DESCRIPTION AND MAINTENANCE

VEHICULAR REPEATER LOGIC BOARD 19C328461

TABLE OF CONTENTS

SPECIFICATIONS

CARRIER CONTROLLED TIMER	2.0 ±.5 min.
TYPE 90 ENCODE TIMER	750 ±80 millisecond
TYPE 90 DECODE TIMER	1.0 ±0.5 sec.
DELAY STATE COUNTER	400 ±20 millisecond
PRIORITY INTERRUPT CLOCK	2.0 ±.3 sec.
PRIORITY INTERRUPT PULSE	6.0 ±.6 millisecond
OPERATING VOLTAGE	10.0 VDC regulated
CURRENT DRAIN	17 mA (Max.) @ 10 VDC

DESCRIPTION

The Logic Board is located in the Vehicular Repeater Unit and is used to control the various operational functions of the repeater and the mobile radio units.

The logic circuitry on the logic board will insure that only one Vehicular Repeater will be repeating within a portable radio coverage area.

If two Vehicular Repeaters should be repeating, the interference resulting from multiple repeater operation will automatically clear itself.

A Priority Interrupt circuit is provided so the operator of a remote portable PE radio unit can communicate to a base station via the Vehicular Repeater, by interrupting a Base-to-Mobile Transmission.

In reference to the logic board circuitry, a logic state "3" means the up/down

counter will be in delay state "4". This logic state "3" is present on the logic board when no Vehicular Repeaters in the area are turned on. When the up/down counter on the logic board is in the delay state "0", the Vehicular Repeater is in a priority state.

The priority logic circuits assure that the last Vehicular Repeater System enabled will normally become the priority unit and will remain until another unit is enabled or the priority unit leaves the area.

If two Vehicular Repeater Systems are in the priority state "0" and have a direct communication path between them (i.e., the monitor receiver in each can receive the other's mobile radio transmission), one of the Vehicular Repeater Systems will move to delay state "1" and the other vehicular repeater will become the priority unit (state "0") to retransmit the radio communications.

During base-to-portable transmission, the vehicular repeater transmitter is unkeyed for 6 milliseconds every 2 seconds to check for portable radio transmissions. If there is activity on the portable frequency, the vehicular repeater will immediately cease transmitting (PORTABLE INTERRUPT). If there is a transmission with Channel Guard tone, the vehicular repeater immediately stops repeating base-to-portable and repeats portable-to-base. This turn around time can vary from 200 milliseconds to two seconds, depending on when the portable PE radio (PTT) was keyed. The Portable Interrupt clock allows the portable PE radio to seize priority when the Vehicular Repeater is repeating. If there is a transmission without Channel Guard tone, the vehicular repeater will immediately stop repeating.

If, for any reason, two or more vehicular repeaters are in the priority state, the first base-to-portable transmission longer than two seconds will cause all the vehicular repeaters in priority state, except one, to advance to delay state "1". This action is initiated by the portable interrupt function. On a base-to-portable transmission, each vehicular repeater is interrupted every two seconds to check for any portable transmission. Since the two second interval is generated by a free-running clock, the intervals in the priority units are random. All of the priority units, except the last one to interrupt will shut down. At the end of the base transmission, the interrupted repeaters will advance to delay state "1", clearing the system. This is known as MULTIPLE PRIORITY CLEARING.

ENABLE OF FIRST VEHICULAR REPEATER SYSTEM

When a vehicle containing the Vehicular Repeater System equipment arrives at a location that requires the operator to be away from the vehicle and yet maintain communication, the Vehicular Repeater System can be enabled. Normally, the portable PE radio should be inserted in the vehicular charger unit and the REPEATER switch be in the "on" position. The operator, removing the portable PE radio, automatically enables the Vehicular Repeater System. The mobile radio unit will transmit and receive on the Channel indicated on the Control Unit. The portable PE radio channel select switch should be set to the assigned repeater channel.

When the PE radio was initially removed from the vehicular charger unit, a switch closure in the vehicular charger unit caused a repeat enable signal to be applied to the logic circuitry in the vehicular repeater radio unit. This, in turn, causes the vehicular repeater transmitter to send a short burst (700 milliseconds) of Type 90 tone. Since no other Vehicular Repeater Systems have been enabled at this time the Type 90 tone burst has no effect. At the time of the Type 90 tone burst, the delay state counter in the enabled vehicular repeater is reset from delay state "3" to priority state "0", making this vehicular repeater the priority unit at this location.

