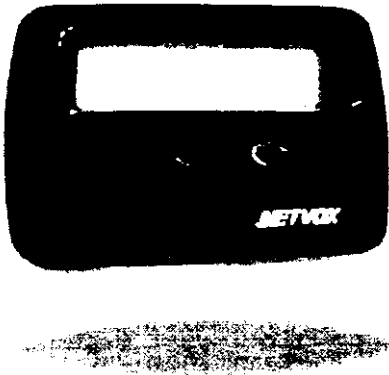


EXHIBIT C

User Manual

Numeric Display Radio Paging Receiver

G-568 Pager



- 26 selectable alerts
- Mute, vibration and alerting sound
- 12 digits LCD display
- Calendar
- Message timestamping
- 4 built-in ID Codes
- 2 built-in alarm clocks
- Continuous message indication
- Manual illumination
- 15 sets of memory retention
- 8 sets of memory protection
- Service area indication
- Error message correction
- Low battery alert
- Key in ID directly
- Unread message reminder

G-568 POCSAG PAGER

Compact in Size

Light in Weight

Easy to Operate

with the Most Advanced Technology

and the Special Design of Battery Saving

USER MANUAL

SPECIFICATIONS

Characteristics

Frequency Range	137MHz - 174MHz, 278MHz - 284MHz
Frequency Deflection	4.5KHz
Modulation Type	FSK
Code Type	POCSAG
Signaling Rate	512BPS/1200BPS
Power Supply	One "AAA" 1.5Volt alkaline battery
Dimensions	63 x 44.6 x 17.5 mm
Weight	50g (with battery and belt clip)
Bit Correction	2 bits error correction / 4 bits error detection
Memory	15 sets of messages (20 digits per each)

Electrical Specification

Paging Sensitivity (uv/m)	> 7uv/m
Spurious Rejection	> 50db
Selectivity	> 60db
Frequency Stability	± 10 ppm/14°F-122°F(-10°C--50°C)
Alert Tone Emission Level	more than 75db spl at 1 ft. (30cm)
Battery Operating	1.2 volt-1.6 volt
Low Voltage Level	1.1 volt
Power Consumption :	
Vibration	80mA
Stand-by	0.6mA
Alert	45mA
Illumination	60mA
Battery Life	about 800 hours
Environmental Condition :	
Temperature	-10°C - 50°C
Humidity	95% at 40°C

Note : Below temperature 32°F (0°C), LCD are not easy for reading out, warm up to resume the function.

PRINCIPLE SUMMARY

Code Format

G-558 designs for compatibility with POCSAG standard code (CCIR radio paging code NO 1).

Diagram 1 - Process of Pager Receiving

Diagram 2 - RF Part

Diagram 3 - CPU Part

RF Part Components

- Antenna
One gold-plated copper bars form a single-loop antenna. The antenna circuitry is made up of L101, L102, C101, VC101, C102, C103 which picks up the VHF signal and is coupled to the RF amplifier.
- RF Amplifier and Tank Circuit
The RF signal is amplified by the cascode amplifier (Q101, Q102) and fed to the mixer (Q304) through SAW filter (F101) and two groups of Tank Circuit (L307 C319, VC301 and C317, C324, L308).
- IF Amplifier
it is made up of Q202 and the related LCR components. The frequency will be double in 138-174MHz and triple in 278-284MHz.
- Mixer
it consists of Q304 and the related LCR components. The RF signal is mixed with local oscillation signal (generated by IF Amp) by the mixer. The resultant 21.4MHz (the first IF signal) is fed to Q407 for amplification through quartz filter (F304).
- FM decoder Circuit
It is made up of U401 (TA31142FN) and the

related circuits. The 20.945MHz signal in U401 is mixed with the first IF signal - 21.4MHz, the resultant 455KHz (the second IF signal) then is selected by 455KHz ceramic band-pass filter (F403) to get the FSK signal Decoder IC needs.

CPU Part Components

- CPUIC
The decoded data is processed by U2 (AR5010) which is a CMOS single chip micro-processor. Some of the peripherals (including LCD display, alerting) are controlled over here.
- Voltage Detector
It is controlled by Q1. Q1 detects voltage of CPU and provides RESET signal for it. Q1 also detects voltage of battery.

