GEMINI ROBOT KITS

Sonar, Stepper and Signal Conditioning Board Assembly Instructions

Parts List

DESCRIPTION	QTY	PART #
Resistors		
220 (RED-RED-BRN-GLD)	2	CCF25220
330 (ORG-ORG-BRN-GLD)	4	CCF25330
470 (YEL-VIO-BRN-GLD)	1	CCF25470
1K (BRN-BLK-RED-GLD)	21	CCF251K
2.2K (RED-RED-RED-GLD)	2	CCF252.2K
2.7K (RED-VIO-RED-GLD)	2	CCF252.7K
3.3K (ORG-ORG-RED-GLD)	4	CCF253.3K
4.7K (YEL-VIO-RED-GLD)	4	CCF254.7K
6.8K (BLU-GRY-RED-GLD)	8	CCF256.8K
10K (BRN-BLK-ORG-GLD)	28	CCF2510K
22K (RED-RED-ORG-GLD)	5	CCF2522K
47K (YEL-VIO-ORG-GLD)	5	CCF2547K
100K (BRN-BLK-YEL-GLD)	15	CCF25100K
200K (RED-BLK-YEL-GLD)	2	CCF25200K
220K (RED-RED-YEL-GLD)	1	CCF25220K
1M (BRN-BLK-GRN-GLD)	11	CCF251M
2.7M (RED-VIO-GRN-GLD)	1	CCF252.7M
10K Multi-turn Pot (103)	1	RJ26FW103
20K Multi-turn Pot (203)	3	RJ26FW203
50K Single turn	3	91ER50K
500K Multi-turn Pot (504)	1	RJ26FW504
Capacitors		
1000 microfarad 35v Electrolytic	1	CRE1000MF35V
470 microfarad 35v Electrolytic	1	CAE470MF35V
1000 microfarad 16v Electrolytic	1	CRE1000MF16V
100 microfarad 16v Electrolytic	12	CRE100MF16V
10 microfarad 16v Electrolytic	9	CRE10MF16V
.047 microfarad (473K)	3	CK05BX473K
.001 microfarad (102K)	1	CK05BX102K
.1 microfarad (104K)	4	CK05BX104K
.01 microfarad (103K)	1	CK05BX103K
100 microfarad 16v Electrolytic	3	CRE100MF16V
330 picofarad (331K)	1	CK05BX331K
.47 microfarad (474K)	1	CK06BX474K
.0068 microfarad (682)	1	CK05BX682K

cont.

Diodes

1N5231	3	1N5231
1N914 or 1N4148	20	1N914 or 1N4148

Transistors

2N2222 (metal)	4	2N2222
PN2222 (plastic)	7	PN2222A
PN2907 (plastic)	4	PN2907A
LM334	1	LM334

IC's

LM324	6	LM324
74C04	1	74C04
TIL-113	6	TIL-113
74HC86	1	74HC86
74HC74	1	74HC74
H11L1	2	H11L1
74HC42	1	74HC42

Miscellaneous

PC Board	1	
LM350	1	LM350T
PRMA1A05 Relay	10	PRMA1A05
Sonar Board (Small PC)	1	607089
4-40 1/2" Nylon Screw	1	94611A110
4-40 Nylon Nut	1	94812A112
Black Heat Sink	1	HS104-1
2 Pin Molex Connector (white)	1	22-26-7023
Amp Connector (6 pin, black)	1	1-87499
Gold Crimp Pins	6	86016-2
Small Tie Wraps	2	T18I
40 Pin Double Male Header	1	929836-01
20 Pin Double Male Header	1	929836-01
16 Pin Double Male Header	1	929836-01
10 Pin Single Male Header	3	929834-01

cont.

6 Pin Single Male Header	2	929834-01
4 Pin Single Male Header	1	929834-01
3 Pin Single Male Header	1	929834-01
2 Pin Single Male Header	1	929834-01
16 Pin Socket	1	ICN-163-S3-T
14 Pin Socket	9	ICN-143-S3-T
6 Pin Socket	8	ICN-063-S3-T
2 Conductor ribbon cable 6"	1	SS1022-7B

Assembling the SSS board.

