MR4 RECEIVER

CIRCUIT DESCRIPTION

The receiver RF input circuit consists of seven high-Q helical resonators (H1 - H7), two amplifier transistors (Q1, Q2) and associated components. The gain of this circuitry at the RF input frequency is nominally 20 dB. Superior intermodulation performance is obtained by passing input signals through two helical resonators (H1, H2) to reject out-of-band energy before amplification. Both amplifier transistors use high bias current for maximum overload capability and minimum distortion. Feedback is used to stabilize amplifier operation against temperature variations, and two sections of power supply decoupling per stage, further insure stable operation. The RF circuit output connects to the input of double balanced mixer SBL-1.

Mixer injection voltage is generated by oscillator and multiplier stages consisting of transistors Q3 through Q6 and associated components. Q3 functions as a fundamental frequency oscillator at a frequency determined by crystals Y1 through Y4. In single frequency receivers, diode CR2 is replaced by a strap to cause crystal Y2 to be selected as the frequency determining element. Y2 may be enclosed by an optional proportional crystal oven in applications at UHF frequencies where the receiver is subject to wide temperature variations. In multi-frequency receivers, oscillator frequency is determined by providing a ground on terminal E5, E8, E11, or E14 to select the associated crystal. The multiplication of ratios of Q4 through Q6 depend upon the frequency range of the receiver as follows:

Frequency Range		**Multiplier**	
in MHz	**Q4**	**Q5**	**Q6**
136 - 151	Doubler	Amplifier	Not Used
151 - 174	Tripler	Amplifier	Not Used
216 - 250	Doubler	Doubler	Not Used
420 - 512	Doubler	Doubler	Doubler

High frequency crystal are used in the MR4 receiver to minimize the number of possible image frequencies by reducing the total multiplication ratio needed to obtain the required injection frequency. To further reduce image levels, double-tuned filters are used between all multiplier stages.

The double balanced mixer output is fed to the high-IF amplifier section which consists of two transistors (Q7, Q8), eight crystal filter sections, and associated components ("B" version command receivers use four filter sections). The high-IF operates at a frequency of 21.4 MHz. Both amplifier stage outputs include broadly tuned resonant circuits (L24, C60 and L27, C66 respectively) to reject signals at frequencies beyond the skirts of the ceramic filters. Generous feedback and decoupling desensitize the amplifiers to temperature and power supply effects.

Conversion from high to low IF frequencies, amplification at the low IF frequency, limiting, and detection is done by integrated circuit U1 (squelch circuitry in U1 is not used). Frequency conversion is controlled by crystal Y5 which operates in conjunction with oscillator circuitry contained in U1. Four pole ceramic filter FL-9 operates at the low IF frequency of 455 KHz to provide additional filtering. Seven amplifier stages contained in U1 provide excellent limiting before detection. Detection is done by discriminator circuitry contained in U1 operating in conjunction with coil L28.

Wideband demodulated audio from U1 is detected by diodes CR5 and CR6 to provide the primary voltage reference for squelch operation. This detected voltage is fed to a Schmitt trigger circuit consisting of transistors Q15 and !6. Hysteresis in the Schmitt trigger produces positive squelch action by requiring a change of about 6 dB in noise level before receiver audio is switched from off to on. The detected control R84 (R84 is external to the MR4). Action of the Schmitt trigger can also be controlled by an external CTCSS decoder to disable receiver audio when no CTCSS signal is present. In applications where CTCSS operation is used, the CTCSS decoder output connects to terminal E33 to control Schmitt trigger operation.

Squelch operation is further enhanced in the MR4 by automatically adjusting the squelch threshold in accordance with received signal level. Received signal at the low IF frequency is amplified by linear amplifier U2, detected by CR13/CR14, level shifted by U3A, and linear fed to fast/slow squelch switch transistor Q14. When weak signals, less than 1 uV, are applied to the receiver transistor Q14 is turned on and applies a ground at terminal E30 to produce normal squelch action. When strong signals, greater than 1uV, are applied to the receiver transistor, Q14 is switched off. With Q14 turned off, the reference voltage at the Schmitt trigger input is increased causing the squelch to be "tightened". Tightening the squelch causes faster operation in response to signal changes and virtually eliminates squelch tail noise. Thus, the MR4 provides high squelch sensitivity to weak signals and noise free operation for strong signals.

Output from the Schmitt trigger gates the audio output of U1. When a received signal is present, audio from U1 is passed to amplifier U3C. Line audio is taken from the output of U3C at terminal E22. Audio from U3C is also routed to power amplifier U4 for driving a local speaker.

Metering circuits are provided to monitor signal strength, discriminator centering, and received signal peak deviation (metering is not provided in version "B" command receivers). All metering circuits are designed to drive 0-1 mA, 2200 Ohm panel meters. Signal strength metering is available at terminal E27 which is driven by DC amplifier transistor Q13. The signal strength meter indication is calibrated using potentiometer R66. Amplifier transistor Q11 drives terminal E20 to provide discriminator metering. Potentiometer R54 allows the discriminator meter to be set to mid-scale when registering an on-frequency signal. The discriminator meter negative terminal should be returned to ground through two series of connected diodes. Diodes CR. and CR8 are provided external to the receiver module for this purpose when the MR4 is factory installed in a repeater or rack panel. Audio is amplified, rectified by CR9/CR10, and level shifted by Q12 to drive peak deviation metering output terminal E6. Metering calibration is done using potentiometer R64.

Switched outputs indicating the presence of received signal are available from Q9 or Q10. Q10 provides a ground at terminal E16 when received signal is present and an open when no signal is present. An inverted output can be obtained by connecting a strap from terminal E16 to terminal E17 and taking the output from terminal E15.

INSTALLATION

The following describes connections which may be made to MR4 receivers furnished in modular form. Receivers furnished in repeaters are completely connected and require no field installation.

1. Connect to receiver terminals E34 (positive) and E35 (ground) from a DC power source having the following characteristics:

Normal Voltage	12 VDC
Regulation	+/- 5%
Ripple	< 100 mV
Current	250 mA

   CAUTION: The MR4 uses negative ground and must be powered from a negative ground or floating power supply. DO NOT connect a positive ground power source to the receiver.

2. To obtain a fixed-level audio output (line audio) connect to terminals E22 (signal) and E23 (ground). This output provides a level of approximately 0.4 vrms and a source impedance of 1000 Ohms. Shielded wire should be used for making this connection.

3. To obtain power amplifier audio output for driving a loudspeaker, connect to terminals E24 (signal) and E25 (ground). This output provides a fixed level of approximately 3 vrms. An external 100 Ohm potentiometer may be connected between this output and the loudspeaker, as shown in the receiver schematic drawing, to adjust loudspeaker volume.

4. Connect a strap from terminal E28 to terminal E29. (Input terminal E28 is used for remote squelch control in repeater applications and is not normally used in other applications.

5. Connect a 50 Kohm potentiometer to terminals E30, E31 and E32, as shown in the receiver schematic diagram. This potentiometer is used for setting the receiver squelch threshold. Shielded wire should be used for making these connections.

