



MAINTENANCE MANUAL

66-88 MHz OSCILLATOR-MULTIPLIER BOARD 19C327790G1, G2

LBI-30631C
(DF1106)

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DESCRIPTION

The oscillator-multiplier board for Custom MVP (osc-mult) contains a Colpitts oscillator, a multiplier stage and two amplifier stages. The operating frequency of the Colpitts oscillator is maintained within ± 5 PPM by an externally compensated crystal module. The crystal frequencies range from approximately 12 to 16 megahertz and are multiplied six times and then amplified to provide a high side injection frequency to the mixer.

CIRCUIT ANALYSIS

F1 OSCILLATOR CIRCUIT

Transistor Q402, a plug-in crystal module and associated components comprise a Colpitts oscillator operating at the F1 receive frequency.

The crystal module located in the emitter-base circuit is temperature compensated to maintain frequency stability over a temperature range of -30°C to $+65^{\circ}\text{C}$. Compensation voltage from the exciter is applied through P602-1 to pin four of the crystal modules.

The compensation voltage varies non-linearly with temperature to complement the temperature/frequency characteristics of the crystal. Listed below are typical minimum and maximum voltage readings to be expected at pin 4 of the crystal modules, as measured with a high impedance meter.

TEMPERATURE RANGE	OUTPUT VOLTAGE	
	MINIMUM	MAXIMUM
-30°C	4.9 Volts	6.0 Volts
-10°C to $+50^{\circ}\text{C}$	3.7 Volts	4.3 Volts
$+75^{\circ}\text{C}$	3.3 Volts	3.8 Volts

SERVICE NOTE

Y1 and C2 are not field replaceable items. C2 is factory selected to complement the temperature/frequency characteristics of each individual crystal. Should it become necessary to replace either Y1 or C2, the entire crystal module must be replaced.

Trimmer capacitor C3 is used to adjust the radio for the exact operating frequency. Refer to the Alignment Procedure for details.

Refer to the System Maintenance Manual for circuit details of the crystal modules.

In single frequency applications, the F1 keying lead is wired to A- by a DA jumper wire connected between H8 and H9.

In multi-frequency radios this jumper is removed to allow F1 frequency selection via the frequency selector switch on the control panel.

With the radio turned on and the PTT switch released, +10V is present on the Rx Osc control lead at P602-6 allowing the oscillator to operate at the F1 crystal frequency. Capacitor C402 provides the necessary in-phase feedback to sustain oscillations. A voltage divider network consisting of R407 and R408 sets the bias for oscillator transistor Q402.

When frequencies other than F1 are selected, A- is removed from the F1 keying lead. Oscillator Q402 turns off due to a rising base voltage, and the selected crystal module oscillator frequency from the multi-frequency board is applied through J402 to a tuned circuit consisting of L401 and C406.

C406 tunes L401 to three times the crystal frequency. The output of the tuned circuit is applied to the base of multiplier Q403. The collector tank circuit of the multiplier (L402, C411, and C412) is tuned to two times the crystal frequency. The output of the amplifier stage is metered across R411 and applied to receiver metering jack J601 through P602-3.

Following Q403 is an amplifier stage, Q404. The output of Q404 is metered through a metering network consisting of C414, C417, R415 and R416 and applied to receiver metering jack J601 through P602-4. The amplified output of Q404 is applied to a tuned circuit (L404 and C415) on the Adapter board. L404 is tuned to six times the crystal frequency.

The output of the Adapter board is inductively coupled from L404 thru L502 and L503 on the RF assembly to the input of the mixer stage. The three LC circuits provide the selectivity for the oscillator-multiplier chain.

