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TRS Challenger Model 1200 Service Manual

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40 CHANNEL C.B. TRANSCIEBER
TRS CHALLENGER
MODEL 1200

SERVICE AND MAINTENANCE
MANUAL

TRS MARKETING INC.
A Subsidiary of CCE Corp.
137E Savarona Way Carson,
CA. 907046 · 213/323-4201

MDK-3000

MEISEI ELECRTCIC CO., LTD.

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WARNING

- A. All adjustments, except for external knobs and controls, must be made by or under the immediate supervision of a person holding a commercial first or second-class radio operator license.
- B. Replacement of substitution of crystals, transistors, and other components are regulated under the Federal Communications Commission (FCC) Rules and Regulations Part 95 and Part 2. All changes or modifications must be made by or under the immediate supervision of a person holding a first or second-class radio operators license. Proper and qualified servicing is necessary to assure continued compliance with FCC Rules and Regulations.
- C. The Federal Communications Commission (FCC) requires a valid CLASS D License or a complete TEMPORARY PERMIT (Form 555-B) to operate the transmitter portion of this unit.

The address of the FCC is:

FEDERAL COMMUNICATIONS COMMISSION,
WASHINGTON, D.C. 20554

GENERAL INFORMATION

LICENSING:

Before filing formal application for a station license, you must read the sections covering Class D Citizens radio stations in Part 95 of the FCC Rules and Regulation. Complete TEMPORARY PERMIT, FCC Form 555-B and APPLICATION FOR CLASS C OR D STATION LICENSE IN THE CITIZENS RADIO SERVICE, FCC Form 505. Forward form 505 to the Federal Communications Commission, Gettysburg, PA 17326

Should you require advice and or assistance, your dealer will be glad to help you. Remember, DO NOT operate your transmitter until FCC Form 555-B has been completed and your permanent license applied for.

SERVICING:

It is the user's responsibility to see that this unit is operation at all times, in accordance with the FCC Citizens Radio Service Regulations.

If you install your own transceiver, DO NOT attempt to make any transmitter tuning adjustment. Adjustments are prohibited by the FCC unless you hold or are in the presence and under the supervision of a first or second class radio telephone licensed person. A Citizens Band or Amateur License is NOT sufficient.

Replacements of crystals, transistors or other components, must be those supplied by the manufacturer.

DESCRIPTION

This unit is a fully solid state 40-channel Citizens Band Transceiver, operated on a 117V 1A AC power source. This transceiver utilizes the latest development in analog, digital and solid state technology to generate all 40 Citizens Band transmit and receive frequencies. A single highly stable crystal quartz oscillator supplies accurate reference signals to a Large Scale Integrated Circuit (L.S.I.). This L.S.I. is the heart and brain of the Phase Lock Loop (P.L.L.) digital frequency synthesizer. By utilizing programmable dividers, and read only memories (R.O.M.S.).

The L.S.I. controls a Voltage Controlled Oscillator (V.C.O.), the frequency of which is continuously compared with that of the CRYSTAL QUARTZ OSCILLATED frequency in phase comparator section, of the L.S.I., hence the final V.C.O. frequency is made to track the crystal quartz oscillators and is as stable as the crystal reference frequency.

The receiver section is a sensitive superheterodyne circuit featuring dual conversion, low noise R.F. stage switchable automatic noise limiting, delta tuning, signal strength meter, mechanical filter, external speaker jack and instantaneous selection of any of the 40 digitally synthesized channel frequencies. The transmitter section is designed around highly reliable silicon transistors. Any of the 40 digital synthesized frequencies are instantaneously selectable. The transmitter output stage is a conservatively rated high gain R.F. power transistor.

SPECIFICATIONS

General

- Phase Locked Loop Digital Synthesizer
- Channels 40 channels
- Frequency Range 26.965 MHz to 27.405 MHz
- Supply Voltage 117V 60Hz AC \pm 10%
- Operating Temperature Range -30°C to +50°C
- Humidity Less than 95%
- Microphone Detachable Dynamic Microphone
- Dimensions 7"7/8(H) x 15"7/8(W) x 11"3/8(D)
- Weight 16 pounds

Controls, Indicators and Connectors

- AC Power Switch
- SWR Switch
- Tone Control
- RF Gain Control
- NB Switch
- ANL Switch
- Delta Tune Control
- Status Lamps 2 LED (RX, MOD)
- Illuminated "ON-THE AIR" Light
- Illuminated S/RF Power, SWR Meter
- External Speaker Jack
- Detachable Dynamic Microphone

Transmitter

- Output Power 4 watts (maximum) at input voltage 117V AC
- Type of Emission 6A3
- Modulation Capability 100%
- Spurious Harmonic Suppression Better than -60dB
- Output Impedance 50 ohms
- Frequency Stability \pm 0.003% at -30°C to 50°C
- Modulator Response 300Hz - 2500Hz \pm 3-10dB
- Modulation Distortion Less than 5% at 80% mod. at 1KHz
- SWR 1 - 3