ENABLE OF SECOND VEHICULAR REPEATER SYSTEM

When a second vehicle, having a Vehicular Repeater System, arrives in the general proximity of the first vehicle, nothing will happen until the repeater in the second vehicle is enabled. Upon removal of the portable PE radio and the automatic enabling of the Vehicular Repeater System, the second vehicular repeater transmitter sends a short burst (700 milliseconds) of Type 90 tone. This tone is received by the first vehicular repeater receiver and detected by its Type 90 decoder. The decoder output informs the logic and control circuits of the first vehicle that the second Vehicular Repeater System is assuming control and will become the priority vehicular repeater. The delay state counter in the first vehicular repeater will advance to delay state "1" while the delay state counter in the second vehicular repeater assumes the priority state. Transmissions to and from all portable PE radios in the area will now be repeated by the second Vehicular Repeater System.

ENABLE OF ADDITIONAL VEHICULAR REPEATER SYSTEMS

The arrival of additional vehicles with Vehicular Repeater Systems in the same general proximity of the last enabled priority vehicular repeater has no effect on the priority Vehicular Repeater System until the newly arrived Vehicular Repeater Systems are enabled. The delay state counter in each vehicular repeater insures that the

last Vehicular Repeater System enabled will be the priority unit.

DEPARTURE OF VEHICULAR REPEATER SYSTEM VEHICLES

The order in which vehicular repeaters leave a location determines whether the priority changes. A vehicle that leaves or disables its Vehicular Repeater System and was not the priority unit has no effect on the remaining Vehicular Repeater Systems. Should the operator reinsert the portable PE radio into the vehicular charger unit of a priority Vehicular Repeater System thereby disabling the vehicular repeater, nothing will happen until a condition to repeat occurs. When this condition occurs, the remaining enabled Vehicular Repeater Systems begin to count down from their delay states. The first Vehicular Repeater System to reach delay state "0" becomes the priority unit and repeats, stopping the countdown in the remaining repeaters.

Refer to the Combination Manual for a complete system description of Vehicular Repeater operation.

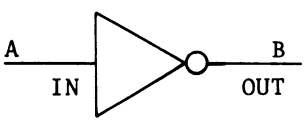
FUNDAMENTALS OF LOGIC CIRCUITS

A logic circuit is a device whose output is either high ("1") or low ("0"). No other condition can exist. By logical arrangement of these devices, functions are performed in a predetermined sequence.

Four main logic devices are used on the logic board in the vehicular repeater. A description of the logic devices and the corresponding "truth table" is provided. The "truth table" identifies all possible input combinations and the resulting output.

The presence of a circle on a logic symbol indicates the signal is inverted (a "1" would become a "0" and a "0" would become a "1").

The inverter circuit produces an output which is the inverse of the input; a logic "1" at input (A) becomes a logic "0" at (B) and vice versa. Refer to the "truth table".

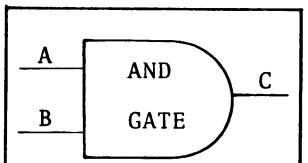


TRUTH TABLE

A	B
1	0
0	1

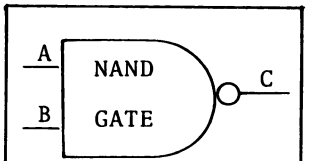
The AND GATE and OR GATE have two or more inputs. The output is determined by the logic level of the inputs. Refer to the "truth table". A circle on the output of an AND gate changes it to a NAND gate.

A circle on the output of an OR gate changes it to a NOR gate. By definition:



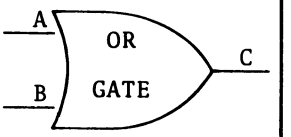
TRUTH TABLE

A	B	C
0	0	0
0	1	0
1	0	0
1	1	1



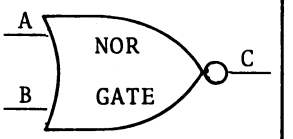
TRUTH TABLE

A	B	C
0	0	1
0	1	1
1	0	1
1	1	0



TRUTH TABLE

A	B	C
0	0	0
0	1	1
1	0	1
1	1	1



TRUTH TABLE

A	B	C
0	0	1
0	1	0
1	0	0
1	1	0

CAUTION

The CMOS Integrated Circuit devices used in this equipment can be destroyed by static discharges. Before handling one of these devices, the serviceman should discharge himself by touching the case of a bench test instrument that has a 3-prong power cord connected to an outlet with a known good earth ground. When soldering or de-soldering a CMOS device, the soldering iron should also have a 3-prong power cord connected to an outlet with a known good earth ground or a battery-operated soldering iron should be used.

