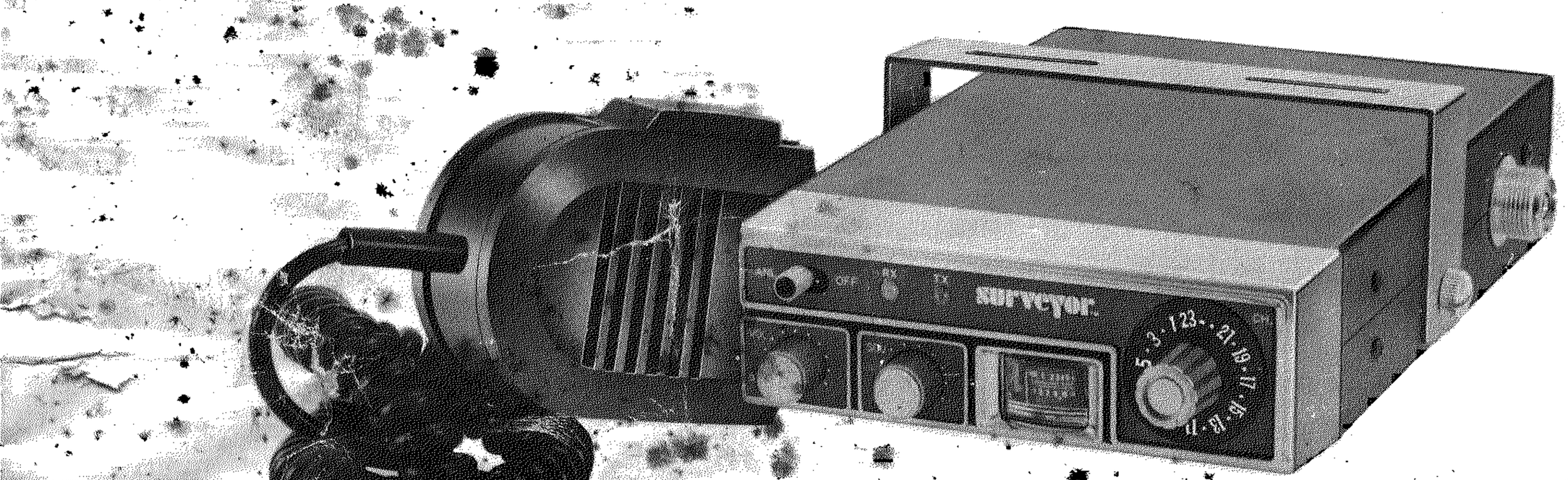
surveyor™

23-Channel Mobile Citizens Band 5 watt Transceiver

MODEL-2100



OWNER'S MANUAL

GENERAL DESCRIPTION

OUTLINE

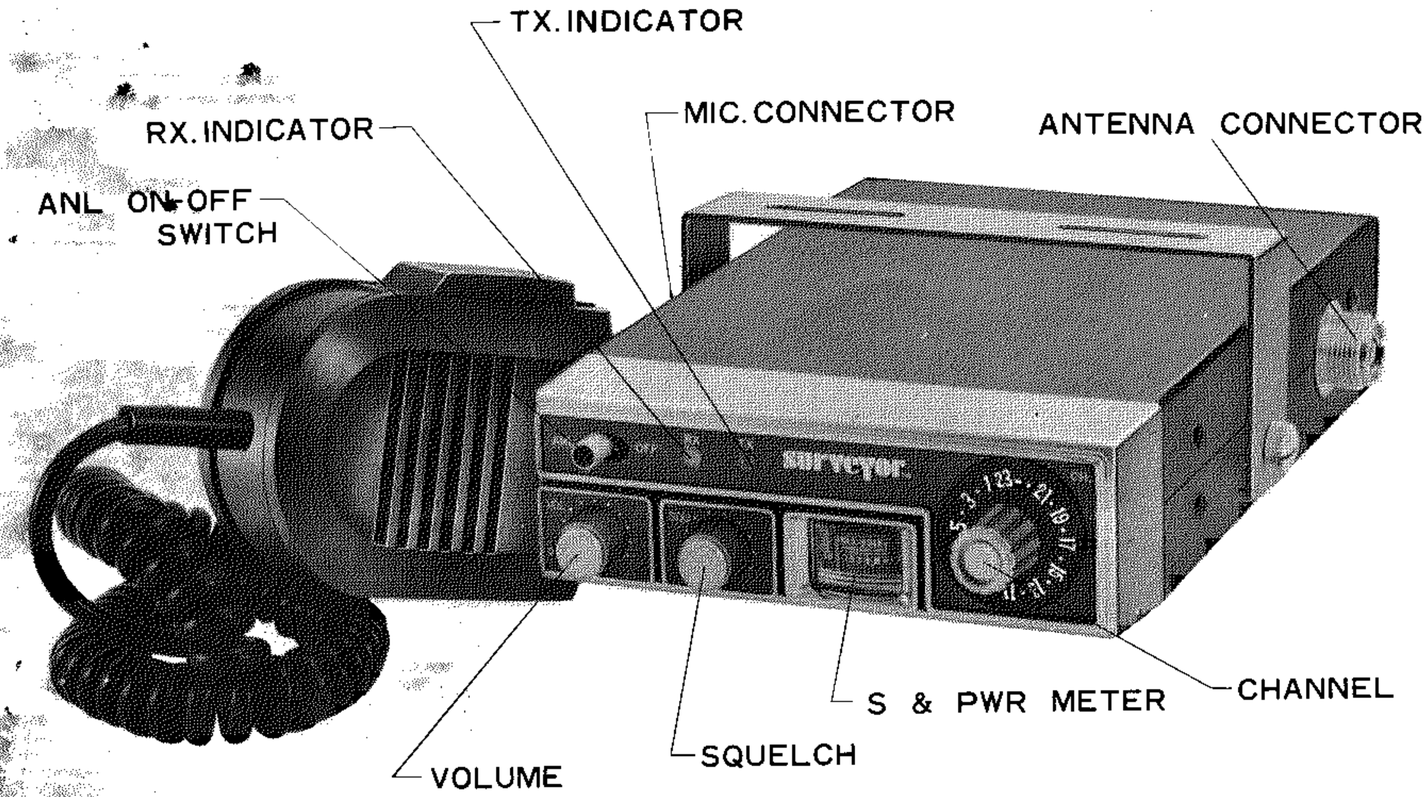
This unit is an extremely compact all solid state 2-way radio providing 23 crystal-controlled transmit and receive channels in the 27MHz citizens band. Apart from communication use.
Latest technical ,advdnces ensure reliable, trouble-free performance. :ouble-free performance.
Technical instruction will be described in this operation manual.

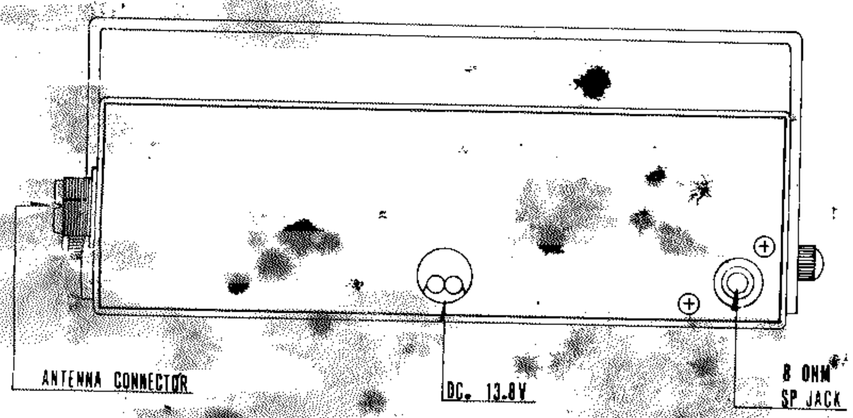
EQUIPMENT LIST

This unit consists of the following.
Unit, self-contained speaker and crystals.
Microphone, (curl cord with plug)
Mounting bracket.
Instruction manual.

FEDERAL COMMUNICATION COMMISSION(F.C.C.) REQUIREMENT

You are required to read and understand Part 95 of the F.C.C. Rules and Regulations prior to operation of this unit. FCC Rules are available from the Superintendent of Documents, Government Printing Office, Washington D. C. 20402. You are also required to fill the enclosed FCC Form 505 and apply for authorization of your station. You are requested to attach the tranmitter identification card when authorization is obtained.
Anyone may operate a duly licensed transmitter, but the licensee is responsible for viorations incurred during use of the transmitter.
The technical information, diagrams and charts provided in this manual are for the use of a qualified holder of a commercial first or second radio-telephone license in servicing this transceiver. Do not attempt to make any transmitter tuning adjustment for yourself. Transmitter adjustment is prohibited by the F.C.C. unless you hold a commercial first or second class radio-telephone license or have a person holding this license supervise the work. A citizens band or Amateur License is not sufficient.


