MAINTENANCE MANUAL
806-825 MHz AND 851-870 MHz RF ASSEMBLY 19D423833G1,3

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DESCRIPTION

The RF Assembly consists of an RF casting with seven capacitively loaded coaxial cavities, an RF amplifier, 1st mixer and 1st IF amplifier/2nd mixer stages.

In MASTR Executive II and Custom MVP mobile and station applications, the 1st oscillator injection frequency is 806-825 MHz. In MASTR® II station applications, the injection frequency is 851-870 MHz.

CAUTION

Anything soldered directly to the casting is not field replaceable. in addition, the set screws holding the links between board or cavities should not be loosened or removed. Only components on the printed wiring boards (including the mixer diode pair) may be replaced. Extreme care should be used when replacing components to avoid damaging the printed circuit boards.

CIRCUIT ANALYSIS

FRONT END & RF AMPLIFIER (A301)

RF from the antenna jacks (J301) is coupled through two coaxial cavities to the base of RF amplifier Q1. The cavities are tuned to the incoming frequency by C301 and C302. Q1 operates as a class A, common emitter amplifier that provides a gain of approximately 8 to 10 dB. The amplified output is coupled through three additional cavities to the first mixer. These cavities are tuned by C303, C304 and C305. The five cavities provide the front end selectivity.

1ST MIXER (A302)

The 1st mixer is a singly balanced diode mixer that converts a signal in the 806-870 MHz range to the 45 MHz 1st IF frequency.

RF from the cavities is coupled through A302-C1 to mixer diodes CR1 and CR2. The low side injection input from J302 is coupled through two tuned cavities to the mixer diodes. The injection input port is isolated from the RF input and IF output by balancing transformer consisting of parallel strip transmission lines that are formed by runs on the printed circuit board. The 1st IF output is coupled through L1 to the 1st IF amplifier stage.

1ST IF AMP/2ND MIXER (A303)

The 1st amplifier/2nd mixer board contains the 1st IF amplifier stage, a four-pole crystal filter, the 2nd oscillator and 2nd mixer stages.

1st IF Amplifier

The 1st mixer output is coupled through a tuned circuit (L1 and C2) that matches the mixer output to ggate 1 of 1st IF amplifier Q1.

Amplifier Q1 is a dual gate FET that provides good intermodulation and desensitization characteristics. The 45 MHz output signal at the drain of Q1 is coupled through a tuned circuit (L2 and C4) that sets the impedance to crystal filter FL1.

FL1 is a 45 MHz, four-pole crystal filter that provides a minimum of 30dB adjacent channel rejection. The filter output is applied through a tuned circuit (L4 and C6) that matches the output impedance of FL1 to the second mixer.

2nd Oscillator

Second oscillator Q2 is a crystal-controlled Colpitts third overtone oscillator that operates at 35.6 MHz. The oscillator frequency is adjusted by L5. TP1 is provided to measure the oscillator frequency.

The oscillator output is coupled through a circuit that is tuned to 35.6 MHz (L6 and C14), and provides selectivity for the oscillator output. C5 is a DC blocking capacitor.

2nd Mixer

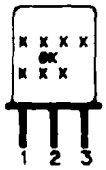
The 45 MHz IF from the crystal filter and the 35.6 MHz 2nd oscillator output are applied to the base of 2nd mixer Q3. The mixer converts the 1st IF frequency to the 2nd IF frequency of 9.4 MHz, and provides 15 dB of conversion gain. L7 and C16 provide selectivity for the 9.4 MHz IF frequency. The output of the mixer is applied to the next IF stage through feed-through capacitor C310.

Supply voltage for the RF assembly is supplied through C309.

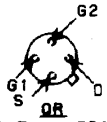
LEAD IDENTIFICATION
FOR L1,L2,&L4-L7

TOP VIEW

LEAD IDENTIFICATION
FOR FL1A AND FL1B



LEAD IDENTIFICATION
FOR Q1



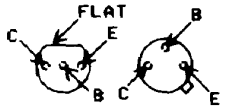
OR

IN-LINE TRIANGULAR

TOP VIEW

NOTE: LEAD ARRANGEMENT, AND NOT CASE SHAPE, IS DETERMINING FACTOR FOR LEAD IDENTIFICATION.