ADJUSTMENT

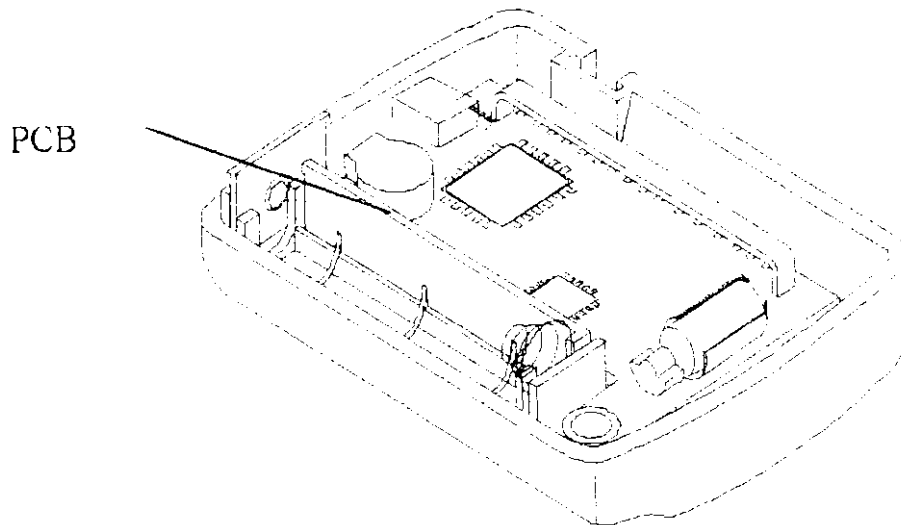
- RF Gain : 455KHz power (TP7)
Conditions : (1) SG output level -57dBm
(2) No modulation
(3) Set SG in the wanted frequency
Adjust point : VC101, VC301
Test point : (1) Observe on the oscilloscope
(2) The biggest stage
- 455KHz Signal Frequency (TP7)
Conditions : (1) SG output level -57dBm
(2) No modulation
(3) Set SG in the wanted frequency
Adjust point : VC202
Test point : (1) Observe on the frequency counter
(2) Frequency : 455KHz $\pm$ 100Hz

Diagram 4 - Adjust Point

REPAIR

General

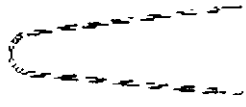
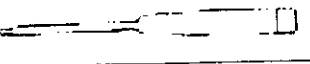
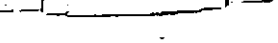
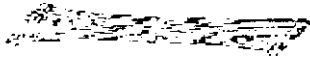
All of the circuit is contained on one print circuit board, including RF and CPU circuit. All the PCB is designed for easy replacement and repair.



Equipment for Test (Table 1)

No.	Equipment	Specification	Purpose
1	RF signal generator	Frequency range : 100-180MHz Deviation : 0-+10KHz Output level : 0.1uV-100mV	Check receiver
2	RF frequency counter	Frequency range : 10-200MHz Input level : 10mV (Minimum)	Check local oscillator
3	Audio frequency counter	Frequency range : 1Hz-1MHz Input level : 10mV (Minimum)	Check local clock frequency
4	Dual - oscilloscope with save function	Frequency range : DC-5MHz	Check decoder and CPU
5	Repairing tools	Ref Table 2	Adjust the trimmer and coil
6	Programmer		
7	Alternating current voltage meter	Frequency range : 0.1-10KHz Voltage range : 1mV-10V Amplitude : -60 - +20dBm	Check audio frequency amplifier
8	DC mini current meter	Sensitivity : 1-200mA	Test DC consumption
9	Oscilloscope	Frequency range : 1-25MHz	General test and adjust
10	Encoder		Generate the NRZ binary code
11	DC power supply	Voltage : 0.5-2V Resolution : 10mV Current : 300mA	Supply power of pager
12	Tooling		Check receiver sensitivity
13	RF voltmeter	Frequency range : 0.1-200MHz Voltage : 0.001-10V	Check receiver
14	Tone volume counter	Net A	Check time volume
15	Shielding room	Attenuation > 70dB	Check pager sensitivity

Repairing Tools (Table 2)

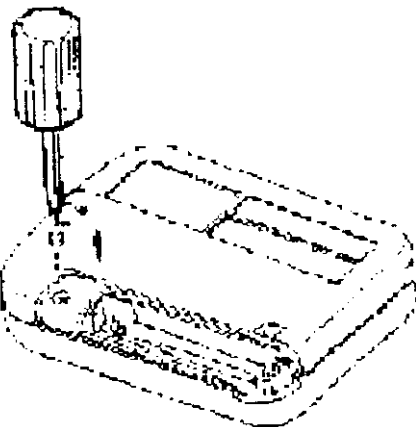
Description	Item No.	Remark	Appearance
Tweezers	ST-001	To disassemble the rubber connector and PCB	
Hexagon screw driver	ST-002	Screw and unscrew the hexagon screw	
Ceramic tuning stick	ST-003	Adjust the adjustable capacitor	
Connecting line	ST-004	Adjust and test PCB	
PCB socket cable	ST-005	Adjust and repair PCB	

Disassembly and Assembly Procedure

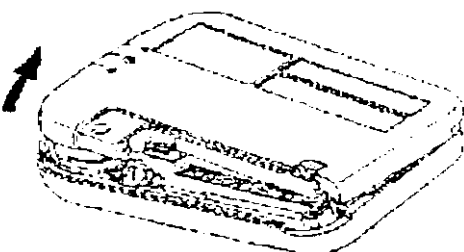
1 Open the battery compartment cover and unload the battery .



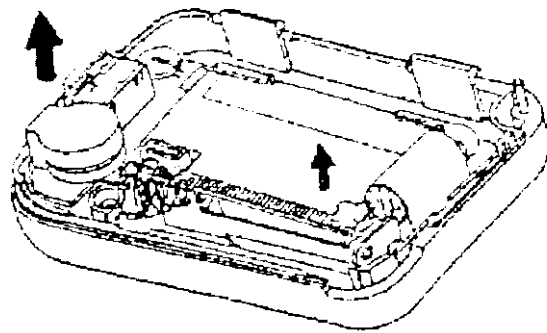
2 Unscrew the screw on button cabinet with (ST-002).



