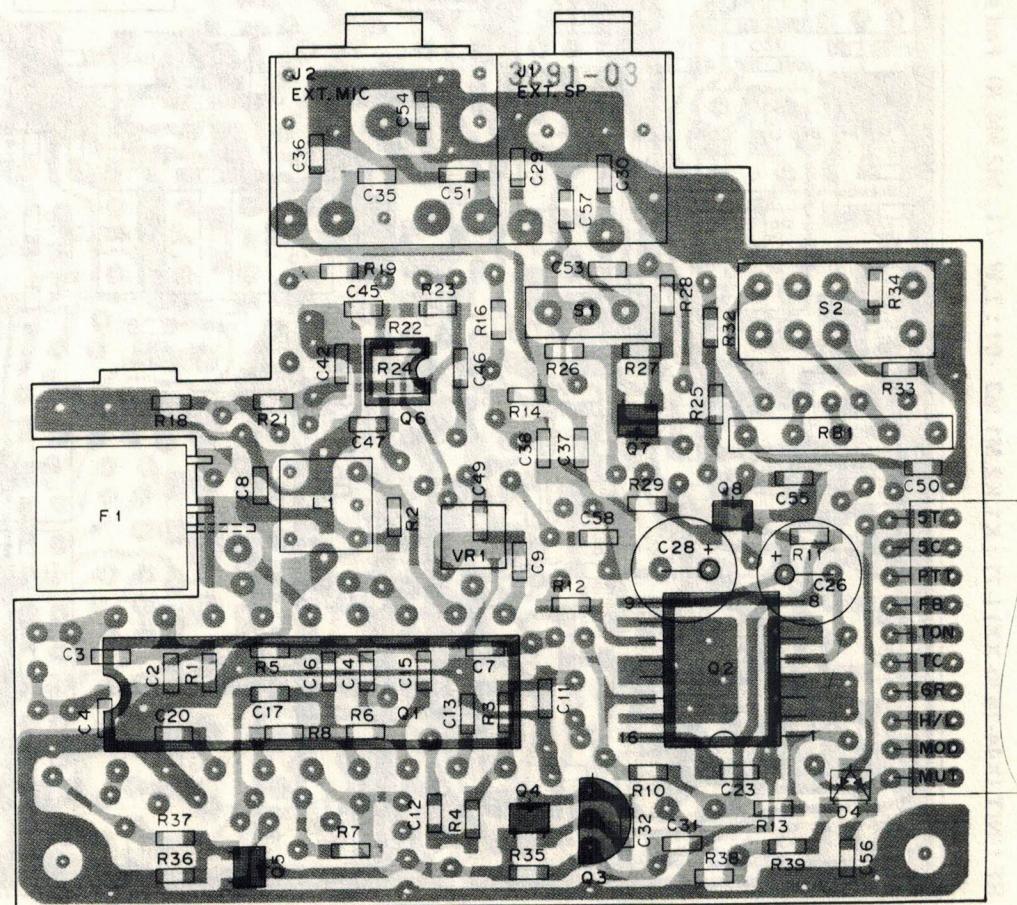
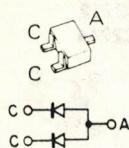
2SB698



2SA1037K
2SA1162
2SC2412K
2SC2712



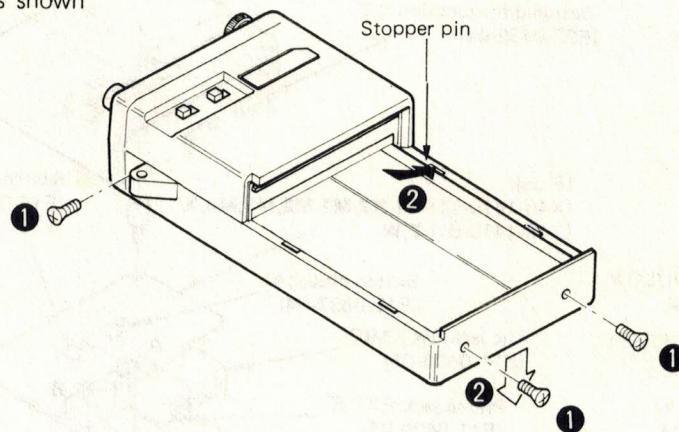
MA152WA



DISASSEMBLY

TOP CASE REMOVE METHOD

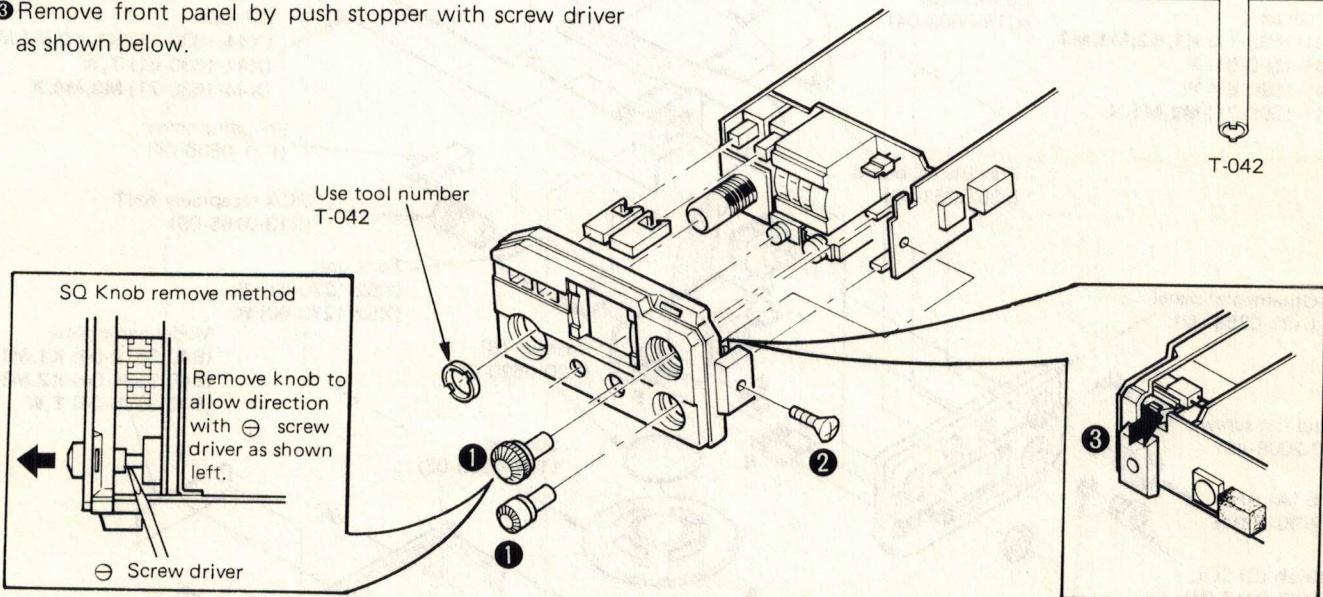
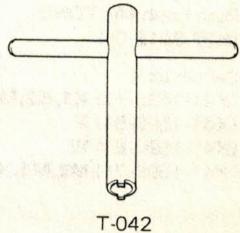
- ① Remove screw (M2 x 5) 3.
- ② Remove front case as allow mark direction holding the stop pin with something \ominus screw driver as shown right.



FRONT PANEL REMOVE METHOD

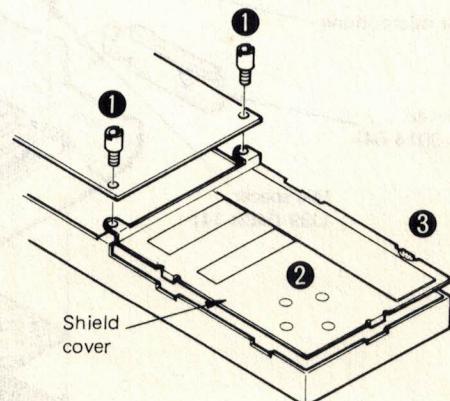
- ① Remove screw on RCA connector and AF, SQ knob.
- ② Remove screw (M2 x 8) 1.
- ③ Remove front panel by push stopper with screw driver as shown below.

TOOL

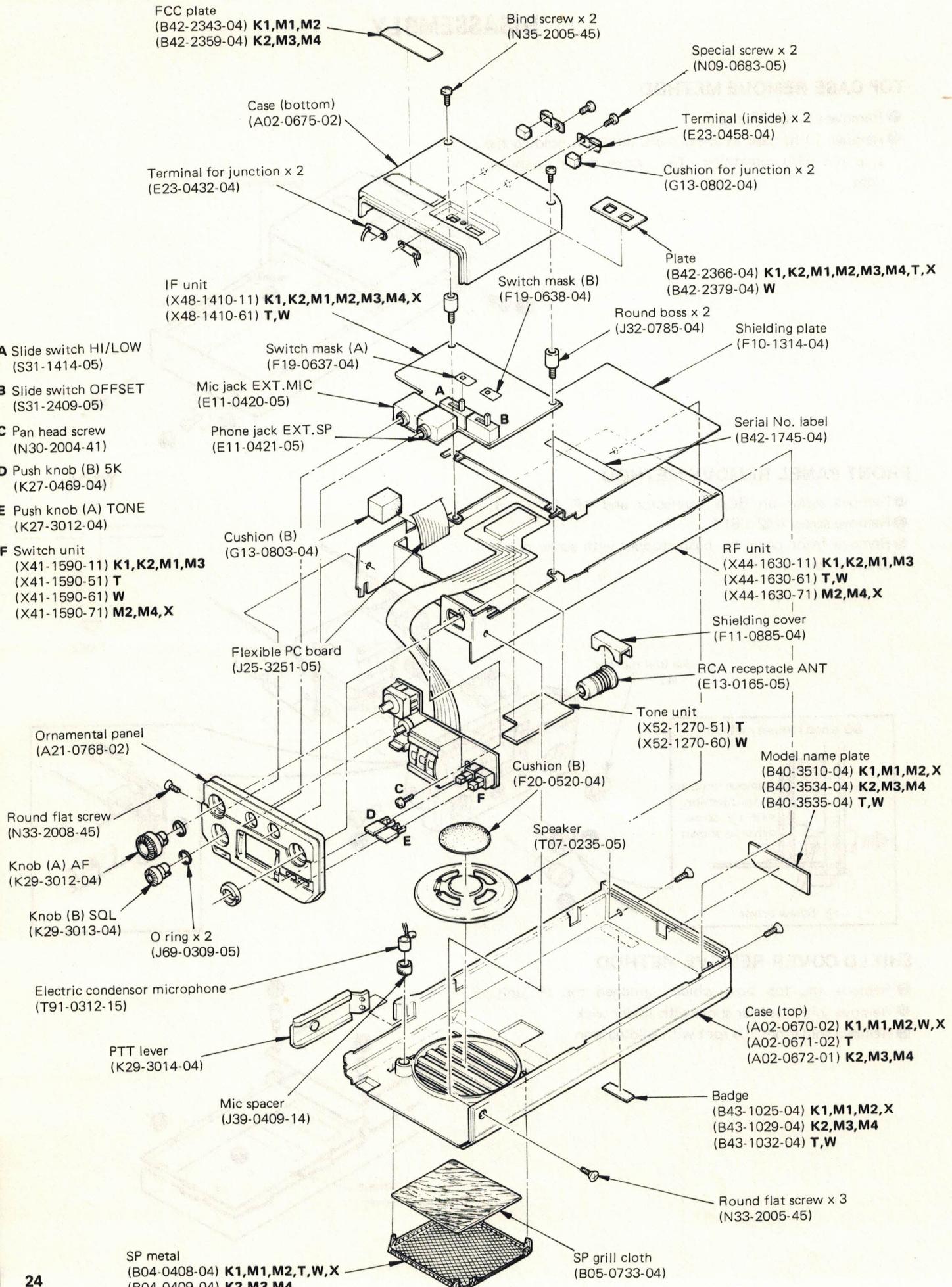


SHIELD COVER REMOVE METHOD

- ① Remove the top boss which tightened the IF unit.
- ② Remove solder at four spots with solder wick.
- ③ Remove solder heating spot with soldering iron.