6. To obtain a logic output signal indicating the presence of received signal connect to terminal E16. Output E16 provides a ground when received signal is present and an open when no received signal is present.

   If an inverted logic signal is desired, connect a strap from terminal E16 to terminal E17 and take the output from terminal E15. Terminal E15 provides an open when received signal is present and a ground when no received signal is present.

7. If CTCSS operation is to be used, connect from terminals E18 (signal) and E19 (ground) to the CTCSS decoder input. Connect from the CTCSS decoder output to terminal E33. The logic signal connected to terminal E33 should provide a ground when a CTCSS signal is detected by the decoder and an open when no CTCSS signal is detected.

8. If metering is to be used, connect 0-1 mA meters having internal resistances of 2200 Ohms to the following terminals:

	Meter + Terminal	**Meter - Terminal**
Signal Strength	E27	Ground
Peak Deviation	E26	Ground
Discriminator	E20	Ground through series connected diodes

9. Adjust the signal strength meter by applying a strong (10,000 uV) signal to the receiver input and setting potentiometer R66 until compression begins (further rotation of the potentiometer causes no further change in the meter indication).

   Set the discriminator meter by applying an on frequency signal to the receiver and adjusting potentiometer R54 for a center scale meter reading.

   Set the peak deviation meter by applying a signal having 5KHz deviation to the receiver and adjusting potentiometer R64 for a center scale reading. Meter indication is directly proportional to deviation, i.e., 0.5 mA indication corresponds to 5 KHz deviation.

ALIGNMENT

All MR4 receivers are factory aligned prior to shipment and require no initial alignment. The information given below is intended to aid re-adjustment following component replacement; it is not a step-by-step alignment procedure. Perform only the adjustments pertaining to the receiver section having the replaced component.

1. The RF section may be aligned by applying a signal to the receiver input and connecting a selective RF monitor to terminal E1. Adjust helical resonator capacitors and coupling capacitors C4 and C15 to obtain a maximum indication on the monitor. Some interaction will be found between resonator H2 and capacitor C4 and between resonator H6 and capacitor C15, so these adjustment should be repeated as necessary until no further increase in gain is obtained.

As adjustments are made, reduce the applied signal level to avoid saturating the amplifier transistors or the RF meter. When properly aligned, the RF section will exhibit a gain of approximately 20 dB.

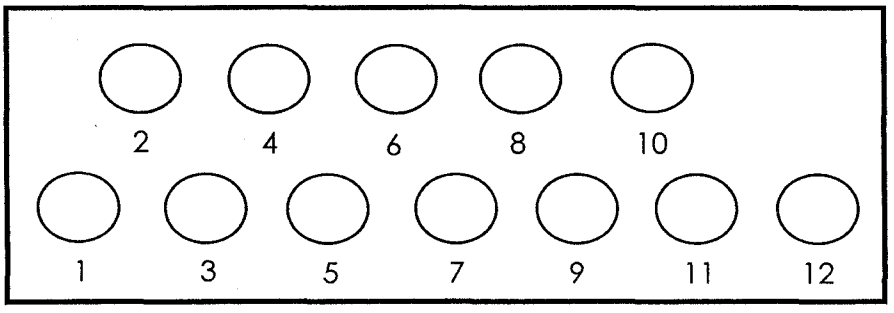
2. If amplifier resonant circuits have a low Q, inductors L24 and L27 should not require adjustment in the field. The IF frequency can be set by loosely coupling a frequency counter to U1 terminal 1 and adjusting C107 to obtain a reading of 21.855 MHz.

3. The discriminator may be adjusted by applying an on-frequency, deviated signal to the receiver input and adjusting L28 for maximum output audio. The adjustment of L28 is not critical and will be found to have a broad maximum.

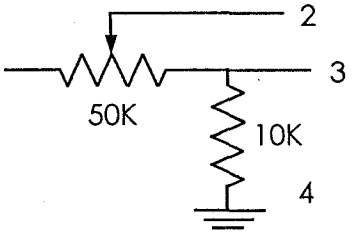
4. Receiver frequency may be set by applying an on-frequency signal to the receiver and adjusting capacitor C24 to obtain a center scale reading on the discriminator meter. In multi-frequency receivers, apply a ground to terminals E14, E11 E5, and E8 in turn to select the appropriate crystal and adjust capacitors C28, C26, C22 and C24, respectively.

5. Multiplier stages may be adjusted by connecting a selective RF monitor to test point TP4 and adjusting the tuning components (inductors and capacitors) for a maximum indication on the monitor. When the multipliers are operating properly, the injection voltage at TP4 should be greater than 300 mV.

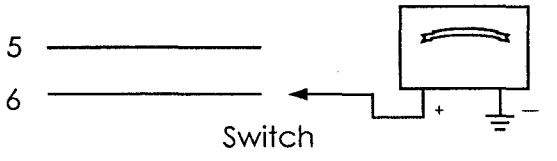
MR4 Receiver



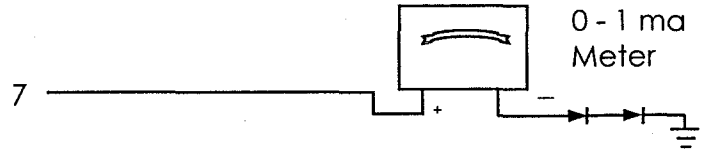
1. Squelch High
2. Squelch Wiper
3. Squelch Low
4. Ground



5. S Meter
6. Peak Deviation

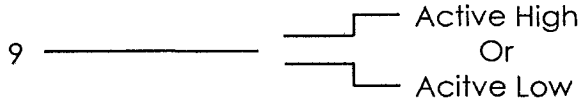


7. Discriminator Meter



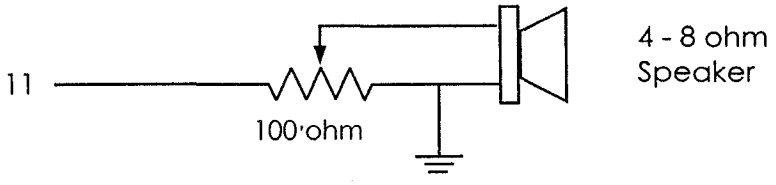
8. No Connection

9. COS



10. Repeat Audio

11. Local Audio



MR4 RECEIVER PARTS LIST - 1 REV A

CAPACITORS

C 1	Part of Helical Resonator
C 2	Part of Helical Resonator
C 3	Part of Helical Resonator
C 4	5 - 25 pf Trim Cap
C 5	.001 Disc
C 6	.001 Disc
C 7	.001 Disc
C 8	.001 Disc
C 9	Part of Helical Resonator
C 10	Part of Helical Resonator
C 11	part of Helical Resonator
C 12	Part of Helical Resonator
C 13	Part of Helical Resonator
C 14	Part of Helical Resonator
C 15	5 - 25 pf Trim Cap
C 16	.001 Disc
C 17	.001 Disc
C 18	.001 Disc
C 19	.001 Disc
C 20	Part of Helical Resonator
C 21	.001 Disc
C 22	5 - 25 pf Trim Cap
C 23	.001 Disc
C 24	5 - 25 pf Trim Cap
C 25	.001 Disc
C 26	5 - 25 pf Trim Cap
C 27	.001 Disc
C 28	5 - 25 pf Trim Cap
C 29	.001 Disc
C 30	100 pf Silver Mica
C 31	4.7Mfd 126v.
C 32	.01 Disc
C 33	F.S.
	8 pf SM (135 - 174 MHz)
	8 pf SM (420 - 512 MHz)
	12 pf SM (216 - 250 MHz)
C 34	F.S.
	56 pf NPO (135 - 151 MHz)
	47 pf NPO (151 - 158 MHz)
	36 pf NPO (158 - 174 MHz)
	39 pf NPO (215 - 250 MHz)
	20 pf NPO (420 - 512 MHz)
C 35	.001 Disc
C 36	.001 Disc