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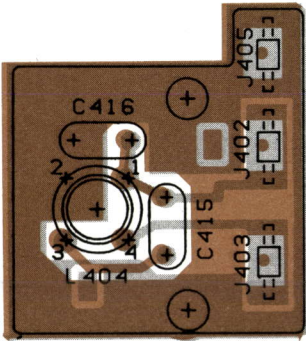


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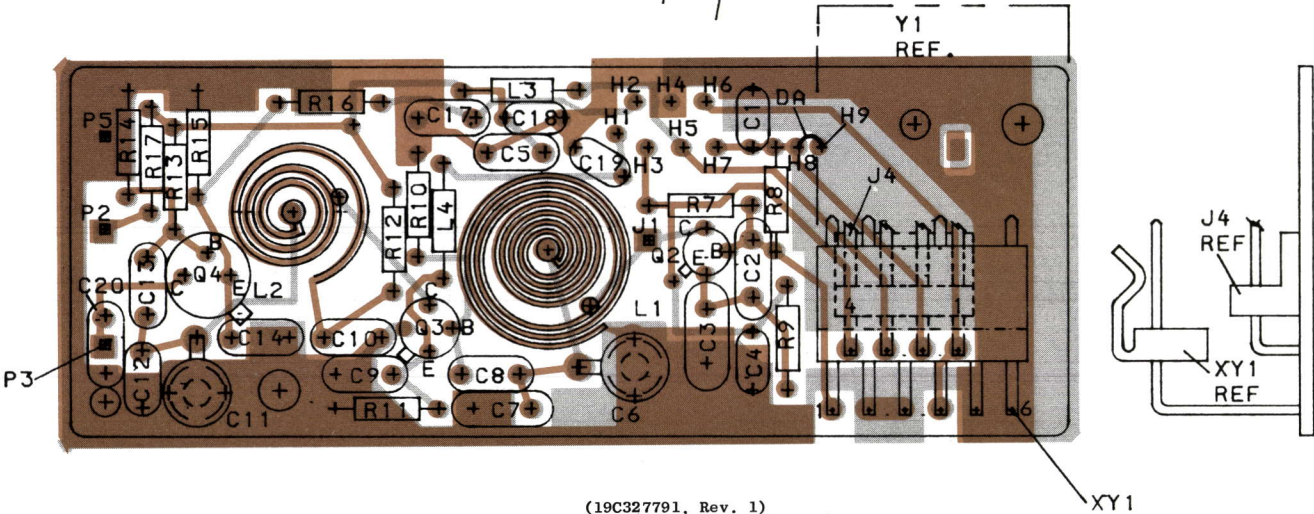
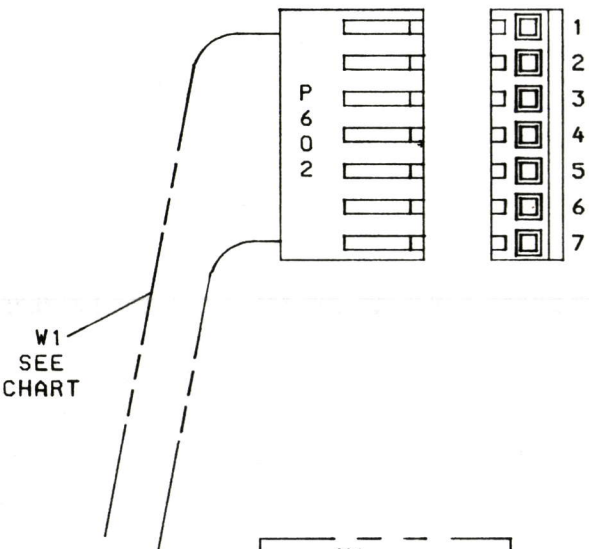
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ADAPTOR

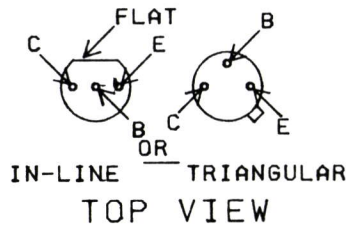


(19B227343, Rev. 0)
(19B227264, Sh. 1, Rev. 0)
(19B227264, Sh. 2, Rev. 0)



(19C327791, Rev. 1)
(19B227989, Sh. 1, Rev. 0)
(19B227989, Sh. 2, Rev. 0)

LEAD IDENTIFICATION
FOR Q2, Q3 AND Q4



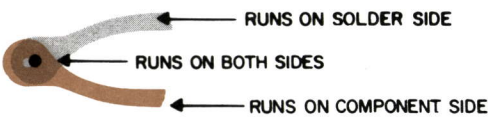
NOTE: LEAD ARRANGEMENT, AND NOT
CASE SHAPE, IS DETERMINING
FACTOR FOR LEAD IDENTIFICATION.