3 Lift the bottom cabinet.

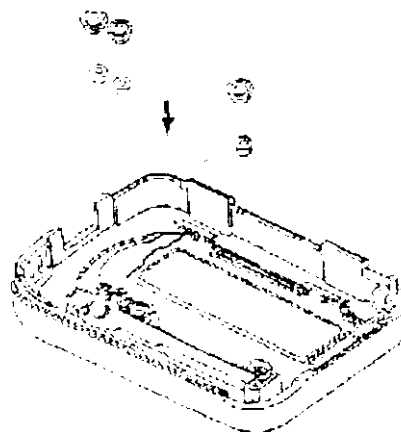


4 Pinch the "+" and "-" battery contact with both hands, disassemble the rubber connector and rubber keys, wipe the contact of rubber connector and PCB. (Replace the LCD and rubber keys when they are damaged)

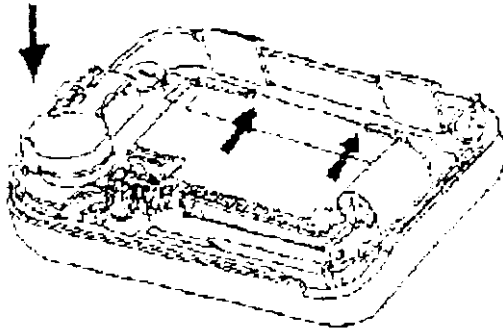


5 Clean the litter inside the cabinet.

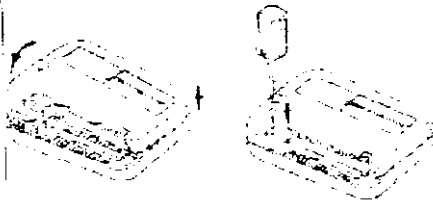
6 Place the 3 rubber keys and rubber connector.



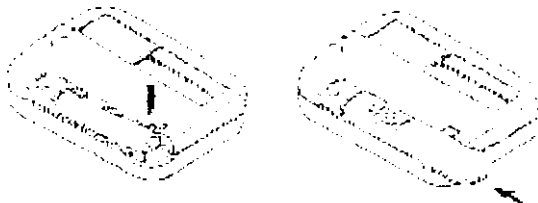
7 Assemble the push switch bracket, then assemble the PCB to the rabbit. The "+" and "-" battery contacts should be vertically assemble to the rabbit of top cabinet.



8 Place the right side hook of bottom cabinet, then compress the left side. Screw the screw and other parts.



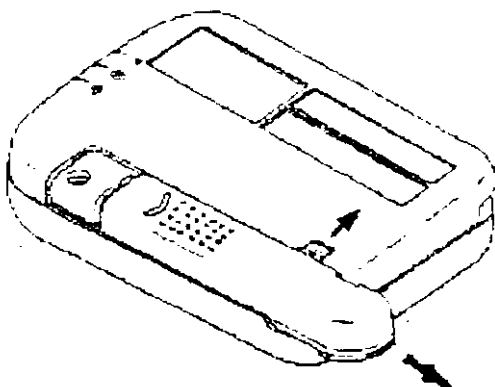
9 Load the battery, assemble the battery compartment cover.



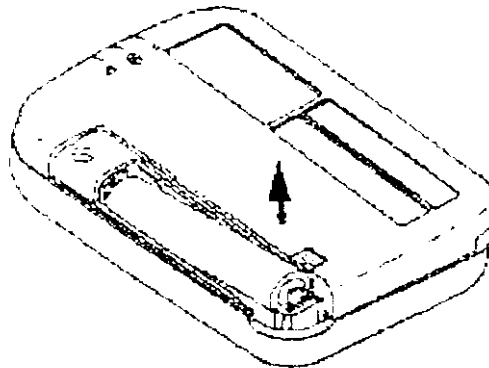
Battery Installation

Caution: Please turn off the power before you load the battery.

1 Slide the battery cover stop and slide to lift the battery cover.



2 Pull the battery from the "+" pole and unload the battery.



3 Insert the battery to battery compartment from "-" pole and push the "+" pole to make sure the battery has contacted the bottom of compartment.

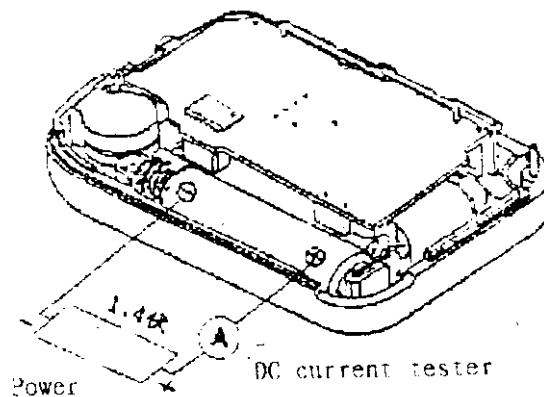
4 Assemble the cover and slide the battery cover stop to fix.

Caution: Do not put the used battery in the fire, lest it should cause explosion.