TX. INDICATOR
RX. INDICATOR
MIC. CONNECTOR
ANTENNA CONNECTOR
ANL ON-OFF SWITCH
CHANNEL
S & PWR METER
SQUELCH
VOLUME


ANTENNA CONNECTOR
DC. 13.8V
8 OHM SP JACK

OPERATION

PRE-CAUTION

a) Polarity check
b) Never attempt to transmit without an antenna connection properly made.

INSTALLATION

As supplied with mounting bracket and other hard ware, installation is simply made, however the following procedure must be followed.

a) Select the position where front control panel faces you.
b) Position should not disturb driver or operator.
c) Do not place near heater ducts and or outlet of air conditioner.
d) Mounting position should not be exposed to water or dust problems.
e) Prior to cable connection, determine polarity of the cables Red(+) Black(−) and whether vehicle has a negative or positive ground electrical system.
   Wrong wiring will blow fuse (2A) placed in the cable for protection of internal damage.
   Do not attempt to insert a fuse more than 2A. Make sure to observe the input power voltage should be 12V DC.
f) Antenna must be of type accepted by FCC. Antenna installation is very important to obtain satisfactory communication.

STAND BY

a) Turn "Volume" knob on the front panel in a clock wise direction until a click noise is heard and channel indicator lamps light up.
b) Squelch control knob: Turn fully counter clockwise.
c) Turn volume control slowly clockwise until you hear sound from speaker, or others transmitted signals, then place volume control in the most audible position.

d) Then turn squelch control slowly in a clockwise direction until you suddenly have no sound. This is the ideal position the squelch is set to. As further turning of squelch will not activate the receiver unless extremely large input power is received. Ideal position is where noise suddenly disappeared.

TRANSMISSION

a) Connect the microphone to the input connector at the left hand corner of the front panel.
b) Make sure to observe that the antenna cable connection is firmly made to the "Ant" Jack.
c) To transmit, press the push-to-talk switch holding the Microphone approx. 2 inches from your mouth. For monitoring, confirm that the red indicator lamp "T.X." is lit also "S" meter should be working.

CHANNEL SELECTOR

The number seen through the indicator lamp on top of the channel switch, shows which channel is under operation. For reference for the channels and frequencies, refer to attached chart. Desired channel can be selected by rotating the channel knob.

EXTERNAL SPEAKER

The transceiver speaker will deliver sufficient power. However we suggest using an external speaker when communication take place where excessive back ground noise prevails. For connection of the external speaker be sure to use the connecting plugs supplied with the unit and plug into the position marked "EXT-SP" on the back panel.

TECHNICAL PERFORMANCE

GENERAL

1)	Frequency range	:	23 channels, between 26.965MHz/27.255MHz
2)	Type of emission	:	A3
3)	Microphone	:	500 ohm
4)	Power supply	:	12V DC, negative or positive ground with built in "Polarity protector"
5)	Power consumption	:	Receive (Squelch ON) approx. 200mA Transmit (Max modulation) approx. 1,500mA
6)	Operating condition	:	
	a) Ambient temperature	:	$-10^{\circ}C - +50^{\circ}C$
	b) Relative humidity	:	$+40^{\circ}C$ 95% or less
	c) Power variation	:	11V – 15V
7)	Dimensions and weight		
	a) Dimension	:	160W × 55H × 215D (m/m)
	b) Weight	:	approx. 1.6Kg

TRANSMITTER

1)	Frequency stability	:	0.005% or less ($-30^{\circ}C - 50^{\circ}C$)
2)	RF output	:	4W max.
3)	Modulation	:	95%
4)	Harmonics and spurious emission	:	50db or more below carrier level
5)	Antenna terminal	:	50 ohm resistive

RECEIVER

1)	Sensitivity	: $1\mu V$ for 10db S/N (30% 1KHz mod.)
2)	Selectivity	: 6db bandwidth: 5.5KHz minimum Adjacent channel rejection: 50db minimum
3)	Spurious rejection	: 50db minimum
4)	AGC characteristics	: Within 10db AF variation for $10\mu V - 10{,}000\mu V$ RF input
5)	Squelch	: Minimum sensitivity: $-0.3\mu V$
6)	Audio output	: 2W
7)	Speaker	: 3" dynamic 8 ohm

ADJUSTMENT AND CHECK OUT

TUNE-UP PROCEDURE

Alignment procedures are as follows:

a) Transmitter alignment:
   Connect 50 ohm dummy load to antenna terminal.

b) Repeated test tune up is recommended as per instruction given in the Tune up procedure table.
   1) Take off the bottom cover after removing 4 screws from both sides of case.
   2) Connect 50 ohm dummy load to the antenna terminal.

