Tram XL5 Owner's Manual

TRAM XL5

SSB

CITIZEN'S BAND TRANSCEIVER

TRAM/DIAMOND
CORPORATION

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LOWER BAY ROAD
WINNISQUAM. N. H. 03289

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LIMITED WARRANTY

TRAM / DIAMOND CORPORATION, hereinafter referred to as TRAM, warrants that, for a period of ninety (90) days from the date of first sale to the original retail purchaser, this TRAM product will be free of defect in materials and workmanship. TRAM's obligation is limited to repairing or at TRAM's option, replacing those equipments or parts which are returned transportation and insurance prepaid, to the factory (or to the dealership where purchased) without alteration or further damage and in TRAM's judgment, were originally defective or became defective in normal use.

This equipment was designed under the direction of TRAM/DIAMOND CORPORATION and is manufactured for TRAM in Japan by one of the foremost makers of fine electronic products.

TRAM/DIAMOND CORPORATION, with pride, has added this product to its line of CB equipment.

LICENSE AND REGULATION INFORMATION

The Federal Communications Commission has made it possible for any citizen over eighteen (18) years of age to obtain a license to operate two-way radios in the Citizens Band. It is not legal to operate this equipment without a license.

Operating and equipment requirements are covered in Part 95 of the Federal Communications Commission's Rules and Regulations. Note the proper use of channel 9 (27.065 MHz). This channel has been reserved for communications concerned with the immediate safety of life of individuals, the immediate protection of property or the emergency assistance to a motorist. No other use of this channel is authorized. All use of this equipment must conform to F.C.C. requirements. TRAM certifies that this equipment is designed and manufactured to fully comply with the F.C.C. technical requirements for Class D Citizens Radio Service operation.

To obtain your license, you must first fill out the F.C.C. application form #505. Read the application form carefully and fill it out, sign it and mail the application with the appropriate application fee to: FEDERAL COMMUNICATIONS COMMISSION, GETTYSBURG PENNSYLVANIA...17325. When approved the F.C.C. will issue your license. You will be assigned a number to be used as your station call letters.

Keep your license close to your equipment at all times. Fill out a transmitter identification card, F.C.C. form #452-C and attach it to the radio. DO NOT MAKE TRANSMISSIONS WITH YOUR EQUIPMENT UNLESS YOU HAVE YOUR LICENSE. Read Part 95 of the F.C.C. Rules and Regulations thoroughly. Make your transmissions short and to the point. Listen to the channel before transmitting to see that it is not in use.

CAUTION: There are no user adjustable components in the XL5 transmitter. Adjustments of the XL5 transmitter or frequency determining circuits can only be done by, or under the immediate supervision of, the holder of a first or second class radio operator license.

GENERAL INFORMATION

The Tram XL5 is a compact mobile transceiver designed to provide 23 channel operation in either SSB or AM modes in the class "D" citizens band service. This versatile unit can also be used for public address paging and can be installed in either positive or negative ground systems.

The advanced solid state circuitry employs 22 transistors, 56 diodes, 2 ICs and 8 FET.

The single conversion receiver uses a highly selective crystal filter in the SSB and AM mode

The switch controlled RF noise blanker is very effective in reducing pulse or ignition type noises. A built-in rugged speaker, dynamic microphone and tamper deterrant mounting hardware complete this communications package of unusually high quality.

ANTENNA AND COAXIAL CABLE (not provided)

The Tram XL5 is designed to work into a 50 ohm unbalanced antenna system. Many suitable antennas are commercially available ranging from full 1/4 wave length whips to base or top loaded antennas designed for cowl or roof top mounting.

The leading antennas are physically shorter and perform almost as well as the full whip. For those who want optimum results, a full 11 meter 1/4 wave whip is recommended. Most of these antennas are designed for use with 52 ohm coaxial cable such as RG-58/U.

INSTALLATION

Having decided where to mount the Tram XL5, position the unit and bracket in place and see that it does not interfere with the vehicle's controls and that all of the Tram XL5 controls are easily accessible.
Mark the bracket location carefully and use the bracket as a drilling template for the mounting holes.

