MOBILE RADIO

MAINTENANCE MANUAL

66—88 MHz POWER AMPLIFIER ASSEMBLY 19D424673G1

TABLE OF CONTENTS

DESCRIPTION

The 66-88 MHz PA assembly for MASTR® Executive II uses two RF power transistors to provide a power output of 25 watts. The output power is adjustable using power adjust control R3 over a range of 8 to 25 watts. A single transistor is used in the power adjust circuit.

Supply voltage for the PA is connected through power leads from the system-audio-squelch board (SAS) to feed through capacitors C297 and C298 on the side of the PA assembly. C297, C298 and C299 prevent RF from getting on the power leads. Diode CR295 will cause the main fuse assembly to blow if the polarity of the power leads is reversed, providing reverse voltage protection for the radio.

The PA assembly is insulated from vehicle ground to permit operation in positive or negative ground vehicles.

NOTE

In positive ground vehicles, A- is "hot" with respect to vehicle ground. Shorting the transmitter PA printed wiring board ground pattern to the radio case may cause one of the in-line fuses to blow.

The hinged PA heat sink pivots 90° to provide access to the power amplifier board, low pass filter and centralized metering jack J205.

Centralized metering jack J205 is provided for use with GE Test Set Model 4EX3A11 or Test Kit 4EX8K12. The Test Set meters the Ampl-1 drive (exciter output), power control voltage (Ampl-1 collector voltage) and PA current.

CIRCUIT ANALYSIS

RF AMPLIFIERS

The exciter output is coupled through cable W216 to PA input jack J201. The RF is coupled through DC blocking capacitor C1 and an impedance matching network to the base of Class C amplifier Q201. The network matches the 50-ohm input to the base of Q201, and consists of C2, C3, C4, L1 and L2. L3 and R1 comprise a stabilizing network in the base circuit of Q201.

Part of the RF input is rectified by CR1 and applied to voltage divider R7 and R8. This voltage is used to meter the AMPL-1 drive at J205-4.

Collector voltage to Q201 (Ampl-1) is controlled by the power adjust circuit, Q215 and R3 and is applied through collector stabilizing network (L5 and R2 and collector feed network L4 and C7). The collector voltage of Q201 is metered through R9 at J205-3.

The output of Q201 is coupled to the base of Class C Power Amplifier, Q202, through coupling capacitor C10 and a matching network consisting of L6, C11, C12, and C13. L8 and R4 comprise a stabilizing network in the base circuit of Q202.

Collector current for Q202 is metered across tapped manganin resistor R6 at J205-5, 6 (PA Current). The reading is taken on the one-Volt scale with the High Sensitivity button pressed, and read as 10 amperes full scale.

Following Q202 is a matching network (L11, C17, C18 and L12) that matches the output of Q202 to the 50-ohm microstrip impedance (W2) to the input of low pass filter.

The PA output is coupled through the low-pass filter antenna transfer relay K1 to the antenna.

Capacitor C19 through C23 and C25, C26 and C36 provide ground isolation for positive and negative ground operation.