3) Power consumption under normal operation:
   Reception (Squelch on) . . . . . 200mA approx.
   Transmission (Non mod.) . . . . . 900mA approx.
   Transmission (Full mod.) . . . . . 1,500mA approx.
4) Maximum modulation degree is tuned at 90% and the level setting for the Over Modulation Protector should be performed by VR3.
5) Standard modulated input for the microphone (50% mod.) is 2mV/ 500 ohm at 1KHz.
6) Alignment of the squelch. Turn the squelch knob to max. position, set VR2 at the point when the squelch opens while tuning VR2 feeding 40db input from SSG which is connected to the antenna terminal. Then remove the input signal and turn the squelch knob full position toward counter-clockwise direction whereby you will hear noise from the speaker. Further, turn knob slowly toward clock-wise direction approximately 1/3 of the way whereby the squelch is activated Fix the squelch knob firmly at this point and check if the squelch is properly working by feeding 0db input signal thru SSG.
7) Indicator setting
   i) RF output
      Set the meter reading shows on 2/3 position by VR4 when transmitting thru 50 ohm dummy load.
   ii) "S Meter"
      Set the meter reading shows on 3/4 position by VR5 feeding 20db SSG output when receiving.

ADJUSTMENT AND CHECK OUT OF TRANSMITTER SECTION

	Item	Adjusting Point	Measuring Point	Adjusting Measuring Value	Measuring Instrument
1	Oscillator (37MHz)	L6	TP-1	Set the channel on Ch.23. Align L6 until Freq. Counter accurately shows 37.850MHz when VTVM is in full scale reading and fix L6. Standard voltage of TP-1 is 0.3V.	Freq. counter RF VTVM
2	Mixer	L7 L8	TP-2	Set the channel on Ch.9. Align L7, L8 until the VTVM on TP-4 points full scale reading. Standard voltage of TP-2 is 2.5V.	RF VTVM
3	Exciter	L11 L13	Ant. terminal	Set the channel on Ch. 9. Align L11, L13 to obtain maximum reading of the dummy load which is connected to the antenna terminal.	50 ohm dummy load
4	Power amp.	L15 L16	Ant. terminal	Align L15, L16 to obtain maximum reading of the dummy load which is connected to the antenna terminal. L11, L13 to be also aligned to obtain the above result. Standard out is 3.2-3.5W.	50 ohm dummy load

	Item	Adjusting Point	Measuring Point	Adjusting Measuring Value	Measuring Instrument
5	Modulation	VT3	Ant. terminal	Feed 2.5KHz AF Oscillator output to the microphone and tune up AF input level until 50% modulation wave is seen through oscilloscope. Increase AF input level 16db (6 times) at 50% modulation. Align VT3 and fix when modulation degree will not exceed 90%. Standard AF input level at 50% modulation is approx. 2mV/500 ohm.	AF oscillator oscilloscope AF VTVM

Note:

1. All tune-up are performed under channel 9 except 37MHz oscillator at 23 Ch.
2. The polarity of every measuring points are plus(+)