Note: The screws provided for attaching the radio to the mounting bracket have a hex socket head and require the use of the allen wrench also provided. These screws, without the allen wrench, are virtually tamper-proof and would discourage theft. We recommend using round headed screws for attaching the mounting bracket under the car dash. Usually there will not be room for a thief to remove these screws using standard tools.

When installing the power cable supplied, it is necessary that the red wire be connected to the positive side of the vehicle's electrical system and the black wire be connected to the negative side of the system. Reversing these connections will cause the 4A line fuse to blow.

If your system is negative (–) ground, ground the black power lead and connect the red lead to the electrical system. If your system is positive (+) ground, ground the red lead and connect the black lead to the electrical system.

Connect the antenna cable to the coaxial connector on the rear panel of the unit using a matching PL-259 UHF connector.

Connect the microphone plug to the microphone jack located on the left of the front panel.

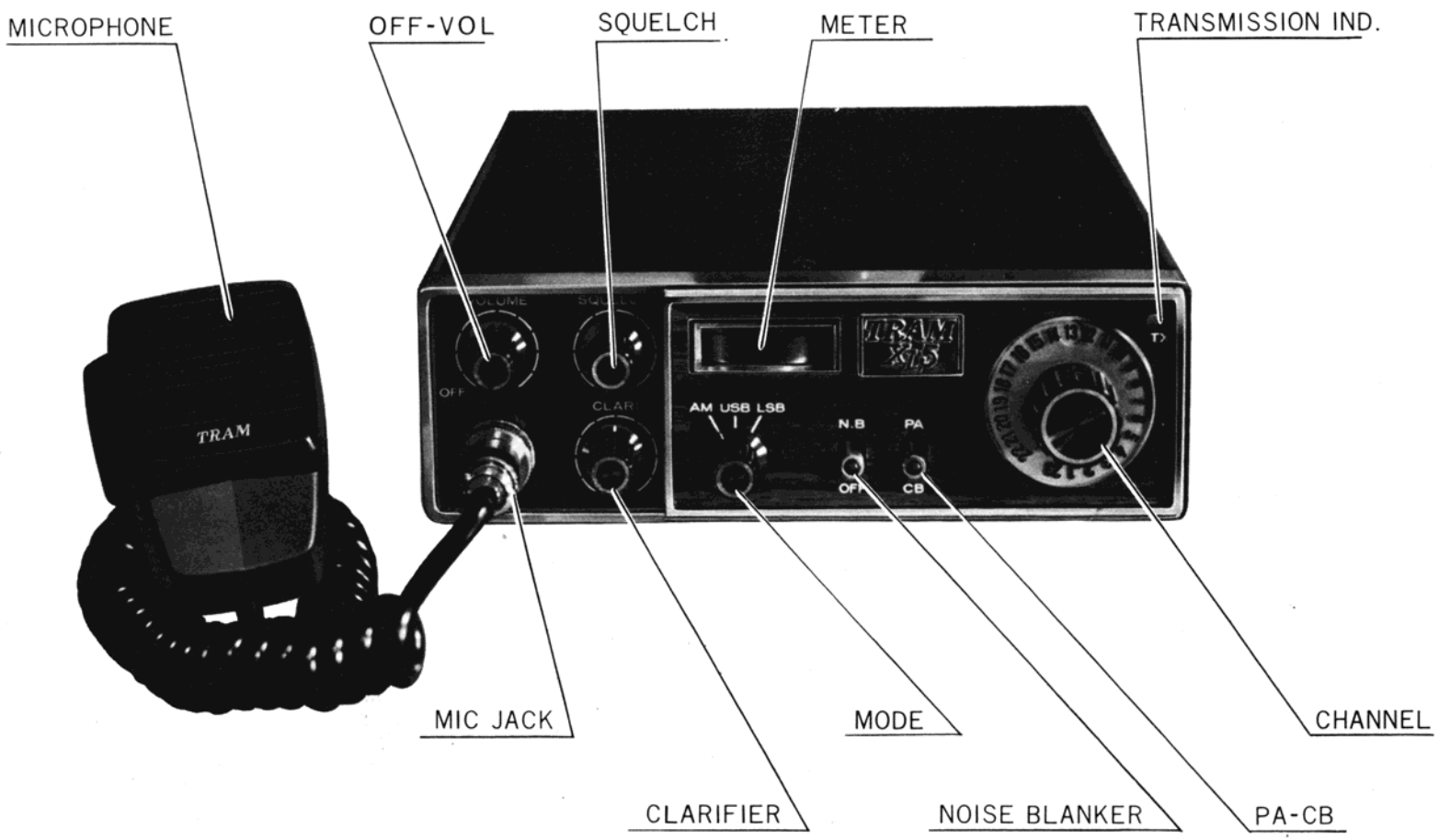
MICROPHONE
OFF-VOL
SQUELCH
METER
TRANSMISSION IND.
TRAM
AM USB LSB
N.B
PA
OFF
CB
MIC JACK
MODE
CHANNEL
CLARIFIER
NOISE BLANKER
PA-CB