RESISTORS

R 1	1K
R 2	1.8K
R 3	220 Ohm with F.Bead
R 4	100 Ohm
R 5	1K
R 6	1.8K
R 7	220 Ohms with F.Bead
R 8	100 Ohm
R 9	10K *
R 10	10K *
R 11	10K *
R 12	10K *
R 13	15K
R 14	3.3 K
R 15	220 Ohm
R 16	39 Ohm with F.Bead
R 17	1.5K
R 18	6.8K
R 19	1.8K
R 20	220 Ohm
R 21	47 Ohm with F.Bead
R 22	6.8K
R 23	1.8K
R 24	220 Ohm
R 25	47 Ohm with F.Bead
R 26	6.8K
R 27	1.8K
R 28	220 Ohm
R 29	47 Ohm with F.Bead
R 30	1K
R 31	2.7K
R 32	1K
R 33	47 Ohm with F.Bead
R 34	75 Ohm
R 35	2K
R 36	2K
R 37	47 Ohm with F.Bead
R 38	1K
R 39	2.7K
R 40	1 K
R 41	75 Ohm
R 42	2.2K
R 43	100K
R 44	4.7K

C 37 F.S. 1 pf tubular

CAPACITORS

C 38 F.S.
10 pf NPO (135 - 151 MHz)
12 pf NPO (151 - 158 MHz)
10 pf NPO (158 - 250 MHz)
15 pf NPO (420- 512 MHz)

C 39 F.S.
10 pf NPO (135 - 151 MHz)
10 pf NPO (151 - 158 MHz)
8 pf NPO (158 - 174 MHz)
12 pf NPO (215 - 512 MHz)

C 40 1 pf (5 pf 220 MHz only)
C 41 .001 Disc
C 42 .01 Disc
C 43 F.S. 1 pf tubular
C 44 F.S.
22 pf (135 - 151 MHz)
(151 - 158 MHz)
(158 - 174 MHz)
(215 - 250 MHz)
(420 - 512 MHz)
C 45 6.8 NPO Disc
C 46 F.S. 1 pf
C 47 .001 Disc
C 48 .01 Disc **
C 49 3 -15 pf Trim Cap **
C 50 1 pf tubular
C 51 3 -15 pf Trim Cap **
C 52 3 -15 pf Trim Cap **
C 53 3 -15 pf Trim Cap **
C 54 1 pf tubular **
C 55 33 pf NPO
C 56 10 pf NPO
C 57 27 pf NPO
C 58 .01 Disc
C 59 .01 Disc
C 60 33 pf NPO
C 61 .01 Disc
C 62 10 pf NPO
C 63 .01 Disc
C 64 .01 Disc
C 65 .001 Disc
C 66 33 pf NPO
C 67 .01 Disc
C 68 100 pf S.M.
C 69 17 pf S.M.
C 70 .01 Disc
C 71 100 pf NPO
C 72 .1 Disc

R 45 1K

RESISTORS

R 46 47K
R 47 4.7K
R 48 390K
R 49 10K
R 50 20K
R 51 7.5K
R 52 4.7K
R 53 390 Ohm
R 54 10K Pot
R 55 20K
R 56 47K
R 57 20K
R 58 1K
R 59 200K
R 60 39 K F.S.

R 61 470K
R 62 1 Meg
R 63 470K
R 65 1 Meg
R 66 5K Pot
R 67 22 meg
R 68 150 Ohm with F.Bead
R 69 22 Meg
R 70 3.9K
R 71 2.2K
R 72 470K
R 73 10K
R 74 1 Meg
R 75 10K
R 76 20K
R 77 4.7K
R 78 100K
R 79 10K
R 80 10K
R 81 10K
R 82 150 Ohm
R 83 3.9K
R 84 50K pot (Squelch)

C 73	.1 Disc
C 74	100 pf S.M.
C 75	100 pf NPO
C 76	100 pf NPO
C 77	4.7 MFD 16 v.
C 78	4.7 MFD 16v.
C 79	.047 Mylar
C 80	.01 Mylar
C 81	2.2 MFD
C 82	2.2 MFD 16 v.
C 83	4.7 MFD 16 v.
C 84	220 MFD 35 v.
C 85	.
C 86	33 MFD 35 v.
C 87	.1 MFD Disc
C 88	220 MFD 35 v.
C 89	.1 MFD Disc
C 90	.1 MFD Disc
C 91	.1 MFD Disc
C 92	100 pf NPO
C 93	100 pf NPO
C 94	4.7 MFD 16v.
C 95	100 pf NPO
C 96	100 pf NPO
C 97	2.2 MFD 16v.
C 98	.1 MFD Disc
C 99	.1 MFD Disc
C 100	.1 MFD Disc
C 101	.1 MFD Disc
C 102	2.2 MFD 16 v.
C 103	33 MFD 35 v.
C 104	.1 MFD Disc
C 105	.01 Mylar
C 106	
C 107	5 - 25 pf Trim Cap