TEST PROCEDURE

□ Current Consumption Test

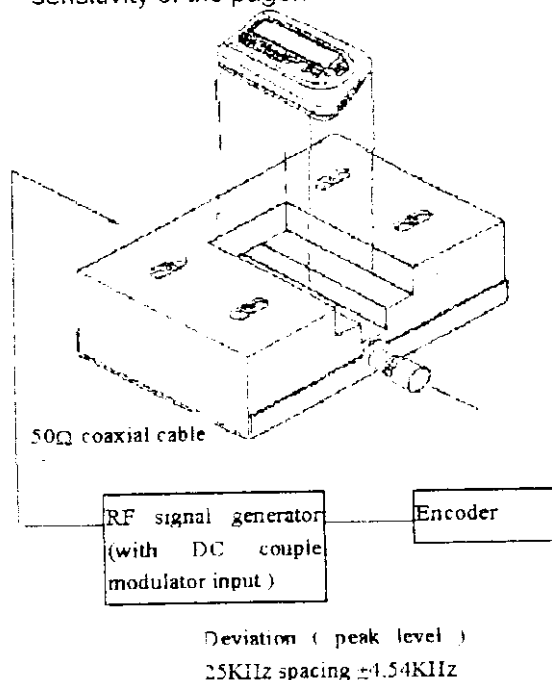
- 1) Unload the battery, connect the DC power supply and DC mini current tester to the poles of battery contacts on PCB.
 - 2) Supply the power at 1.4V.
 - 3) Switch on.
 - 4) Observe the range of DC current tester.
- Specification : The instant current when LCD display turning off should be less than 0.18mA.



□ Sensitivity Test

Sensitivity is measured by field strength ($\mu\text{V/m}$). The repeating test is essential condition for testing this specification. Sensitivity should be tested in the shield area that avoid interrupting by external noise. The value of sensitivity is a relative. It should be measured by compared to a well operating pager. The test procedure as below :

- 1) Connect the encoder output to external modulator pot of signal generator. And set the strength of signal generator to -50dBm.
- 2) Connect the RF output of signal generator to the tooling with the 50 ohms coaxial cable.
- 3) Place the pager in the tooling.
- 4) Connect the power supply to the pager.
- 5) Press the "send" key of encoder, the pager will receive the signal and start alerting.
- 6) Decrease the output level of SG gradually, test each level till the pager alerts for 3 times. Study the scale of output level that indicates the sensitivity of the pager.



Repair

1. Solder

The iron used for soldering the PCB is recommended to the adjustable melting type.

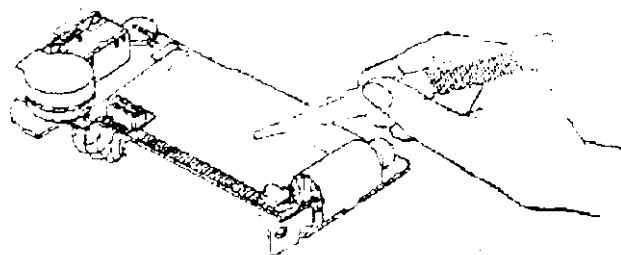
2. Desolder

A vacuum desolder tool is recommended in desoldering the components on PCB

3. Replacemnts of component

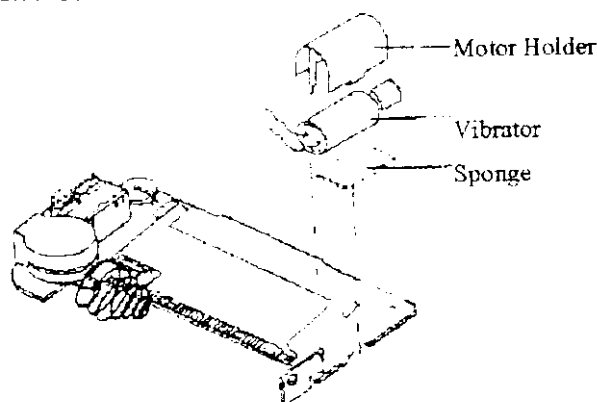
Pinch the component with the tweezers and pick it up from the PCB. The below sketch indicates the replacement of crystal oscillator.

Caution Don't overheat the contact of component



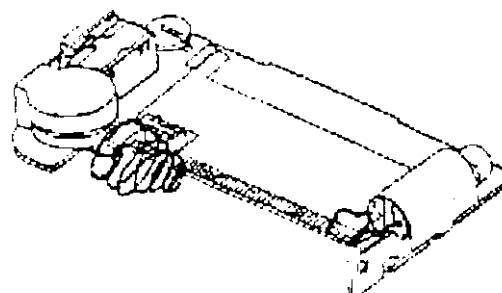
Vibrator Installation

- 1) Stick a sponge under the vibrator and place inside the holder, then solder the holder to fix on PCB



- 2) Solder red and black wire of vibrator to the PCB, please refer to the sketch below.