LEAD IDENTIFICATION
FOR Q2&Q3



OR

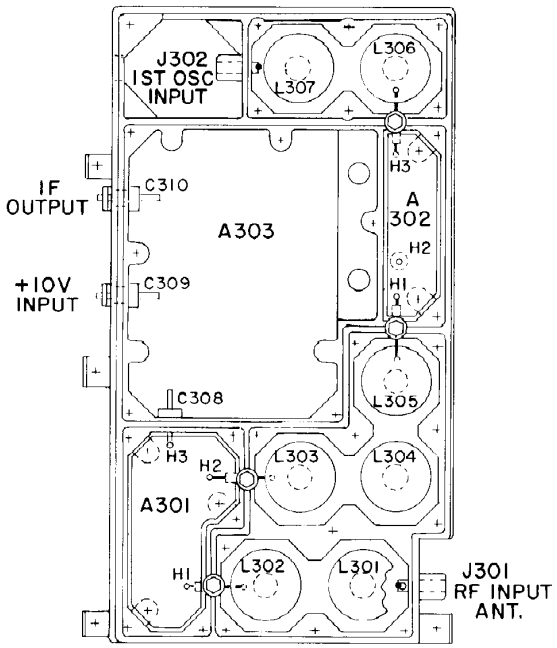
IN-LINE TRIANGULAR

TOP VIEW

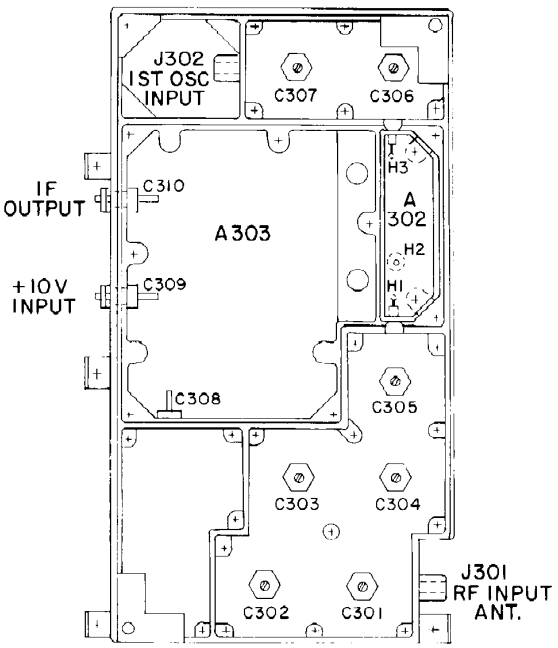
NOTE: LEAD ARRANGEMENT, AND NOT CASE SHAPE, IS DETERMINING FACTOR FOR LEAD IDENTIFICATION.

TOP VIEW

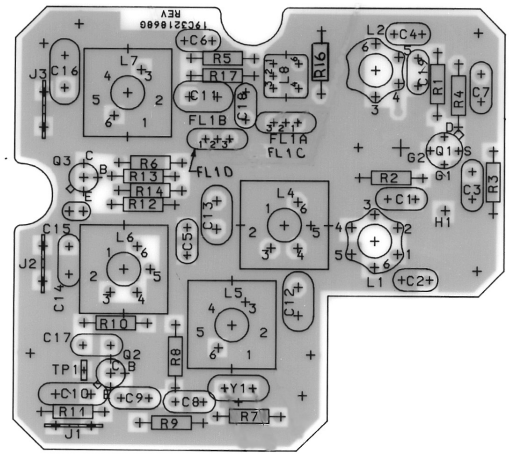
(WITHOUT COVERS)



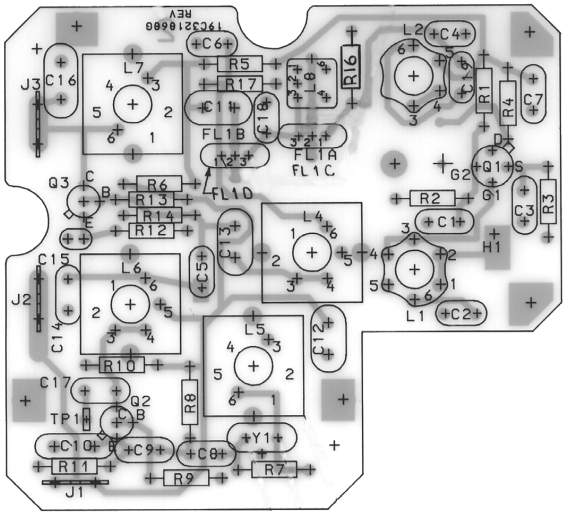
(WITH COVERS)



(19C327922, Rev. 0)