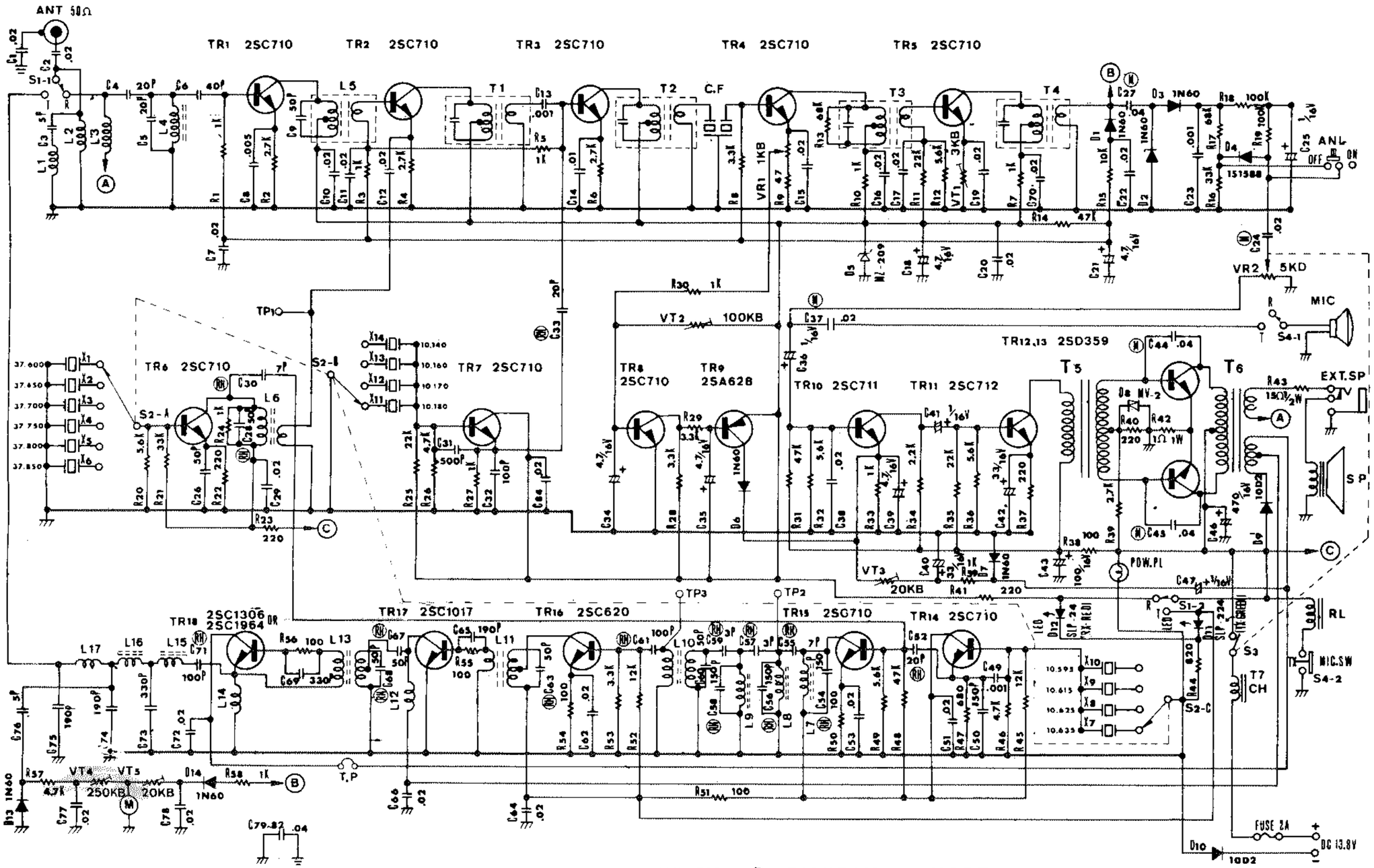
ADJUSTMENT AND CHECK OUT OF RECEIVER SECTION

	Item	Adjusting Point	Measuring Point	Adjusting Measuring Value	Measuring Instrument
1	AF Amplifier	None	Speaker terminal	Check the wave and output voltage of the speaker terminals feeding with approx. 10mV signal to both inputs of VR2. The output voltage is approx. 3V. It is satisfactory if no remarkable distorted wave is found. Speaker (8 ohm)	AF oscillator VTVM oscilloscope
2	2nd IF	T2 T3 T4	EXT. SP	Accurately align SSG freq. to 455KHz and feed 20db output power, at 30% modulation from TR3 Base. Align T2-T4 until you obtain maximum AF output. It is normal, circuits thereafter the 2nd IF, if AF output at EXT. SP reads 3V/8 ohm when the input at TR3 Base lowered to 15db.	SSG, VTVM, oscilloscope
3	2nd Local oscillator (10MHz)		TR7 Emitter	Set to channel 9. Connect Freq. Counter and VTVM to TR7 Emitter Align until VTVM indicates max. position and Freq. Counter accurately points 10.180MHz. Standard voltage at TR3 Emitter is 0.6V.	Freq. Counter VTVM