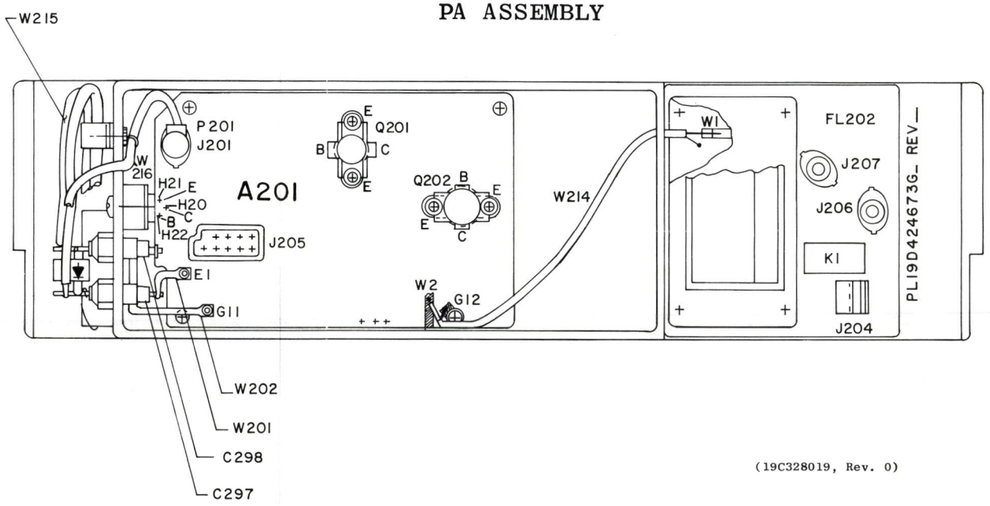
WARNING

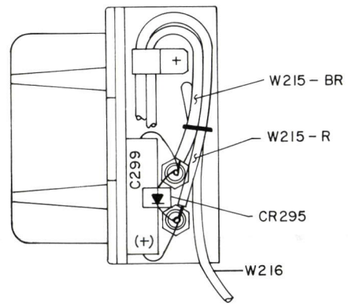
The RF Power Transistors used in the transmitter contain Beryllium Oxide, a TOXIC substance. If the ceramic, or other encapsulation is opened, crushed, broken or abraded, the dust may be hazardous if inhaled. Use care in replacing transistors.

POWER ADJUST CIRCUIT

The power adjust circuit consists of R3 and Q215. R3 controls the base voltage and therefore the conduction of Q215. Q215 is connected in series with the collector feed network for Q201 thereby controlling the drive to PA transistor Q202 and the output power. R3 is adjusted to provide the desired output power over a range of 8 to 25 watts.

PA ASSEMBLY

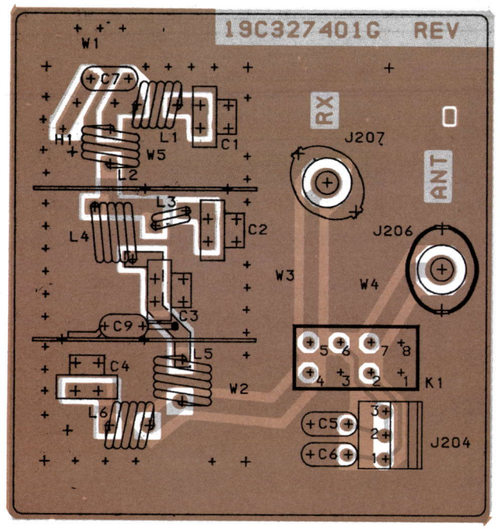




END VIEW

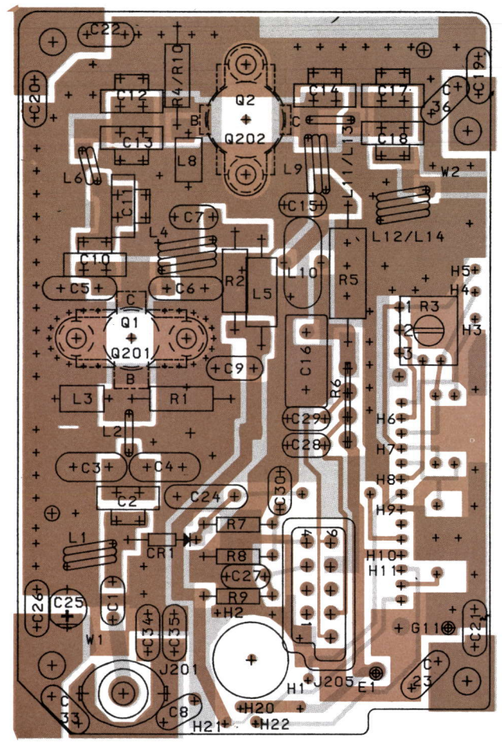
(19C328019, Rev. 0)

LOW PASS FILTER FL201

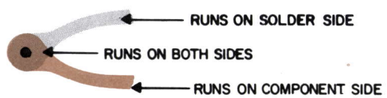


(19C327850, Rev. 2)
(19B227594, Sh. 1, Rev. 0)
(19B227594, Sh. 2, Rev. 0)