RECEIVER

- Sensitivity Less than 0.7 μ V for 10 dB (S+N) /N at 1KHz 30%
- Selectivity \pm 4KHz at 6dB Down
- Adjacent Channel Rejection -60dB average
- Squelch Sensitivity 0.1 μ V to 1mV
- IF Frequency 1st 10.695MHz, 2nd 455KHz
- Automatic Gain Control Less than 10dB change in Audio output for signal input from 15dBu to 70dBu
- Noise Blanker Built-in ON-OFF
- Noise Limiter (ANL) Series Diode Type
- Delta Tune \pm 1KHz (receiver only)
- RF Gain Control Variable 30dB
- Audio Output Power 3.5 watts minimum at 8 ohms
- Frequency Response 3000Hz to 3000Hz \pm 6dB
- Built-in Speaker 8ohms, 3.5" round
- External Speaker 8ohms, Built-in Speaker to be automatically disconnected when external speaker is plugged in.
- Audio Distortion Less than 7% at 3 watts at 1KHz
- Headphone 8ohms, Built-in Speaker and EXT SP to be automatically disconnected when Headphone is plugged in.
- Power Consumption 117V AC
Receive (squelch) 0.4 amps.
Receive (3.5 watts audio) 0.5 amp
Transmit (90% modulation) 0.7 amp

SQUELCH CONTROL	SWR SET CONTROL	SWR METER	CHANNEL INDICATOR	S/RF METER	MOD INDICATOR	
				ON-THE-AIR INDICATOR	RX INDICATOR	
MICROPHONE CONNECTOR	HEADPHONE CONNECTOR	POWER SWITCH	SWR-CAL SWITCH	AF GAIN CONTROL	TONE CONTROL	CHANNEL SELECTOR
NOISE BLANKER SWITCH		DELTA FREQUENCH CONTROL	antenna	ANTENNA CONNECTOR	FUSE	
EXTERNAL SPEAKER	AC POWER CORD					

OPERATING PROCEDURE RECEIVE

1. Push on "POWER ON" switch
2. Adjust VOLUME CONTROL (AF Gain) to comfortable listening level.
3. While listening to the background noise (wait until the channel is clear if signals are present.), adjust the SQUELCH CONTROL until the background noise just disappears. The Receiver will remain quiet until a signal is received that is greater in strength than the background noise. Be careful not to advance the SQUELCH CONTROL further than is necessary to quiet the background noise, or weak signals may not be heard.
5. Turning F knob to left or right changes the receiver frequency and permits very accurate tuning of stations that may be slightly off frequency. The center position of this control is the center of the channel frequency.
6. The RF Gain control should be turned fully clockwise during normal operation. Turning this counterclockwise will reduce the receiver sensitivity, eliminating weak signals, and allow very strong signals to be received without overload distortion.

OPERATING PROCEDURE-TRANSMIT

1. Select the desired channel.
2. If the channel is clear, press the Press-to-Talk switch on the microphone. Hold the microphone close to, but to the side of your mouth and speak in a normal voice. The ON-THE-AIR lamp will light and the red modulation lamp will fluctuate as you speak, indicating modulation.

FUNCTION OF CONTROLS AND INDICATORS

Power-On

Push AC power ON.

AF Gain Control

Rotate counterclockwise to set the desired listening level

Squelch Control

Blank out unwanted noise when no signals are present. Turn the squelch control fully clockwise and then slowly counterclockwise until receiver noise appears. Any signal to be received must now be slightly stronger than the average received noise. Further clockwise rotation will increase the squelch threshold which a signal must overcome in order to be heard. Only strong signals will be heard at the maximum clockwise setting.

RF Gain Control

The RF Gain control is used to reduce the sensitivity of the receiver. By turning this control counterclockwise, weak signals can be eliminated and very strong signals which overload the RF amplifier and cause audio distortion can be reduced.

Delta Frequency Control

Allows the receiver to be tuned above and below the center channel frequency so reception of stations operating slightly off frequency may be optimized.

Tone Control

By turning this control counter-clockwise, AF output signal can be turned low and by turning control clockwise, AF output signal can be toned high.

SWR Set (Standing Wave Ratio)

S.W.R. (Standing Wave Ratio) is a measured indicator of how well the antenna is matched to the transmitter. While transmitting in AM adjust SWR CAL control so that the needle on the meter moves to full scale point.

SWR CAL Switch

This switch is used SWR Meter set maximum by turning SWR set knob.

ANL Switch

The ANL switch is used to turn the ANL Circuit ON and OFF.

NB Switch

The NB switch is used to turn the noise blanker circuit ON and OFF. The noise blanker is designed to reduce IMPULSE-TYPE noises, such as those created by an automobile ignition system. To ensure reception of very weak signals it is recommended that the NB switch only be turned on when noise becomes excessive.

REMOTE SPEAKER

The external speaker jack on the rear panel is used for remote receiver monitoring. The external speaker is 8 ohms impedance and should be rated at 3 watts power dissipation. When the external speaker is plugged in, the internal speaker is disconnected.