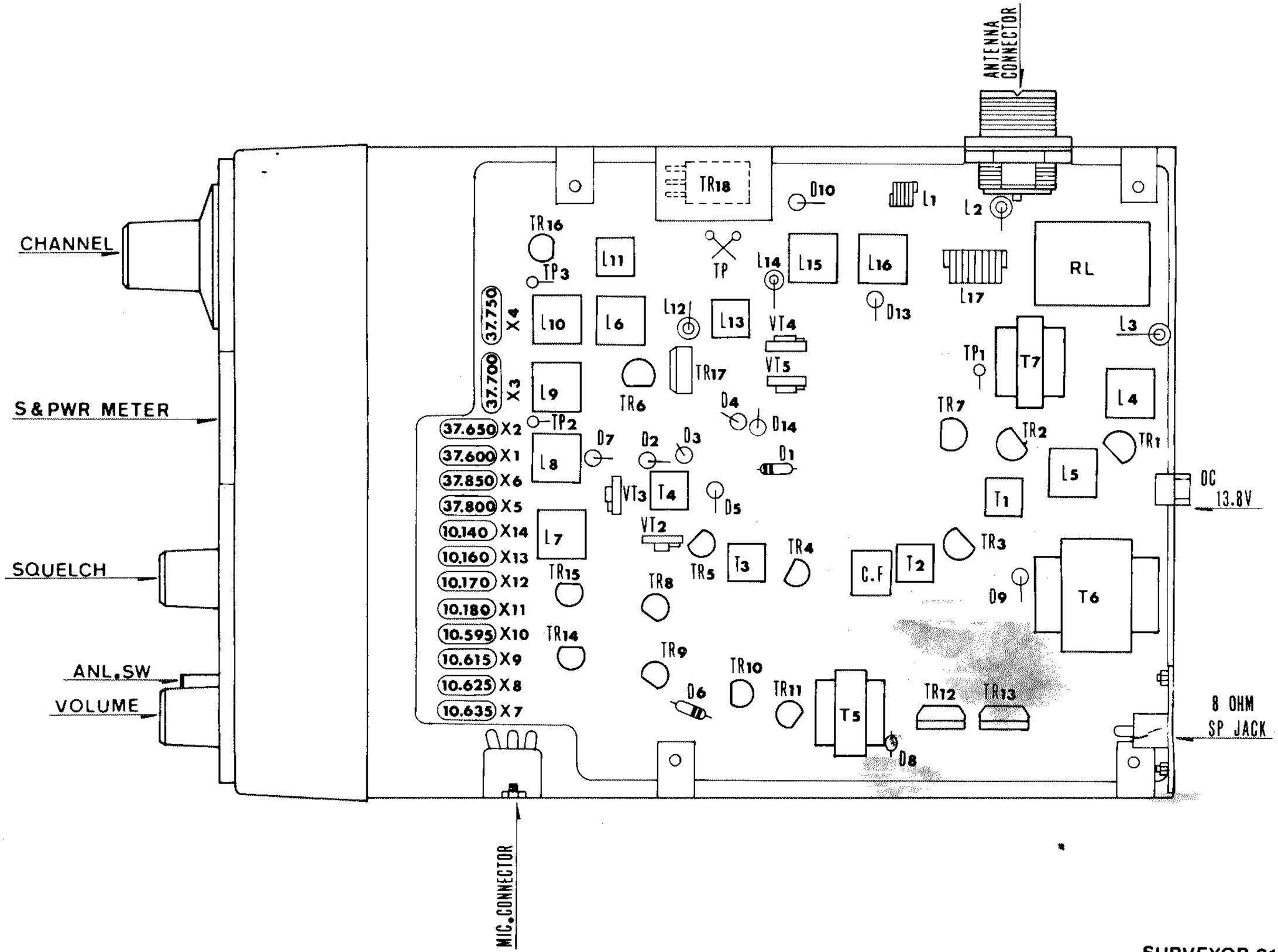
	Item	Adjusting Point	Measuring Point	Adjusting Measuring Value	Measuring Instrument
4	1st IF	T1	EXT. SP	Set the selector on Ch.11. Adjust SSG Freq. sharply on 10.615MHz. Align thru L4, L5 until AF output of J3 outputs maximum power by feeding approx. 20db output at 30% modulation to TR2 Base. It is normal if AF output measured 3V/8 ohm against 10db input to TR2 Base.	SSG VTVM, oscilloscope
5	1st local oscillator (37MHz)	L6	TP1	This stage is common with the oscillator in transmitter section. For alignment, refer to the instruction given in transmitter section.	Freq. counter VTVM
6	RF amplifier	L4 L5	EXT.SP	Set the selector on Ch.9. Align SSG freq. to the Ch. 9 frequency. Align L2, L3 until AF output of EXT.SP obtains max. output feeding from antenna terminal AUT with 10db output at 30% modulation. AF output of EXT. SP is 3V/8 ohm against RF input of 2db-3db.	SSG VTVM, oscilloscope

Note:

1. Make certain that prior to adjustments, the AF output terminal (EXT. SP) must be connected with either 8 ohm speaker or non-inductive resistor.
2. SSG connection to TR2 Base, TR3 Base must be made thru 0.04-0.1uf capacitor.