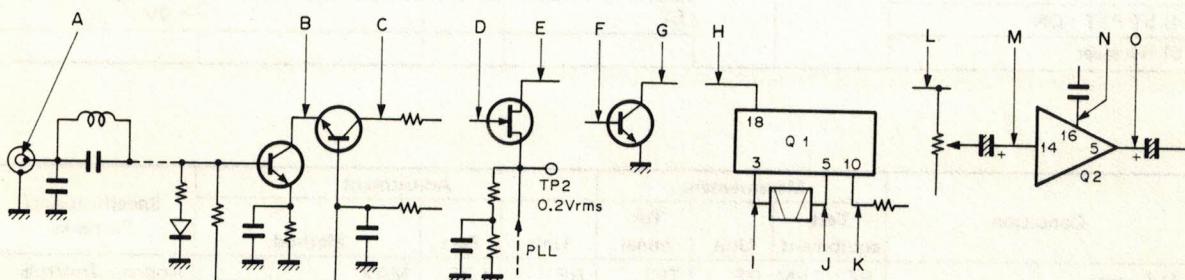
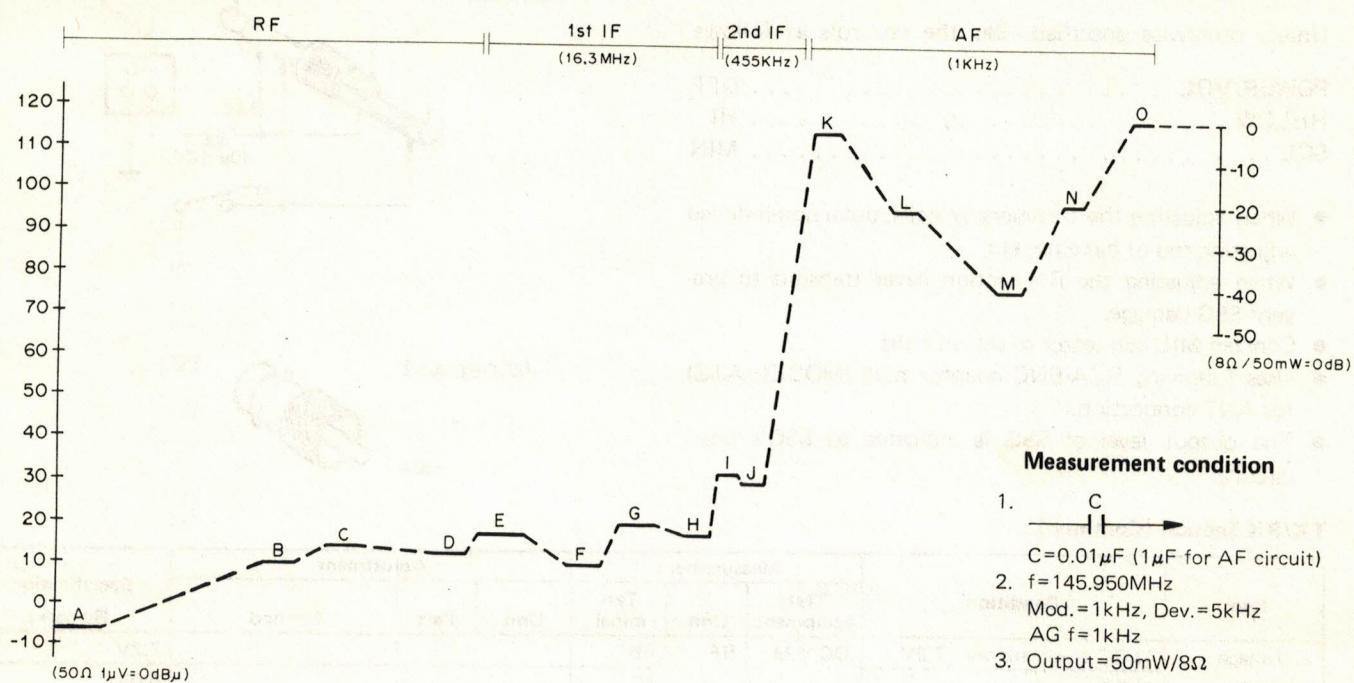


TH-21A/AT/E DISASSEMBLY

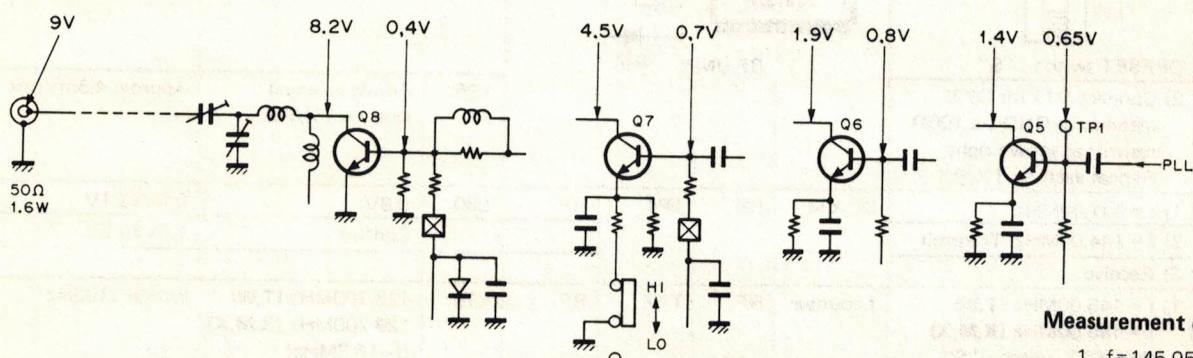


LEVEL DIAGRAM

RX SECTION



TX SECTION



Measurement condition

1. $f = 145.950\text{MHz}$
2. Output = 1.6W

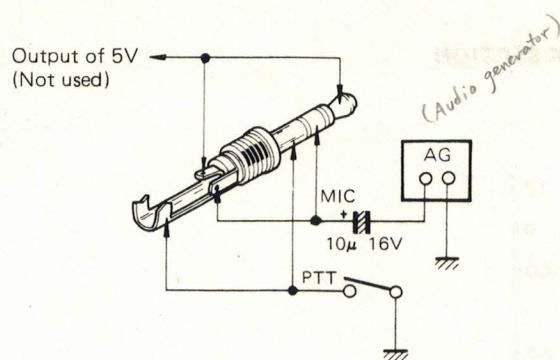
ADJUSTMENT

PREOPERATION

Unless otherwise specified. Set the controls as follows.

POWER/VOL OFF
HI/LOW HI
SQL MIN

- When adjusting the trimmers or coils, use a non-induced adjusting rod of bakelite, etc.
- When adjusting the RX section never transmit to prevent SSG damage.
- Connect MIC connector as shown right.
- Uses following RCA-BNC adaptor plug (MODEL AJ-3) for ANT connection.
- The output level of SSG is indicated as SSG's open circuit.



MODEL AJ-3



BNC-J

RCA

TX/RX Section (Common)

| Item | Condition | Measurement | | | Adjustment | | | Specification/ Remarks |
|------------------|---------------------------|--------------------|------|---------------|------------|------|--------|---------------------------|
| | | Test- equipment | Unit | Ter- minal | Unit | Part | Method | |
| 1. Voltage check | 1) DC power supply : 7.2V | DC V.M | RF | FB | | | | 7.2V |
| | 2) 5C | | | 5C | | | | 5.0V |
| | 3) 6R | | | 6R | | | | 5.7V |
| | 4) 5T PTT : ON | | | 5T | | | | 4.9V |
| | 5) Receiver | | | | | | | |

PLL Section

| Item | Condition | Measurement | | | Adjustment | | | Specifications/ Remarks |
|------------------------|--|-------------------|------|---------------|------------|------------|---|----------------------------|
| | | Test equipment | Unit | Ter- minal | Unit | Part | Method | |
| 1. HET | 1) f: any • Cut wire No.1 or connect to GND at Q15 collector on RF unit. • Turn L26 slug all the way inside. L26 OFFSET switch : "S" | RF VTVM | RF | TP3 | RF | L25, 26 | MAX Repeat couple times. | Approx. 7mVrms |
| | 2) Connect D17 (or D22) cathode to GND via 100Ω resistor as shown right. Repeat each on TX/RX. | | | | | L26 | Adjust to equal level on TX/RX. | |
| 2. PLL voltage setting | 1) f = 141.00MHz | DC VM | RF | TP4 | RF | L30 | 0.9V | 0.9V±0.1V |
| | 2) f = 144.00MHz, Transmit | | | | | | Confirm | 1.6V±0.2V |
| | 3) Receive | | | | | | | |
| 3. RX. f adjustment | 1) f = 145.00MHz (T,W) f = 146.00MHz (K,M,X) OFF SET switch : "S" | f.counter | RF | TP2 | RF | L19 | 128.700MHz (T,W) 129.700MHz (K,M,X) (f-16.3MHz) | Within ±100Hz |
| | 2) 5kHz switch : ON | | | | RF | TC4 | 128.705MHz (T,W) 129.705MHz (K,M,X) | |
| | 3) REV (T,W) only f = 145.00MHz OFF SET switch : REV 5kHz Switch : OFF | | | | RF | L20 | 128.100MHz | |
| | 4) 5kHz switch : ON | | | | RF | TC5 | 128.105MHz | |

ADJUSTMENT

TX Section

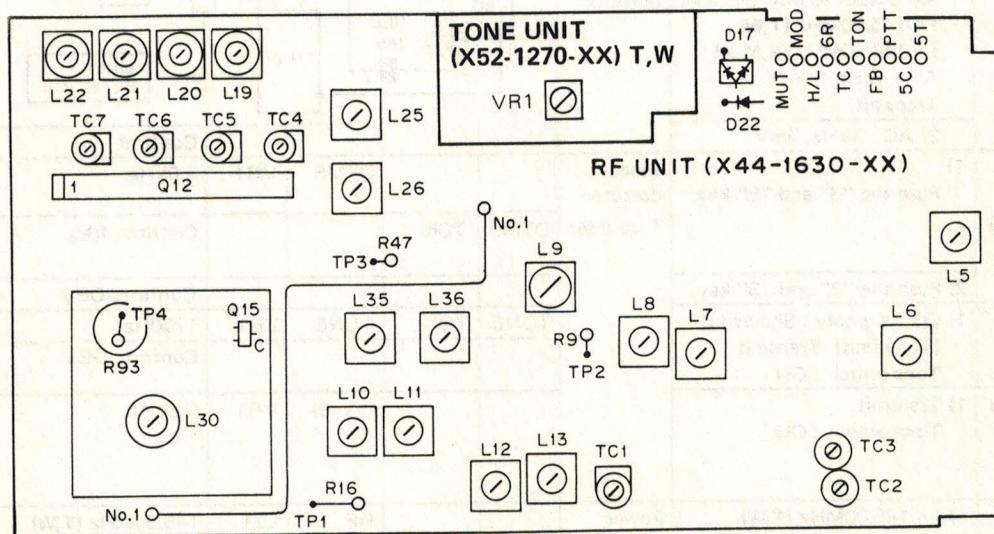
| Item | Condition | Measurement | | | Adjustment | | Specifications/ Remarks |
|--|---|--------------------------------|------|---------------|------------|--|---|
| | | Test-equipment | Unit | Ter- minal | Unit | Part | |
| 1. Power output adjustment | 1) f = 145.00MHz (T,W) f = 146.00MHz (K,M,X) ANT : Connect a power meter HI/LO : HI Transmit Power supply : 7.2V | DC AM | | | RF | L10-13 TC1 | MAX |
| | 2) f = 144.00MHz HI/LO : HI HI/LO : LO | Power meter DC AM (1A) | | ANT | RF | TC1-3 | MAX 1.2W or more 600mA or less |
| | 3) f = 145.96MHz (T,W) f = 147.96MHz (K,M,X) HI/LO : HI HI/LO : LO | Power meter | | | | | Confirm 1.0W or more 600mA or less 0.1-0.2W Approx. 300mA |
| | 4) f = 145.00MHz (T,W) f = 146.00MHz (K,M,X) AG : 1kHz, 50mV Transmit | Power meter | | | | | Confirm 1.0W or more 600mA or less 0.1-0.2W Approx. 300mA |
| | 5) f = 145.00MHz (T,W) f = 146.00MHz (K,M,X) AG : 1kHz, 5mV | Power meter Linear detector | | IF | VR1 | 4.5kHz | 4.5kHz±0.1kHz |
| | 6) f = 145.00MHz (T,W) f = 146.00MHz (K,M,X) AG : 1kHz, 5mV | | | | Coupler | POWER METER | |
| 2. Deviation adjustment | 1) ANT : Power meter and linear detector, use capacitor 10μF/16V between AG output to MIC terminal f = 145.00MHz (T,W) f = 146.00MHz (K,M,X) AG : 1kHz, 50mV Transmit | Power meter Linear detector | | | | | |
| | 2) AG : 1kHz, 5mV | | | | | | |
| 3. Tone encoder (K2,M3,M4) Type only | 1) Push the "3" and "6" key. | Linear detector f. counter | | DTMF | VR1 | 3.0kHz | Within ±0.5kHz |
| | 2) Push the "2" and "3" key. | | DTMF | TON | | Confirm. freq. | 1471.9Hz±5Hz |
| 4. Tone (T,W) type only | 1) (T) type only : Shorted C7 (Tone unit) Transmit Tone switch : ON | | | | | Confirm. DEV | 1.2kHz±0.5kHz |
| | 2) (W) type only : Shorted C7 (Tone unit) Transmit Tone switch : ON | | TONE | TON | TONE | VR1 1750Hz | Within ±17.5Hz 2.5kHz or more |
| 5. Option tone unit (TU-6) used (K,M,X) | 1) Transmit Tone switch : ON | | | (TU-6) | VR1 | 0.5kHz | 0.5-0.6kHz |
| 6. TX f adjustment | 1) f = 145.00MHz (T,W) f = 146.00MHz (K,M,X) OFF SET switch : "S" Transmit | Power meter f. counter | | RF | L21 | 145.00MHz (T,W) 146.00MHz (K,M,X) | Within ±100Hz |
| | 2) 5kHz switch : ON | | | | TC6 | 145.005MHz (T,W) 146.005MHz (K,M,X) | |
| | 3) f = 145.00MHz (T,W) f = 146.00MHz (K,M,X) OFF SET switch : "-" Transmit | | | | L22 | 144.400MHz (T,W) 145.400MHz (K,M,X) | |
| | 4) 5kHz Switch : ON | | | | TC7 | 144.405MHz (T,W) 145.405MHz (K,M,X) | |
| | 5) (K,M,X) type only f = 146.00MHz OFF SET switch : "+" Transmit | | | | L20 | 146.600MHz | |
| | 6) 5kHz switch : ON | | | | TC5 | 146.605MHz | |