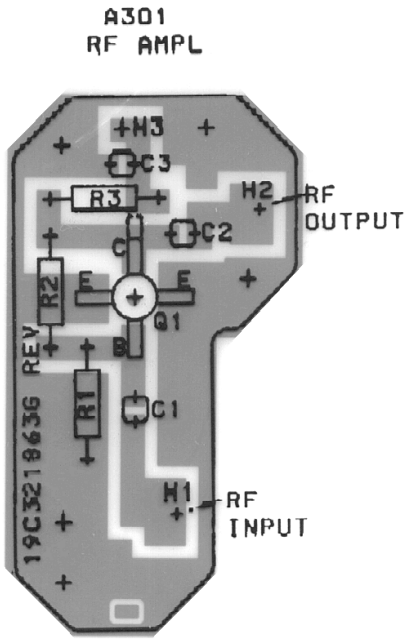


(19C321868, Rev. 7)
(19B227115, Sh. 1, Rev. 2)

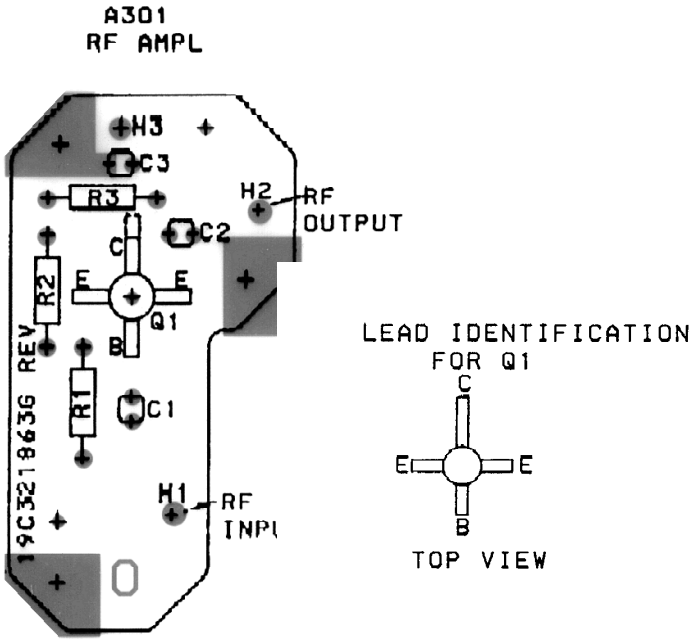


(19C321868, Rev. 7)
(19B227115, Sh. 2, Rev.)

RF ASSEMBLY
19D423833G1,3

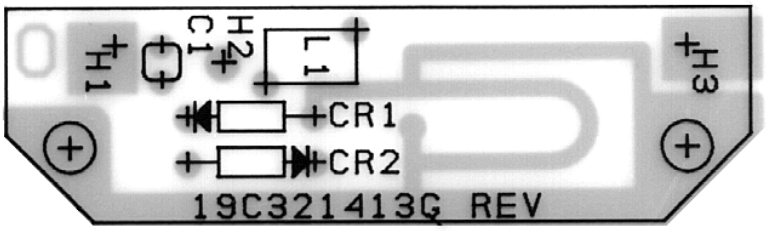


(19C321863, Rev. 2)
(19B227114, Sh. 1, Rev. 0)

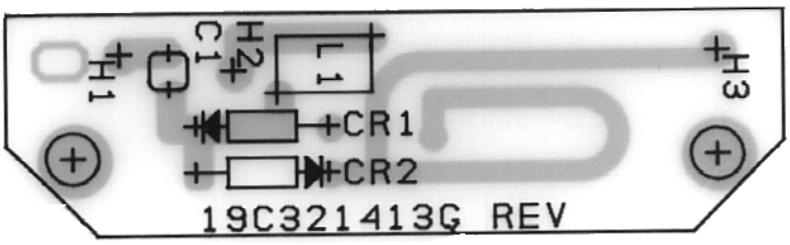


(19C321863, Rev. 2)
(19B227114, Sh. 2, Rev. 0)