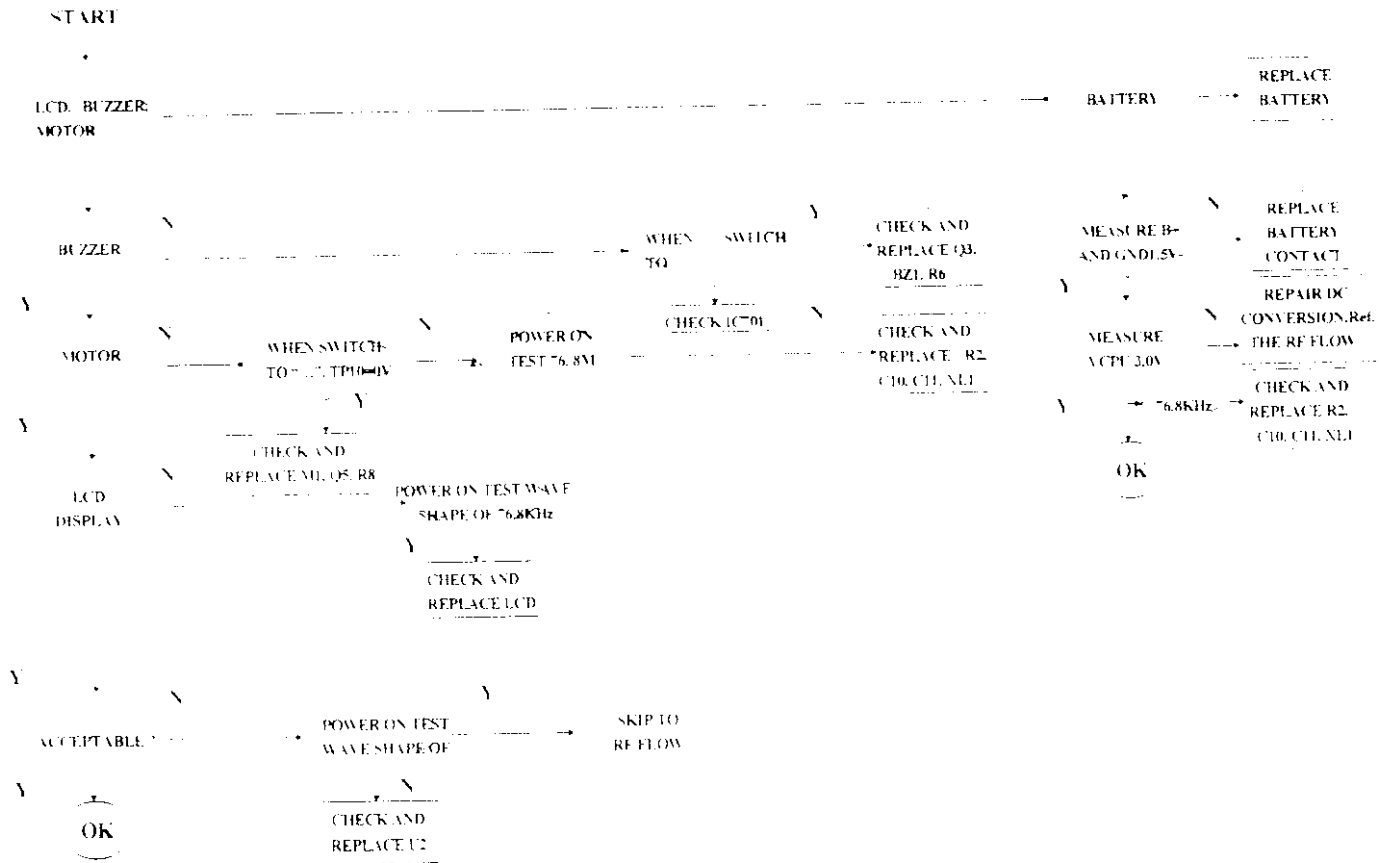
3)



EXPLORED VIEW

ITEM	PART NAME	ITEM	PART NAME
1	CLIP PLATE	17	FLANNEL
2	E RING	18	BATTERY CONTACT (+)
3	CLIP	19	BATTERY CONTACT (-)
4	CLIP RIVET	20	HOLDER
5	CLIP SPRING	21	REFLEXIBLE PAPER
6	CLIP BRACKET	22	RUBBER CONTACT
7	FREQ. PLATE1	23	FUNCTION KEY (LEFT)
8	SCREW	24	FUNCTION KEY (MIDDLE)
9	BATTERY COVER STOPPER	25	FUNCTION KEY (RIGHT)
10	BATTERY COMPARTMENT COVER	26	RING
11	BASE CABINET (BOTTOM)	27	CHAIN SHAFT
12	ANTENNA (SMALL)	28	CHAIN
13	RF PCB	29	BASE CABINET (TOP)
14	ANTENNA (LARGE)	30	BRASS SUPPORT
15	BUBBLE CUSHION (BIG)	31	NAME PLATE
16	BUBBLE CUSHION (SMALL)	32	LOGO NAME

TROUBLESHOOTING FLOW CHART



U 401=24 (IF IN)



U 401=15 (NRZ)