ADJUSTMENT

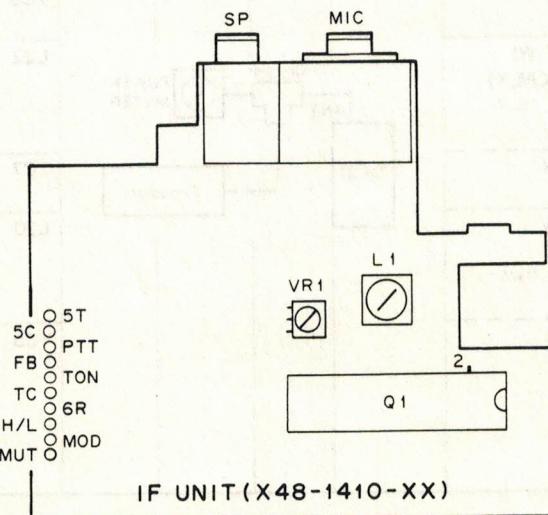
RX Section

| Item | Condition | Measurement | | | Adjustment | | | Specifications/ Remarks |
|----------------|---|--|--------|----------|----------------------|--|---------|----------------------------|
| | | Test-equipment | Unit | Terminal | Unit | Part | Method | |
| 1. Sensitivity | 1) f: any 2) SSG : 145.04MHz (T,W) 146.04MHz (K,M,X) -4~-6dB μ MOD: 1kHz DEV, 5kHz SSG : 0dB μ | f.counter | IF | Q1 - 2 | | | Confirm | 15.845MHz±240Hz |
| S/N | 3) f = 144.00~147.99MHz (K,M,X) f = 144.00~145.99MHz (T,W) | SSG AF V.M. Oscillo-scope 8Ω Dummy load | EXT.SP | RF | L5-8 L9,35, 36 | 8Ω Dummy Load AF V.M. Oscilloscope | MAX | S/N 28dB or more |

TOP VIEW

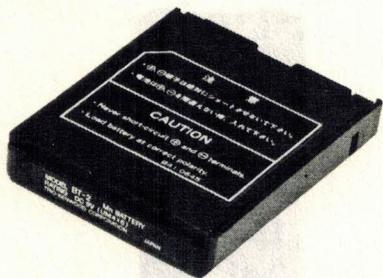


BOTTOM VIEW

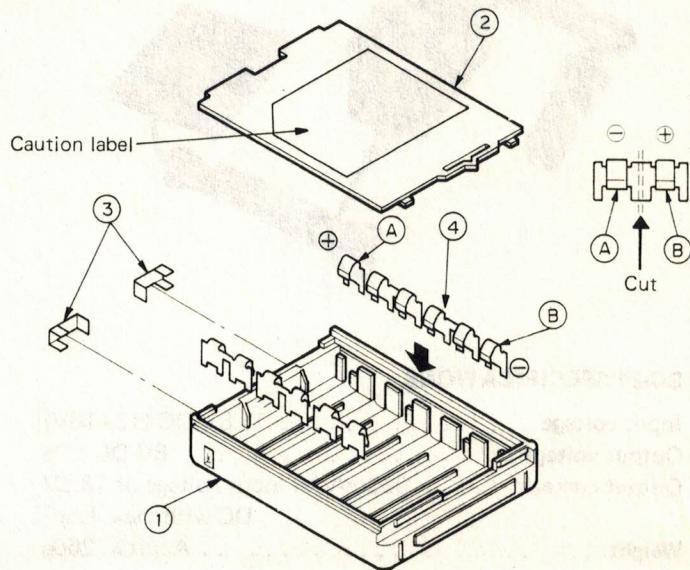


**BT-2 (AAA MANGANESE/ALKALINE BATTERY CASE)/
EB-2 (EXTERNAL C MANGANESE/ALKALINE BATTERY CASE)/
PB-21 (Ni-Cd BATTERY)**

BT-2 OUTSIDE VIEW



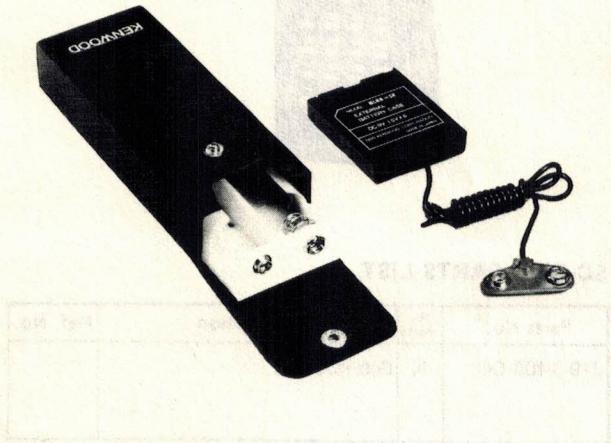
BT-2 DISASSEMBLY



BT-2 PARTS LIST

| Parts No. | Re-marks | Description | Ref. No. |
|-------------|----------|------------------------|----------|
| A02-0677-02 | * | Battery case | 1 |
| A02-0678-03 | * | Battery case cover | 2 |
| E23-0451-04 | | Terminal board (A) x 2 | 3 |
| E23-0452-04 | | Terminal board (B) x 6 | 4 |

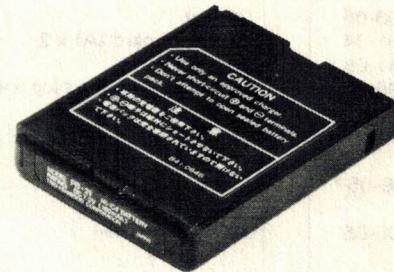
EB-2 OUTSIDE VIEW



EB-2 PARTS LIST

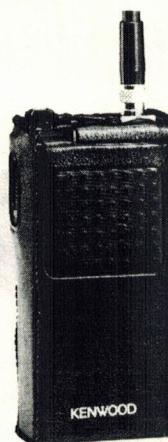
| Parts No. | Re-marks | Description | Ref. No. |
|-------------|----------|-------------------------------|----------|
| A02-0677-02 | * | Battery case | |
| A02-0678-03 | * | Battery case cover | |
| E23-0451-04 | | Terminal board (A) x 2 | |
| E30-1793-05 | N* | Cord ass'y | |
| H25-0103-04 | | Protective bag (Hard case) | |
| H25-0096-04 | | Protective bag (Battery case) | |
| J21-4154-04 | N* | Fied plate (Cord bushing) | |

PB-21 OUTSIDE VIEW



PB-21 SPECIFICATIONS

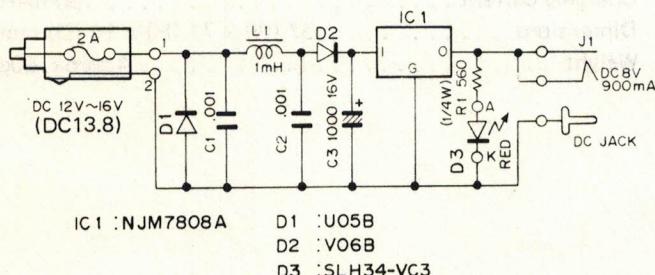
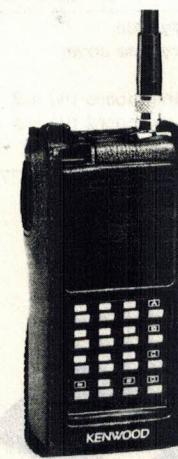
| | |
|----------------------------|--|
| Output voltage | 7.2V |
| Charging current | 36mA (ordinary charging for approx. 8hrs.) |
| Charging current | 180mAH |
| Dimensions | 57 (W) x 71 (H) x 14 (D) mm |
| Weight | Approx. 80g |

DC-21 (DC-DC CONVERTER)/SC-8/8T (SOFT CASE)**DC-21 OUTSIDE VIEW****SC-8 OUTSIDE VIEW****DC-21 SPECIFICATIONS**

| | |
|-----------------------|--|
| Input voltage | 13.8V DC (12–16V) |
| Output voltage | 8V DC ±5% |
| Output current | 900mA (at input voltage of 13.8V DC with max. load) |
| Weight | Approx. 260g |

DC-21 PARTS LIST

| Parts No. | Re-marks | Description | Ref. No. |
|-------------|----------|-----------------------------------|----------|
| A02-0677-02 | * | Battery case | |
| A02-0678-03 | * | Battery case cover | |
| E03-0203-05 | | DC jack | J1 |
| E23-0451-04 | | Terminal board (A) x 2 | |
| E30-1791-05 | N | Cord with plug | |
| E30-1796-05 | | Cord with cigarette plug and fuse | |
| F05-2023-05 | | Fuse 2A | |
| J42-0439-05 | | Cord bushing | |
| L15-0305-05 | | Choke coil 1mH | L1 |
| NJM7808A | | IC | IC1 |
| SLH-34-VC3 | | LED (Red) | D3 |
| U05B | | Diode | D1 |
| V06C | | Diode | D2 |

DC-21 SCHEMATIC DIAGRAM**SC-8T OUTSIDE VIEW****SC-8/8T PARTS LIST**

| Parts No. | Re-marks | Description | Ref. No. |
|-------------|----------|-------------|----------|
| J19-1408-04 | N | Belt hook | |

SMC-30 (SPEAKER MICROPHONE)/ TU-6 (PROGRAMMABLE TONE ENCODER) TH-21A/AT ONLY

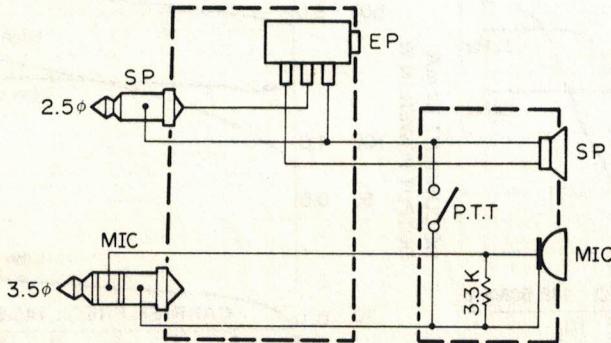
SMC-30 OUTSIDE VIEW



SMC-30 PARTS LIST

| Parts No | Re- marks | Description | Ref. No |
|----------------------------|--------------|------------------------------------|---------|
| E30-1789-05 | N | Curled cord ass'y | |
| J19-1360-08 J42-0429-08 | | Clip metal fitting Cord bushing | |
| K29-3035-08 | N | PTT knob | |
| S50-1408-08 | | Micro switch | |
| T07-0219-08 T97-1024-08 | | Speaker Electret microphone | |