Figure 1

OPERATION

A. Control Function

1. **OFF-VOL.** The volume control is combined with the DC power switch. At the extreme CCW (counter clockwise) position of the knob, the DC power to the unit is switched off.
   Advancing the control CW (clockwise) from this position turns on the power. To increase the loudness of the receiver audio, turn the control in a CW direction.

2. **SQUELCH.** This control, if turned CW, will quiet the receiver audio. If it is set just beyond the point where the receiver background noise disappears, any signal greater in strength than the noise level will restore the receiver to operation. The control may also be advanced to higher settings so that only relatively strong signals will open the squelch. This can be particularly useful if the band is open with skip signals that are weaker than the stations in your local area. The squelch can then be set to open only on the strong local signals.

3. **CLARIFIER.** Allows variation of the receiver operating frequencies above and below the assigned frequency. Satisfactory reception on SSB signals requires very careful tuning. Although this clarifier control is intended primarily to tune in SSB signals, it may be used to optimize AM signals.

4. **MODE.** The position of this switch determines what type of signal will be received and also what type of signal will be transmitted.

5. **CHANNEL SELECTOR.** The XL5 is supplied equipped for 23 channel operation. The desired channel is selected by rotating the channel selector knob so that the number of the channel appears in the window. There is no stop on the switch so the knob can be continuously rotated in either direction allowing quick channel change.

6. **NOISE BLANKER.** The NB switch is used to turn the RF noise blanker ON and OFF in AM and SSB. It also switches the series gate ANL during AM operation.

7. **PA-CB SWITCH.** This switch is used for selecting normal CB communications or public address paging. In the PA position, it disables the transceiver and the internal speaker unit, and connects the audio amplifier output circuit to an external loud speaker unit (4 ohms -- not supplied) for paging.

8. **METER.** Indicates signal strength of received signal in S units, and relative power output in watts.

9. **TRANSMISSION INDICATOR.** When the transmitter is keyed (on) in SSB or AM, this red lamp will glow at full brilliance.

10. **MIC JACK.** The microphone is connected to this jack. A matching four (4) pin connector is supplied attached to the microphone.

B. OPERATING PROCEDURE TO RECEIVE

1. Be sure that power source and antenna are connected to the proper connectors before going to the next step.
2. Set PA-CB switch to the CB position and turn unit on by turning VOL control CW.
3. Set the MODE switch to the desired mode. (AM-USB or LSB)
4. Set the CHANNEL selector switch to the desired channel.
5. Set the VOLUME for a comfortable listening level.
6. Listen to the background noise from the speaker. Turn the SQUELCH control slowly CW until the noise JUST disappears (no signal should be present). The SQUELCH is now properly adjusted. The receiver will remain quiet until a signal is actually received. Do not advance the control too far, or some of the weaker signals will not be heard.
7. Adjust the CLARIFIER control to clarify the SSB signals or to optimize AM signals.