HEADPHONE

The headphone jack on the front panel is used for receiver monitoring. The external headphone is 8 ohms impedance and should be rated at 100mW power dissipation. When the HEADPHONE is plugged in, the internal speaker and remote speaker are disconnected.

FUNCTION OF METER

This meter has three functions as follows:

1. SIGNAL STRENGTH METER: The metering circuit is calibrated so that 100 microvolts will read S9.
2. RELATIVE POWER OUTPUT METER: A reading of 4-10 under normal conditions is to be expected.
3. STANDING WAVE RATIO METER: In the transmit mode, the SWR meter indicates S.W.R. as well as relative R.F. power.

MICROPHONE CONNECTION

Insert Microphone Plug into Microphone Connector on the front left side Panel and finger tighten the outside ring-nut.

ANTENNA CONNECTION

A CB antenna of 50 ohm impedance and 27MHz must be used. Push Antenna Cable Plug into Antenna Jack on the Rear Panel and finger tighten the outside ring-nut.

WARNING: DO NOT PRESS TALK SWITCH
BEFORE CONNECTION OF ANTENNA

TRANSCEIVER LOCATION

You can install this unit in any location where 117V AC power is available. It can be connected to a wall outlet of house current by using the AC power cord. The unit should be placed in a convenient operating location close to an AC power outlet; suitable ground and the antenna lead-in cable.

ANTENNAS

One of the important keys to achieving optimum communications system performance is the installation of a good antenna system. Only a properly matched antenna system will allow maximum power transfer from the 50 ohms transmission line to the radiating element.

Antenna height is an important factor when maximum range is desired. Keep the antenna clear of surrounding structures or foliage. FCC regulations limit antenna to 60 feet above ground level for a Non-directional Antenna and 20 feet above an existing structure for a directional antenna.

BASE STATION ANTENNA

The TRS CHALLENGER MODEL 1200 may be used with any type of 50 ohms base station antenna. A Ground Pine Vertical Antenna will provide the most

uniform horizontal coverage. This type of antenna is best suited for communication with a mobile unit. For point-to-point operation where both stations are fixed, a Directional Beam will usually increase communications range since this type of antenna concentrates transmitted energy in one direction. The Beam Antenna also allows the receiver to "listen" in only one direction thus reducing interfering signals.

CIRCUIT DESCRIPTION

Tuning Range:

Frequency Range: 26.965MHz to 27.405MHz

MHz	CH*	MHz	CH*	MHz	CH*	MHz	CH*
26.965	1	27.085	11	27.215	21	27.315	31
26.975	2	27.105	12	27.225	22	27.325	32
26.985	3	27.115	13	27.255	23	27.335	33
27.005	4	27.125	14	27.235	24	27.345	34
27.015	5	27.135	15	27.245	25	27.355	35
27.025	6	27.155	16	27.265	26	27.365	36
27.035	7	27.165	17	27.275	27	27.375	37
27.055	8	27.175	18	27.285	28	27.385	38
27.065	9	27.185	19	27.295	29	27.395	39
27.075	10	27.205	20	27.305	30	27.405	40

* = Channel Indication Number responds to the allocated frequencies.

Frequency Range of the 1st Local Oscillator

Frequency Range: 16.27 MHz to 16.71 MHz including the fundamental frequency and other frequencies used to generate 1st local oscillator frequencies.

2nd Local Oscillator 10.24 MHz
 1st IF : 10.695 MHz
 2nd IF : 10.455 MHz

This system is 40 channels double conversion P.L.L. (Phase Locked Loop) controlled CB Transceiver.

The basis block diagram for the determining frequency and stabilizing system is as shown in the P.L.L. Unit. The constitutional section to 1st local, 2nd local and TX frequency of the transceiver used P.L.L. system.

P.L.L.-UNIT

A phase locked loop (PLL) synthesizer is used to stabilize output frequencies using a CMOS/LSI device in combination with V.C.O. (voltage controlled oscillator).

To understand the operation of the PLL synthesizer, refer to block diagram and schematic diagram.

Refer the crystal-controlled frequency, which is 10.24MHz and is oscillated by C-MOS Amp in the IC1. This frequency is divided into 2048 by Fix Divider to make 5KHz and is used as the phase comparator signal.

The V.C.O. consists of an IC2 circuit which oscillates from 16.207 to 16.710 MHz at the receiving mode. At the time of transmission, the oscillating frequencies ranging from 16.725 to 17.165 MHz are taken and combined with a frequency of 10.24 MHz which is derived from the reference oscillation by a mixer in the IC2, which, in turn, produces the frequency range 26.965 to 27.405 MHz.

Through the code convertor, programmable divider is connected to channel selector.

Channel selector specifies comparable divided-frequencies ranging from 182 to 270 (at receiving mode), from 273 to 361 (at transmission mode).

Frequencies (CH1 to CH40) are divided to programmable divider

As a result, divider output obtains 5KHz signal.