PA BOARD A201



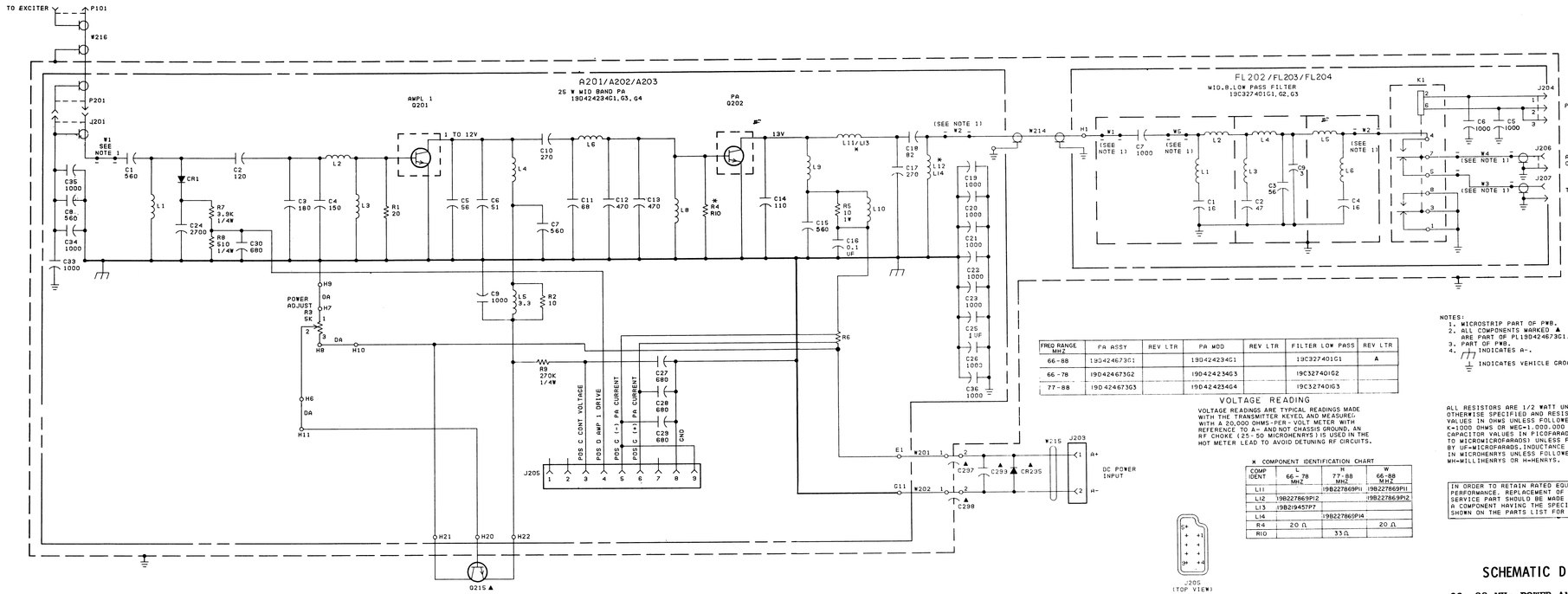
(19C327844, Rev. 2)
(19B227591, Sh. 1, Rev. 1)
(19B227591, Sh. 2, Rev. 1)



CONNECTION CHART			
FROM	TO	WIRE	REMARKS
H10	H8	DA	SLEEVE
H11	H6	DA	SLEEVE
H7	H9	DA	SLEEVE

OUTLINE DIAGRAM

66—88 MHz POWER AMPLIFIER



FREQ RANGE MHZ	PA ASSY	REV LTR	PA MOD	REV LTR	FILTER LOW PASS	REV LTR
66-88	19D424673G1		19D424234G1		19C327401G1	A
66-78	19D424673G2		19D424234G3		19C327401G2	
77-88	19D424673G3		19D424234G4		19C327401G3	

VOLTAGE READING

VOLTAGE READINGS ARE TYPICAL READINGS MADE WITH THE TRANSMITTER KEYED, AND MEASURED WITH A 20,000 OHMS-PER-VOLT METER WITH REFERENCE TO A- AND NOT CHASSIS GROUND. AN RF CHOKE (25-50 MICROHENRYS) IS USED IN THE HOT METER LEAD TO AVOID DETUNING RF CIRCUITS.