C. OPERATING PROCEDURE TO TRANSMIT

CAUTION: Be sure that the antenna is properly connected to the unit before attempting to transmit. Transmitting without an antenna or into a poor or broken antenna with a high SWR (5:1 or over) can cause permanent damage to the transmitter final transistor.

1. Select the desired channel.
2. If the channel is clear, push 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 red lamp will light when the transmitter is keyed.

SPECIFICATIONS

GENERAL

Channels:	23AM, 23LSB, 23USB
Frequency Range:	26.965 to 27.255 MHz
Frequency Tolerance:	0.005%
Frequency Stability:	0.001%
Operating Temperature Range:	–30°C to +50°C
Microphone:	Dynamic with push-to-talk switch and coiled cord
Supply Voltage:	13.8V DC (positive or negative ground)
Current Drain:	Receive: 1.3A @ maximum audio output 0.5A standby (no signal) Transmit: AM full mod . . . . . 2.0A SSB 12W PEP. 2.4A
Meter:	Illuminated, indicates receiving signal strength, relative power output
Size:	7-½" x 2-¼" x 10"
Weight:	6½ pounds (w/accessories)

TRANSMITTER

AM Mode, Full Carrier:	3.75 watts
Modulation Capability:	95% to 100%
SSB Suppressed Carrier:	Peak envelope power output . . . 12 watts
Harmonic Suppression and Spurious Emissions:	Better than FCC requirement
Frequency Response:	AM and SSB . . . . . 300 to 3000Hz.

RECEIVER

Sensitivity:	AM .... 0.5μV provides more than 1 watt audio. with gain control full and noise blanker off. Signal mod. 30% @ 1kHz sine wave. SSB ... 0.1μV provides more than 1 watt audio output.
Signal to Noise Ratio:	AM.... 0.5μV for 10db S + N/N, signal mod. 30% @ 1kHz sine wave. SSB ... 0.1μV for 10db S + N/N carrier on and off.
Selectivity:	AM.... 6db @ 4kHz, 50db @ 20kHz. SSB ... 6db @ 2.2kHz, 50db @ 5.5kHz.
AGC:	Change in audio output less than 12db from 10μV to 0.1 volts.
Squelch:	Adjustable. Threshold less than 0.5μV. Tight more than 200μV.
Audio Frequency Response:	300 to 3000 Hz
Distortion:	Less than 10% at 2.5 watts output Less than 10% at 4.0 watts into ext. 4 ohm speaker.
Image Rejection:	More than 50db.
IF Rejection:	More than 60db @ 7.8MHz.
Adjacent Channel Rejection:	More than 60db @ 0.5μV "NB" off More than 50db @ 0.5μV "NB" on
Cross Modulation:	More than 55db.
IF Frequency:	AM.... 7.8MHz, SSB ... 7.8MHz.
Clarifier Range:	±1200Hz
Noise Blanker:	RF type Noise Blanker.

REPLACEMENT PARTS LIST

CAPACITORS

Schematic symbols	Description
C102, 222, 301, 309, 312, 319, 332, 361, 401, 615	Ceramic 0.001μF
C104, 110, 111, 114, 115, 118, 119, 120, 121, 123, 126, 127, 131, 134, 137, 138, 139, 140, 201, 202, 205, 207, 208, 212, 213, 214, 218, 223, 224, 226, 229, 230, 302, 303, 304, 307, 308, 310, 311, 313, 314, 317, 333, 336, 339, 349, 358, 402, 403, 412, 505, 601, 602, 603, 614, 620, 706, 001, 002, 004, 005, 007, 008, 009	Ceramic 0.1μF
C003	Ceramic 0.047μF
C231, 232, 233, 234, 235, 236, 237, 238, 239, 240	Ceramic UJ 22pF
C410	Ceramic UJ 30pF
C701	Ceramic GDC 0.001μF
C101	Mica 65pF
C103, 116, 128, 130, 133, 203, 216, 220, 306, 344, 404, 406, 413, 416	Mica 100pF
C105, 215, 219	Mica 2pF
C106	Mica 400pF
C107	Mica 10pF
C108, 124, 210, 515	Mica 220pF
C112, 408	Mica 150pF
C113, 228	Mica 56pF
C117	Mica 30pF
C122	Mica 130pF
C129, 316, 318, 322, 359, 360, 411	Mica 20pF
C225, 315, 407	Mica 15pF
C35	Mica 85pF
C217, 221	Mica 300pF
C329, 518	Mica 47pF