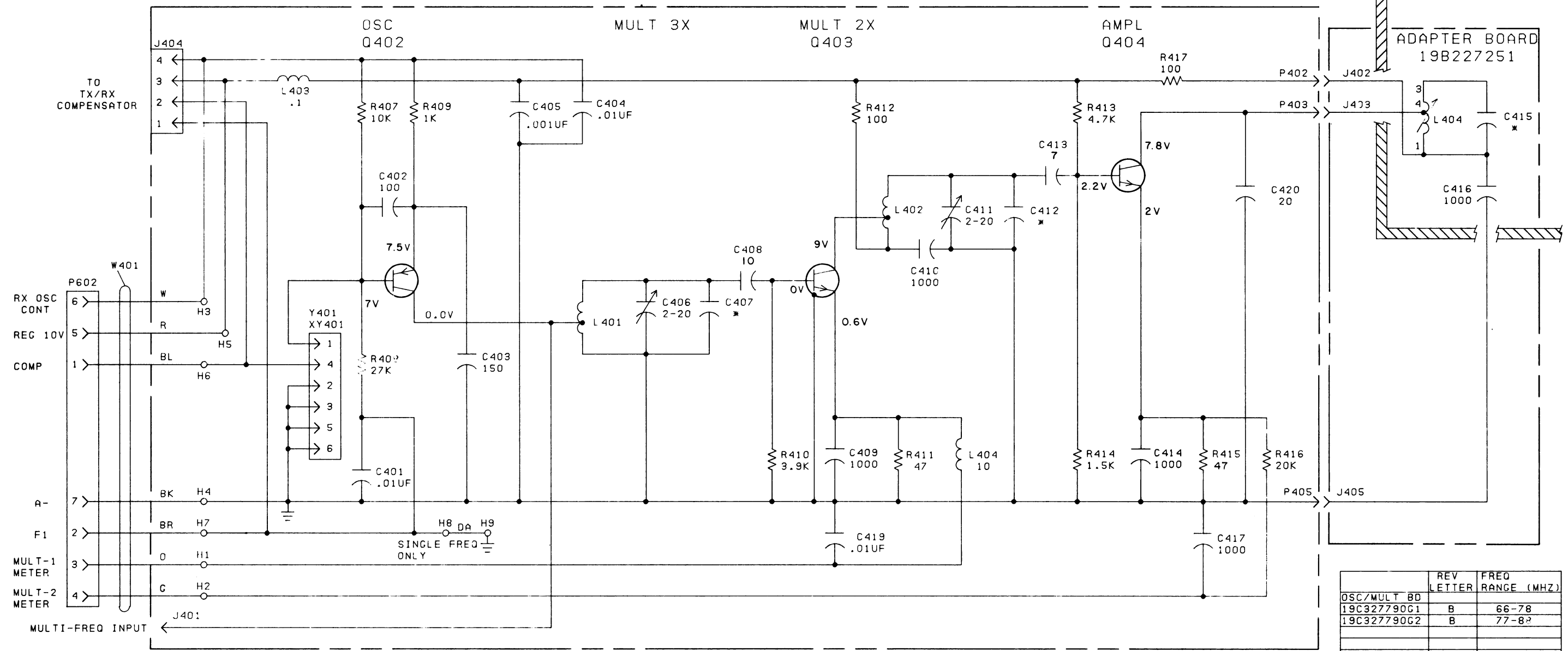
CONNECTION CHART	
WIRE	TO
W1-O	H1
W1-G	H2
W1-W	H3
W1-BK	H4
W1-R	H5
W1-BL	H6
W1-BR	H7

PARTIAL REFERENCE DESIGNATIONS ARE
SHOWN, FOR COMPLETE DESIGNATION,
PREFIX WITH 400 SERIES.
EXAMPLE: J1- J401, C1- C401, R1- R401, ETC.

