The *'ROCK-MITE-20'*
- *a Simple Transceiver*

Parts list

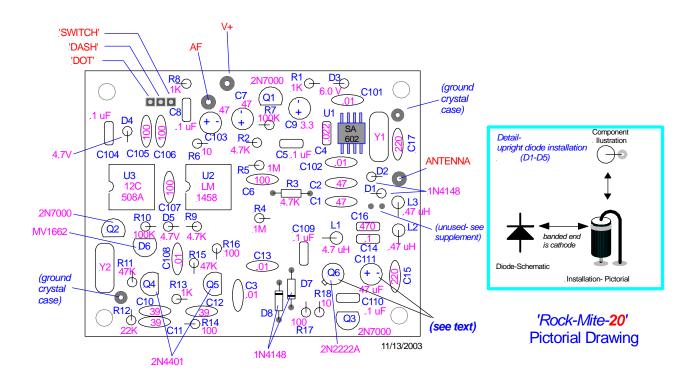| Qty.	Ref. Designator	Component	Description
3	C10,C11,C12	39 pF NPO disk or mono. cap	'39' or '39J'.
2	C1,C2	47 pF NPO disk cap	'47' or '47J' ceramic
4	C6,C105-107	100 pF disk cap	'101' or '101J' ceramic
2	C15,C17	220 pF mono. Cap	'221' or '221J', epoxy case
1	C16	470 pF mono. Cap	'471' or '471J"- epoxy case
5	C3,C13,C101,102, 108	.01 uF disk cap	'103', ceramic
1	C4	.022 uF monolithic cap	'223', epoxy case
6	C5,C8,C14,C104,109,110	.1 uF monolithic	'104', epoxy case
1	C9	3.3 uF electrolytic cap	
2	C7,C103	47 uF electrolytic cap	
1	C111	47 uF electrolytic cap	low-profile case
4	D1,D2,D7,D8	1N4148 diode	*In bag-strip*
1	D3	1N5233B diode- 6.0V Zen.	*In bag-strip*
2	D4,D5	1N5230B diode- 4.7V Zen.	*In bag-strip*
1	HS1	TO-18 heat sink, anodized	*see text*
1	D6	MV1662 varicap diode	2 leads- stripes only *in semiconductor bag*
1	L1	4.7 uH RF choke	Ylw-violet-gold-slvr, *In bag-strip*
2	L2,L3	0.47 uH RF choke	Ylw-violet-silvr-silvr *In bag-strip*
2	R6,R18	10 ohm resistor	Brown-blk-blk-gold
3	R14,R16,R17	100 ohm resistor	Brown-blk-brn-gold
3	R1, R8, R13	1K ohm resistor	Brown-blk-red-gold
3	R2,R3,R9	4.7K ohm resistor	Ylw-violet-red-gold
1	R12	22K resistor	Red-red-org-gold
2	R11,R15	47K resistor	Ylw-violet-org-gold
2	R7,R10	100K resistor	Brown-blk-ylw-gold
2	R4,R5	1 M resistor	Brown-blk-green-gold
3	Q1,Q2,Q3	**2N7000 transistor**	(TO-92 package)
2	Q4,Q5	2N4401 transistor	(TO-92 package)
1	Q6	2N2222A transistor	Metal can package
1	U1	SA602AD SMT IC	*in semiconductor bag*
1	U2	MC1458, LM1458 IC	8-pin DIP IC
1	U3	**12C508A**	8-pin DIP IC, *pre-programmed*
2	Y1, Y2	14.060 Mhz crystal	
2	- -	8-pin IC socket	
1	- -	2-1/2" RG-174/U coax	
1	- -	Printed circuit board	'K1SWL 9/02'

Notes: 1) Items in gray shading are in antistatic envelope.
Components in bold (above) are static-sensitive.

the 'Rock-Mite-20'
D. Benson, K1SWL 9/7/2002

'SWITCH'
'DASH'
'DOT'
V+
AF

R8 1K
2N7000
R1 1K
D3 6.0 V
C101 .01
(ground crystal case)

.1 uF
C7 47
Q1
C103
R7 100K
U1
SA 602
Y1
C17 220

D4
100 100
C8 .1 uF
C9 3.3
R2 4.7K
.022
C4
D2
ANTENNA

4.7V
C104 C105 C106
R6 10
C5 .1 uF
C102 .01
D1
1N4148

U3 12C 508A
U2 LM 1458
R5 100
1M
R3 4.7K
C2 47
C1 47
L3 .47 uH
L2
(unused- see supplement)

2N7000
MV1662
R10 100K
D5 4.7V
R9 4.7K
R4 1M
C16 470
L1 4.7 uH
C14 .47 uH

(ground crystal case)
Y2
R11 47K
C108 .01
R15 47K
R16 100
C13 .01
C111 47 uF
C15 220