* COMPONENT IDENTIFICATION CHART

COMP IDENT	L 66-78 MHZ	N 77-88 MHZ	W 66-88 MHZ
L11		19B227869P11	19B227869P11
L12	19B227869P12		19B227869P12
L13	19B219457P7		
L14		19B227869P14	
R4	20 Ω		20 Ω
R10		33 Ω	

NOTES:
1. MICROSTRIP PART OF PWB.
2. ALL COMPONENTS MARKED ▲ ARE PART OF PL19D424673G1.
3. PART OF PWB.
4. ⏚ INDICATES A-.
   ⏚ INDICATES VEHICLE GROUND.

ALL RESISTORS ARE 1/2 WATT UNLESS OTHERWISE SPECIFIED AND RESISTOR VALUES IN OHMS UNLESS FOLLOWED BY K=1000 OHMS OR MEG=1,000,000 OHMS. CAPACITOR VALUES IN PICOFARADS (EQUAL TO MICROW(MICROFARADS) UNLESS FOLLOWED BY UF=MICROFARADS.INDUCTANCE VALUES IN MICROHENRYS UNLESS FOLLOWED BY MH=MILLIHENRYS OR H=HENRYS.

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.

(19B622281, Rev. 4)

SCHEMATIC DIAGRAM

66—88 MHz POWER AMPLIFIER

PARTS LIST

LBI30558A

66-88 MHz 25 WATT POWER AMPLIFIER
19D424673G1 66-88 MHz
19D424673G2 66-78 MHz
19D424673G3 77-89 MHz

SYMBOL	GE PART NO.	DESCRIPTION
A201 thru A203		25 WATT MODULE A201 19D424234G1 66-88 MHz A202 19D424234G3 66-78 MHz A203 19D424234G4 77-89 MHz
		- - - - - - - - - - CAPACITORS - - - - - - - - - -
C1	19A116655P15	Ceramic disc: 560 pf ±20%, 1000 VDCW; sim to RMC Type JF Discap.
C2	19A116079P20J	Silver mica: 130 pf ±5%, 250 VDCW.
C3	7489162P33	Silver mica: 180 pf ±5%, 500 VDCW; sim to Electro Motive Type DM-15.
C4	7489162P21	Silver mica: 150 pf ±5%, 500 VDCW; sim to Electro Motive Type DM-15.
C5	19A116656P5628	Ceramic disc: 56 pf ±5%, 500 VDCW, temp coef -80 PPM.
C6	19A116656P5128	Ceramic disc: 51 pf ±5%, 500 VDCW, temp coef -80 PPM.
C7 and C8	19A116655P15	Ceramic disc: 560 pf ±20%, 1000 VDCW; sim to RMC Type JF Discap.
C9	19A116655P20	Ceramic disc: 1000 pf ±10%, 1000 VDCW; sim to RMC Type JF Discap.
C10	19A116079P27GJ	Mica: 270 pf ±5%, 250 VDCW.
C11	19A116079P6AJ	Mica: 68 pf ±5%, 250 VDCW.
C12 and C13	19A116079P47GJ	Mica: 470 pf ±5%, 250 VDCW.
C14	19A116079P110J	Mica: 110 pf ±5%, 250 VDCW.
C15	19A116655P15	Ceramic disc: 560 pf ±20%, 1000 VDCW; sim to RMC Type JF Discap.
C16	19A116966P107	Metallized polyester: 0.1 µf ±10%, 50 VDCW.
C17	19A116079P27GJ	Mica: 270 pf ±5%, 250 VDCW.
C18	19A116079P82J	Mica: 82 pf ±5%, 250 VDCW.
C19 thru C23	19A116655P20	Ceramic disc: 1000 pf ±10%, 1000 VDCW; sim to RMC Type JF Discap.
C24	19A116655P21	Ceramic disc: 2700 pf ±20%, 1000 VDCW; sim to RMC Type JF Discap.
C25	19A134202P14	Tantalum: 1 µf ±20%, 35 VDCW.
C26	19A116655P20	ceramic disc: 1000 pf ±10%, 1000 VDCW; sim to RMC Type JF Discap.
C27 thru C30	19A116655P18	Ceramic disc: 680 pf ±10%, 1000 VDCW; sim to RMC Type JF Discap.