SCHEMATIC DIAGRAM MODEL surveyor 2100



SURVEYOR 2100

PARTS LIST

Symbol No.	Name of Parts	Description
	PC Board	DEP-23001
TR 1	Transistors	2SC-710
TR 2	〃	
TR 3	〃	
TR 4	〃	
TR 5	〃	
TR 6	〃	
TR 7	〃	
TR 8	〃	
TR 9	〃	2SA-628
TR 10	〃	2SC-711
TR 11	〃	2SC-712
TR 12	〃	2SD-359
TR 13	〃	—
TR 14	〃	2SC-710(D)
TR 15	〃	
TR 16	〃	2SC-620
TR 17	〃	2SC-1017
TR 18	〃	2SC-1306 or 1964
X 1	Crystal	37.600
X 2	〃	37.650
X 3	〃	37.700
X 4	Crystal	37.750
X 5	〃	37.800
X 6	〃	37.850
X 7	〃	10.635
X 8	〃	10.625
X 9	〃	10.615
X10	〃	10.595
X11	〃	10.180
X12	〃	10.170
X13	〃	10.160
X14	〃	10.140
D 1	Diode	IN-60
D 2	〃	
D 3	〃	
D 6	〃	
D 7	〃	
D 12	LED	SLP-24
D 13	〃	
D 4	〃	1S-1588
D 9	〃	10D2
D 10	〃	
D 5	〃	MZ-09

Symbol No.	Name of Parts	Description	Symbol No.	Name of Parts	Description
D 11	LED	SLP-224	T6	Input Trans	DEP-50107
D 8	Varistor	MV-2	T7	Output Trans	DEP-50108
			T8	Choke Trans	DEP-50109
L 1	TVI Coil	2E-48014			
L 2	Choke Coil	DEP-50104	RL	Relay	DEP-50114
L 3	Choke Coil	DEP-50104			
L 4	RX ANT Coil	DEP-50127	VR2	VR(With S)	DEP-50111
L 5	RX RF Coil	DEP-60011	VR1	VR(W/O, S)	DEP-50112
L 6	OSC Coil	DEP-23003			
L 7	TX MIX Coil	DEP-50105	VT1	Semi-Fixed VR	3KB
L 8	TX MIX Coil	DEP-50105	VT2	〃	100KB
L 9	〃	DEP-50105	VT3	〃	20KB
L 10	〃	DEP-60011	VT4	〃	250KB
L 11	TX Drive Coil	DEP-23005	VT5	〃	20KB
L 12	Choke Coil	DEP-50103			
L 13	TX RF Coil	DEP 23005	R 1	Resistor	Carbon 1/4W [illegible]K
L 14	Choke Coil	DEP-50103	R 2	〃	〃 2.7K
L 15	TX RF Coil	DEP-50101	R 3	〃	〃 [illegible]K
L 16	〃	DEP-50102	R 4	〃	〃 2.7K
L 17	〃	DEP-50106	R 5	〃	〃 [illegible]K
			R 6	〃	〃 2.7K
T1	IFT	DEP-23004	R 7	〃	〃 1K
T2	〃	DEP-50124	R 8	〃	〃 3.3K
T3	〃	DEP-50125	R 9	〃	〃 47Ω
T4	〃	DEP-50126	R 10	〃	〃 1K

Symbol No.	Name of Parts	Description	Symbol No.	Name of Parts	Description
R 11	Resistor	Carbon 1/4W 22K	R 36	Resistor	Carbon 1/4W 5.6K
R 12	〃	〃 5.6K	R 37	〃	〃 220 Ohm
R 13	〃	〃 68K	R 38	〃	〃 100 Ohm
R 14	〃	〃 47K	R 39	〃	〃 2.7K
R 15	〃	〃 10K	R 40	〃	〃 220 Ohm
R 16	〃	〃 33K	R 41	〃	〃 220 Ohm
R 17	〃	〃 68K	R 42	〃	〃 1W 1 Ohm
R 18	〃	〃 100K	R 43	〃	〃 1/2W 15 Ω
R 19	〃	〃 100K	R 44	〃	〃 1/2W 820 Ohm
R 20	〃	〃 5.6K	R 45	〃	12K
R 21	〃	〃 33K	R 46	〃	4.7K
R 22	〃	〃 220 Ohm	R 47	〃	〃 680 Ohm
R 23	〃	〃 220 Ohm	R 48	〃	〃 47K
R 24	〃	〃 1K	R 49	〃	〃 5.6K
R 25	〃	〃 22K	R 50	〃	〃 100 Ohm
R 26	〃	〃 4.7K	R 51	〃	〃 100 Ohm
R 27	〃	〃 1K	R 52	〃	〃 12K
R 28	〃	〃 3.3K	R 53	〃	〃 3.3K
R 29	〃	〃 3.3K	R 54	〃	〃 100 Ohm
R 30	〃	〃 1K	R 55	〃	〃 100 Ohm
R 31	〃	〃 47K	R 56	〃	〃 100 Ohm
R 32	〃	〃 5.6K	R 57	〃	〃 4.7K
R 33	〃	〃 1K	R 58	〃	〃 1K Ohm
R 34	〃	〃 2.2K	R 59	〃	〃 1K
R 35	〃	〃 22K	R 60	〃	〃 6.8K