OUTLINE DIAGRAM

66—88 MHZ OSCILLATOR/MULTIPLIER





	REV LETTER	FREQ RANGE (MHZ)
OSC/MULT BD		
19C327790G1	B	66-78
19C327790G2	B	77-88
ADAPTER BD		
19B227251G5		66-78
19B227251G6		77-88

*COMPONENT VALUE TABLE			
COMPONENT DESIGNATION	66-78 MHZ	77-88 MHZ	
C407	L	H	
C412	18	10	
C415	27	20	

ALL RESISTORS ARE 1/4 WATT UNLESS OTHERWISE SPECIFIED AND RESISTOR VALUES IN OHMS UNLESS FOLLOWED BY K=1000 OHMS OR MEG=1,000,000 OHMS. CAPACITOR VALUES IN PICO FARADS (EQUAL TO MICROMICROFARADS) UNLESS FOLLOWED BY UF=MICROFARADS.

VOLTAGE READINGS
VOLTAGE READINGS ARE TYPICAL READINGS MEASURED TO SYSTEM NEGATIVE (P903-6) WITH TEST SET MODEL 4EX3A11 OR A 20.000 OHM-PER-VOLT METER WITH RF DRIVE.

IN ORDER TO RETAIN RATED EQUIPMENT PERFORMANCE, REPLACEMENT OF ANY SERVICE PART SHOULD BE MADE ONLY WITH A COMPONENT HAVING THE SPECIFICATIONS SHOWN ON THE PARTS LIST FOR THAT PART.

SCHEMATIC DIAGRAM

66-88 MHz OSCILLATOR/MULTIPLIER

Issue 3

PARTS LIST

LBI-30632C
66-88 MHz OSCILLATOR-MULTIPLIER
19C327790G1, G2
AND
ADAPTER BOARD
19B227251G5, G6

SYMBOL	GE PART NO.	DESCRIPTION
		66-88 MHz OSCILLATOR-MULTIPLIER 19C327790G1 66-78 MHz (L) 19C327790G2 77-88 MHz (H)
		- - - - - CAPACITORS - - - - -
C401	19A700005P7	Polyester: 0.01 uF ±10%, 50 VDCW.
C402	5496218P763	Ceramic disc: 100 pF ±5%, 500 VDCW, temp. coef -750 PPM.
C403	19A700105P38	Mica: 150 pF ±5%, 500 VDCW.
C404	19A700005P7	Polyester: 0.01 uF ±10%, 50 VDCW.
C405	19A116655P19	Ceramic disc: 1000 pF ±20%, 1000 VDCW; sim to RMC Type JF Discap.
C406	19A700012P2	Variable, ceramic: 2.5 to 20 pF 200 VDCW, temp coef -250 -700 PPM; sim to Panasonic ECX1ZW20X32.
C407L	5496219P45	Ceramic disc: 18 pF ±5%, 500 VDCW, temp. coef 0 PPM.
C407H	5496219P41	Ceramic disc: 10 pF ±5%, 500 VDCW, temp. coef 0 PPM.
C408	5496219P41	Ceramic disc: 10 pF ±5%, 500 VDCW, temp. coef 0 PPM.
C409 and C410	19A116655P19	Ceramic disc: 1000 pF ±20%, 1000 VDCW; sim to RMC Type JF Discap.
C411	19A700012P2	Variable, ceramic: 2.5 to 20 pF 200 VDCW, temp coef -250 -700 PPM; sim to Panasonic ECX1ZW20X32.
C412L	5496219P45	Ceramic disc: 18 pF ±5%, 500 VDCW, temp. coef 0 PPM.
C412H	5496219P41	Ceramic disc: 10 pF ±5%, 500 VDCW, temp. coef 0 PPM.
C413	5496219P38	Ceramic disc: 7.0 pF ±5%, 500 VDCW, temp. coef 0 PPM.
C414	19A116655P19	Ceramic disc: 1000 pF ±20%, 1000 VDCW; sim to RMC Type JF Discap.
C417	19A116655P19	Ceramic disc: 1000 pF ±20%, 1000 VDCW; sim to RMC Type JF Discap.
C418 and C419	19A700005P7	Polyester: 0.01 uF ±10%, 50 VDCW.
C420	19A116656P20J8	Ceramic disc: 20 pF ±5%, 500 VDCW, temp coef -80 PPM.
		- - - - - JACKS AND RECEPTACLES - - - - -
J401	19A701785P1	Contact, electrical; sim to Molex 08-50-0404.
J404	19A116659P118	Connector, printed wiring: 4 contacts; sim to Molex 09-88-2041.
		- - - - - INDUCTORS - - - - -
		(Part of printed board 19C327789P1).
L401 and L402		
L403	19B209420P101	Coil, RF: .10 uH ±10%, 0.8 ohms DC res max; sim to Jeffers 4416-1K.
L404	19A700024P25	Coil, RF: 10.0 uH ±10%, 3.70 ohms DC res max.
		- - - - - PLUGS - - - - -
P402 and P403	19A701785P3	Contact, electrical.
P405 and P602	19A701785P3	Contact, electrical. (Part of W401).