The PLL phase comparator, compares both phases of reference 5KHz programmable divider and the original 5 KHz.

The phase error voltage is integrated and then is applied into V.C.O.

It then tracks onto the frequency selected by the channel selector in order to obtain stabilizing frequency.

The above mentioned frequencies ranging from 16.27 to 16.7MHz are used as the first local oscillation signal of receiver, and 10.24MHz signal functions as the second local oscillation signal, and also 26.965 to 27.405MHz is used as the transmission signal.

(REF: Schematic diagram and Block diagram)

LIMITING MODULATION

The audio input signal of the microphone is amplified by transistor Q203, Q204, and AN-7150 IC. AN-7150 drives the modulation transformer T202. This modulation signal is detected by diodes D201, D202, and D203. These diodes produce D.C. Voltage proportional to the modulation level. This D.C. Voltage is added to the gate voltage of audio limiter circuit FET Q201 and Q202 (variable attenuator), and hence controls the audio signals from a microphone. The controlled audio signals are amplified and fed to RF Amplifier Q222 and Q223. As the result, the modulation is not exceeded 100% by adjusting volume VR-1.

LOW PASS FILTER (RF)

Low Pass Filter : L205, L206, L207, L208
C117, C118, C119, L120, C122
CV101

FINAL AMPLIFIER (RF)

Type Number : 2SC1306 or 2SC2029

DESCRIPTION Q23 FINAL RF AMP.

NPN Epitaxial Plener Silicon Transistor for high frequency Power amplifiers.

- NOTE: 1. All voltages and currents shown are D.C. values.
2. Transmitter section was operated without modulation.
3. Test Set-up shown is typical for each reading.

A Ampmeter: YOKOKAWA ELECTRO WORKS NO.14
V Voltmeter: " " " "

ELECTRICAL FUNCTION OF SOLID STAGE DEVICES (MDK-3000)

1. Diodes

D 1	Protector
D 2	Modulation Limiter
D 3	"
D 4	Detector
D 5	A.N.L.
D 6	Voltage Regulator
D 7	Detector (RX Meter)
D 8	" (SQ)
D 9	" (")
D 10	Voltage Regulator
D 11	N.B.
D 12	"
D 13	RX Protector
D 14	"
D 15	Detector (TX Meter)
D 16	Protector
D 17	"
D 18	"
D 20	RX indicator
D 21	MOD Indicator
D201	PLL Control
D301	Rectifier
D302	Standard Voltage
D501	SWR Detector
D502	" "

2. IC IC1 (AN7150) : AF Amp and MOD Amp.

3. TRANSISTORS

Q 1: Modulation Limiter
Q 2: "
Q 3: Mic Amp
Q 4: "
Q 5: Receiver AF Amp.
Q 6: " RF Amp.
Q 7: Receiver 1st Mixer
Q 8: " 2nd "
Q 9: Receiver IF Amp.
Q10: " "
Q11: " "
Q12: 1st Local Amp.
Q13: 2nd " "
Q14: SQ Amp.
Q15: LED Driver
Q16: Noise Blanker
Q17: "
Q18: "
Q19: "
Q20: "
Q21: TX Buffer Amp.
Q22: "
Q23: TX Final
Q201: PLL control
Q301: Voltage Regulator
Q302: " "
Q302: " "
Q303: " "
Q304: " "
Q305: " "

P.L.L.

IC1 (TC9103P) : P.L.L.
IC2 (TA7310P) : Double Balance Mixer

D1 : Voltage Regulator
D2 : Voltage Controlled Oscillator
D3 : P.L.L. Control
D4 : " "

D5 : Clarifier

Q1 : 2nd Local Buffer
Q2 : Buffer Amp.
Q3 : Mixer
Q4 : Voltage Regulator
Q5 : Unlock Circuit
Q6 : TX/RX Control

LIST OF EQUIVALENT TRANSISTOR

A. FINAL AMP	2SC1306	NIPPON ELECTRIC COMPANY (NEC)
	2SC1975	MATSUSHITA ELECTRONICS CORP.
	2SC2029	FUJITSU LIMITED
B. RF DRIVER	2SC1449	(NEC)
	2SC1973	MATSUSHITA
	2SC2028	FUJITSU
C. MOD AMP	AN7150	MATSUSHITA
	AN7151	MATSUSHITA
D. RX RF. MIX	2SK61-Y	TOSHIBA
	2SK33	mitsubishi
	3SK49	MATSUSHITA
E. RX IF, MIX	2SC945	(NEC)
	2SC828	MATSUSHITA
	2SC372	TOSHIBA
	2SC1675	(NEC)
	2SC380	TOSHIBA
F. ALC	2SK-30	TOSHIBA
	2SK-33	MITSUBISHI
G. AVR	2SD288	(NEC)
	2SD526	TOSHIBA
	2SD389	MATSUSHITA
	2SD313	SANYO
	2SD586	(NEC)

ATTACHMENT D: TUNE-UP PROCEDURE

ABBREVIATIONS:

1. RF VTVM RADIO FREQUENCY VACUUM TUBE VOLT METTER
3400A HEWLEFT PACKARD
2. ATT ATTENUATOR
RF 6-20 WEINSCHALL
AF AT-253 ANRITSU DENKI
3. RF RADIO FREQUENCY
4. AF AUDIO FREQUENCY
5. SSG STANDARD SIGNAL GEN
6. FC FREQUENCY COUNTER
7. DCV D.C. VOLTMETER
8. OSCILLOSCOPE 1707B HEWLETT PACKARD

NOTE SSG : ATT -20- 100 DB MICRO
AM MOS. 1000Hz and 400Hz 0 - 100%

CAUTION BEFORE ALIGNMENT

- A) Microphone must be connected
- B) The AF output terminal (EXT. JACK) must be connected to either an 8 ohm speaker or 8 ohm non inductive resistor.
- C) Standard voltage is 117V
- D) ANT. terminal (rear panel) must be connected to either a 50 ohm non Inductive Resistor or other 50 ohm Dummy Load.

1. ALIGNMENT PROCEDURE OF PLL UNIT

1.1) Band Pass Filter

- a) Input the signal from SSG (26.965-27.405z) into T.P.3 (IC2 No.4) under transmission.
- b) Connect the oscilloscope to T.P.1 (terminal T out)
- c) Adjust T3, T4, T5, for flat and maximum response of the filter.

1.2) V.C.O.

- a) Turn channel switch to CH1 under receiving mode.
- b) Connect the DCV to lock voltage T.P.2 (between R12 and R15) and adjust T1 to 2V

1.3) Frequency adjust

- a) Turn channel switch CH1 under transmission.
- b) Connect the FC to T.P.1 (terminal T out)
- c) Adjust to 26.965Mhz by VC1.

1.4) 10.24MHz Mixing level

- a) Connect the RF VTVM to T.P.1 (terminal T out)
- b) Adjust T2 for maximum.

2. ALIGNMENT PROCEDURE OF AVR

2.1) Output Voltage

- a) Connect 10 ohms dummy and DCV terminal 7 and 8.
- b) Adjust VR-301 at 13.8V

3. ALIGNMENT PROCEDURE OF RECEIVER SECTION

3.1) 2nd LOCAL OSC (10.24MHz)

Connect RF VTVM output of T213 coil and align to maximum reading on RF VTVM.

3.2) RF Gain

Set the channel of "SSG" to CH20 set "SSG" frequency to 1000Hz at 30 percent modulation.

Set the channel of Transceiver at CH20, set the volume to maximum, The squelch to minimum and turn the RF volume clockwise.

Align coils T204 to T212 for maximum audio output.

3.3) Maximum Sensitivity

Set the channel of "SSG" at CH20, set "SSG" frequency at 1000Hz with 30 percent modulation, and set the "ATT" to +3dB. Micro, and set the channel of transceiver to CH20, set the volume to maximum and the output power must be less than 0.5W (DC power : 13.8V) squelch to minimum, and the RF volume turn clockwise. Re-align coils T204 to T213 to obtain maximum sensitivity.

3.4) S Meter Calibration

Set the channel of "SSG" to CH20, "SSG" frequency at 1000Hz with 30 percent modulation and the "ATT" to 66dB. Micro. Set the Channel of transceiver to CH20 and set squelch to minimum and the RF volume turn clockwise. Align VR3 to indicate 7/10 on S Meter.

3.5) Squelch

Set the channel of "SSG" to CH20, "SSG" frequency at 1000Hz with 30 percent modulation and the "ATT" to 66dB. micro. Set the channel of transceiver to CH20, volume to maximum and squelch to maximum and the RF volume turn clockwise. With above condition, adjust VR5 so as audio output just ceases and check AF output when output of "SSG" becomes 67 to 70 dB. micro.

3.6) S/N

Set the channel of "SSG" to CH20, "SSG" frequency at 1000Hz with 30 percent modulation and the "TT" to +3dB micro. Set the channel of transceiver to CH20, and adjust volume control to obtain AF output voltage 2V. Check that AF output voltage is less than 0.615V when "SSG" modulation is turned off.

3.7) Noise Measurement

Check that noise voltage is less than 300MV on all channels, when NB ON and ANL ON (Align T203)

3.8) Noise of PA.

Check that no noise is presented when the transceiver is operated in the PA mode.