Symbol No.	Name of Parts	Description	Symbol No.	Name of Parts	Description
C 1	Capacitor	(Ceramic) 0.02	C 26	Capacitor	(Ceramic) 50 P
C 2	〃	〃 0.02	C 27	〃	(Mylor) 0.04
C 3	〃	〃 5 P	C 28	〃	(Ceramic) 50 P(RH)
C 4	〃	〃 20 P	C 29	〃	〃 0.02
C 5	〃	〃 20 P	C 30	〃	〃 7 P(RH)
C 6	〃	〃 40 P	C 31	〃	〃 500 P
C 7	〃	〃 0.02	C 32	〃	〃 100 P
C 8	〃	〃 0.005	C 33	〃	〃 20 P
C 9	〃	〃 50 P	C 34	〃	(Electro) 4.7 uF 16V
C 10	〃	〃	C 35	〃	〃 4.7 uF 16V
C 11	〃	〃 0.02	C 36	〃	〃 1 uF 16V
C 12	〃	〃 0.02	C 37	〃	(Mylor) 0.02
C 13	〃	〃 0.001	C 38	〃	(Ceramic) 0.02
C 14	〃	〃 0.01	C 39	〃	(Electro) 4.7 uF 16V
C 15	〃	〃 0.02	C 40	〃	〃 33 uF 16V
C 16	〃	〃 0.02	C 41	〃	(Electro) 1 uF16V
C 17	〃	〃 0.02	C 42	〃	〃 33 uF16V
C 18	〃	(Electro) 4.7 uF16V	C 43	〃	〃 100 uF16V
C 19	〃	(Ceramic) 0.02	C 44	〃	(Mylor) 0.04
C 20	〃	〃 0.02	C 45	〃	〃 0.04
C 21	〃	(Electro) 4.7 uF16V	C 46	〃	(Electro) 470 uF16V
C 22	〃	(Ceramic) 0.02	C 47	〃	〃 1 uF16V
C 23	〃	〃 0.001	C 48	〃	
C 24	〃	(Mylor) 0.02	C 49	〃	(Ceramic) 0.001uF
C 25	〃	(Electro) 1 uF 16V	C 50	〃	〃 150 P

Symbol No.	Name of Parts	Description	Symbol No.	Name of Parts	Description
C 51	Capacitor	(Ceramic) 0.02	C 76	Capacitor	(Ceramic) 5P
C 52	〃	〃 20P (RH)	C 77	〃	〃 0.02
C 53	〃	〃 0.02	C 78	〃	〃 0.02
C 54	〃	〃 150P (RH)	C 79	〃	〃 0.04
C 55	〃	〃 7P (RH)	C 80	〃	〃 0.04
C 56	〃	〃 150P (RH)	C 81	〃	〃 0.04
C 57	〃	〃 3P (RH)	C 82	〃	〃 0.04
C 58	〃	〃 150P (RH)	C 83	〃	〃 0.01
C 59	〃	〃 3P (RH)	C 84	〃	〃 0.02
C 60	〃	〃 50P			
C 61	〃	〃 100P (RH)			
C 62	〃	〃 0.02			
C 63	〃	〃 50P (RH)			
C 64	〃	〃 0.02			
C 65	〃	〃 190P			
C 66	〃	〃 0.02			
C 67	〃	〃 50P (RH)			
C 68	〃	〃 50P (RH)			
C 69	〃	〃 330P			
C 70	〃	〃 0.02uF			
C 71		〃 100P			
C 72		〃 0.02			
C 73		〃 330P			
C 74		〃 190P			
C 75		〃 190P			

surveyor

Warranty Service Procedure

Should your Surveyor unit require service while still under warranty, simply wrap it carefully in a cushioned box and mail it post-paid to:

SMC Service Center
29245 Stephenson Highway
Madison Heights, Mi. 48071

Include your name, address, date of purchase and a brief explanation of the problem you are experiencing.

Out of Warranty Service Procedure

Should your Surveyor unit require service AFTER the warranty has expired, follow the same instructions as above AND enclose your check or money order for $ 20.00 ea. This payment will cover the following: Complete inspection, complete repair (including parts and labor), return postage, insurance and handling.

RECORD YOUR MODEL NUMBER AND SERIAL NUMBER PRIOR TO MAILING.

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