SMC-30 SCHEMATIC DIAGRAM



SMC-30 SPECIFICATIONS

• SPEAKER

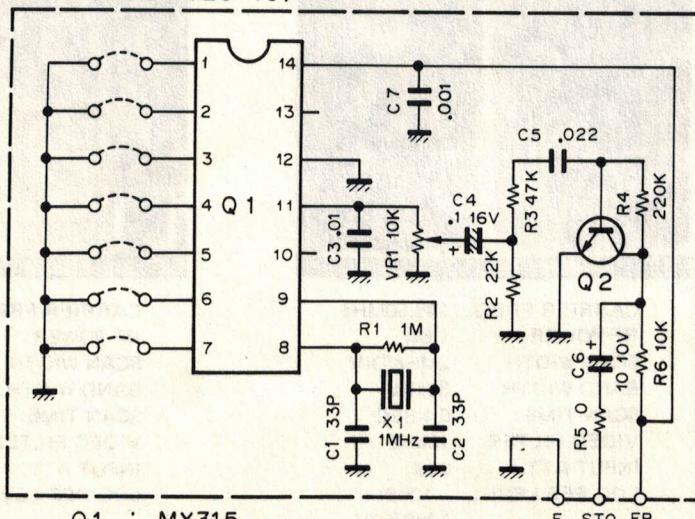
Speaker 40mmφ
Max. Input 0.5W
Input impedance 8Ω

• MICROPHONE

Type Electret condensor
Sensitivity -67dB
Output impedance 2kΩ
Frequency response 200Hz~5kHz
Operating temperature -20°C~+60°C
Dimensions 51W x 73H x 33D (mm)
(Projections excluded)
Weight 130g (Code included)

TU-6 SCHEMATIC DIAGRAM

TU-6 (X52-1320-10)



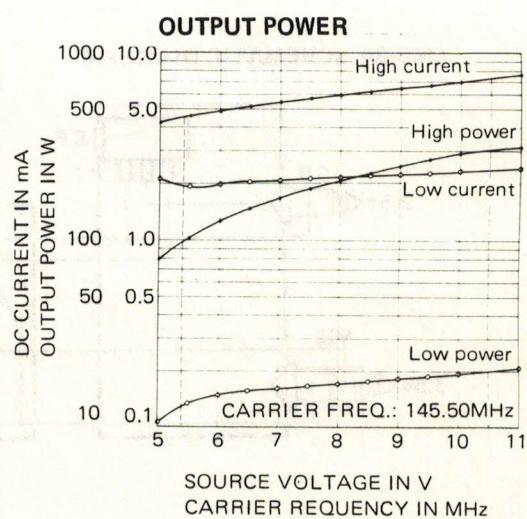
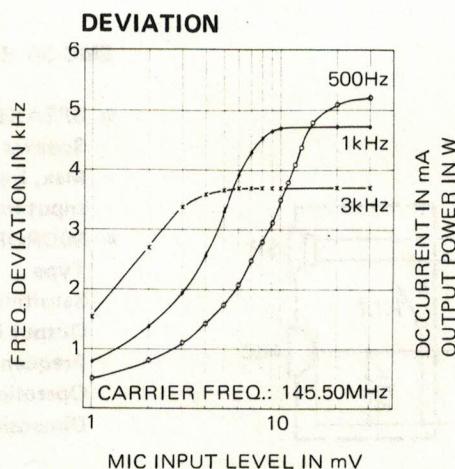
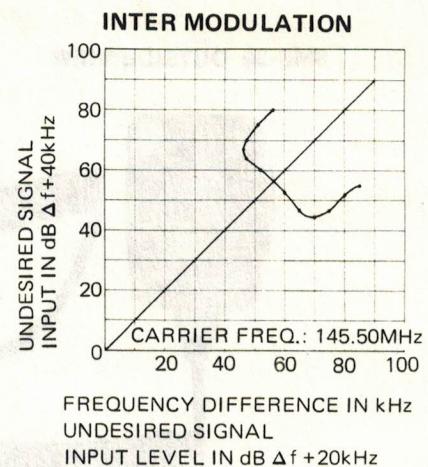
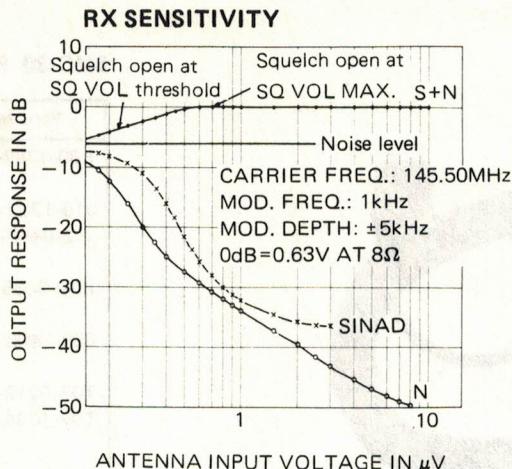
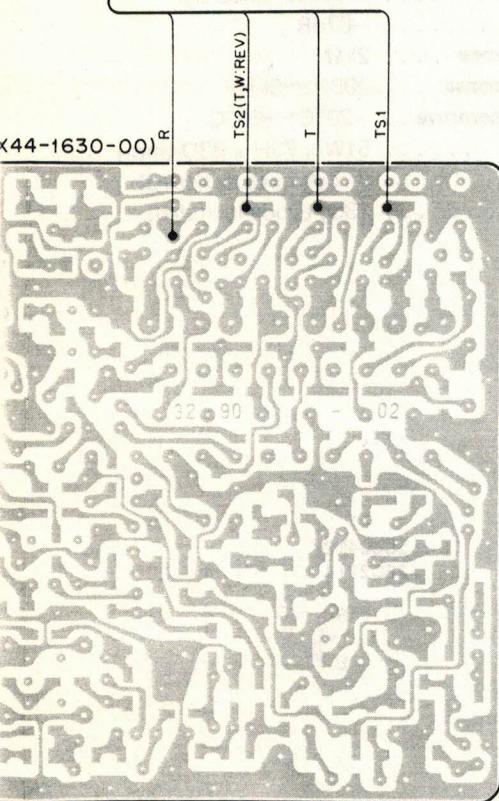
Q1 : MX315

Q2 : 2SC2412K(Q) or 2SC2712(Y)

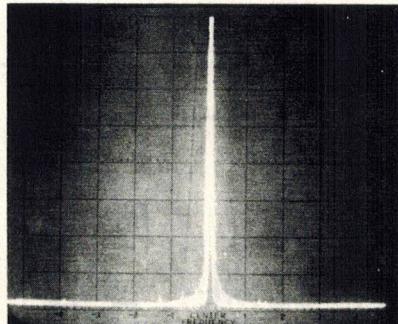
2SC2412K
2SC2712



REFERENCE DATA

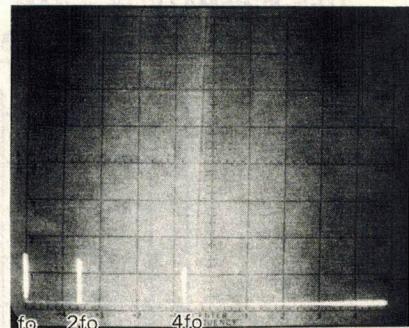


NEAR SPURIOUS RESPONSE



CARRIER FREQ.: 145.50MHz
RF POWER: 1.6W
SCAN WIDTH: 2MHz/DIV
BAND WIDTH: 30kHz
SCAN TIME: 0.1 SEC
VIDEO FILTER: 10kHz
INPUT ATT.: 0dB
LOG REF LEVEL: -10dBm
10dB/DIV

HARMONICS SPURIOUS RESPONSE



CARRIER FREQ.: 145.50MHz
RF POWER: 1.6W
SCAN WIDTH: 100MHz/DIV
BAND WIDTH: 30kHz
SCAN TIME: 2 SEC
VIDEO FILTER: 10kHz
INPUT ATT.: 0dB
LOG REF LEVEL: -10dBm
10dB/DIV

The fundamental signal is reduced by HPF.
(fc : 240MHz)

TU-6 (PROGRAMMABLE TONE ENCODER) TH-21A/AT ONLY

TU-6 SPECIFICATIONS

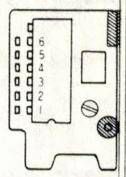
| | |
|------------------------------|---|
| Oscillator frequency | 1MHz ± 0.1% |
| Usable frequency range | 37 EIA Specification Group Frequencies (67.0–250.3Hz) |
| Weight | 3g |
| | |

TU-6 TONE FREQUENCY CHART

Setting the frequency

Cut and connect pins 1–6 of the IC to the PC board pattern by soldering to set the frequency.

- "0" in the table indicates the connection.
- "1" in the table indicates the disconnection.



| # | EIA Specification Group | Hz | Program Lines (ON...1, OFF...0) | | | | | | # | EIA Specification Group | Hz | Program Lines (ON...1, OFF...0) | | | | | |
|------|-------------------------|----|---------------------------------|---|---|---|---|---|------|-------------------------|----|---------------------------------|---|---|---|---|---|
| | | | 1 | 2 | 3 | 4 | 5 | 6 | | | | 1 | 2 | 3 | 4 | 5 | 6 |
| 1 A | 67.0 | 1 | 1 | 1 | 1 | 1 | 1 | | 21 A | 141.3 | 1 | 0 | 0 | 0 | 0 | 0 | |
| 2 B | 71.9 | 1 | 1 | 1 | 0 | 1 | | | 22 B | 146.2 | 0 | 1 | 1 | 1 | 0 | 1 | |
| 3 C | 74.4 | 1 | 1 | 1 | 0 | 1 | 1 | | 23 A | 151.4 | 0 | 1 | 1 | 1 | 0 | 0 | |
| 4 A | 77.0 | 1 | 1 | 1 | 1 | 0 | 0 | | 24 B | 156.7 | 0 | 1 | 1 | 0 | 0 | 1 | |
| 5 C | 79.7 | 1 | 1 | 0 | 1 | 1 | 1 | | 25 A | 162.2 | 0 | 1 | 1 | 0 | 0 | 0 | |
| 6 B | 82.5 | 1 | 1 | 1 | 0 | 0 | 1 | | 26 B | 167.9 | 0 | 1 | 0 | 1 | 0 | 1 | |
| 7 C | 85.4 | 1 | 1 | 0 | 0 | 1 | 1 | | 27 A | 173.8 | 0 | 1 | 0 | 1 | 0 | 0 | |
| 8 A | 88.5 | 1 | 1 | 1 | 0 | 0 | 0 | | 28 B | 179.9 | 0 | 1 | 0 | 0 | 0 | 1 | |
| 9 C | 91.5 | 1 | 0 | 1 | 1 | 1 | 1 | | 29 A | 186.2 | 0 | 1 | 0 | 0 | 0 | 0 | |
| 10 B | 94.8 | 1 | 1 | 0 | 1 | 0 | 1 | | 30 B | 192.8 | 0 | 0 | 1 | 1 | 0 | 1 | |
| 11 A | 100.0 | 1 | 1 | 0 | 1 | 0 | 0 | | 31 A | 203.5 | 0 | 0 | 1 | 1 | 0 | 0 | |
| 12 B | 103.5 | 1 | 1 | 0 | 0 | 0 | 1 | | 32 B | 210.7 | 0 | 0 | 1 | 0 | 0 | 1 | |
| 13 A | 107.2 | 1 | 1 | 0 | 0 | 0 | 0 | | 33 A | 218.1 | 0 | 0 | 1 | 0 | 0 | 0 | |
| 14 B | 110.9 | 1 | 0 | 1 | 1 | 0 | 1 | | 34 B | 225.7 | 0 | 0 | 0 | 1 | 0 | 1 | |
| 15 A | 114.8 | 1 | 0 | 1 | 1 | 0 | 0 | | 35 A | 233.6 | 0 | 0 | 0 | 1 | 0 | 0 | |
| 16 B | 118.8 | 1 | 0 | 1 | 0 | 0 | 1 | | 36 B | 241.8 | 0 | 0 | 0 | 0 | 0 | 1 | |
| 17 A | 123.0 | 1 | 0 | 1 | 0 | 0 | 0 | | 37 A | 250.3 | 0 | 0 | 0 | 0 | 0 | 0 | |
| 18 B | 127.3 | 1 | 0 | 0 | 1 | 0 | 1 | | | | | | | | | | |
| 19 A | 131.8 | 1 | 0 | 0 | 1 | 0 | 0 | | | | | | | | | | |
| 20 B | 136.5 | 1 | 0 | 0 | 0 | 0 | 1 | | | | | | | | | | |