1. Insert and solder all sockets as follows. Take time to check for pin 1.

( ) U1 - 14 Pin Socket
( ) U2 "
( ) U4 "
( ) U5 "
( ) U9 - 6 Pin Socket
( ) U6 "
( ) U7 "
( ) U8 "
( ) U12 - 14 Pin Socket
( ) U10 "
( ) U11 "
( ) U14 "
( ) U15 "
( ) U20 - 6 Pin Socket
( ) U17 "
( ) U16 "
( ) U18 "
( ) U19 - 16 Pin Socket

2. Insert and solder all resistors into their proper locations.

( ) R1 - 1K (BRN-BLK-RED-GLD)
( ) R2 - 1K "
( ) R4 - 1K "
( ) R5 - 1K "
( ) R10 - 1K "
( ) R11 - 1K "
( ) R12 - 1K "

( ) R7 - 10K (BRN-BLK-ORG-GLD)
( ) R8 - 10K "
( ) R9 - 1K (BRN-BLK-RED-GLD)
( ) R13 - 1K "
( ) R14 - 1K "
( ) R15 - 1K "
( ) R16 - 200K (RED-BLK-YEL-GLD)
( ) R18 - 1M (BRN-BLK-GRN-GLD)
( ) R19 - 200K (RED-BLK-YEL-GLD)
( ) R20 - 1M (BRN-BLK-GRN-GLD)
( ) R28 - 47K (YEL-VIO-ORG-GLD)
( ) R29 - 47K "
( ) R30 - 330 ohms (ORG-ORG-BRN-GLD)
( ) R31 - 330 ohms "
( ) R32 - 1K (BRN-BLK-RED-GLD)
( ) R37 - 100K (BRN-BLK-YEL-GLD)
( ) R38 - 100K "
( ) R39 - 6.8K (BLU-GRY-RED-GLD)
( ) R40 - 10K (BRN-BLK-ORG-GLD)
( ) R41 - 10K "
( ) R42 - 10K "
( ) R43 - 1K (BRN-BLK-RED-GLD)
( ) R44 - 1K "
( ) R45 - 6.8K (BLU-GRY-RED-GLD)
( ) R46 - 10K (BRN-BLK-ORG-GLD)
( ) R47 - 1K (BRN-BLK-RED-ORG)
( ) R48 - 100K (BRN-BLK-YEL-GLD)
( ) R49 - 100K "
( ) R50 - 100K "
( ) R51 - 100K "
( ) R52 - 1K (BRN-BLK-RED-GLD)
( ) R53 - 10K (BRN-BLK-ORG-GLD)
( ) R54 - 6.8K (BLU-GRY-RED-GLD)
( ) R55 - 1K (BRN-BLK-RED-GLD)
( ) R56 - 1K "
( ) R57 - 10K (BRN-BLK-ORG-GLD)
( ) R58 - 100K (BRN-BLK-YEL-GLD)
( ) R59 - 47K (YEL-VIO-ORG-GLD)
( ) R60 - 47K "
( ) R61 - 470 ohms (YEL-VIO-BRN-GLD)
( ) R62 - 10K (BRN-BLK-ORG-GLD)
( ) R63 - 1K (BRN-BLK-RED-GLD)
( ) R64 - 1K "
( ) R65 - 6.8K (BLU-GRY-RED-GLD)
( ) R66 - 10K (BRN-BLK-ORG-GLD)