3.9) RF and TONE Control

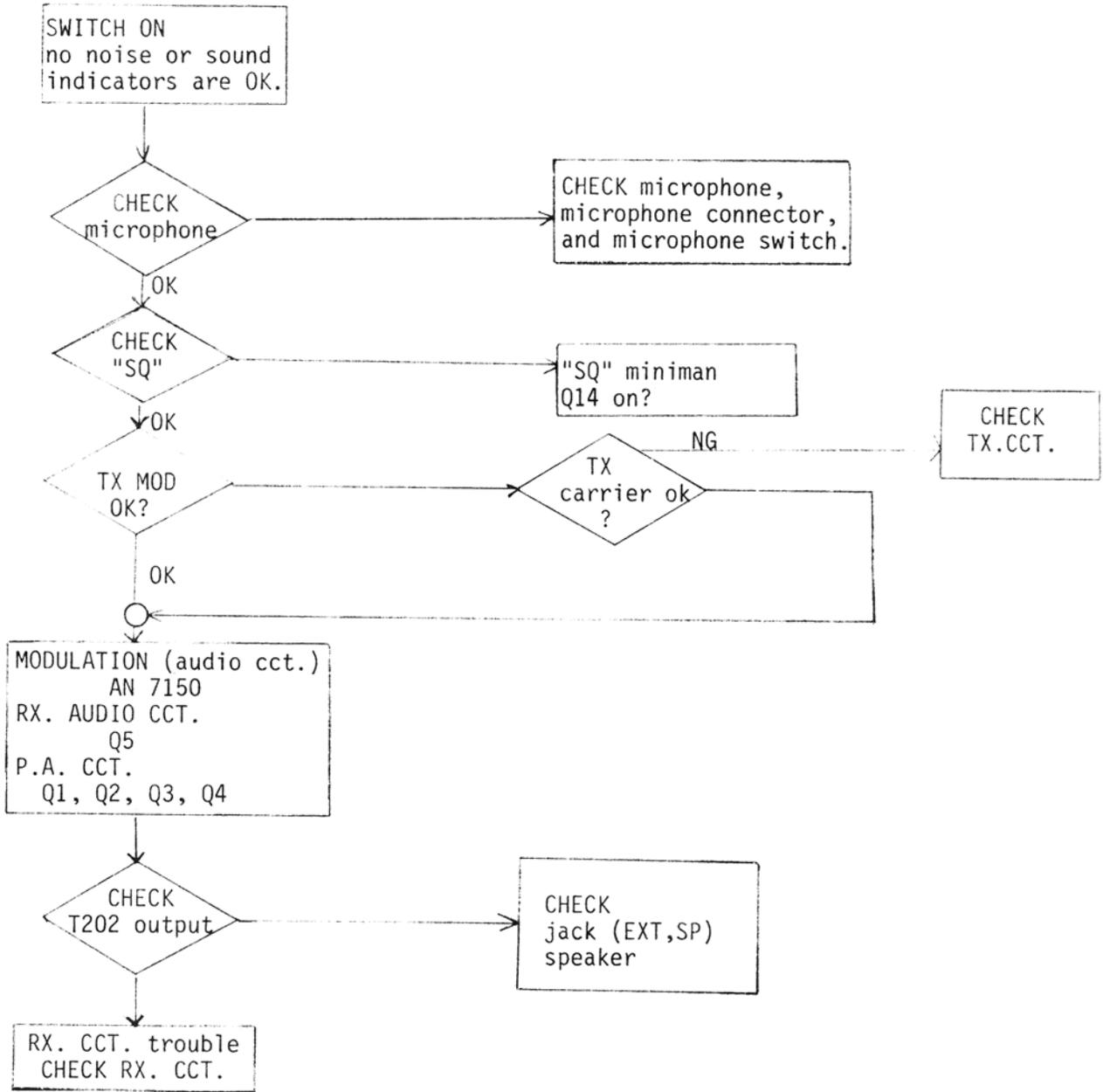
Check effect of RF control and TONE control.