TU-6 PARTS LIST

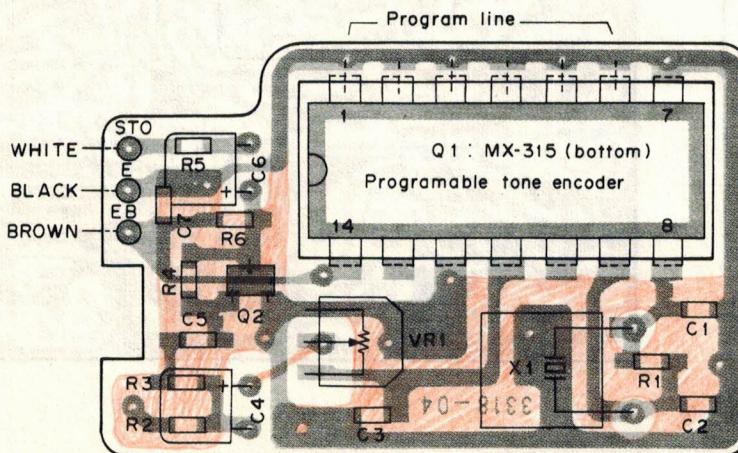
| Parts No. | Re-marks | Description | Ref. No. | Q'ty |
|---------------------|----------|--------------------|----------|------|
| TU-6 GENERAL | | | | |
| B50-4178-00 | N | Instruction manual | | 1 |
| G13-0806-04 | N | Cushion | | 1 |
| H25-0029-04 | | Protective bag | | 1 |
| X52-1320-10 | N | Tone unit | | 1 |

TONE UNIT (X52-1320-10)

| | | | | |
|------------------------------|---------------|---------|-------|---|
| CC73FCH1H330J | Chip cap. | 33P | C1, 2 | 2 |
| CE04CW1A100M | Electro | 10 10V | C6 | 1 |
| CK73FB1E103K | Chip cap. | 0.01 | C3 | 1 |
| CK73FB1E223K | Chip cap. | 0.022 | C5 | 1 |
| CK73FB1H102K | Chip cap. | 0.001 | C7 | 1 |
| C90-0888-05 | Tantalum | 0.1 16V | C4 | 1 |
| L77-0982-05 | Crystal | 1MHz | X1 | 1 |
| RD73FB2A103J | Chip resistor | 10kΩ | R6 | 1 |
| RD73FB2A105J | Chip resistor | 1MΩ | R1 | 1 |
| RD73FB2A223J | Chip resistor | 22kΩ | R2 | 1 |
| RD73FB2A224J | Chip resistor | 220kΩ | R4 | 1 |
| RD73FB2A473J | Chip resistor | 47kΩ | R3 | 1 |
| R12-3449-05 | Trim. pot. | 10kΩ(B) | VR1 | 1 |
| R92-0670-05 | Chip resistor | 0Ω | R5 | 1 |
| MX315 | IC | | Q1 | 1 |
| 2SC1412K(Q) or 2SC2712(Y) | TR | | Q2 | 1 |

TU-6 PC BOARD VIEW

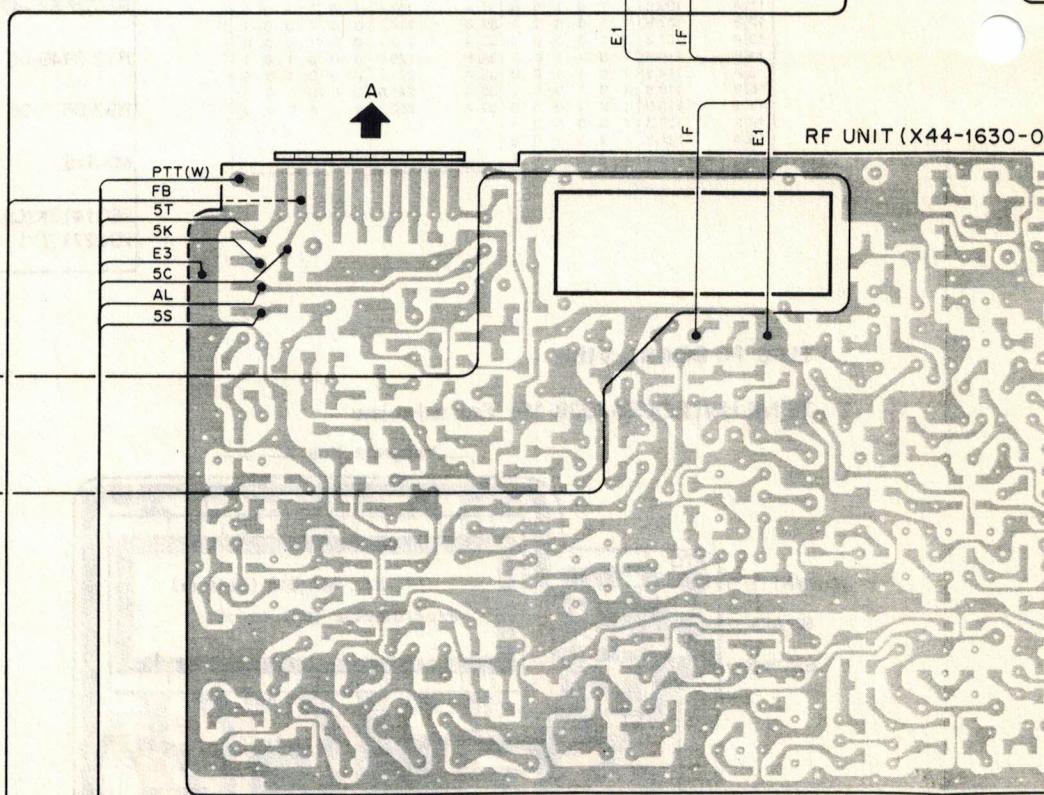
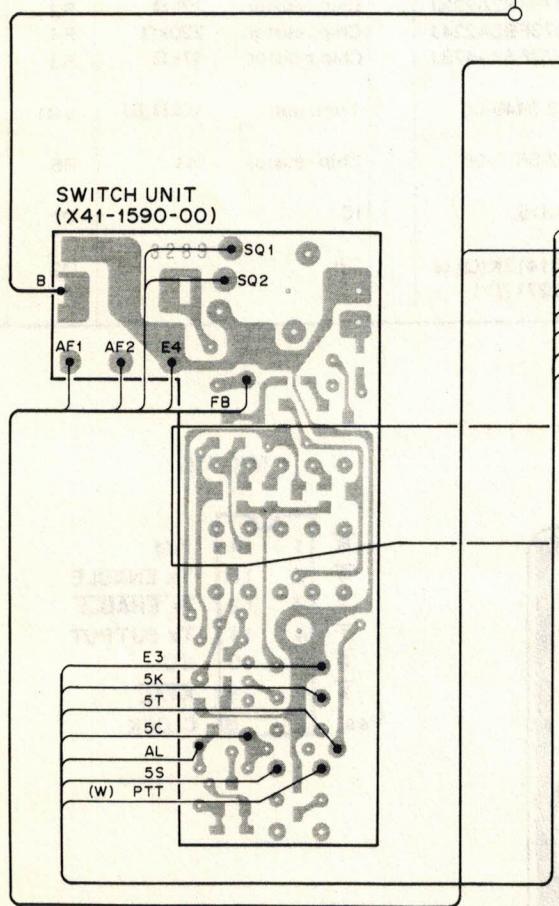
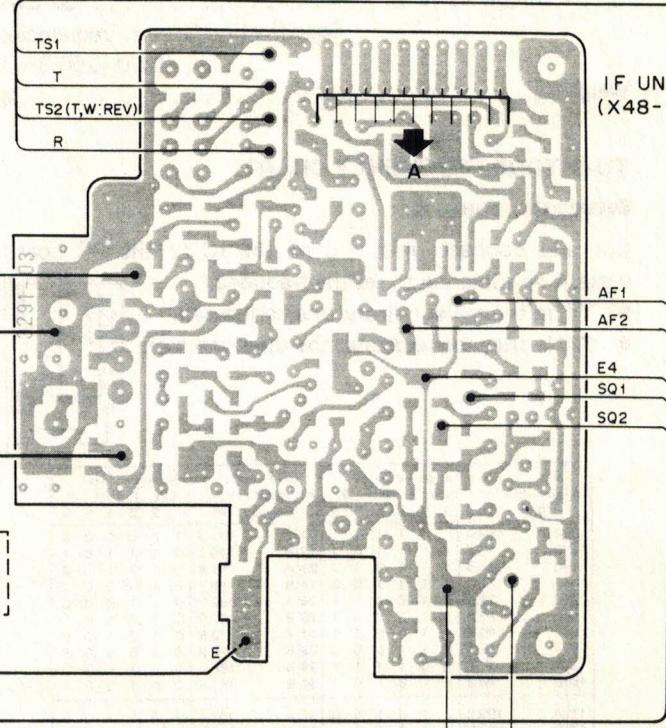
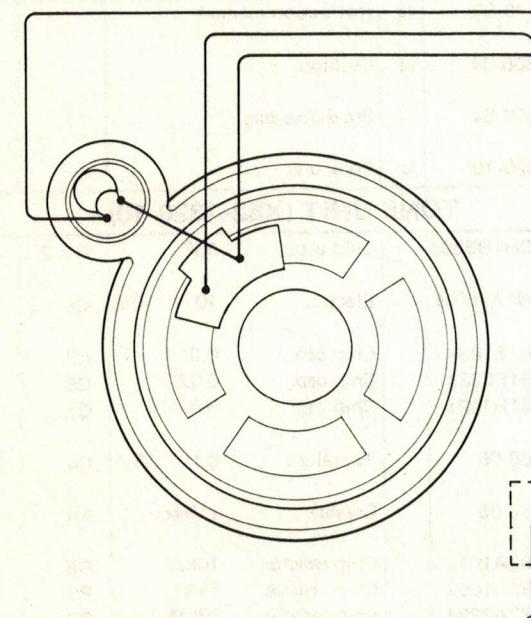
TONE UNIT (X52-1320-10) Foil side view



Q1 : MX315 Q2 : 2SC2412K(Q) or 2SC2712(Y)

MX-315

| | | | |
|-----|---|----|-----------|
| 8 | 1 | 14 | Vdd |
| 4 | 2 | 13 | Tx ENABLE |
| 2 | 3 | 12 | Tx ENABLE |
| 1 | 4 | 11 | Tx OUTPUT |
| X | 5 | 10 | NC |
| Y | 6 | 9 | XTAL |
| Vss | 7 | 8 | CLOCK |