CRYSTALS AND FILTERS

Y1 - Y4

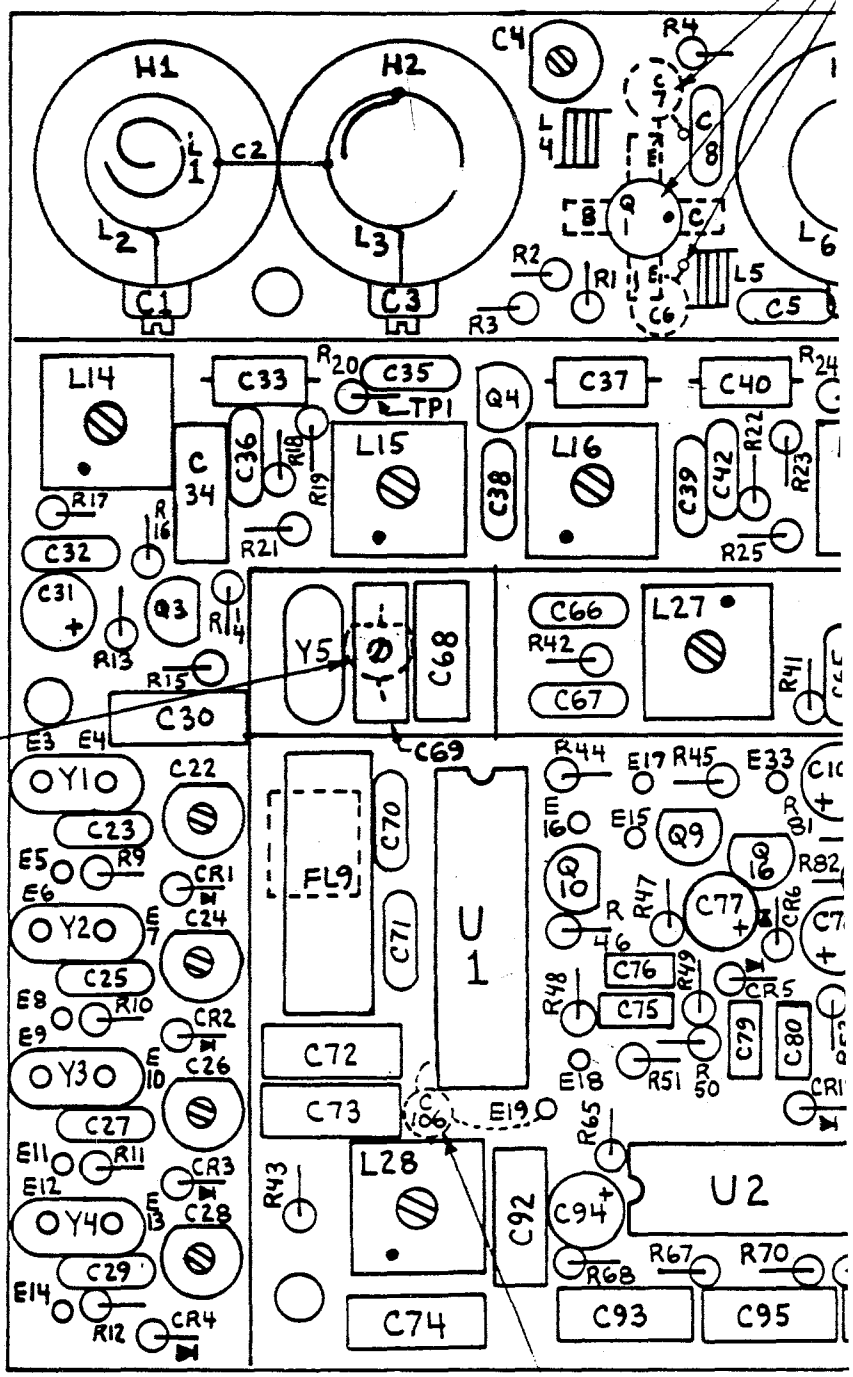
136 - 151 Fx = (FO-21.4Mhz)/2
151 - 174 Fx = (FO-21.4Mhz)/2
216 - 250 Fx = (FO-21.4Mhz)/4
420 - 512 Fx = (FO-21.4MHz)/8
Parallel resonant, third overtone, resistance 30 Ohm max. 12 pf load capacity, HC-25/U case

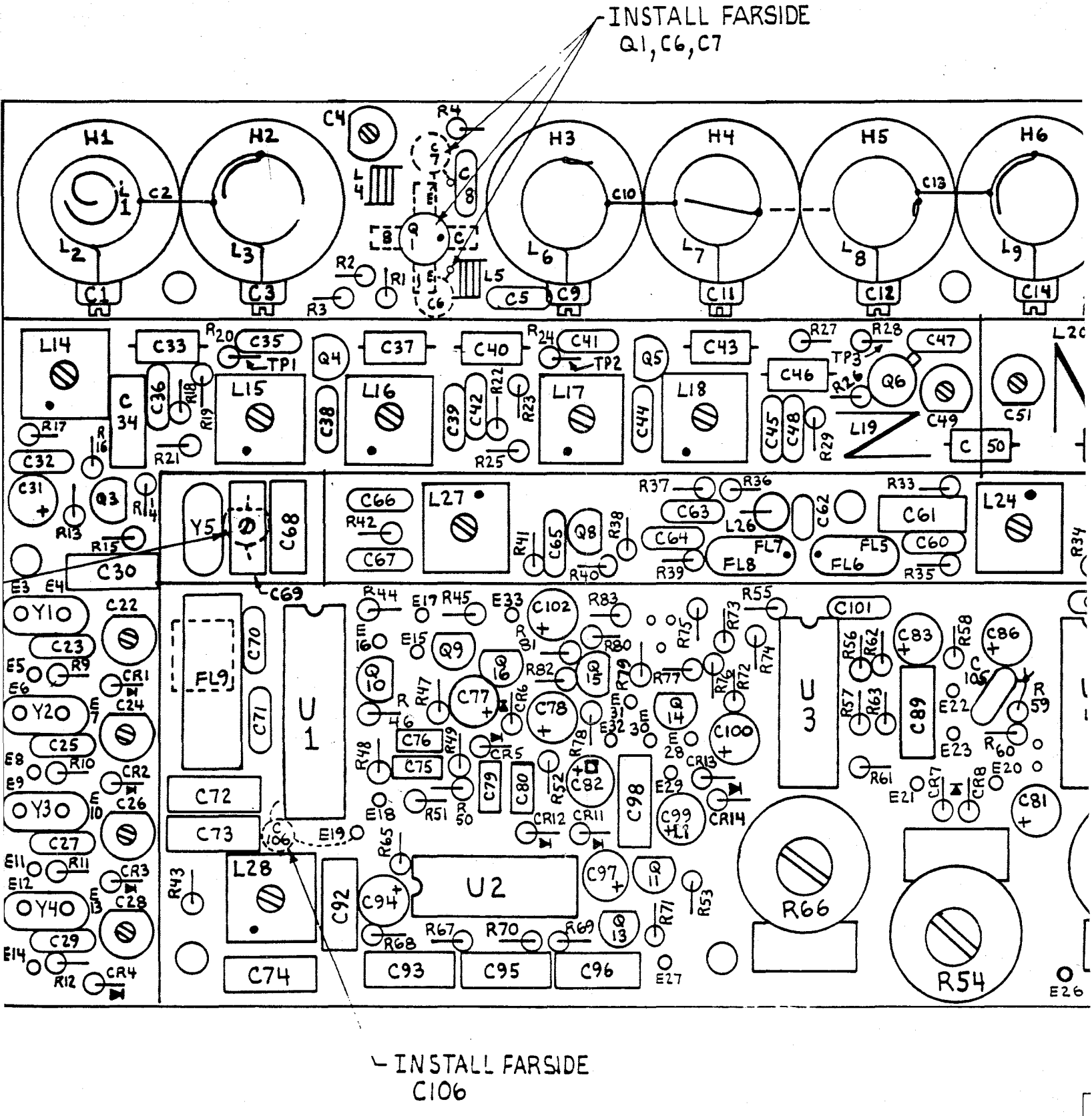
SEMI-CONDUCTOR DEVICES

Q 1	MRF 901
Q 2	MRF 901
Q 3	2N4123
Q 4	2N3563
Q 5	2N3563
Q 6	2N5179
Q 7	2N3563
Q 8	2N3563
Q 9	2N4123
Q 10	2N4123
Q 11	2N4123
Q 12	2N4123
Q 13	2N4123
Q 14	2N4123
Q 15	2N4123
Q 16	2N4123
U 1	MC 3359
U 2	CD4007
U 3	LM3900
U 4	LM380
U 5	7808
CR 1	1N1448 *
CR 2	1N1448 *
CR 3	1N1448 *
CR 4	1N1448 *
CR 5-14	1N1448