( ) R67 - 1K (BRN-BLK-RED-GLD)
( ) R68 - 100K (BRN-BLK-YEL-GLD)
( ) R69 - 100K "
( ) R70 - 100K "
( ) R71 - 100K "
( ) R72 - 100K "
( ) R73 - 6.8K (BLU-GRY-RED-ORG)
( ) R121 - 6.8k "
( ) R120 - 330 ohms (ORG-ORG-BRN-GLD)
( ) R119 - 6.8k (BLU-GRY-RED-ORG)
( ) R74 - 100K (BRN-BLK-YEL-GLD)
( ) R75 - 100K "
( ) R76 - 10K (BRN-BLK-ORG-GLD)
( ) R77 - 3.3K (ORG-ORG-RED-GLD)
( ) R78 - 4.7K (YEL-VIO-RED-GLD)
( ) R79 - 3.3K (ORG-ORG-RED-GLD)
( ) R80 - 4.7K (YEL-VIO-RED-GLD)
( ) R81 - 3.3K (ORG-ORG-RED-GLD)
( ) R82 - 4.7K (YEL-VIO-RED-GLD)
( ) R83 - 3.3K (ORG-ORG-RED-GLD)
( ) R84 - 4.7K (YEL-VIO-RED-GLD)
( ) R122 - 1K (BRN-BLK-RED-GLD)
( ) R106 - 10K (BRN-BLK-ORG-GLD)
( ) R118 - 2.2K (RED-RED-RED-GLD)
( ) R90 - 220 ohms (RED-RED-BRN-GLD)
( ) R92 - 10K (BRN-BLK-ORG-GLD)
( ) R93 - 22K (RED-RED-ORG-GLD)
( ) R95 - 100K (BRN-BLK-YEL)
( ) R96 - 220K (RED-RED-YEL-GLD)
( ) R97 - 1M (BRN-BLK-GRN-GLD)
( ) R98 - 47K (YEL-VIO-ORG-GLD)
( ) R99 - 10K (BRN-BLK-ORG-GLD)
( ) R100 - 2.7M (RED-VIO-GRN-GLD)
( ) R101 - 10K (BRN-BLK-ORG-GLD)
( ) R105 - 10K "
( ) R104 - 10K "
( ) R24 - 10K "
( ) R103 - 10K "
( ) R86 - 10K "
( ) R33 - 10K "
( ) R26 - 10K "
( ) R22 - 10K "
( ) R36 - 10K "
( ) R27 - 1M (BRN-BLK-GRN-GLD)
( ) R25 - 1M "

( ) R23 - 1M (BRN-BLK-GRN-GLD)
( ) R125 - 1M "
( ) R85 - 1M "
( ) R34 - 1M "
( ) R126 - 1M "
( ) R102 - 1M "
( ) R124 - 10K (BRN-BLK-ORG-GLD)
( ) R114 - 2.7K (RED-VIO-RED-GLD)
( ) R123 - 10K (BRN-BLK-ORG-GLD)
( ) R110 - 10K "
( ) R87 - 2.7K (RED-VIO-RED-GLD)
( ) R115 - 2.2K (RED-RED-RED-GLD)
( ) R88 - 10K (BRN-BLK-ORG-GLD)
( ) R108 - 22K (RED-RED-ORG-GLD)
( ) R116 - 6.8K (BLU-GRY-RED-GLD)
( ) R117 - 330 ohms (ORG-ORG-BRN-GLD)
( ) R113 - 10K (BRN-BLK-ORG-GLD)
( ) R109 - 22K (RED-RED-ORG-GLD)
( ) R112 - 22K "
( ) R111 - 22K "

3. Insert and solder all diodes into their proper locations.

( ) CR1 - IN5231
( ) CR2 - "
( ) CR5 - IN914 / IN4148
( ) CR6 - "
( ) CR7 - IN5231
( ) CR8 - IN914 / IN4148
( ) CR9 - "
( ) CR10 - "
( ) CR11 - "
( ) CR12 - "
( ) CR4 - "
( ) CR13 - "
( ) CR3 - "
( ) CR16 - "
( ) CR17 - "
( ) CR18 - "
( ) CR19 - "
( ) CR20 - "
( ) CR21 - "
( ) CR22 - "
( ) CR23 - "
( ) CR24 - "
( ) CR25 - "

4. Insert and solder all potentiometers into their proper locations.

( ) R3 - 20K multi turn (203)
( ) R14 - "
( ) R17 - "
( ) R35 - 50K single turn (50K)
( ) R94 - 500K multi turn (503)
( ) R91 - 10K multi turn (103)
( ) R89 - 50K single turn (50K)
( ) R107 - "

5. Insert and solder all transistors into their proper locations.

( ) Q2 - PN2907
( ) Q3 - "
( ) Q4 - PN2222
( ) Q5 - "
( ) Q15 - "
( ) Q14 - PN2907
( ) Q7 - PN2222
( ) Q6 - "
( ) Q13 - "
( ) Q16 - "
( ) Q12 - PN2907
( ) Q8 - PN2222
( ) Q9 - "
( ) Q10 - "
( ) Q11 - "

6. Insert and solder the current source into its proper location.

( ) Q1 - LM334

7. Insert and solder all capacitors into their proper locations.

( ) C3 - 10 mF 16v electrolytic
( ) C6 - "
( ) C5 - 1mF 16v electrolytic
( ) C9 - "
( ) C10 - "
( ) C11 - 10mF 16v electrolytic
( ) C12 - "
( ) C19 - 1mF 16v electrolytic
( ) C20 - "
( ) C13 - "

cont.