CHECK AND REPLACE U401 RELATED PARTS

CHECK AND REPLACE U401

OK

START

VOLTAGE U401=17

CHECK AND REPLACE U401, U405

WAVE SHAPE U401=20

ADJUST LOCAL OSCILLATOR

CHECK AND REPLACE XL201, Q203

WAVE SHAPE TP7

TUNING VC202

CHECK AND REPLACE Q203, L206, L205, R205, R207, L204, C211, C212, C213, VC202, R208

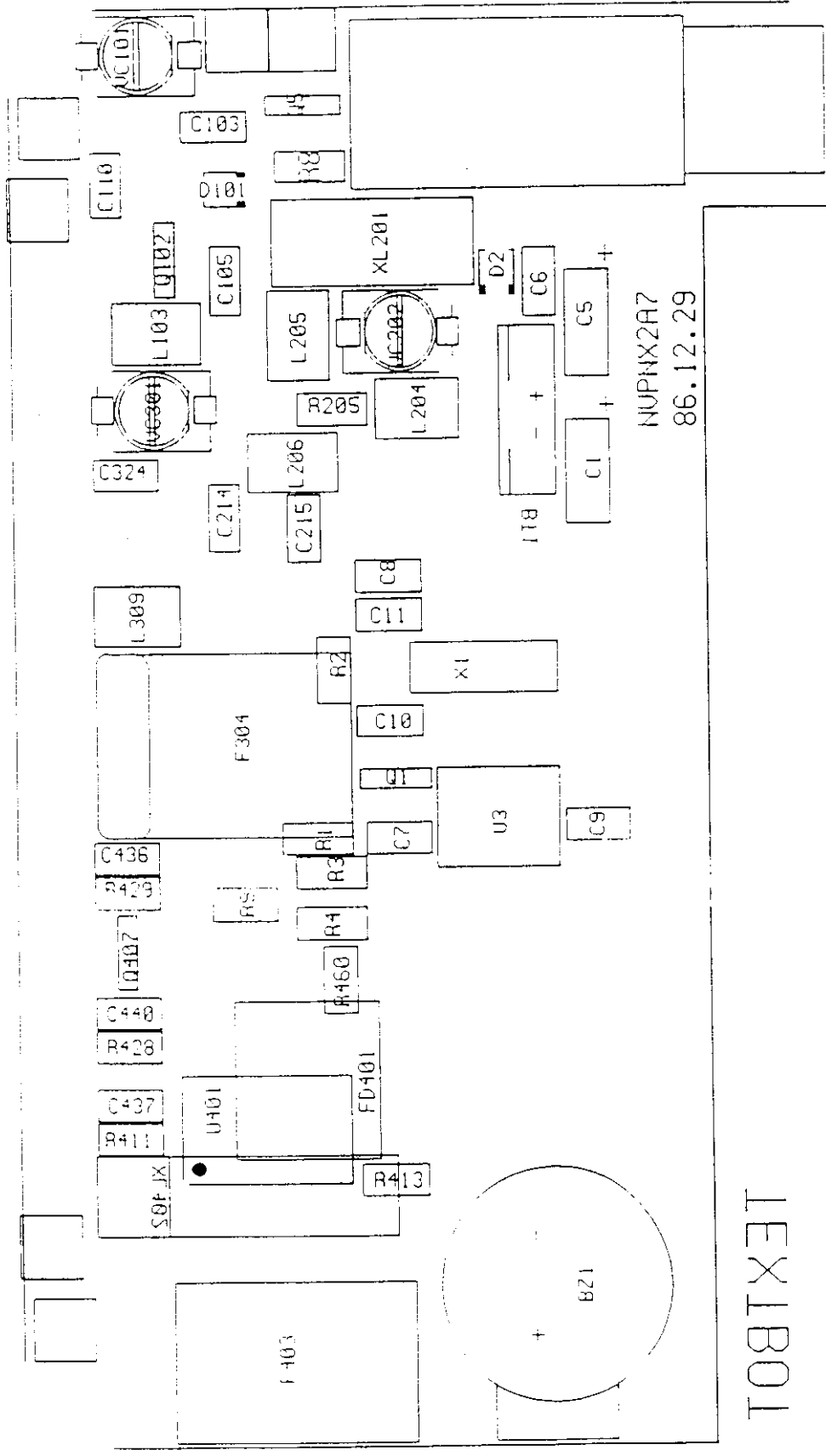
WAVE SHAPE U401=15

CHECK GAIN AND REPLACE DAMAGED PARTS

PCB PARTS LIST

ITEM	QTY	Comp-name	PART-NAME	DESCRIPTION
1	1	IF IC	U401	TA31145FN
2	4	RF TR	Q101,102,203,304	2SC3356 (R24)
3	1	RF TR	Q407	2SC2404 (UC)
4	1	TR	Q405	2SA1162 (G)
5	1	PROTECT DIODE	D101	MA111
6	1	PN DIODE	D102	1SS314
7	1	XTAL	XL201	(FCH-21.4) / 2 MHZ UM5
8	1	XTAL	XL402	20.945MHZ (20P 3*9)
9	1	XTAL FILTER	F304	21.4MHZ (UM-5)
10	1	CERAMIC FILTER	F403	455KHZ (CFWM455E)
11	1	DISCRIMINATOR	FD401	CDBM455C28
12	1	TRIMMER CAP	VC301	2~10P (TC03C100A)
13	2	TRIMMER CAP	VC101,202	4.5~20P (TC03C200A)
14	1	ANTENNA	L102	ANTENNA (BIG)
15	1	ANTENNA	L101	ANTENNA (SMALL)
16	4	TAN CAP	C427,434,435,438	10U/4V (A CASE)
17	2	INDUCTOR	L307,308	39NH (+/-5%) NL 252018T-039J
18	2	INDUCTOR	L103,206	68NH (+/-5%) NL 252018T-068J
19	1	INDUCTOR	L204	560NH (+/-5%) NL 252018T-561J
20	1	INDUCTOR	L205	680NH (+/-5%) NL 252018T-681J
21	1	INDUCTOR	L309	2.7UH (+/-5%) NL 252018T-2R7
22	1	0603 SMD RES	R450	4.7R (5% 0.062W)
23	1	0603 SMD RES	R104	10R (5% 0.062W)
24	2	0603 SMD RES	R103,310	220R (5% 0.062W)
25	1	0603 SMD RES	R207	470R (5% 0.062W)
26	1	0603 SMD RES	R208	680R (5% 0.062W)
27	1	0603 SMD RES	R460	1KR (5% 0.062W)
28	2	0603 SMD RES	R102,309	1.5KR (5% 0.062W)
29	3	0603 SMD RES	R320,413,428	3.3KR (5% 0.062W)
30	1	0603 SMD RES	R101	15KR (5% 0.062W)
31	3	0603 SMD RES	R120,411,455	22KR (5% 0.062W)
32	1	0603 SMD RES	R205	39KR (5% 0.062W)
33	1	0603 SMD RES	R308	47KR (5% 0.062W)
34	3	0603 SMD RES	R414,415,416	68KR (5% 0.062W)
35	1	0603 SMD RES	R429	100KR (5% 0.062W)
36	1	0603 SMD CAPACITOR	C228	1P (NPO: +/-0.25P)
37	1	0603 SMD CAPACITOR	C109	2P (NPO: +/-0.25P)
38	1	0603 SMD CAPACITOR	C317	4P (NPO: +/-0.25P)
39	2	0603 SMD CAPACITOR	C106,319	10P (NPO: +/-0.25P)
40	1	0603 SMD CAPACITOR	C102	12P (NPO: +/-0.25P)