SYMBOL	GE PART NO.	DESCRIPTION
		- - - - - TRANSISTORS - - - - -
Q402	19A700022P1	Silicon, PNP; sim to Type 2N3906.
Q403*	19A134670P1	Silicon, NPN. Earlier than REV A:
	19A115440P1	Silicon, NPN.
Q404	19A116868P1	Silicon, NPN; sim to Type 2N4427.
		- - - - - RESISTORS - - - - -
R407	19A700106P87	Composition: 10K ohms ±5%, 1/4 w.
R408	19A700106P97	Composition: 27K ohms ±5%, 1/4 w.
R409	19A700106P63	Composition: 1K ohms ±5%, 1/4 w.
R410	19A700106P77	Composition: 3.9K ohms ±5%, 1/4 w.
R411	19A700106P31	Composition: 47 ohms ±5%, 1/4 w.
R412	19A700106P39	Composition: 100 ohms ±5%, 1/4 w.
R413	19A700106P79	Composition: 4.7K ohms ±5%, 1/4 w.
R414	19A700106P67	Composition: 1.5K ohms ±5%, 1/4 w.
R415	19A700106P31	Composition: 47 ohms ±5%, 1/4 w.
R416	3R152P203J	Composition: 20K ohms ±5%, 1/4 w.
R417	19A700106P39	Composition: 100 ohms ±5%, 1/4 w.
		- - - - - CABLES - - - - -
W401	19B226965G2	Cable. includes (P602) 19A116659P82.
		- - - - - SOCKETS - - - - -
XY401	19A136694G1	Connector, printed wiring: 6 contacts; sim to Molex 09-75-1064.
		ADAPTER BOARD 19B227251G5 66-78 MHz (L) 19B227251G6 77-88 MHz (H)
		- - - - - CAPACITORS - - - - -
C415L	19A116656P27K8	Ceramic disc: 27 pF ±10%, 500 VDCW, temp coef -80 PPM.
C415H	19A116656P20J8	Ceramic disc: 20 pF ±5%, 500 VDCW, temp coef -80 PPM.
C416	19A116655P19	Ceramic disc: 1000 pF ±20%, 1000 VDCW; sim to RMC Type JF Discap.
		- - - - - JACKS AND RECEPTACLES - - - - -
J402 and J403	19A701883P4	Contact, electrical; sim to AMP 86444-1. (Strip Form).
J405	19A701883P4	Contact, electrical; sim to AMP 86444-1. (Strip Form).
		- - - - - INDUCTORS - - - - -
L404	19C307169P205	Coil, RF: variable, wire size No. 20 AWG; sim. to Paul Smith Co. Sample No. 060876-DB-2.
		- - - - - MISCELLANEOUS - - - - -
	4031594P1	Insulator. (Used with C406 and C411).
		ASSOCIATED ASSEMBLIES
		- - - - - CRYSTAL MODULES - - - - -
		NOTE: When reordering give GE Part Number and specify exact operating frequency needed.
Y401	19B226962G33	Rx. 5 PPM. (66-78 MHz).
	19B226962G34	Rx. 5 PPM. (77-88 MHz).

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 descriptions of parts affected by these revisions.

- REV. A - Oscillator/Multiplier Board 19C327790G1, G2
To incorporate new transistor. Changed Q403.
- REV. B - To incorporate new transistor. Changed Q404 and R415.
Q404 was: 19A115329P2 - Silicon, NPN.
R415 was: 3R152P101J - Composition: 100 ohms ±5%. 1/4 W.