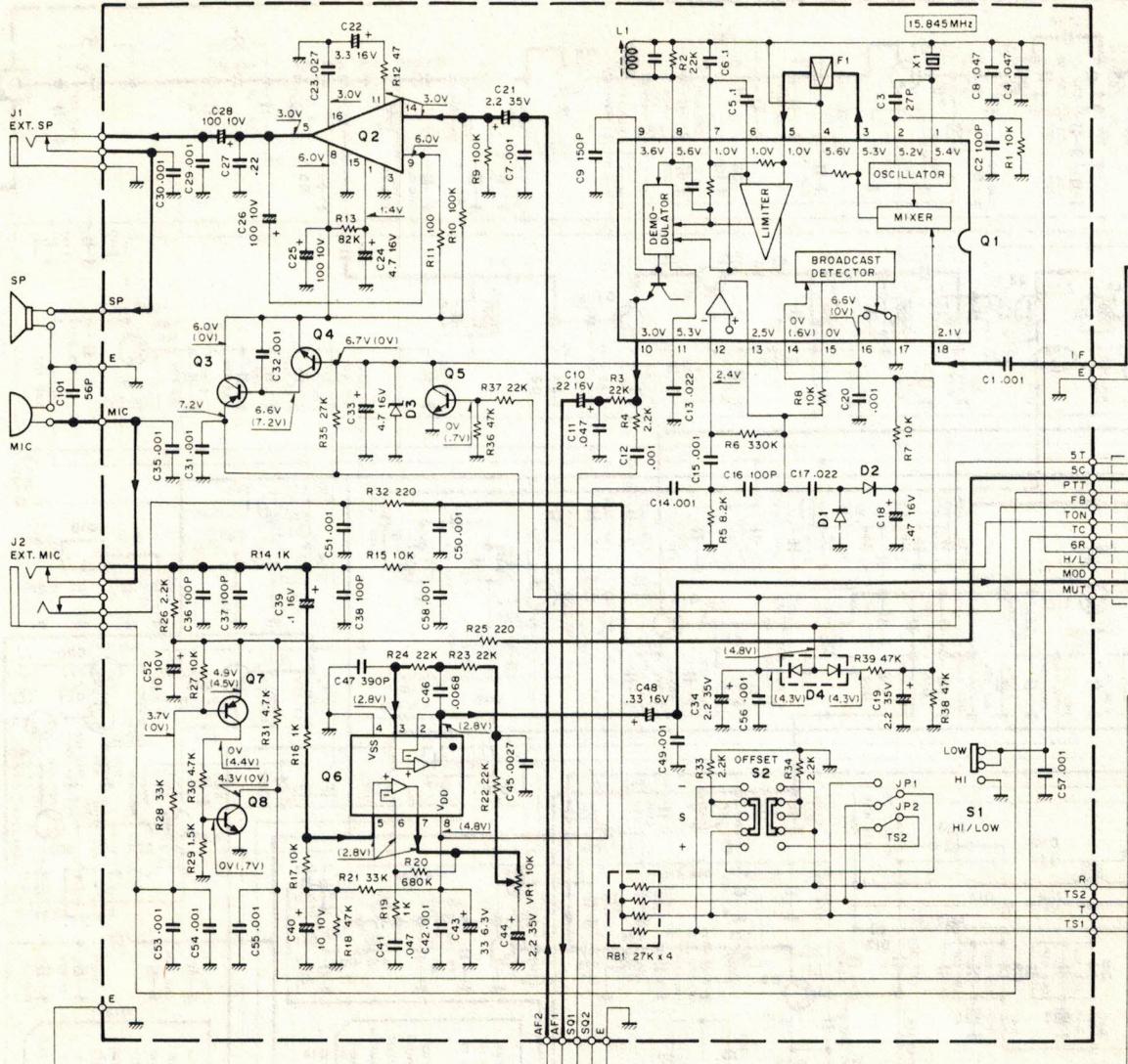
Signal line

Control line

Common DC line

Voltage measurement conditions f = 145.50MHz, RX

IF UNIT (X48-1410-11)

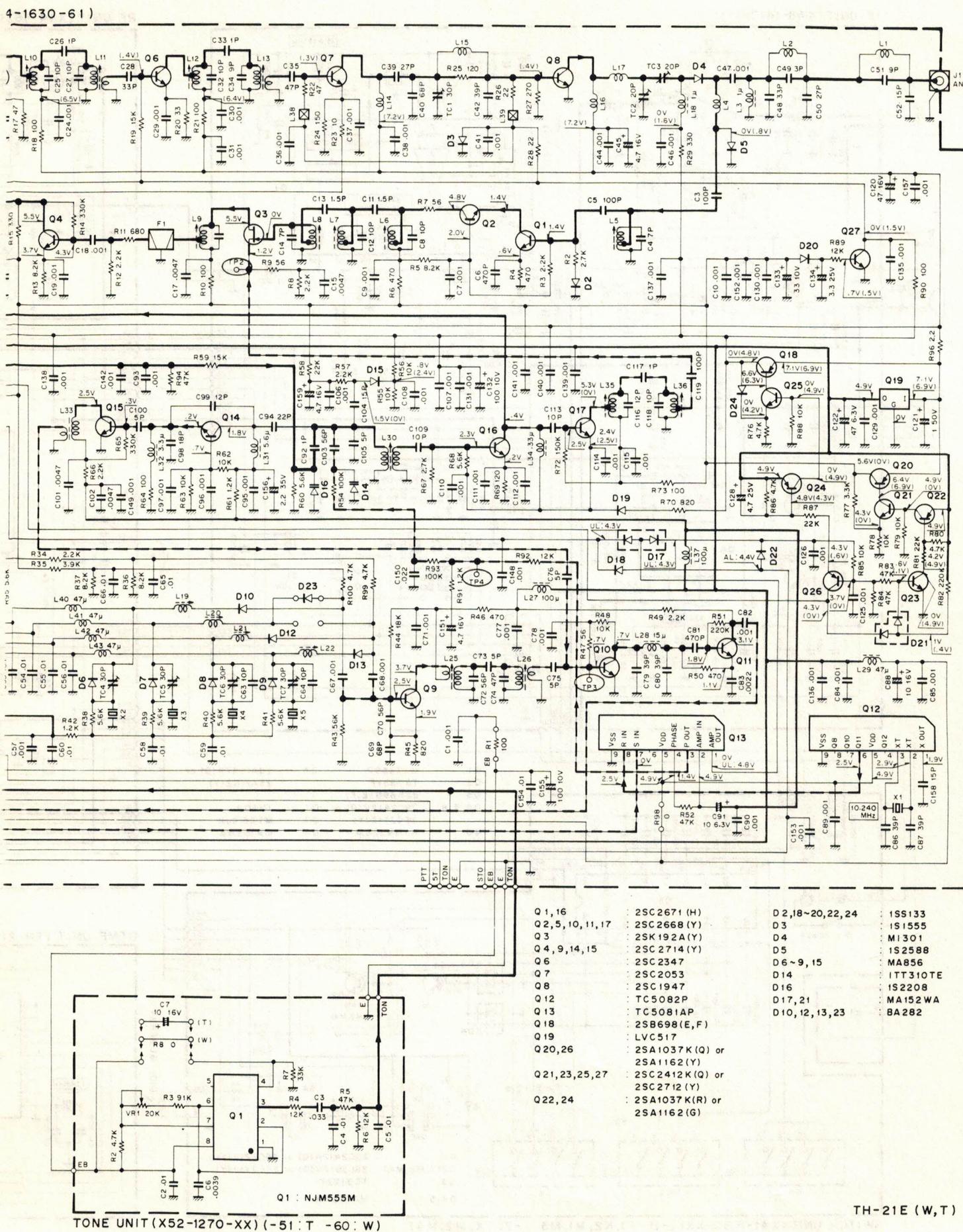


Signal line

Control line

Common DC line

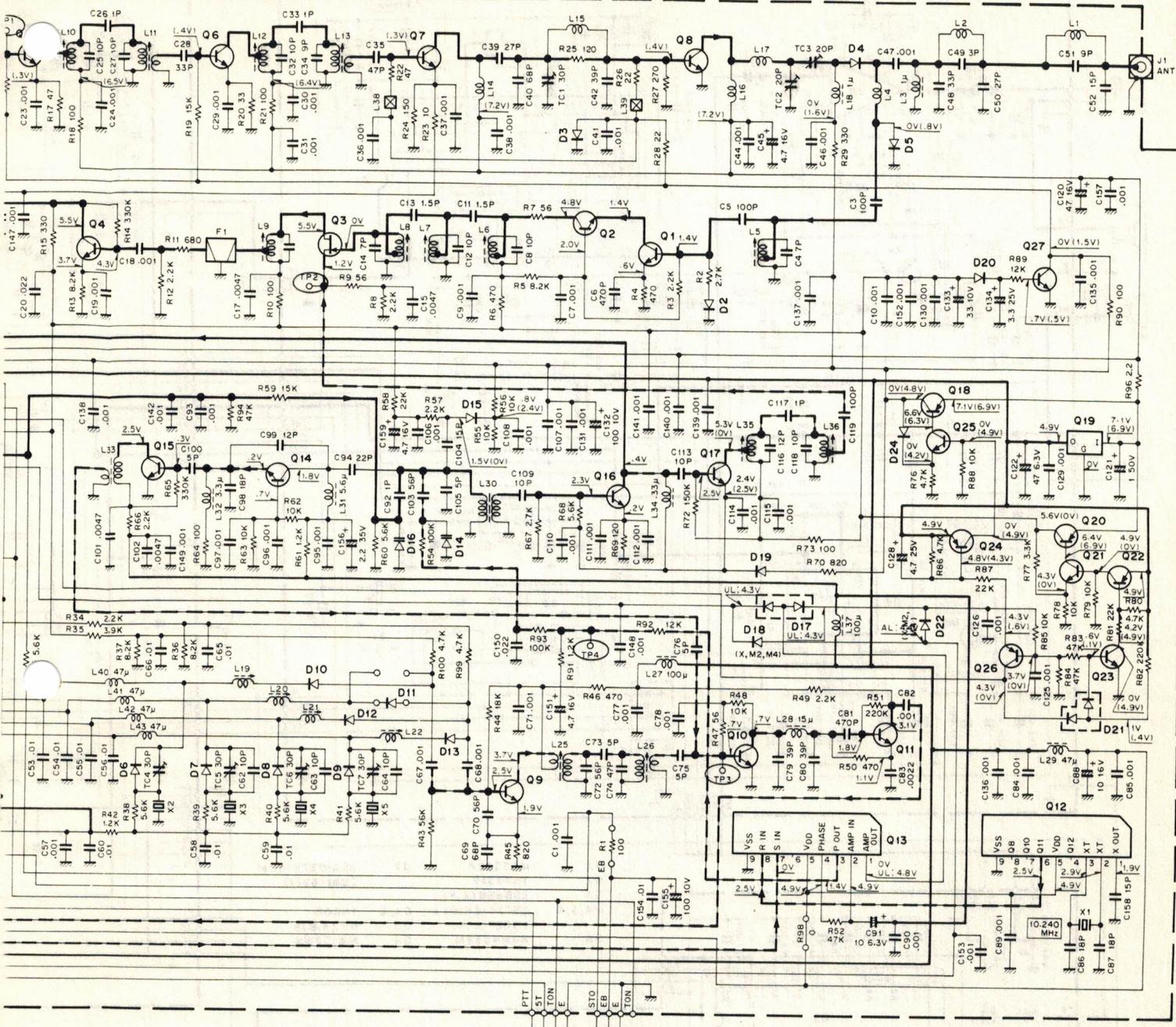
Voltage measurement conditions f=145.50MHz, RX no signal, () : TX.



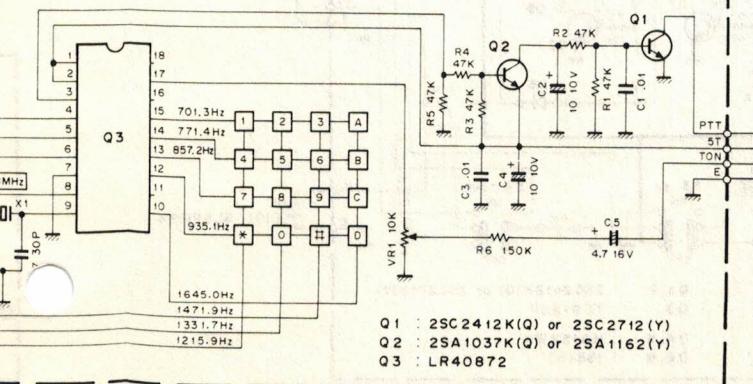
TH-21A/AT SCHEMATIC DIAGRAM

50MHz, RX no signal, () : TX.