( ) C14 - 1mF 16v electrolytic
( ) C15 - "
( ) C16 - "
( ) C23 - 10mF 16v electrolytic
( ) C25 - 1mF 16v electrolytic
( ) C26 - "
( ) C27 - 10mF 16v electrolytic
( ) C28 - "
( ) C29 - "
( ) C30 - 1mF 16v electrolytic
( ) C31 - 10mF 16v electrolytic
( ) C8 - .047mF (473K)
( ) C21 - "
( ) C17 - .001mF (102K)
( ) C18 - .1mF (104K)
( ) C22 - .01mF (103K)
( ) C24 - .047mF (473K)
( ) C32 - 330pF (331K)
( ) C33 - .47mF (474K)
( ) C34 - .1mF (104K)
( ) C35 - "
( ) C36 - .0068mF (682K)
( ) C37 - .1mF (104K)
( ) C4 - 1000mF 25v electrolytic
( ) C38 - " (positive lead towards C4)
( ) C41 - 100mF 16v electrolytic
( ) C7 - " (positive lead towards R41)
( ) C40 - "
( ) C39 - 470mF 35v electrolytic

8. Insert and solder all relays into their proper locations.

( ) K1-10 - PRMA 1A05

9. Insert the LM350 into the circuit board and place the heat sink under it. (You will have to cut off the corner nearest to C4.) We recommend that you use heat sink compound between the heat sink and the LM350. Secure onto the board with the nylon screw and nut.

10. Cut or break the headers to the specified sizes, then insert short pin side into the circuit board and solder.

( ) J5 - 10 Pin single male
( ) J10 - 16 Pin double male
( ) J6 - 10 Pin single male
( ) J9 - 4 Pin single male
( ) J8 - 2 Pin single male
( ) J7 - 6 Pin single male
( ) J2 - 20 Pin double male
( ) J4 - 6 Pin single male
( ) J3 - 10 Pin single male
( ) J11 - 3 Pin single male
( ) J1 - 40 Pin double male

11. At this point we recommend that you clean the board. You can either use alcohol and a srub brush or purchase Flux Remover from your nearest electronics store.

12. Next you will mount the connector to the Sonar board, and then mount it to the SSS board.

To mount the two conductor cable to the white molex connector, first snip between the wires with your diagonal cutters and then seperate approximately 1 inch on one end and 1/2 inch on the other. You want to place your wire so that it comes to the side of the connector with the black line on it.

Using the 1" end, place the wire on top so that it fits into the silver teeth and push down with a small screwdriver. (Do not strip first.) Be careful that the wire does not extend beyond the connector's edge.

Position the sonar board with the numbers 7555744 in the lower right corner. The other end of the wire will insert in the holes located in the lower left corner. While making sure that pin 1 of J8 goes to the board and solder underneath.

Cut 3 1/2" off the 6 conductor cable and discard. Snip between each wire and peel back 1 1/2". Strip approximately 1/8" of insulation on each end. Attach 6 gold crimp pins to these wires. (See instructions.) Push the pins into the Black Amp Connector. The brown wire is pin 1. You should hear a faint click when the pin is locked in.

Mount the sonar board to the SSS board with the numbers 755744 in the

cont.

lower right corner by inserting a tie wrap through thetop two holes in the SSS board and around the sonar board. Do the same for the bottom but do not secure tightly until after the SSS board is mounted onto the robot frame.

Connect the 6 pin amp connector to J7 on the SSS board. Make sure to match up pin 1. Now connect the small molex connector to J8. Be sure that the black mark on the connector faces the sonar board.

13. Insert IC"s making sure that all legs are properly seated in the socket.

( ) U1 - LM324
( ) U2 - LM324
( ) U4 - LM324
( ) U5 - 74C04
( ) U9 - TIL-113
( ) U6 - TIL-113
( ) U7 - TIL-113
( ) U8 - TIL-113
( ) U12 - LM324
( ) U10 - LM324
( ) U11 - LM324
( ) U14 - 74HC86
( ) U15 - 74HC74
( ) U20 - H11L1
( ) U17 - TIL-113
( ) U16 - H11L1
( ) U18 - TIL113
( ) U19 - 74HC42

The board is now complete.

SSS BOARD
CIRCUIT DIAGRAM