4. ALIGNMENT PROCEDURE OF TRANSMITTER SCETION

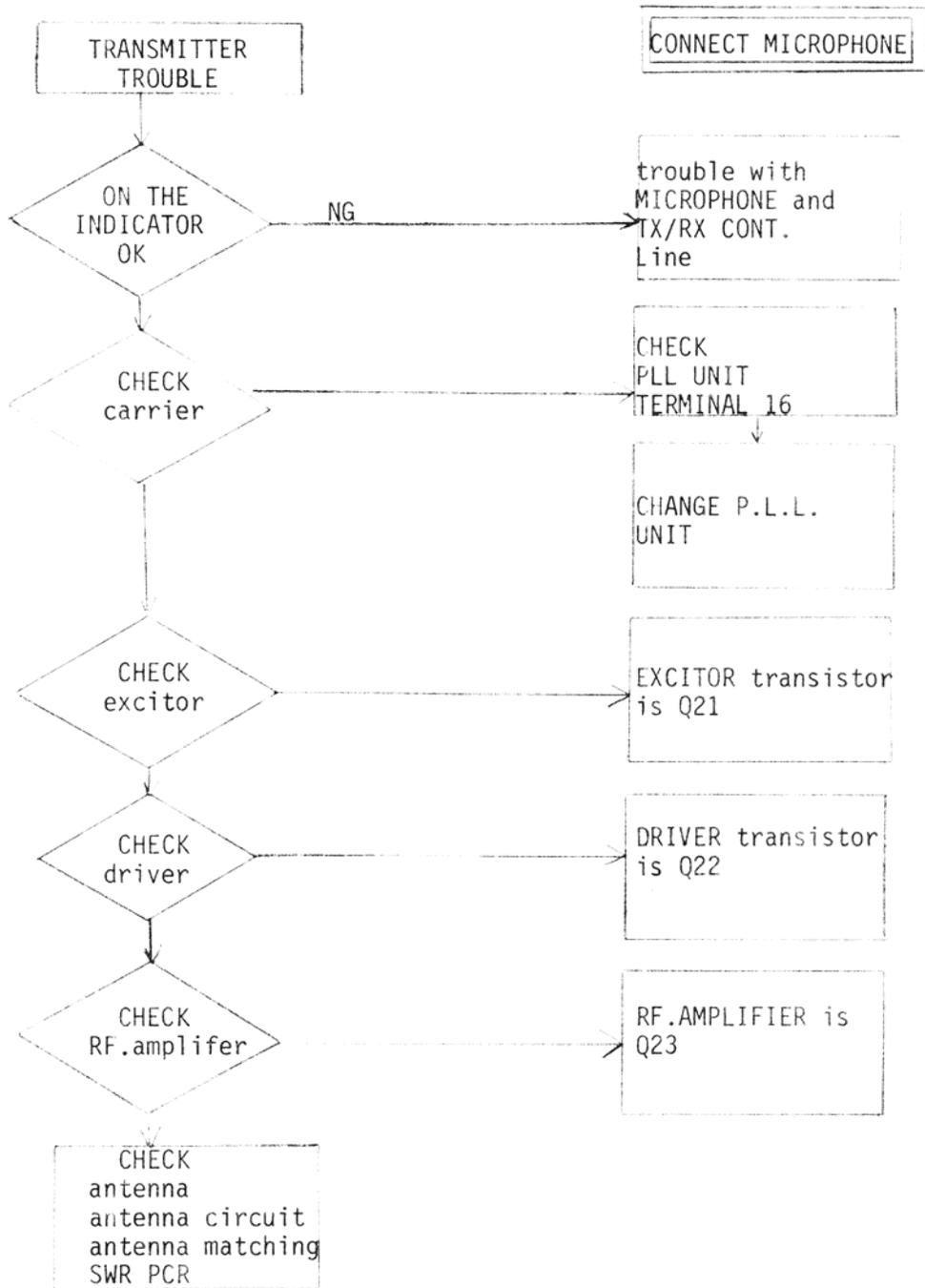
4.1) RF-POWER-Amp

Set the channel of transceiver at CH20, align coils T214, 204 and CV101 for maximum indication on power meter.

NO SOUND FLOW CHART No.2



TRANSMITTER CCT, FLOW CHART No. 4



PARTS LIST

TRS
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Inc.

Circuit Symbol	Description	Type	Parts No.
VARIABLE RESISTORS			
VR301	Semi-Fixed Resistor	2K ohms-B	12-001
VR1	Variable Resistors	500 ohms-B	12-002
VR6	" "	VZ103KTH 200	12-003
VR3,4	" "	20K ohms-B	12-004
VR2	" "	50K ohms-B	12-005
VR5	" "	100K ohms-B	12-006
SQ, SWR	" "	VM10A509-50KB	12-007
F, TONE	" "	VM10A509-10KA	12-008
RF	" "	VM10A507-10KB	12-009
RESISTORS			
R111,309	Carbon Resistor	RD1/4PJ 33ohms	12-010
R72,104,108,501,502	" "	" 100 "	12-011
R38,304	" "	" 470 "	12-012
R305, 306	" "	" 560 "	12-013
R302	" "	" 680 "	12-014
R25, 70, 103, 112, 301, 303	" "	" 1K	12-015
R80	" "	" 1.5K	12-016
R15, 83, 94	" "	" 2.2K	12-017
R14, 59	" "	" 4.7K	12-018
R85	" "	" 5.6K	12-019
R39, 56	" "	" 10K	12-020
R74,79	" "	" 33K	12-021
R17	" "	" 75K	12-022
R2, 29, 86	" "	" 100K	12-023
R92	" "	" 220K	12-024
R155, 307	" "	RD1/2WPJ 2.2M	12-025

PARTS LIST

TRS
Marketing
Inc.