(X44-1630-XX) (-11: K1, K2, M1, M3 - 71: X, M2, M4)



IT (TH-21AT ONLY)



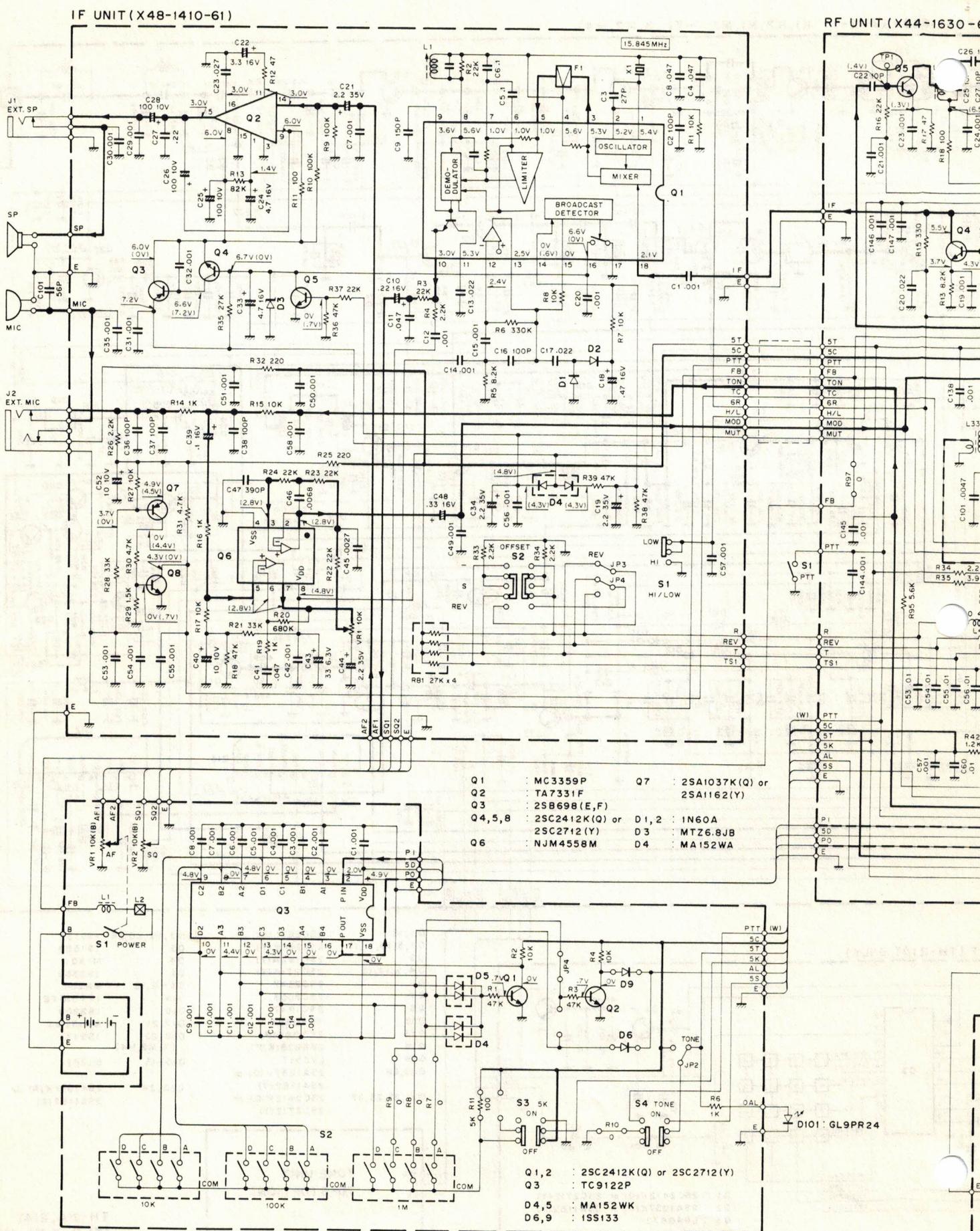
| | | | |
|--------------------|----------------------------------|-----------------|----------------------------------|
| Q 1, 16 | : 2SC2671 (H) | D 2, 19, 20, 24 | : ISS133 |
| Q 2, 5, 10, 11, 17 | : 2SC2668 (Y) | D 3 | : IS1555 |
| Q 3 | : 2SK192A (Y) | D 4 | : MI301 |
| Q 4, 9, 14, 15 | : 2SC2714 (Y) | D 5 | : IS2588 |
| Q 6 | : 2SC2347 | D 6 ~ 9, 15 | : MA856 |
| Q 7 | : 2SC2053 | D 14 | : ITT310TE |
| Q 8 | : 2SC1947 | D 16 | : IS2208 |
| Q 12 | : TC5082P | D 17, 21 | : MA152WA |
| Q 13 | : TC5081AP | D 18, 22 | : ISS133 (X, M2, M4) |
| Q 18 | : 2SB698(E, F) | D 10 ~ 13 | : BA282 |
| Q 19 | : LVC517 | | |
| Q 20, 26 | : 2SA1037K (Q) or 2SA1162 (Y) | | |
| Q 21, 23, 25, 27 | : 2SC2412K (Q) or 2SC2712 (Y) | Q 22, 24 | : 2SA1037K (R) or 2SA1162 (G) |

TONE UNIT
TU-6 (OPTION)

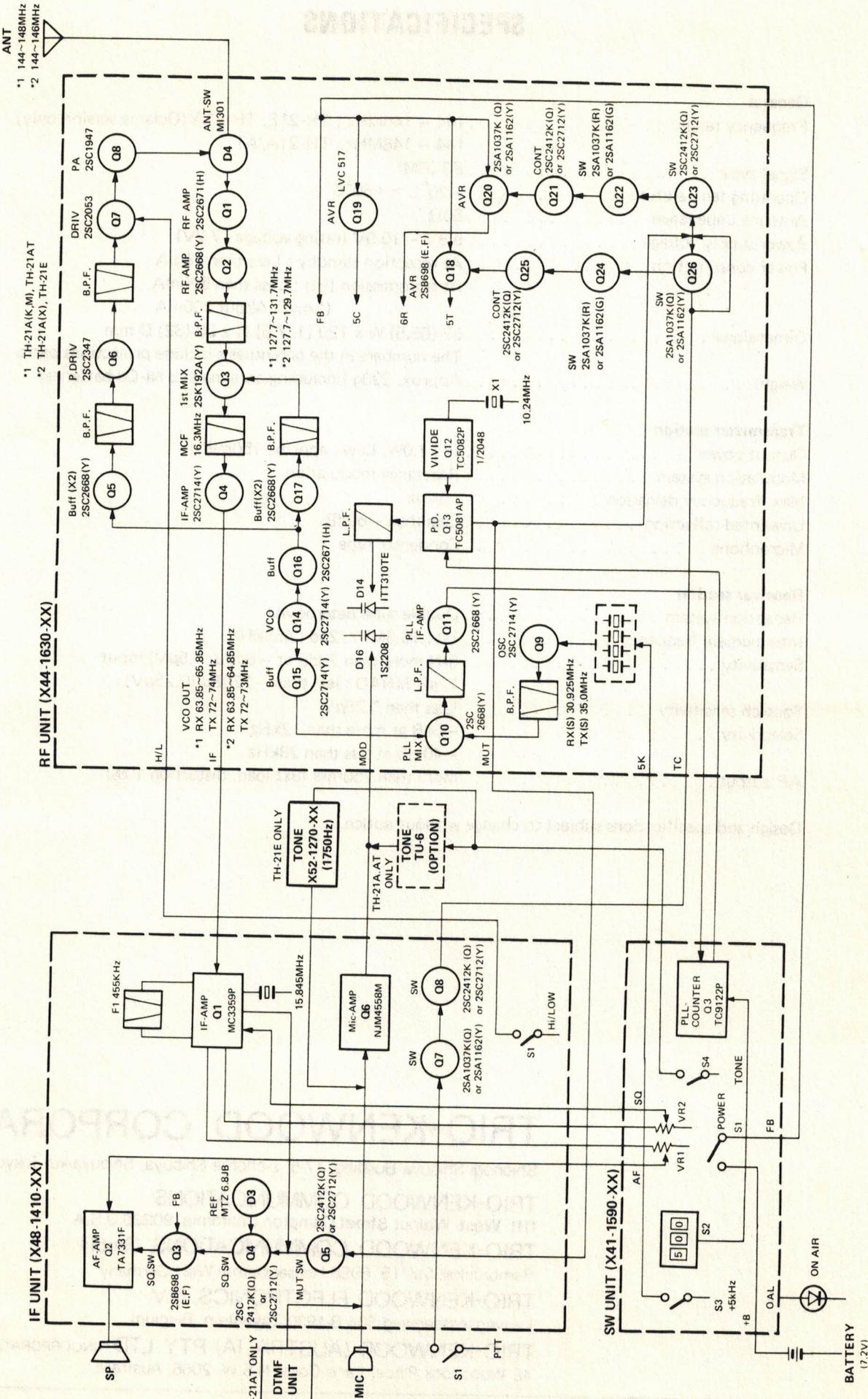
TH-21A, 21AT
(K1, 2, X, M1 ~ M4)

TH-21E SCHEMATIC DIAGRAM

Signal line



BLOCK DIAGRAM TH-21A/AT/



SPECIFICATIONS

General

| | |
|-----------------------|---|
| Frequency range | 144 – 146MHz ; TH-21E, TH-21A (Oceania version only) |
| | 144 – 148MHz ; TH-21A/AT |
| Signal type | F3 (FM) |
| Operating temperature | -20°C ~ +50°C |
| Antenna impedance | 50Ω |
| Power supply voltage | 5.8V – 10.0V (rating voltage ; 7.2V) |
| Power consumption | At reception standby ; Less than 28mA At transmission (Hi) ; Less than 600mA (Low) ; About 300mA |
| Dimensions | 57 (65.5) W x 120 (127.5) H x 28 (32) D mm The numbers in the parenthesis include projections parts. |
| Weight | Approx. 290g (including antenna and Ni-Cd batteries) |

Transmitter section

| | |
|--------------------------|--------------------------------|
| Output power | Hi ; 1.0W, Low ; approx. 150mW |
| Modulation system | Reactance modulation |
| Max. frequency deviation | ±5kHz |
| Unwanted reflection | Less than -60dB |
| Microphone | Condenser type |

Receiver section

| | |
|------------------------|---|
| Reception system | Double superheterodyne |
| Intermediate frequency | 1st ; 16.3MHz, 2nd ; 455kHz |
| Sensitivity | S/N more than 28dB at -6dB μ (0.5 μ V) input 12dB SINAD ; less than -12dB μ (0.25 μ V) |
| Squelch sensitivity | Less than 0.25 μ V |
| Selectivity | -6dB at more than 12kHz -40 dB at less than 28kHz |
| AF output | More than 250mW (8Ω load, distortion 10%) |

Design and specifications subject to change without notice.

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TRIO-KENWOOD (AUSTRALIA) PTY. LTD. (INCORPORATED IN NSW)
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INSTRUCTION MANUAL

DC-DC CONVERTER

Thank you for purchasing the Kenwood DC-21 power adapter. The DC-21 is designed for mobile operation with the TH-21 and TH-41 handheld transceivers.

OPERATION

Insert the DC-21 adapter plug into the AVR unit jack as shown. Slide the adapter onto the transceiver until it locks. Connect the AVR cigarette lighter plug to the vehicle's cigarette lighter socket. The red LED power indicator at the bottom of the DC-21 will light to indicate power is available. The LED will light regardless of the transceivers power switch setting.

CAUTION:

The DC-21 input voltage is 13.8 VDC. It cannot be used with a 6 or 24 volts battery system.

SPECIFICATIONS

| | |
|----------------|--|
| Input voltage | 13.8V DC (12V ~ 16V) |
| Output voltage | 8V DC ± 5% |
| Output current | 900mA (at input voltage of 13.8V DC, with max. load) |
| Weight | Approx. 260g |
| Accessories | Instruction manual, 1 Spare fuse (2A), 1 |

CIRCUIT

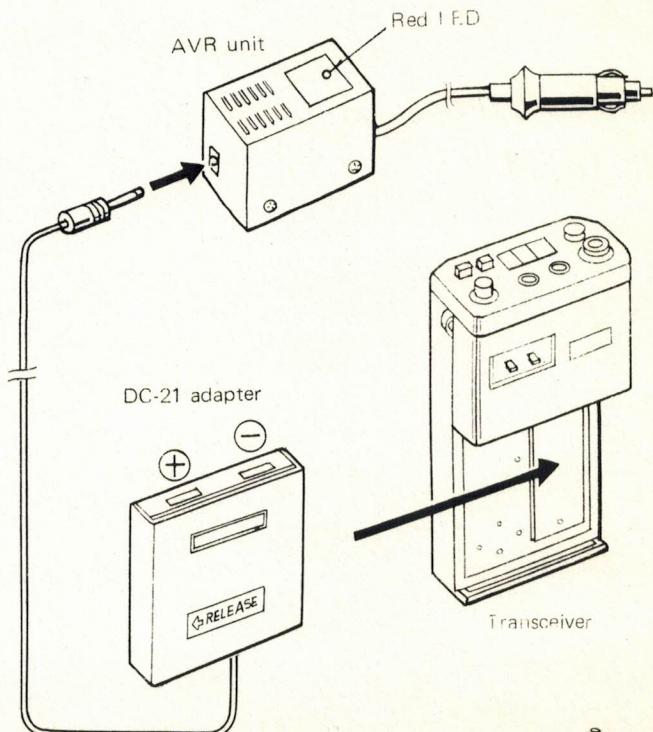
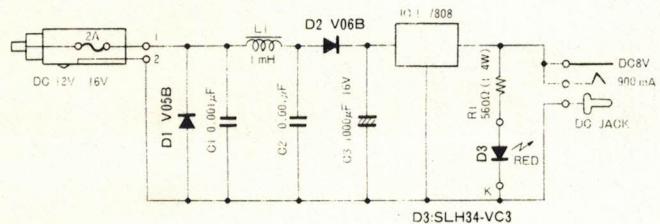


Fig. 1

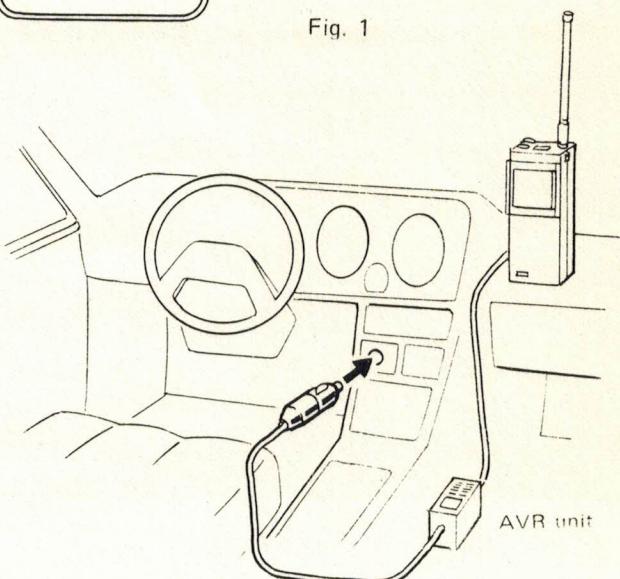


Fig. 2

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TRIO-KENWOOD (AUSTRALIA) PTY. LTD. INCORPORATED IN N.S.W.
4E Woodcock Place, Lane Cove, N.S.W. 2066, Australia

INSTRUCTIONS

SPEAKER MICROPHONE

The model SMC-30 is a compact size and light weight speaker microphone designed exclusively for use with the TR-2600 series, 3600 series, TH-21 series and 41 series Transceiver. For installation convenience, a clip is attached on the rear. The MIC plug is combined with an earphone jack and the built-in speaker in the SMC-30 is cut off when an earphone is set.