C33 thru C36	19A116655P20	Ceramic disc: 1000 pf ±10%, 1000 VDCW; sim to RMC Type JF Discap.
		- - - - - - - DIODES AND RECTIFIERS - - - - - -
CR1	19A115250P1	Silicon, fast recovery, 225 mA, 50 PIV.
		- - - - - - - - - - TERMINALS - - - - - - - - - -
E1	19A134203P1	Contact, electrical: sim to Selectro 22901082-00-0-590.
G11	19A134263P1	Contact, electrical: sim to Selectro 229-1082-00-0-590.
		- - - - - - - - JACKS AND RECEPTACLES - - - - - -
J201	19A130924G1	Receptacle, coaxial: jack type; sim to Cinch 14B11613.
J205	19B219374G1	Connector: 9 contacts.
		- - - - - - - - - - INDUCTORS - - - - - - - - - -
L1	19B227869P6	Coil.
L2	19B227869P7	Coil.
L3	19A129773G1	Coil.
L4	19B227869P8	Coil.
L5	7488078P10	Choke, RF: 3.30 µh ±10%, 0.15 ohms DC res max; sim to Jeffers 4421-1K.
L6	19B227869P9	Coil.
L8	19A129773G1	Coil.
L9	19B227869P10	Coil.
L10	19A129346G1	Coil.
L11	19B227869P11	Coil.
L12	19B227869P12	Coil.
L13	19B219457P7	Coil.
L14	19B227869P14	Coil.
		- - - - - - - - - - RESISTORS - - - - - - - - - -
R1	3R77P200J	Composition: 20 ohms ±5%, 1/2 w.
R2	3R77P100J	Composition: 10 ohms ±5%, 1/2 w.
R3	19A116559P102	Variable, cermet: 5K ohms ±20%, .5 w; sim to CTS Series 360.
R4	3R77P200J	Composition: 20 ohms ±5%, 1/2 w.
R5	3R76P100J	Composition: 10 ohms ±5%, 1 w.
R6	19C320212P2	Shunt resistor.
R7	3R152P392J	omposition: 3.9K ohms ±5%, 1/4 w.
R8	3R152P511J	Composition: 510 ohms ±5%, 1/4 w.
R9	3R152P274J	Composition: 270K ohms ±5%, 1/4 w.
		- - - - - - - - - - CABLES - - - - - - - - - -
W1 and W2		(Part of 19D424233P1 printed board).
		- - - - - - - - - - CAPACITORS - - - - - - - - - -
C297 and C298	19A116708P1	Ceramic, feed-thru: 0.01 µf +100% -0%, 500 VDCW; sim to Erie Style 327.
C299	19A115680P10	Electrolytic: 200 µf +150% -10%, 18 VDCW; sim to Mallory Type TTX.
		- - - - - - - - DIODES AND RECTIFIERS - - - - -
CR295	19A116783P1	Silicon.
		- - - - - - - - - - FILTERS - - - - - - - - - -
FL202 thru FL204		COMPONENT BOARD 19C327401G1 66-88 MHz 19C327401G2 66-78 MHz 19C327401G3 77-89 MHz
		- - - - - - - - - - CAPACITORS - - - - - - - - - -
C1	19A166779P16D	Metallized teflon: 16 pf ±.5 pf 250 VDCW.
C2	19A166779P47J	Metallized teflon: 47 pf ±5%, 250 VDCW.
C3	19A166779P56J	Silver mica: 56 pf ±5%, 250 VDCW.
C4	19A166779P16D	Metallized teflon: 16 pf ±.5 pf, 250 VDCW.
C5 thru C8	19A116655P20	Ceramic disc: 1000 pf ±10%, 1000 VDCW; sim to RMC Type JF Discap.
C9*	19A116656P3J0	Ceramic disc: 3 pf ±0.5 pf, 500 VDCW, temp coef 0 PPM. Added to G1 by REV A.
		- - - - - - - - JACKS AND RECEPTACLES - - - - - -