COILS AND INDUCTORS

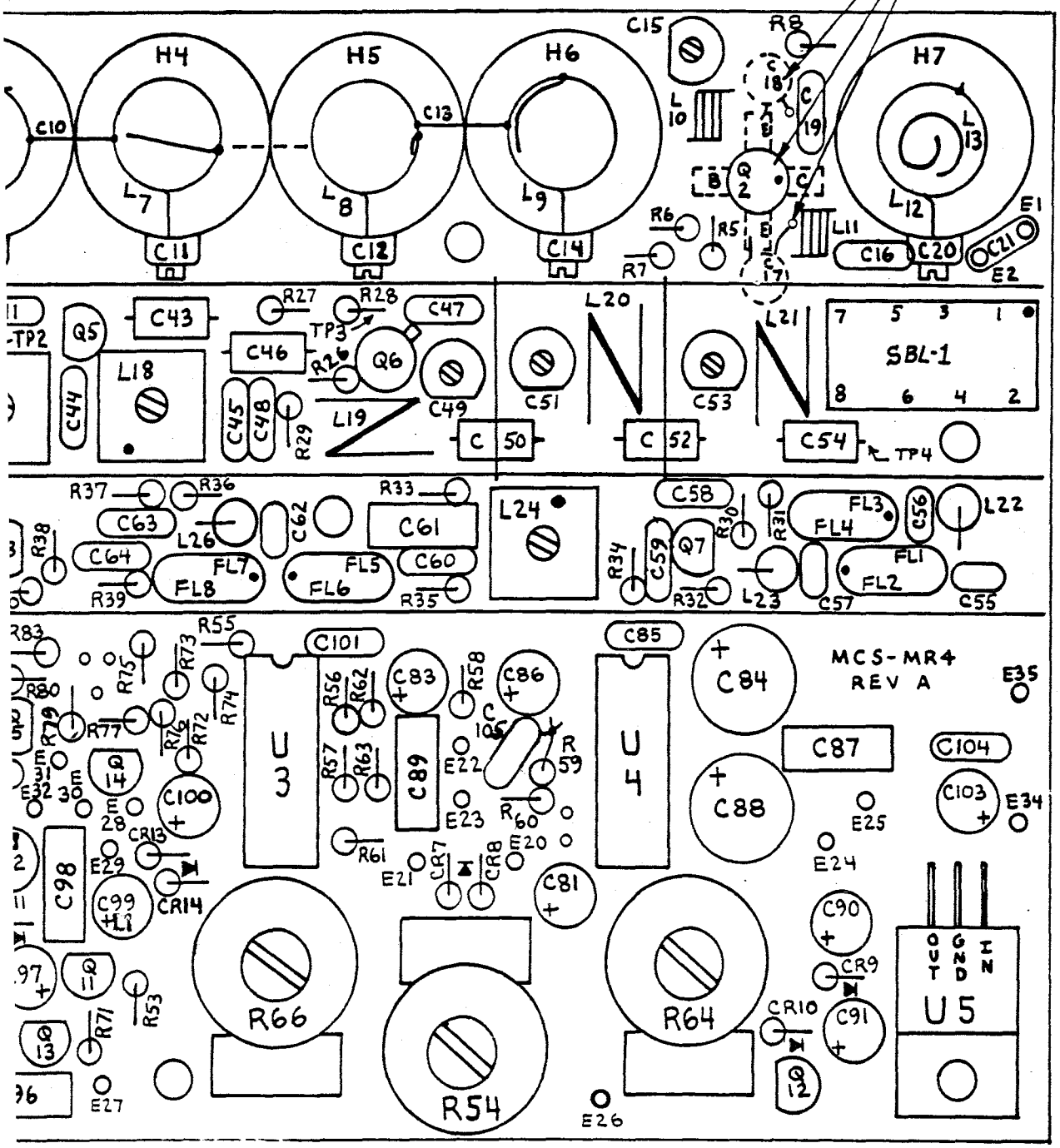
L1	Part of Helical Resonator
L2	Part of Helical Resonator
L3	Part of Helical Resonator
L4	6T2518 (135 - 174 MHz)
L5	Part of Helical Resonator
L6	Part of Helical Resonator
L7	Part of Helical Resonator
L8	Part of Helical Resonator
L9	Part of Helical Resonator
L10	6T2528 (135 - 174 MHz) 5T2518 (216 - 250 MHz)
L11	5T2518
L12	Part of Helical Resonator
L13	Part of Helical Resonator


INSTALL FARSIDE
C107
H1
H2
L1
L2
L3
C1
C2
C3
C4
C7 TRIM
C8
L4
Q1
B
C
E
C6
L5
L6
C5
R1
R2
R3
R4
L14
C33
R20
C35
TP1
Q4
C37
C40
R24
C34
C36
R18
R19
L15
C38
L16
C39
C42
R22
R23
R25
R17
R16
R21
C32
C31
Q3
R14
R13
R15
Y5
C68
C66
R42
C67
L27
R41
C30
C69
E3
E4
Y10
C22
C23
R9
CR1
E5
E6
Y20
C24
C25
R10
CR2
E8
E9
Y30
C26
C27
R11
CR3
E11
E12
Y40
C28
C29
R12
CR4
E14
FL9
C70
C71
U1
C72
C73
C106
E19
R44
E17
R45
E33
E15
Q9
R47
C77
CR6
R46
C76
R49
CR5
R48
C75
C79
C80
R51
R50
E18
R65
L28
C92
C94
U2
R43
C74
R67
R70
R68
C93
C95
INSTALL FARSI
C106