OPERATION

1. Insert the MIC and SP plug into the transceiver MIC and SP jack as shown in the illustration.
The transceiver audio output are switched over to the SMC-30.
2. Use the rear clip to hold the SMC-30 on your waist band or breast pocket, etc.
3. When you intend to set an earphone, use the earphone jack on the SMC-30. The speaker line to the SMC-30 is cut off.

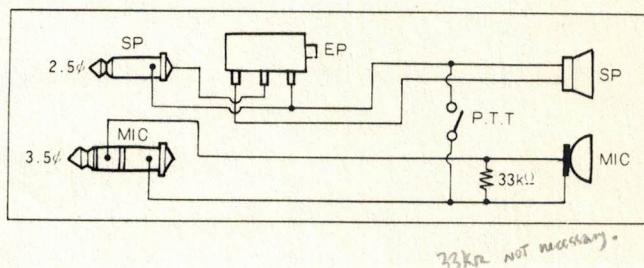
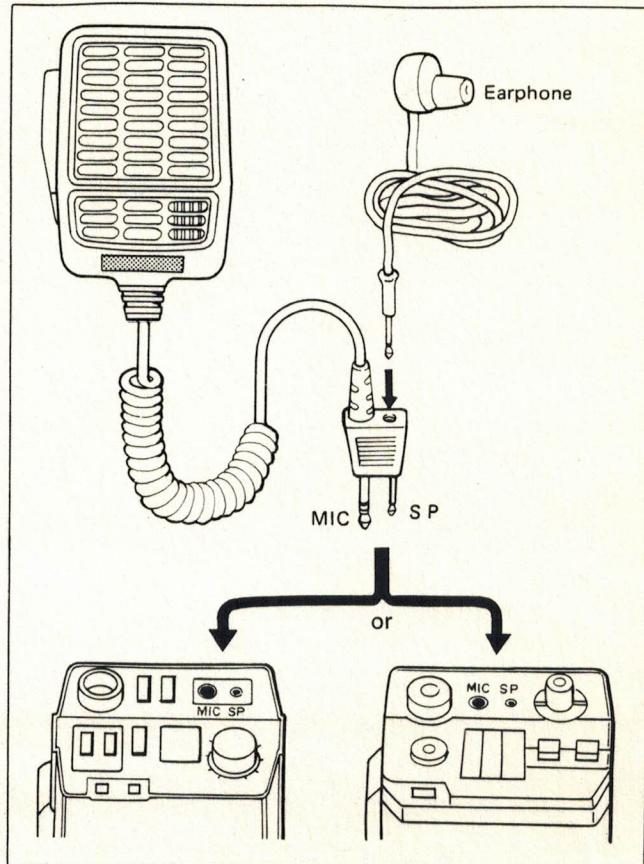
SPECIFICATIONS

- SPEAKER

Speaker : 40mm ϕ
Max. input : 0.5W
Input impedance : 8 Ω

- MICROPHONE

Type : Electret condensor
Sensitivity : -67dB
Output impedance : 2k Ω
Frequency response : 200Hz ~ 5kHz
Operating temperature : -20°C ~ +60°C
Dimensions : 51W x 73H x 33D (mm)
(Projections excluded)
Weight : 130g (Code included)



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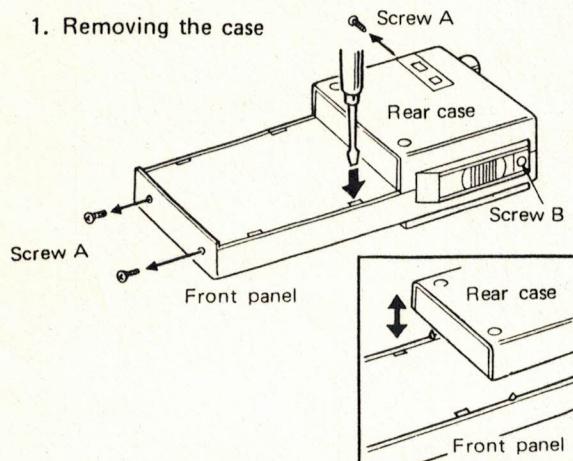
TRIO-KENWOOD ELECTRONICS, N.V.

Leuvensesteenweg 504, B-1930 Zaventem, Belgium

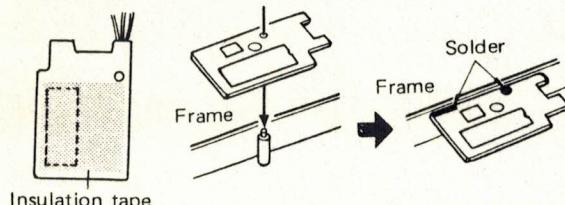
TRIO-KENWOOD (AUSTRALIA) PTY. LTD. (INCORPORATED IN NSW)
4E, Woodcock Place, Lane Cove, N.S.W. 2066, Australia

The TU-6 subaudible tone encoder is designed exclusively for use with the TH series transceivers. 37 standard EIA tones are available.

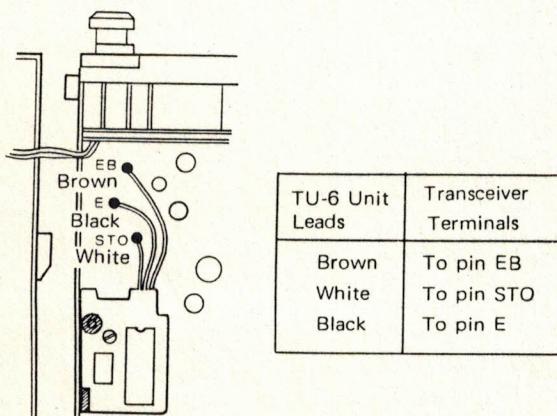
1. Removing the case



2. Installing the repeater tone unit



Attach the insulating tape to the bottom of the TU-6 IC as shown in the figure. Solder the repeater tone unit to the frame as shown, and connect the leads to the terminals of the unit as shown below.



Accessories

- Instruction manual 1
- Insulation tape 1

Specifications

- Oscillation frequency 1 MHz
- Usable frequency ... EIA Specification Group 37 frequencies
- Weight 3g

③ ④ ⑤ ⑥ ⑦ ⑧ ⑨

Removing the front panel

- (1) Remove the battery.
- (2) Remove the 3 screws labeled A and loosen screw B.
- (3) Insert a flat tipped screwdriver into the notch as shown in the figure to disengage the claw and remove the front panel.

Note: Since the speaker and microphone are attached to the front panel take care not to break the leads when removing the front panel.

Installing the front panel

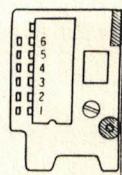
Install the front panel by inserting two pins of the front panel into notches in the rear case, as shown in the figure at the left.

Note: When installing the front panel take care not to pinch the speaker leads.

Setting frequency

Solder or desolder pin 1-6 of the IC to the PC board pattern to select the desired frequency.

- "0" in the table indicates connection.
- "1" in the table indicates no connection.



| # | EIA Specification Group | Program Lines Hz | Program Lines | | | | | | # | EIA Specification Group | Program Lines Hz | Program Lines | | | | | |
|------|-------------------------|------------------|---------------|---|---|---|---|---|------|-------------------------|------------------|---------------|---|---|---|---|---|
| | | | 1 | 2 | 3 | 4 | 5 | 6 | | | | 1 | 2 | 3 | 4 | 5 | 6 |
| 1 A | | 67.0 | 1 | 1 | 1 | 1 | 1 | 1 | 21 A | | 141.3 | 1 | 0 | 0 | 0 | 0 | 0 |
| 2 B | | 71.9 | 1 | 1 | 1 | 1 | 0 | 1 | 22 B | | 146.2 | 0 | 1 | 1 | 0 | 1 | 1 |
| 3 C | | 74.4 | 1 | 1 | 1 | 0 | 1 | 1 | 23 A | | 151.4 | 0 | 1 | 1 | 1 | 0 | 0 |
| 4 A | | 77.0 | 1 | 1 | 1 | 1 | 0 | 0 | 24 B | | 156.7 | 0 | 1 | 1 | 0 | 0 | 1 |
| 5 C | | 79.7 | 1 | 1 | 0 | 1 | 1 | 1 | 25 A | | 162.2 | 0 | 1 | 1 | 0 | 0 | 0 |
| 6 B | | 82.5 | 1 | 1 | 1 | 0 | 0 | 1 | 26 B | | 167.9 | 0 | 1 | 0 | 1 | 0 | 1 |
| 7 C | | 85.4 | 1 | 1 | 0 | 1 | 0 | 1 | 27 A | | 173.8 | 0 | 1 | 0 | 1 | 0 | 0 |
| 8 A | | 88.5 | 1 | 1 | 1 | 0 | 0 | 0 | 28 B | | 179.9 | 0 | 1 | 0 | 0 | 0 | 1 |
| 9 C | | 91.5 | 1 | 0 | 1 | 1 | 1 | 1 | 29 A | | 186.2 | 0 | 1 | 0 | 0 | 0 | 0 |
| 10 B | | 94.8 | 1 | 1 | 0 | 1 | 0 | 1 | 30 B | | 192.8 | 0 | 0 | 1 | 0 | 0 | 1 |
| 11 A | | 100.0 | 1 | 1 | 0 | 1 | 0 | 0 | 31 A | | 203.5 | 0 | 0 | 1 | 1 | 0 | 0 |
| 12 B | | 103.5 | 1 | 1 | 0 | 0 | 0 | 1 | 32 B | | 210.7 | 0 | 0 | 1 | 0 | 0 | 1 |
| 13 A | | 107.2 | 1 | 1 | 0 | 0 | 0 | 0 | 33 A | | 218.1 | 0 | 0 | 1 | 0 | 0 | 1 |
| 14 B | | 110.9 | 1 | 0 | 1 | 1 | 0 | 1 | 34 B | | 225.7 | 0 | 0 | 0 | 1 | 0 | 1 |
| 15 A | | 114.8 | 1 | 0 | 1 | 1 | 0 | 0 | 35 A | | 233.6 | 0 | 0 | 0 | 1 | 0 | 0 |
| 16 B | | 118.8 | 1 | 0 | 1 | 0 | 0 | 1 | 36 B | | 241.8 | 0 | 0 | 0 | 0 | 0 | 1 |
| 17 A | | 123.0 | 1 | 0 | 1 | 0 | 0 | 0 | 37 A | | 250.3 | 0 | 0 | 0 | 0 | 0 | 0 |
| 18 B | | 127.3 | 1 | 0 | 0 | 1 | 0 | 1 | | | | | | | | | |
| 19 A | | 131.8 | 1 | 0 | 0 | 1 | 0 | 0 | | | | | | | | | |
| 20 B | | 136.5 | 1 | 0 | 0 | 0 | 0 | 1 | | | | | | | | | |

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