J204	19A116659P55	Connector, printed wiring: 3 contacts; sim to Molex 09-52-65-1031.
J206 and J207	19A130924G1	Connector, receptacle: coaxial, jack type; sim to Cinch 14B11613.
		- - - - - - - - - - RELAYS - - - - - - - - - -
K1	19B209558P1	Hermetic sealed: 180 to 341 ohms coil res, 2 form C contacts, 8.0 to 16.3 VDC; sim to GE 3SAY1760A2.
		- - - - - - - - - - INDUCTORS - - - - - - - - - -
L1	19B227869P1	Coil.
L2	19B227869P2	Coil.
L3	19B227869P3	Coil.
L4	19B227869P4	Coil.
L5	19B227869P5	Coil.
L6	19B227869P13	Coil.
		- - - - - - - - - - CABLES - - - - - - - - - -
W1 thru W5		(Part of printed board 19C327400P1).
		- - - - - - - - - - TRANSISTORS - - - - - - - -
Q201	19A134489P1	Silicon, NPN.
Q202	19A134489P2	Silicon, NPN.
Q215	19A116742P1	Silicon, NPN.
		- - - - - - - - - - PLUGS - - - - - - - - - -
P201		(Part of W216).
P203		(Part of W215).
		- - - - - - - - - - CABLES - - - - - - - - - -
W201	19B227024P1	Jumper.
W202	19B227023G1	Jumper.
W214	19A130831G2	Cable, RF: approx 5-1/4 inches long.
W215		CABLE ASSEMBLY 19B227053G1
		- - - - - - - - JACKS AND RECEPTACLES - - - - - -
J203		Connector. Includes:
	19A134281P2	Shell.
	19A134282P4	Contact, electrical. (Quantity 2).
		- - - - - - - - - - MISCELLANEOUS - - - - - - - - -
	7117269P1	Solderless terminal.
W216	19A130909G1	Cable, RF: approx 7-1/2 inches long. Includes P201 (5491689P01).
		- - - - - - - - - - MISCELLANEOUS - - - - - - - - - -
	19C332159G4	Casting, heat sink.
	19C321441P2	Insulator. (Located between A201 and heat sink).
	N44P9006C6	Machine screw: No. 4-40 x 3/8. (Secures Q201, Q202).
	19A130568P1	Plate. (Located under Q215 next to heat sink).
	19A116023P1	Insulator, plate. (Used with Q215 next to 19A130568P1 plate).
	19A134016P1	Insulator, bushing. (Located under 4-40 nut at Q215).
	19A129434P1	Washer, fiber. (Used with C297, C298).
	19B201074P305	Tap screw, Phillips POZIDRIV®: No. 6-32 x 5/16. (Secures A201- Quantity 3).
	19B201074P306	Tap screw, Phillips POZIDRIVE: No. 6-32 x 3/8. (Secures A201 and solderless terminal 7878455P2- Quantity 3).
	7878455P2	Solderless terminal. (Located on A201 mounting screw).
	4028851P6	Clip loop. (Secures W215).
	19C321982P1	Insulator. (Located under A201-A203).
	19B201074P320	Tap screw, Phillips POZIDRIV®: No. 6-32 x 1-1/4. (Secures FL202-FL204).
	7139898P3	Hex nut: brass. (Used with C297 and C298).

*COMPONENTS ADDED, DELETED OR CHANGED BY PRODUCTION CHANGES

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.

Low Pass Filter Assembly 19C327401G1

REV. A - To improve operation. Added C9.