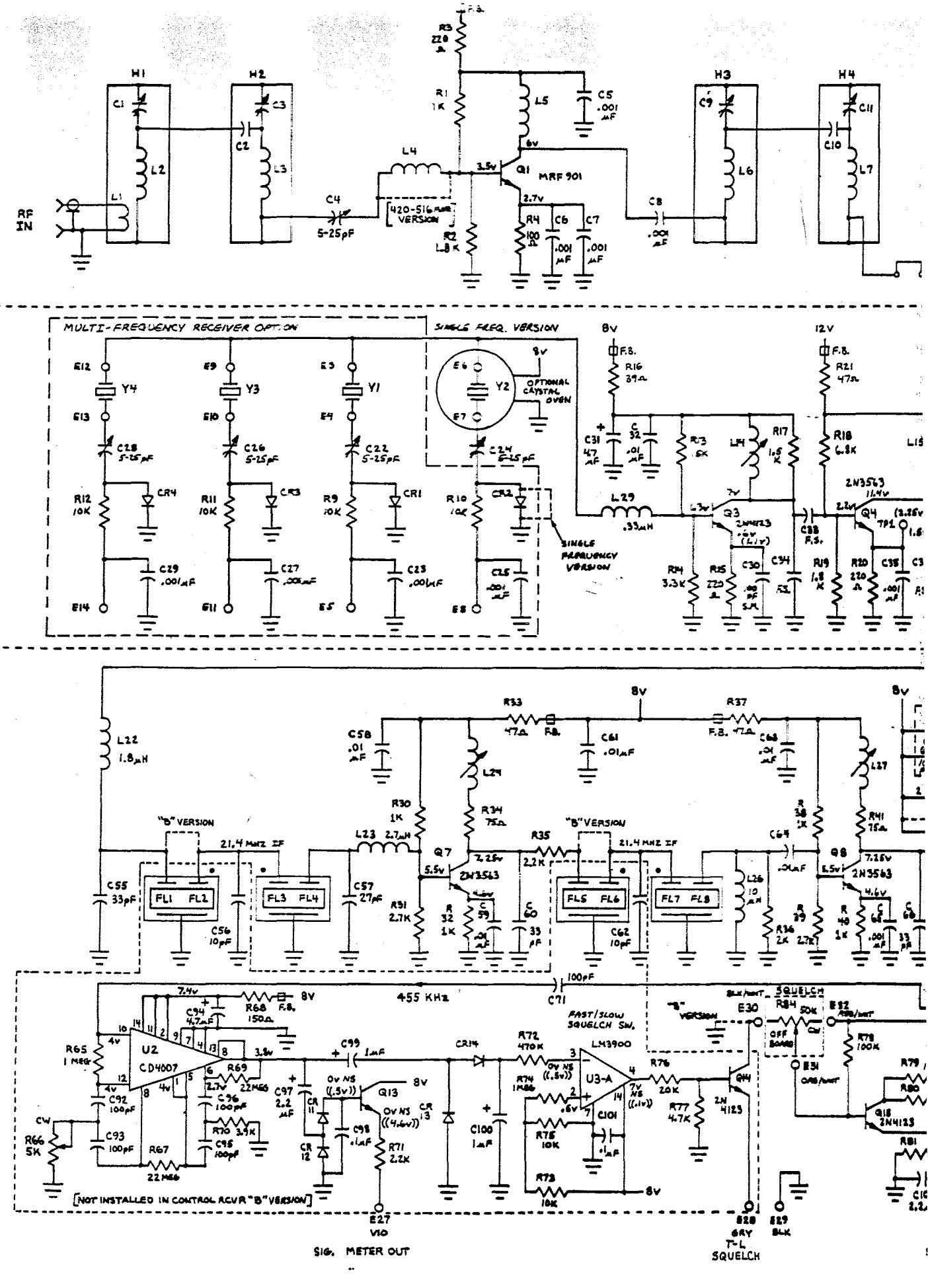

INSTALL FARSIDE
Q1, C6, C7
H1
H2
H3
H4
H5
H6
L1
L2
L3
L4
L5
L6
L7
L8
L9
C1
C2
C3
C4
C5
C6
C7
C8
C9
C10
C11
C12
C13
C14
Q1
R1
R2
R3
R4
L14
L15
L16
L17
L18
L19
L20
C31
C32
C33
C34
C35
C36
C37
C38
C39
C40
C41
C42
C43
C45
C46
C47
C48
C49
C50
C51
Q3
Q4
Q5
Q6
TP1
TP2
TP3
Y5
C30
C66
C67
C68
C69
L27
L26
L24
C61
C62
C63
C64
C65
Q8
FL5
FL6
FL7
FL8
C22
C23
C24
C25
C26
C27
C28
C29
Y10
Y20
Y30
Y40
CR1
CR2
CR3
CR4
FL9
C70
C71
C72
C73
C74
C75
C76
C77
C78
C79
C80
C82
C83
C86
C89
C92
C93
C94
C95
C96
C97
C98
C99
C100
C101
C102
U1
U2
U3
L28
R66
R54
R59
R60
E1
E2
E3
E4
E5
E6
E7
E8
E9
E10
E11
E12
E13
E14
E15
E17
E18
E19
E20
E21
E22
E23
E26
E27
E28
E29
E32
E33
INSTALL FARSIDE
C106