Circuit Symbol	Description	Type	Parts No.
RESISTORS (continued)			
R26	Carbon Resistor	RD1/4WPRJ 47ohms	12-026
R47	" "	" 22 "	12-027
R41, 308	" "	" 33 "	12-028
R52	" "	" 47 "	12-029
R36, 43, 58, 77, 81, 110, 201	" "	" 100 "	12-030
R115	" "	" 150 "	12-031
R34, 107, 113, 153	" "	" 220 "	12-032
R21	" "	" 270 "	12-033
R23, 71	" "	" 330 "	12-034
R30, 49, 57, 93, 109, 151	" "	" 470 "	12-035
R19, 40, 46, 51, 69, 90	" "	" 1K	12-036
R401-414	" "	" 1K	12-037
R20	" "	" 1.2K	12-038
R44	" "	" 1.8K	12-039
R98, 99, 102	" "	" 2.2K	12-040
R31, 35	" "	" 3.3K	12-041
R22, 48, 53, 61, 101	" "	" 4.7K	12-042
R202	" "	" 5.1K	12-043
R4	" "	" 6.8K	12-044
R106	" "	" 10K	12-045
R67, 73, 76, 78, 82, 87	" "	" 10K	12-045
R203	" "	" 10K	12-045
R28, 42	" "	" 15K	12-046
R13, 63, 68, 89, 97, 105	" "	" 22K	12-047
R204	" "	" 22K	12-047
R18	" "	" 27K	12-048
R95	" "	" 33K	12-049
R9, 205	" "	" 47K	12-050
R33, 64, 65	" "	" 51K	12-051

PARTS LIST

TRS
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Circuit Symbol	Description	Type	Parts No.
RESISTORS (continued)			
R91	Carbon Resistor	RD1/4PRJ 68K ohm	12-052
R100	" "	" 75K	" 12-053
R6, 32, 62, 96	" "	" 100K	" 12-054
R3, 7, 8, 12	" "	" 220K	" 12-055
R60	" "	" 330K	" 12-056
R11	" "	" 470K	" 12-057
R27		2W 3.9ohms K	12-058
R154		2W 8.2 " K	12-059
CAPACITORS			
C201	Electrolytic Condenser	10V 47µF	13-001
C77, 22	" "	10V 100	13-002
C15, 18, 24, 25, 65	" "	16V 10	13-003
C100, 101, 151	" "	" 10	13-004
C11	" "	" 33	13-005
C12, 13, 16, 23, 26, 131	" "	" 47	13-006
C212	" "	" 47	13-006
C31	" "	" 100	13-007
C29	" "	" 220	13-008
C30, 136	" "	" 470	13-009
C130	" "	" 1000	13-010
C7, 89, 90	" "	35V 4.7	13-011
C307	" (BLOCK TYPE)	" 4700	13-012
C5, 6, 75	" "	50V 1	13-013
C110	" "	" 10	13-014

PARTS LIST

TRS
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Circuit Symbol	Description	Type	Parts No.
CAPACITORS (continued)			
C8, 55, 61, 67	Mylar Condenser	CQ92MCIH 102M	13-015
C14, 96, 98, 72, 302	" "	" 222M	13-016
C154	" "	" 223M	13-017
C19, 20, 73, 301	" "	" 333M	13-018
C9, 17, 28, 71, 74, 76	" "	" 104M	13-019
C155	" "	" 104M	13-019
C137	Ceramic Condenser	50V B 471K	13-020
C27, 47, 99, 206=211	" "	" 102Z	13-021
C153	" "	" 472K	13-022
C54	" "	50V CH 050C	13-023
C45, 91	" "	" 100K	13-024
C44, 119	" "	" 150K	13-025
C36, 37, 505	" "	" 300K	13-026
C92, 111, 112, 123	" "	" 390K	13-027
C40, 109	" "	" 470K	13-028
C88	" "	" 510K	13-029
C79	" "	" 560K	13-030
C108	" "	" 680K	13-031
C83	" "	" 101Z	13-032
C120	" "	" 181K	13-033
C124	" "	50V CK 010C	13-034
C39, 46	" "	" 020C	13-035
C10, 21, 59, 86, 87, 97	" "	50VF 103Z	13-036
C125, 501-503	" "	" 103Z	13-036
C1-4, 32-35, 41-43, 49	" "	" 203Z	13-037
C50, 53, 56-58, 95, 60	" "	" 203Z	13-037
C62-64, 66, 68-70, 80, 81	" "	" 203Z	13-037
C84, 85, 94, 103-105, 107	" "	" 203Z	13-037
C113-116, 126, 127, 132, 133	" "	" 203Z	13-037
C152, 156, 159, 202-205	" "	" 203Z	13-037

PARTS LIST

TRS
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Circuit Symbol	Description	Type	Parts No.
MISCELLANEOUS (continued)			
	Sub Panel		14-043
	Chassis		14-044
	Center Panel		14-045
	Heat Sink		14-046
	" "		14-046
	Grommet		14-047
	Meter Absorber		14-048
	Terminal		14-049
	PWR Chassis		14-050
	Heat Sink		14-046
	Terminal		14-049
	Holder		14-050
	Bolt		14-051
	SN1-26-6		14-052
	PN1-26-6		14-053
	N1-3-10		14-054
	PN1-3-6		14-055
	PN1-3-6-54AF		14-056
	SN1-3-8		14-057
	SN1-3-10		14-058
	T1-3-10-54AF		14-059
	M1W-3,5-13		14-060
	PN1-4-6		14-061
	N1-4-10		14-062
	Washer AHIN3		14-063
	" 3LMIW		14-064
	" 3PIW		14-065
	" 3APBW		14-066