Schematic symbols	Description
C330, 331	Mica 4.7pF
C337	Mica 1 pF
C409	Mica 500pF
C135, 335, 345	Mylar-film 0.1μF
C136, 227, 310, 311, 321, 323, 324, 325, 326, 327, 328, 340, 341, 342, 343, 346, 353, 354, 355, 356, 357, 511, 523, 609	Mylar-film 0.04μF
C512	Mylar-film 0.002μF
C510	Mylar-film 0.005μF
C607	Mylar-film 0.03μF
C516, 520	Mylar-film 0.047μF
C125, 204, 211	Gimic 1pF
C405	Gimic 2pF
C132, 334, 338, 347, 350, 351, 352, 362, 363, 501, 502, 503, 604, 606, 612, 613, 616, 618	Electrolytic 1μF 50V
C142	Electrolytic 22μF 16V
C348, 608, 617, 619	Electrolytic 10μF 16V
C506, 513, 517, 605	Electrolytic 47μF 16V
C507	Electrolytic 0.22μF 50V
C519	Electrolytic 470μF 16V
C514, 521, 522, 703, 704, 705	Electrolytic 220μF 16V
C610, 611	Electrolytic 4.7μF 16V
C702	Electrolytic 2200μF 16V
C141, 414	Ceramic Variable 13pF
C241, 242, 243, 244, 245, 246	Ceramic Variable 30pF
C247, 248, 249, 250, 364	Ceramic Variable 40pF
C415	Ceramic Variable 20pF

RESISTORS

All resistors are 1/4 watt, 10% carbon fixed type.

R101, 222, 303, 329, 334, 340, 355, 356, 507, 604, 615,	3.3KΩ
R108, 201, 208, 336	560Ω
R109, 112, 123, 125, 127, 212, 217, 223, 301, 302, 316, 321, 324, 326, 332, 338, 344, 405, 406, 506, 508, 511, 610, 622	1KΩ

Schematic symbols	Description
R113	5.6Ω
R114	10Ω
R115, 202, 209	47Ω
R225, 308, 331, 401, 503	100Ω
R614	270Ω
R116, 118, 119, 205, 309, 328, 333, 359, 411, 517, 606, 607	470Ω
R117, 322, 409	2.7KΩ
R120, 315, 404	47KΩ
R121, 310, 346, 357, 412, 413, 504, 515, 619, 621	4.7KΩ
R513	6.8KΩ
R122, 207, 305, 306, 348, 349, 350	100KΩ
R124, 323, 352, 353, 354, 509, 510, 603, 609, 612	10KΩ
R126	4.7MΩ
R203, 210	68KΩ
R211, 313, 410	220Ω
R213, 337	470KΩ
R214, 219, 402, 403	330Ω
R215, 221, 304, 516, 618	22KΩ
R216, 220, 351, 408, 502	33KΩ
R307, 319, 320	1MΩ
R311, 312, 342, 345, 360, 608, 613	2.2KΩ
R314	680Ω
R317	20KΩ
R318	220KΩ
R325	200Ω
R327	22Ω
R330, 335, 343, 358, 407, 505, 605, 611, 620	15KΩ
R347	82KΩ
R501	56KΩ
R602	270KΩ
Metaloxide film type.	
R102	1W 150Ω
R103	2W 200Ω
R105	2W 100Ω

Schematic Symbols	Description
R218	1W 100Ω
R701, 702	1W 56Ω
R703	1W 33Ω
R104	Solid type 5.6Ω 1/2W
R106	Solid type 22Ω 1/2W
R107	Solid type 470Ω 1/2W
R110	Solid type 47Ω 1/2W
R111	Solid type 2.2Ω 1/2W
R129	Semi fixed 100KΩ
R130, 617	Semi fixed 10KΩ
R361	Semi fixed 5KΩ
R228	Semi fixed 100KΩ
R363	10KΩ
R364, 520	50KΩ
R414	Semi fixed 500Ω
R616	Semi fixed 1KΩ
R521	Variable 10KΩ D w/sw
R229, 519	Variable 10KΩ B w/sw