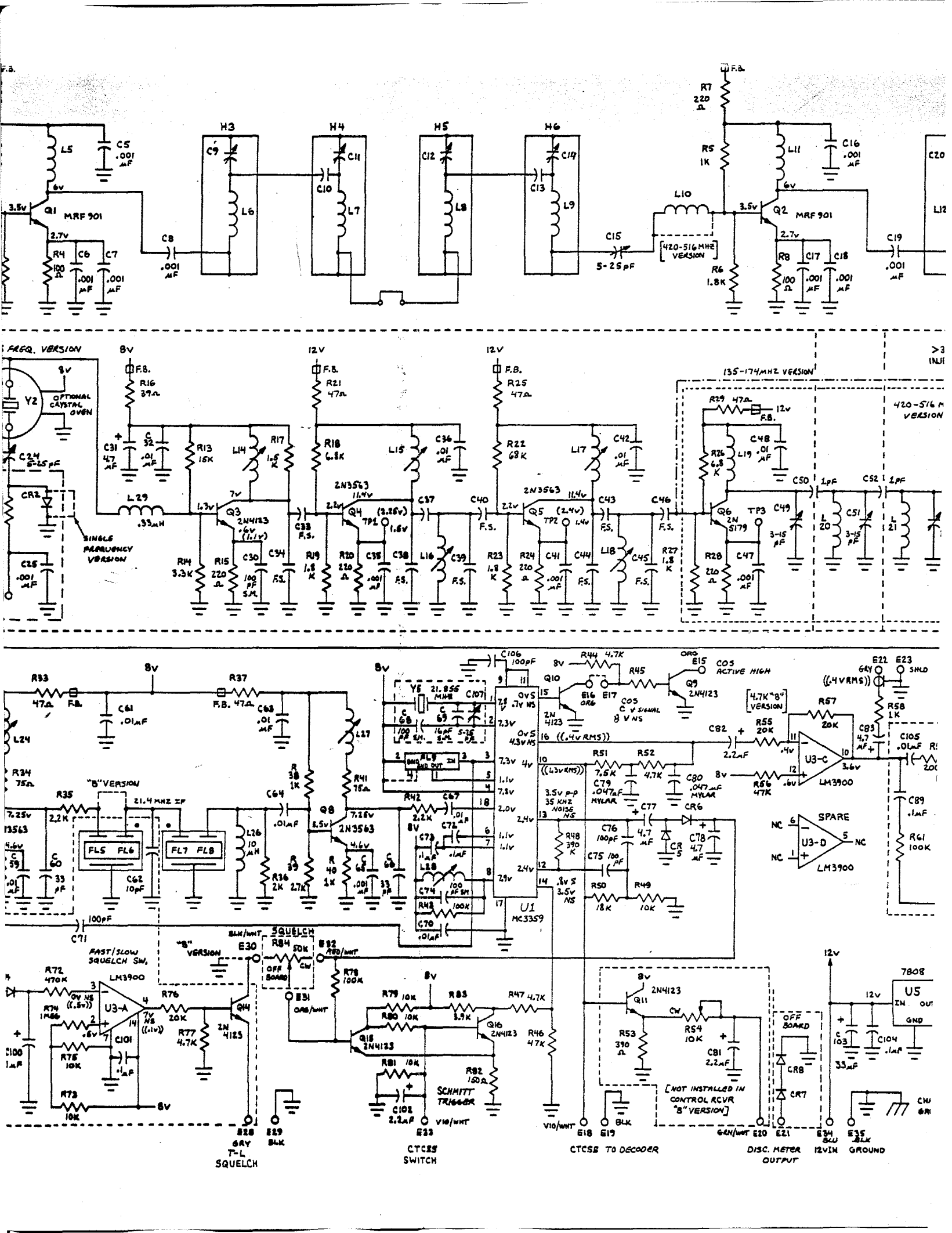
INSTALL FARSIDE
Q1, C6, C7

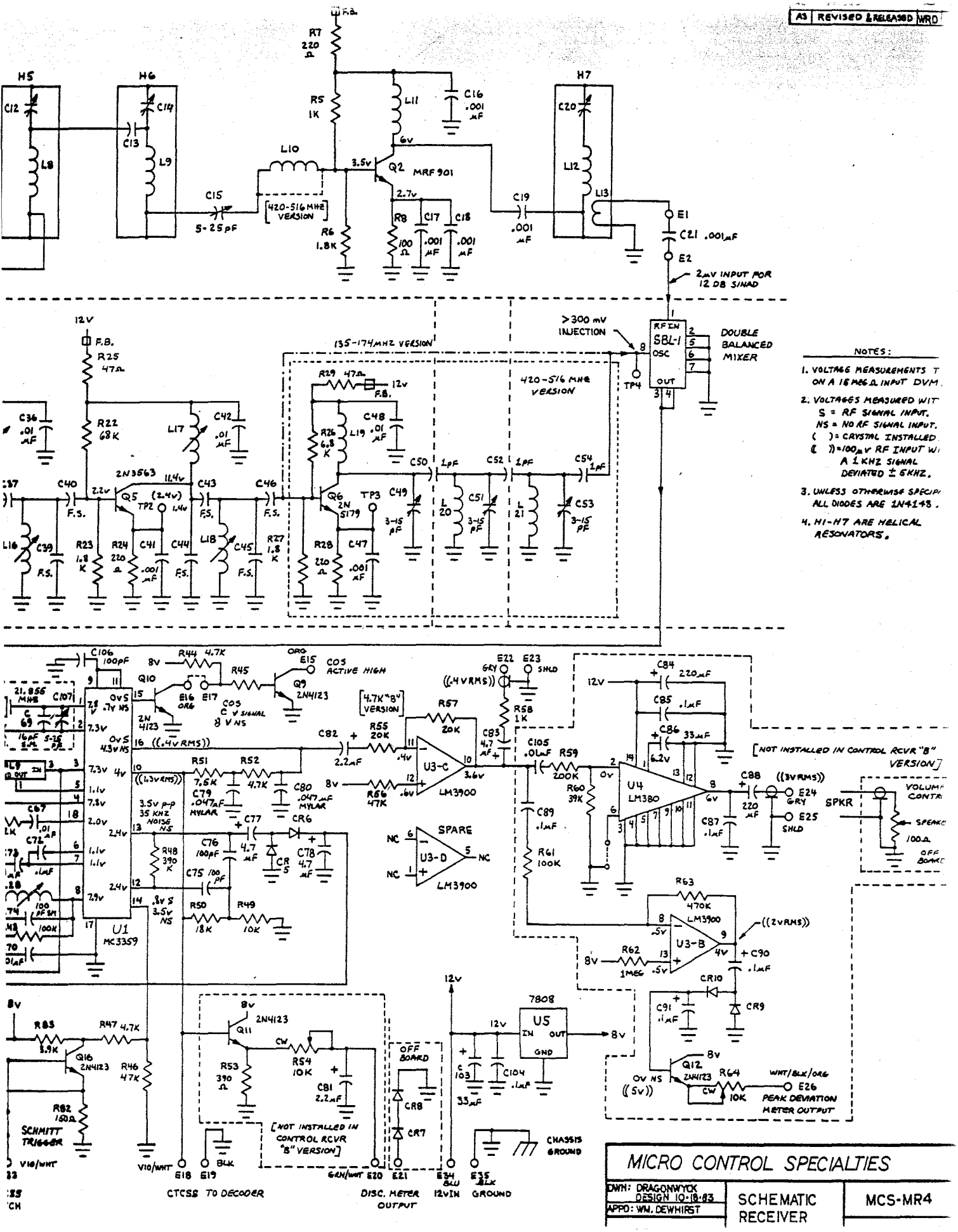
INSTALL FARSIDE
Q2, C17, C18



MICRO CONTROL SPECIALTIES		
23 ELM PARK GROVELAND, MA. 01834		
2 x 1		
8 23 83	WILLIAM R. DEWHIRST	DRAGONWYCK
ASSEMBLY DRAWING		
RECEIVER P.C. BOARD	REV A3 MCS - MRR	


H1
H2
H3
H4
RF IN
L1
L2
C1
C2
L3
C3
C4
5-25pF
L4
420-516 MHz VERSION
R2
1.8K
R3
220Ω
R1
1K
L5
C5
.001 μF
8v
3.5v
Q1
MRF 901
2.7v
R4
100Ω
C6
.001 μF
C7
.001 μF
C8
.001 μF
C9
L6
C10
L7
C11
MULTI-FREQUENCY RECEIVER OPTION
SINGLE FREQ. VERSION
E12
E13
E14
Y4
C28
5-25pF
R12
10K
CR4
C29
.001μF
E9
E10
E11
Y3
C26
5-25pF
R11
10K
CR3
C27
.001μF
E3
E4
E5
Y1
C22
5-25pF
R9
10K
CR1
C23
.001μF
E6
E7
E8
Y2
OPTIONAL CRYSTAL OVEN
C24
5-25pF
R10
10K
CR2
C25
.001 μF
SINGLE FREQUENCY VERSION
8V
F.B.
R16
39Ω
C31
47 μF
C32
.01 μF
R13
5K
LM
1.5 K
R17
12V
R21
47Ω
R18
6.8K
L29
.33μH
7v
3.3v
Q3
2N4123
2N3563
11.4v
Q4
7.2v
C33
F.B.
R14
3.3K
R15
220Ω
C30
.001 μF
5K
C34
R19
1.8 K
R20
220Ω
C35
.001 μF
L22
1.8μH
"B" VERSION
21.4 MHz IF
C55
33pF
FL1
FL2
C56
10pF
FL3
FL4
C57
27pF
R33
47Ω
F.B.
C58
.01 μF
C61
.01μF
L24
R30
1K
R34
75Ω
L23
2.7μH
Q7
7.25v
5.5v
2N3563
4.6v
R31
2.7K
R32
1K
C59
.01 μF
C60
33 pF
R35
2.2K
FL5
FL6
C62
10pF
FL7
FL8
C64
.01μF
L26
10 μH
R36
2K
R39
2.7K
R40
1K
C65
.001 μF
C66
33 pF
R37
F.B.
47Ω
C63
.01 μF
L27
R38
1K
R41
75Ω
Q8
7.26v
6.5v
2N3563
4.6v
455 KHz
C71
100pF
7.4v
C94
4.7μF
R68
150Ω
F.B.
8V
U2
CD4007
R65
1 MEG
4v
3.8v
R69
22MEG
2.7v
C92
100pF
C96
100pF
C93
100pF
R67
22MEG
R70
3.9K
C95
100pF
CW
R66
5K
C99
1μF
CR14
R72
470K
0v NS ((.5v))
R74
1MEG
.6v
R75
10K
U3-A
LM3900
7v NS ((.1v))
C101
.1μF
R73
10K
R76
20K
Q14
2N 4123
R77
4.7K
C97
2.2 μF
CR 11
CR 12
C98
.1μF
R71
2.2K
Q13
0v NS ((4.6v))
CR 13
C100
1μF
FAST/SLOW SQUELCH SW.
"B" VERSION
E30
SQUELCH
R84
50K
E32
E31
OFF BOARD
R78
100K
R79
R80
Q18
2N4123
R81
C10
2.2
[NOT INSTALLED IN CONTROL RCVR "B" VERSION]
E27
V10
SIG. METER OUT
E28
6RY
T-L SQUELCH
E29
BLK