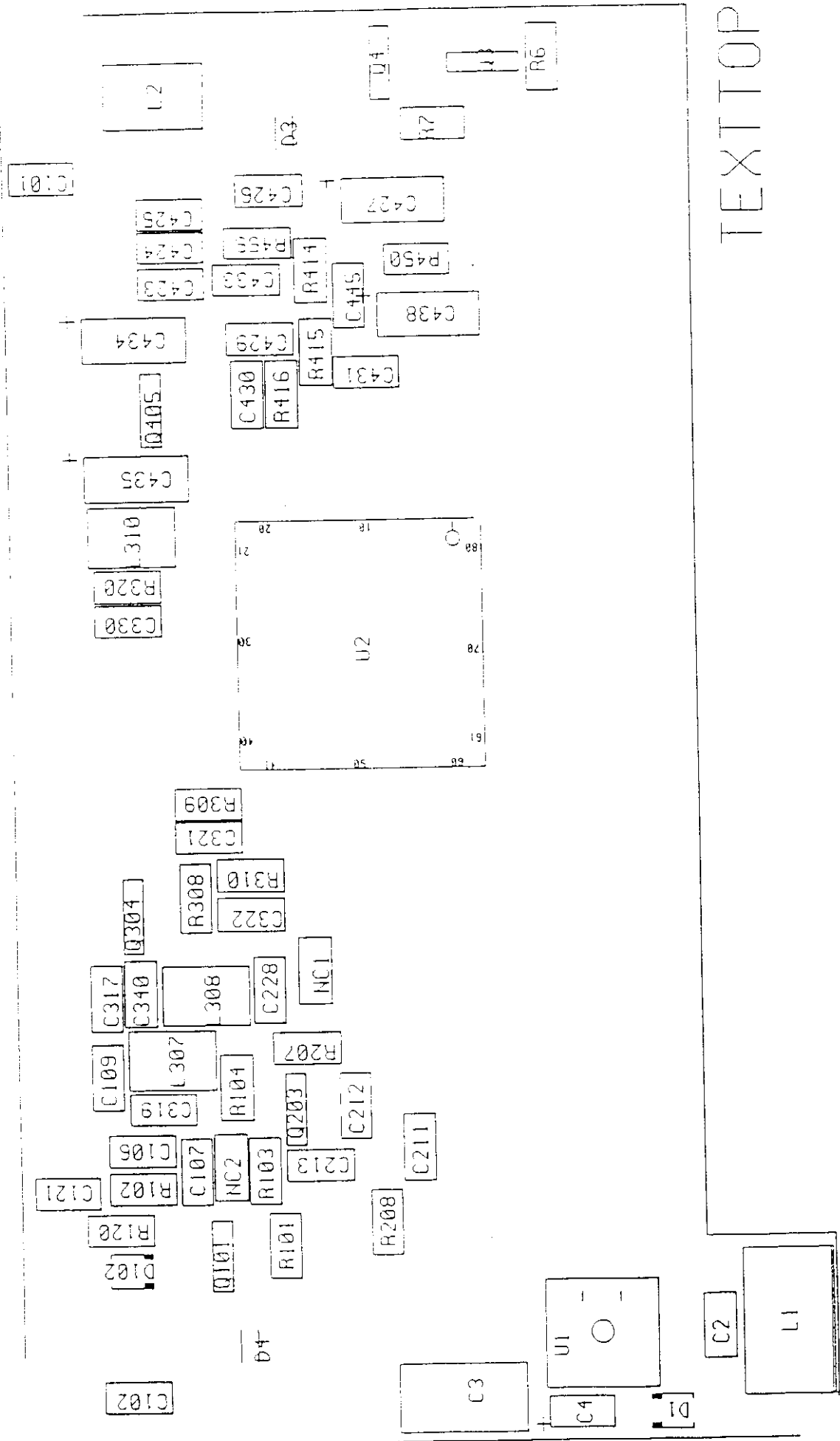
ITEM	QTY	Comp-name	PART-NAME	DESCRIPTION
41	1	0603 SMD CAPACITOR	C211	15P (NPO: +/-0.25P)
42	2	0603 SMD CAPACITOR	C214.324	18P (NPO: +/-0.25P)
43	1	0603 SMD CAPACITOR	C321	20P (NPO: +/-5%)
44	1	0603 SMD CAPACITOR	C110	22P (NPO: +/-5%)
45	2	0603 SMD CAPACITOR	C212.423	27P (NPO: +/-5%)
46	4	0603 SMD CAPACITOR	C101.103.213.424	33P (NPO: +/-5%)
47	1	0603 SMD CAPACITOR	C430	560P (X7R: +/-10%)
48	3	0603 SMD CAPACITOR	C340.436.440	1000P (X7R: +/-10%)
49	1	0603 SMD CAPACITOR	C429	3300P (X7R: +/-10%)
50	5	0603 SMD CAPACITOR	C105.121.215.322.431	0.01U (X7R: +/-10%)
51	7	0603 SMD CAPACITOR	C107.108.425.426.433.437.445	0.1U (Y5V: -80/-20%)