DIODES TRANSISTORS AND ICS

CR101, 102	10D-4
CR103, 104, 105	1S990S
CR107, 108, 109, 110, 307, 308, 309, 313, 315, 316, 317, 318, 322, 323, 324, 501, 601, 603	IN60
CR106, 201, 202, 205, 206, 306, 310, 311, 312, 314, 319, 320, 321, 405, 602	WG-713
CR203	IS2688
CR204, 303	IS1007
CR301, 302,	IS2472
CR502, 701	IN4004
CR702, 703, 704	BZ090
Q1	2SC1307
Q2	2SC1306
Q3	2SC1449
Q4, 6, 8, 10, 11, 14, 17, 18, 19, 21, 23, 24	2SC710C
Q12	2SC710B

Schematic Symbols	Description
Q5, 7, 13	3SK45
Q9, 20	2SK19
Q15	2SK55
Q16, 25	2SK30 or 2SK40
Q22, 27, 29, 30	2SC372
Q28	2SA495
Q26, 31	2SD187
IC301	μA703
IC501	TA7205P

COILS, CHOKES, AND TRANSFORMERS

L101, 109, 111	RF Choke 0.65μH
L102, 107, 202	RF Choke 0.22μH
L103, 104, 302, 401	RF Choke 150μH
L105	RF Coil C997N
L106	RF Coil C043N
L108	RF Coil C996N
L110	RF Coil C979N
L112	RF Choke 1.2μH
L201	RF Choke 5.5μH
L203, 204, 301, 304, 305, 401	RF Choke 470μH
L303	RF Choke 22μH
L402	RF Choke 22μH
T101	RF Transformer C042D
T102	RF Transformer C182Z
T103	RF Transformer C181Z
T201	RF Transformer Z287A
T202	RF Transformer Z286K
T203	RF Transformer Z285I
T204	RF Transformer Z284A
T205	RF Transformer Z188A
T206	RF Transformer Z282I
T301	RF Transformer C200Z
T302	RF Transformer C993Z
T303, 304, 305, 306, 308, 309	IF Transformer S-183A
T307	IF Transformer S-190A
T401	IF Transformer S-111D
T402, 403	RF Transformer Z1761
T701	AF choke K-18

SWITCHES

Schematic Symbols	Description
S1	Rotary Switch 24 steps
S2	Rotary Switch 8c-3p
S3	Slide Switch 4c-2p
S4	Slide Switch 2c-2p

CRYSTALS

Y201	11.700MHz
Y202	11.750MHz
Y203	11.800MHz
Y204	11.850MHz
Y205	11.900MHz
Y206	11.950MHz
Y207	7.4625MHz
Y208	7.4725MHz
Y209	7.4825MHz
Y210	7.5025MHz
Y401	7.8025MHz

MISCELLANEOUS

DS701	Channel indicator lamp
DS702	Meter lighting lamp
DS703	TX indicator L.E.D.
J501, 502	Earphone jack 3.5ϕ
K1, 2, 3, 4	Relay 12V DC
M1	S/RFO meter
RL-301	Crystal filter
J101	Antenna connector
J601	Microphone Connector
YH1	Crystal holder 12p

IMPORTANT NOTICE

To insure continued compliance to FCC technical requirements, service requiring adjustments to the transmitter portion of this transceiver should be performed only by persons holding commercial first or second class radio operator licenses.

Replacement crystals should be ordered from Tram/Diamond Corporation in order that proper transmitter output frequency tolerances be maintained.

FCC Type Acceptance data is on file at the Federal Communications Commission, listed as FCC Type Number XL 5.

When returning this product for warranty service please include a copy of bill of sale or other proof of purchase to ensure proper handling.