F.B.
L5
C5 .001 µF
6v
3.5v
Q1 MRF 901
2.7v
R4 100Ω
C6 .001 µF
C7 .001 µF
C8 .001 µF
H3
C9
L6
H4
C11
C10
L7
H5
C12
L8
H6
C14
C13
L9
C15 5-25 pF
L10
[420-516 MHz VERSION]
R7 220Ω
R5 1K
L11
C16 .001 µF
6v
3.5v
Q2 MRF 901
2.7v
R6 1.8K
R8 100Ω
C17 .001 µF
C18 .001 µF
C19 .001 µF
FREQ. VERSION
8v
F.B.
R16 39Ω
Y2
OPTIONAL CRYSTAL OVEN
C24 5-25 pF
CR2
C25 .001 µF
SINGLE FREQUENCY VERSION
C31 47 µF
C32 .01 µF
R13 15K
L14
R17 1.5K
L29 .33µH
7v
1.3v
Q3 2N4123 .6v (1.1V)
R14 3.3K
R15 220Ω
C30 100 pF S.M.
C34 F.S.
12v
F.B.
R21 47Ω
R18 6.8K
L15
C36 .01 µF
2N3563 11.4v
2.2v
Q4 (3.25v) TP1 1.6v
C33 F.S.
C37
R19 1.8K
R20 220Ω
C35 .001 µF
C38 F.S.
L16
C39 F.S.
C40
12v
F.B.
R25 47Ω
R22 68K
L17
C42 .01 µF
2N3563 11.4v
2.2v
Q5 (2.4v) TP2 1.4v
C43 F.S.
C46 F.S.
R23 1.8K
R24 220Ω
C41 .001 µF
C44 F.S.
L18
C45 F.S.
R27 1.8K
135-174MHz VERSION
R29 47Ω
12v
F.B.
R26 6.8K
L19
C48 .01 µF
Q6 2N5179
TP3
C49 3-15 pF
C50 1pF
C52 1pF
L20
C51 3-15 pF
L21
R28 220Ω
C47 .001 µF
420-516 MHz VERSION
R33 47Ω F.B.
8v
R37 F.B. 47Ω
C61 .01µF
C63 .01 µF
L24
L27
R34 75Ω
"B" VERSION
R35
21.4 MHz IF
7.25v
13563
4.6v
2.2K
C59 .01 µF
C60 33 pF
FL5 FL6
FL7 FL8
C62 10pF
L26 10 µH
C64 .01µF
R38 1K
R39
R36 2K 2.7K
R40 1K
C66 .001 µF
33 pF
R41 75Ω
Q8 2N3563
7.25v
8.5v
4.6v
R42 2.2K
C67 .01 µF
8v
C72 .1µF
C73 .1µF
L28 100 µH SM
C74
R43 100K
C70 .01µF
C106 100pF
Y3 21.856 MHz
C107
C68 100 pF
C69 16pF S.M. 5-25 pF
FL9 2ND OUT
U1 MC3359
7.8 V
7.3v
OVS .7V NS
OVS 4.3V NS
7.3v 4v
1.1v
7.8v
2.0v
2.4v
1.1v
1.1v
2.4v
7.9v
.8v S 3.5v NS
R44 4.7K
8v
R45
ORG E15 COS ACTIVE HIGH
Q9 2N4123
Q10 2N 4123
E16 ORG
E17 COS C V SIGNAL 8 V NS
((.4v RMS))
((.43v RMS))
3.5v P-P 35 KHz NOISE NS
R51 7.5K
R52 4.7K
C79 .047µF MYLAR
C80 .047µF MYLAR
R48 390K
C76 100pF
C75 100 pF
R50 18K
R49 10K
C77 4.7 µF
CR6
CR5
C78 4.7 µF
[4.7K "B" VERSION]
R55 20K
C82 2.2µF
U3-C LM3900
.4v
3.6v
8v
.6v
R66 47K
R57 20K
C83 4.7 µF
R58 1K
C105 .01µF
R61 100K
SPARE
U3-D LM3900
NC
E22 GRY ((.4V RMS))
E23 SHLD
C89 .1µF
C71 100pF
FAST/SLOW SQUELCH SW.
"B" VERSION
BLK/WHT
E30
SQUELCH
R84 50K
OFF BOARD
CW
E32 RED/WHT
E31 ORG/WHT
R72 470K
LM3900
U3-A
R74 1MEG
.6v
R75 10K
C101 .1µF
R73 10K
8v
R76 20K
Q14 2N 4125
R77 4.7K
R78 100K
8v
R79 10K
R83 3.9K
R47 4.7K
R80 10K
Q16 2N4123
Q18 2N4123
R81 10K
C102 2.2µF
R82 150Ω
SCHMITT TRIGGER
E33 VIO/WHT
R46 47K
8v
2N4123
Q11
CW
R54 10K
R53 390Ω
C81 2.2µF
OFF BOARD
CR8
CR7
[NOT INSTALLED IN CONTROL RCVR "B" VERSION]
12v
7808
U5
IN OUT
GND
C103 33µF
C104 .1µF
E18 VIO/WHT
E19 BLK
E20 GRN/WHT
E21
E34 BLU 12VIN
E35 BLK GROUND
E28 GRY T-L SQUELCH
E29 BLK
CTCSS SWITCH
CTCSS TO DECODER
DISC. METER OUTPUT



MICRO CONTROL SPECIALTIES

DWN: DRAGONWYCK DESIGN 10-18-83 APPD: WM, DEWHIRST	SCHEMATIC RECEIVER	MCS-MR4