Q4
R13 1K
Q5
C3 .01
D7
Q6
R18 10
C110 .1 uF

R12 22K
C10 39 39
C12
D8
R14 100
C11 100
1N4148
R17 100
2N2222A
Q3
2N7000

2N4401

11/13/2003

Detail- upright diode installation (D1-D5)
Component Illustration
banded end is cathode
Diode-Schematic
Installation- Pictorial

'Rock-Mite-20'
Pictorial Drawing

Recommended Assembly Sequence:

- **Download and print the following supplement**: http://smallwonderlabs.com/RMhelps.pdf

- **U1 Installation:** Install the surface-mount IC (U1) first- it's more difficult to install when surrounded by other components. Remove U1 from its protective packaging and place it over the pads on the board. The printed labeling on U1 must read 'upright' as shown above. **Do not pre-tin the pads.** The orientation of U1 must match that of the drawing above, i.e., text is 'upright'. 'Tack' down one of the IC corner pins while holding the device down with a fingertip. Move to the opposite side of the IC and solder all pins down. Note: it's easiest to use an excess of solder and remove the excess with solder-wick. (Solder the second group of 4 pins and wick as needed.

- **IC Sockets**: (see the supplement).

- **C111 Installation:** There are 3- 47 uF electrolytic capacitors in this kit. Install the short one at C111.

- **Q6 Installation:** Install the supplied heat sink HS1 on the 2N2222A before installation on the board. Q6 installation should be done late in the assembly to facilitate installation of shorter components nearby. Ensure that the heat sink does not touch the leads of any nearby components.

- **Resistors and diodes**: Most of the resistors and diodes and the RF chokes are mounted 'hairpin'-fashion. Diodes are orientation-critical- be sure to match the banded end of the diode to the wire bend as shown above at upper right, and follow the installation orientation shown on the pictorial above. Resistors are non-critical- their orientations shown above need not be strictly observed.

- **Crystals:** Y1 and Y2 should be stood slightly (0.5 to 1mm) above the printed-circuit board to prevent shorts from case to PC-board traces. Install short lengths of leftover resistor lead from the bottom end of both crystal cases to the nearest ground point. [The crystal cases are tinned and will accept solder readily- use a minimum of heat.] *You'll find it easiest to stand the wire lead up in its mounting hole and solder it first, then cut the wire short, bend it over to the crystal case and solder that end.*

Spare ground pads are provided next to Y1 and Y2. Lay the board down on a flat surface and stand a leftover component lead upright in each hole. Solder on the top side of the board and trim the lead length to 4-5 mm. Bend this 'flying' lead over to the crystal cans and solder to the crystal. Use minimum heat.

- Remaining parts may be installed without regard to sequence. It may be helpful to note the tight clusters of parts and install those first. Install ICs in the sockets as shown above- see the supplement for orientation info.

RockMite operation:

The RockMite-20 operates on approximately 14060 Khz. The microcontroller provides a 'shift' signal to the Local Oscillator. This signal changes state upon key-down and key-up and provides roughly 700 Hz of frequency shift.

The RockMite contains a built-in Iambic Keyer. Dot and Dash inputs are not firmware-reversible but may be wired to suit the operator's preference.

If either the Dot or Dash inputs is grounded upon power-up, the keyer function is bypassed and the other input accepts a straight-key or external keyer. This is achieved automatically by the use of a 3-conductor jack and 2-conductor (monaural) plug. *Thanks to Steve Weber, KD1JV, for the suggestion.*

'SWITCH' Input

- A brief (<250 ms) closure to ground on the 'switch' input reverses the offset to provide a second operating frequency. **Frequency selection**:   When you wish to work another station, use this function to select the higher of the two pitches on a received signal. Note that the pitch at the other setting is a measure of how close to zero-beat you are; ideally it would be just a low-frequency 'thump'. If the two selections yield 'high' and 'higher' you probably won't be able to work the other station.

- A longer (>250 ms) closure to ground on the 'switch' input puts the keyer in a speed-adjustment mode. The RockMite outputs a Morse code "S" to acknowledge entry into this mode. Tapping (or holding) the Dot paddle speeds up the keyer; the same operations on the Dash paddle slow it down. The default (power-up) speed is approximately 16 WPM and the upper and lower limits are ~40 WPM/5WPM If no dot/dash inputs are received over an interval of ~1.5 seconds, the Rock-mite outputs a lower-frequency tone and reverts to normal operation. *The Morse "S" and subsequent tones are not transmitted on the air.*

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On-Line Resources:

Rock-mite images: http://www.qsl.net/k7qo/rocky1.html
Modifications and tips: http://www.radioactivehams.com/~n0rc/rm/
Missing Parts :   dave@smallwonderlabs.com

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