A302
1ST MIXER

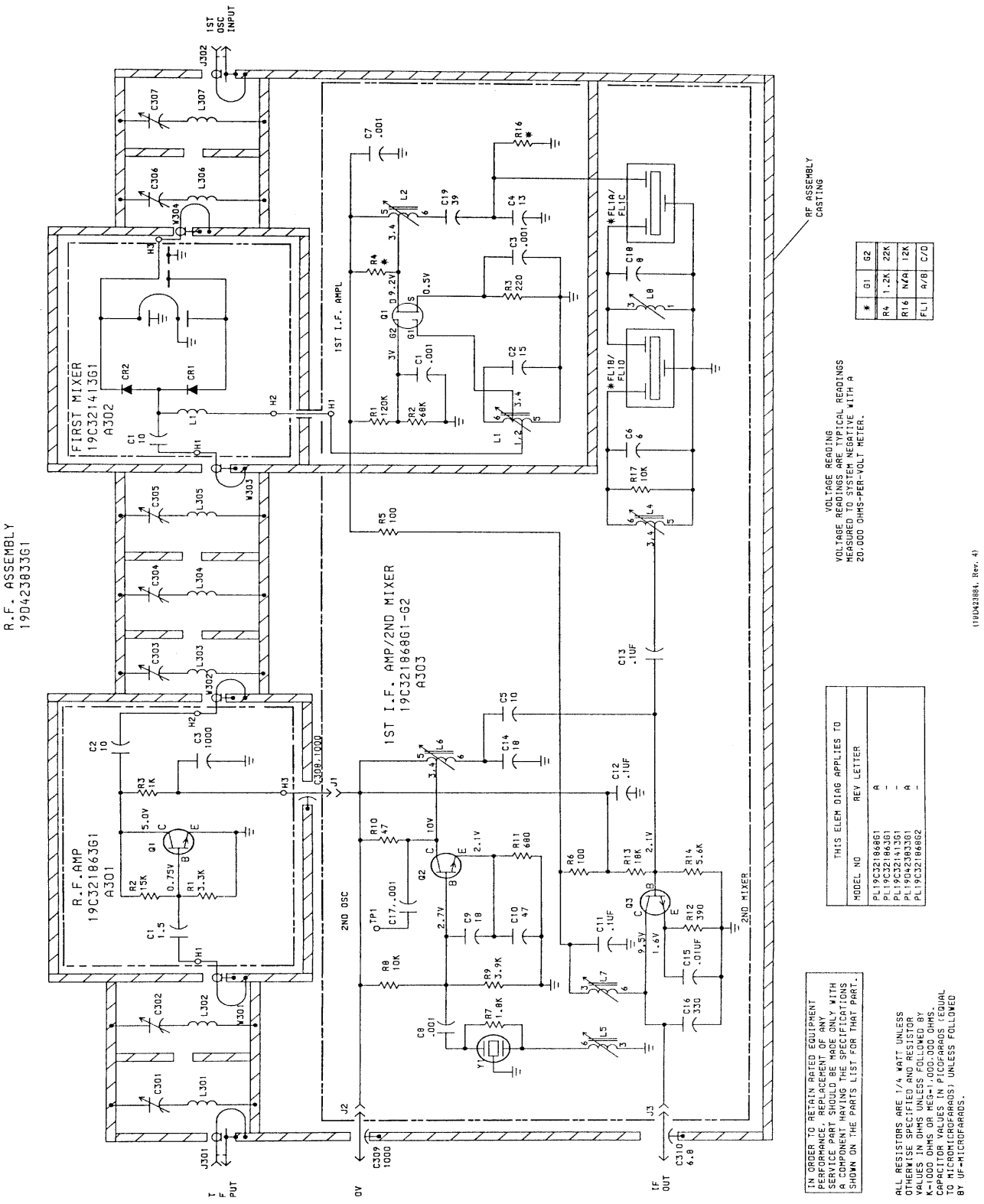


(19C321413, Rev. 1)
(19A130436, Sh. 1, Rev. 0)



(19C321413, Rev. 1)
(19A130436, Sh. 2, Rev. 0)