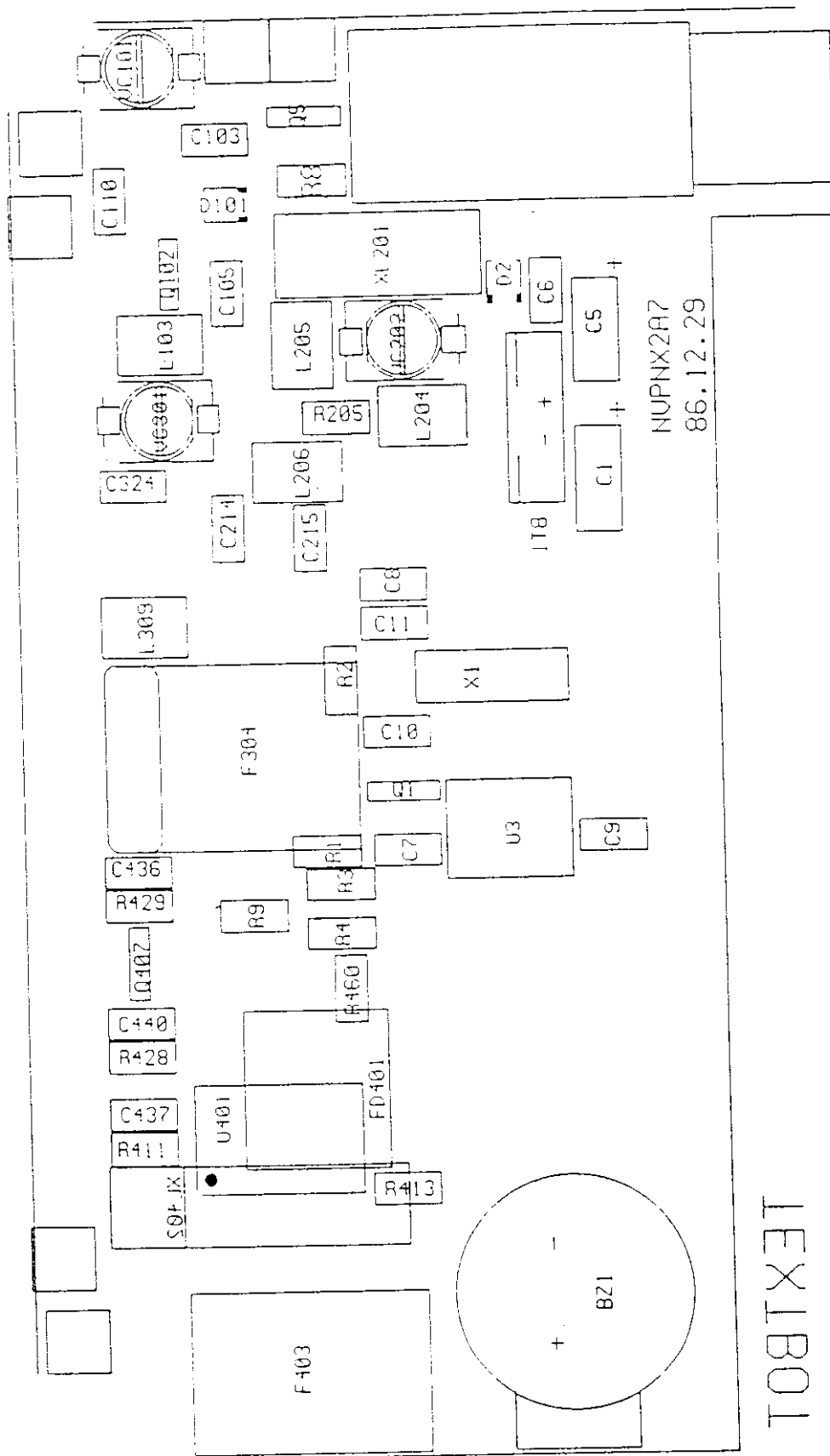


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