RF ASSEMBLY
19D423833G1,3



RF ASSEMBLY
19D423833G1,3

PARTS LIST

LBI-30491K
RF ASSEMBLY
19D423833G1 25 kHz CHANNEL SPACING
19D423833G3 25/12.5 kHz CHANNEL SPACING

SYMBOL	PART NO.	DESCRIPTION
A301		**RF AMPLIFIER 19C321863G1**
		- - - - - - - - - - CAPACITORS - - - - - - - - - -
C1	19A700219P6	Ceramic: 1.5 pF ±5%, 100 VDCW, temp coef 0 PPM.
C2	19A700219P26	Ceramic: 10 pF ±5%, 100 VDCW, temp coef 0 PPM.
C3	19A116192P13	Ceramic: 1000 pF ±10%, 50 VDCW; sim to Erie 8121-A050-W5R-102K.
		- - - - - - - - - - TRANSISTORS - - - - - - - - - -
Q1	19A134336P1	Silicon, NPN.
		- - - - - - - - - - RESISTORS - - - - - - - - - -
R1	19A700106P75	Composition: 3.3K ohms ±5%, 1/4 w.
R2	19A700106P91	Composition: 15K ohms ±5%, 1/4 w.
R3	19A700106P63	Composition: 1K ohms ±5%, 1/4 w.
A302		**1st MIXER 19C321413G1**
		- - - - - - - - - - CAPACITORS - - - - - - - - - -
C1	19A700219P26	Ceramic: 10 pF ±5%, 100 VDCW, temp coef 0 PPM.
		- - - - - - - - - - DIODES - - - - - - - - - -
CR1 and CR2	19A116052P4	Silicon, hot carrier: Fwd. drop .350 volts max.
		- - - - - - - - - - INDUCTORS - - - - - - - - - -
L1	19A136535P1	Coil.
A303		**1st IF AMP/2nd MIXER 19C321868G1 (Used in G1). 19C321868G2 (Used in G3).**
		- - - - - - - - - - CAPACITORS - - - - - - - - - -
C1	19A701602P20	Ceramic: 1000 pF ±10%, 1000 VDCW.
C2	19A143491P15J0	Ceramic: 15 pF ±5%, temp coef 0 PPM.
C3	19A701602P20	Ceramic: 1000 pF ±10%, 1000 VDCW.
C4	19A143491P13J0	Ceramic: 13 pF ±5%, 500 VDCW, temp coef 0 ±30 PPM.
C5	19A143491P10J0	Ceramic: 10 pF ±5%, temp coef 0 PPM.
C6	19A701624P4	Ceramic, disc: 6 pF ±0.5 pF, 500 VDCW, temp coef 0 PPM ±60.
C7 and C8	19A701602P20	Ceramic: 1000 pF ±10%, 1000 VDCW.
C9	19A143491P18J0	Ceramic: 18 pF ±5%, 500 VDCW, temp coef 0 PPM.
C10	19A116656P47J0	Ceramic disc: 47 pF ±5%, 500 VDCW; temp coef 0 PPM.
C11 thru C13	19A143477P26	Polyester: .1 uF ±20%, 50 VDCW.
C14	19A143491P18J0	Ceramic: 18 pF ±5%, 500 VDCW, temp coef 0 PPM.
C15	19A116192P1	Ceramic: 0.01 uF ±20%, 50 VDCW; sim to Erie 8121 Special.
C16	7489162P39	Silver mica: 330 pF ±5%, 500 VDCW: sim to Sprague Type 118.
C17	19A701602P20	Ceramic: 1000 pF ±10%, 1000 VDCW.
C18	19A701624P6	Ceramic, disc: 8 pF ±0.5 pF, 500 VDCW, temp coef 0 PPM ±60.
C19	19A700235P20	Ceramic: 39 pF ±5%, 50 VDCW.

*COMPONENTS ADDED, DELETED OR CHANGED BY PRODUCTION CHANGES

SYMBOL	PART NO.	DESCRIPTION
		- - - - - - - - - - FILTERS - - - - - - - - - -
FL1A	19A702166G12	Crystal Pair. (Used in G1).
FL1B		Part of FL1A. (Used in G1).
FL1C	19A702166G8	Crystal Pair. (Used in G2).
FL1D		Part of FL1C. (Used in G2).
		- - - - - - - - - MISCELLANEOUS - - - - - - - - -
	19A702166G3	Crystal. (Used in FL1A & B above (19A702166G12)).
	19A702166G7	Crystal. (Used in FL1C & D above (19A702166G8)).
		- - - - - - - - - - JACKS - - - - - - - - - -
J1 thru J3	19A116975P1	Contact, electrical.
		- - - - - - - - - - INDUCTORS - - - - - - - - - -
L1	19C850878P8	Coil, RF.
L2	19C850878P9	Coil, RF.
L4	19C850878P12	Coil, RF.
L5	19C850878P11	Coil, RF.
L6	19C850878P10	Coil, RF.
L7	19C850878P11	Coil, RF.
L8	19B801413P4	Coil, RF.
		- - - - - - - - - - TRANSISTORS - - - - - - - - -
Q1	19A116818P1	N Channel, field effect.
Q2 and Q3	19A702613P1	Silicon, NPN.
		- - - - - - - - - - RESISTORS - - - - - - - - - -
R1	3R152P124J	Composition: 120K ohms ±5%, 1/4 w.
R2	19A700106P107	Composition: 68K ohms ±5%, 1/4 w.
R3	19A700106P47	Composition: 220 ohms ±5%, 1/4 w.
R4	19A700106P65	Composition: 1.2K ohms ±5%, 1/4 w. (Used in G1).
R4	19A700106P95	Composition: 22K ohms ±5%, 1/4 w. (Used in G2).
R5 and R6	19A700106P39	Composition: 100 ohms ±5%, 1/4 w.
R7	19A700106P69	Composition: 1.8K ohms ±5%, 1/4 w.
R8	19A700106P87	Composition: 10K ohms ±5%, 1/4 w.
R9	19A700106P77	Composition: 3.9K ohms ±5%, 1/4 w.
R10	19A700106P31	Composition: 47 ohms ±5%, 1/4 w.
R11	19A700106P59	Composition: 680 ohms ±5%, 1/4 w.
R12	19A700106P53	Composition: 390 ohms ±5%, 1/4 w.
R13	19A700106P93	Composition: 18K ohms ±5%, 1/4 w.
R14	19A700106P81	Composition: 5.6K ohms ±5%, 1/4 w.
R16	19A700106P89	Composition: 12K ohms ±5%, 1/4 w. (Used in G2).
R17	19A700106P87	Composition: 10K ohms ±5%, 1/4 w.
		- - - - - - - - - - TEST POINTS - - - - - - - - -
TP1	9A701622P1	Cotter pin.
		- - - - - - - - - - CRYSTALS - - - - - - - - - -
Y1	19B206221G3	Quartz: 35.6 MHz, temp range -30°C to 80°C.
		- - - - - - - - - - CAPACITORS - - - - - - - - - -
C301 thru C307		Mechanical. Includes:
	19A143476G1	Nut, stamped: No. 6-32.
	4036765G13	Screw: No. 6-32.
C308 and C309	19B209488P2	Ceramic: 1000 pF -10+100%, 500 VDCW: sim to Allen Bradley Style FA5D.
C310	19B209488P1	Ceramic: 6.8 pF ±20%, 500 VDCW: sim to Allen Bradley Style FA5D.

SYMBOL	PART NO.	DESCRIPTION
		- - - - - - - - - - - - JACKS - - - - - - - - - - - -
J301 and J302	19A136570G1	Connector, receptacle: jack type; sim to Cinch National Tel.
		- - - - - - - - - - - - INDUCTORS - - - - - - - - - - - -
L301 thru L307		Mechanical. Includes:
	19A136541P1	Rod.
	4038914P4	Disc.
		- - - - - - - - - - - - CABLES - - - - - - - - - - - -
W301	19A136548G3	Cable, RF.
W302	19A136548G4	Cable, RF.
W303	19A136548G2	Cable, RF.
W304	19A136548G1	Cable, RF.
		- - - - - - - - - - MISCELLANEOUS - - - - - - - - - -
	19B201074P305	Tap screw, Phillips POZIDRIV: No. 6-32 x 5/16. (Secures covers for A301-A303).
	19A136543P1	Link. (Used with J301 and J302).
	N70AP2108C	Set screw, hex socket: No. 1/4-20 x 1/2. (Secures link parallel to rods).
	19A136562P1	Contact. (Used with C309 and C310).
	4036066P2	Washer. (Used with C309 and C310).
	4029309P1	Terminal, feed thru. (Connects A302 to A303).
	19C321656P1	Cover. (A303).
	19B227317G1	Cover. (A301).
	19C321657P1	Cover. (A302).

PRODUCTION CHANGES

Changes in the equipment to improve performance or to simplify circuits are identified by a "Revision Letter", which is stamped after the model number of the unit. The revision stamped on the unit includes all previous revisions. Refer to the Parts List for the descriptions of parts affected by these revisions.

REV. A - RF ASSEMBLY 19C321868G1
To improve operation, changed C6 and R4, added C18, C19, L8, R17, FL1A and FL1B and deleted FL1. Old part numbers were:

C6 - 19a143491P10J0, Ceramic: 10 pF ±5%, temp coef 0 PPM.
R4 - 19A700106P63, Composition: 1K ohm ±5%, 1/4 w.
FL1 - 19B209613P1, Bandpass filter: 45.000000 MHz.

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Printed in U.S.A.