CIRCUIT ANALYSIS

INPUT SIGNALS

Mobile Non-Channel Guard Indicator

This input is provided by the system board and tells the logic a given mobile radio channel will not have Channel Guard tones present. Therefore the logic will not look for Channel Guard on that channel before repeating. This is used in a multi-frequency radio where some RF channels have Channel Guard and some RF channels do not.

Channel Guard (CG) Decode

The CG Decoder provides a signal to tell the logic board that a Channel Guard tone from the mobile radio channel has been decoded.

Type 90 Decode

The Type 90 Decode input is received from the Type 90 Encode/Decode module. When present, it indicates that a Type 90 tone has been decoded on the repeater receiver or the repeater-to-portable channel.

The detected Type 90 tone burst received from other arriving vehicular repeaters, activates the Delay State Counter on the logic board in the repeaters already located in the coverage area.

Mobile Simplex Indicator

This input, provided by the System Board, indicates to the logic board that the mobile radio channel is either a simplex or half-duplex channel (separate transmit and receive frequencies). The logic looks for an input from the mobile detector.

Monitor CAS

The Monitor CAS input signal, provided by the optional mobile in the vehicular repeater detector, indicates whether activity is present on the mobile radio transmitter frequency, when operating not on a simplex channel. The logic board looks for a carrier transmitted via a mobile radio frequency.

Mobile CAS

The Mobile CAS input signal is provided by the squelch circuit located on the System Board in the vehicular repeater. It indicates when activity is present on the mobile radio channel as detected by the MASTR® II receiver. The logic looks for a carrier transmitted via the mobile radio frequency. It may be transmitted from a mobile or base station.

Mobile CG Decode

The Mobile CG Decode signal is received from the Mobile CG Decoder via the Systems board. When present, this signal indicates to the Logic Board that a properly tone coded message is being received from the base station or a second mobile radio.

Repeater CAS

The Repeater CAS input signal is received from the squelch circuit on the vehicular repeater system board. The logic looks for a carrier transmitted via a portable radio frequency which may be from a portable or from another repeater.

Repeater Channel Guard (CG) Decode

The Repeater CG Decode signal is received from the Channel Guard decoder located in the vehicular repeater. When present, this signal indicates to the logic that a portable radio Channel Guard tone has been decoded.

Mobile Push-To-Talk (PTT)

The PTT input signal received this input from the System Board and indicates that the mobile radio microphone (PTT) button has been pushed and that the mobile radio is in the transmit mode.

Repeater Enable

The Repeater Enable signal is provided by the vehicular charger unit. The vehicular charger unit is equipped with a REPEATER enable disable switch. When the REPEATER switch is placed in the ENABLED position and the portable PE radio is removed from the vehicular charger unit, a low is applied to the logic board, indicating the repeater is to be enabled.

OUTPUTS

Mobile Transmit Enable

The Mobile Transmit Enable signal is applied to the System Board in the vehicular repeater and causes the mobile radio transmitter to be keyed when the output lead is "high". This output is "high" when the vehicular repeater is repeating portable-to-base.

Type 90 Encode Enable

The Type 90 Encode Enable signal is applied to the Type 90 encode module that is plugged into the System Board in the vehicular repeater. When a repeat enable signal is applied to the logic circuitry, the vehicular repeater transmitter will send a short burst (700 milliseconds) of Type 90 tone. If no other Vehicular Repeater Systems have been enabled at this time the Type 90 tone burst has no effect. At the time of the Type 90 tone burst, the delay state counter in the enabled vehicular repeater is reset from delay state "3" to delay state "0" (Priority Unit).

Type 90 Decode Enable

The Type 90 Decode Enable signal is applied to the System Board in the vehicular repeater. When a second vehicular repeater arrives in the general proximity of the first (Priority) vehicular repeater and upon enabling the second vehicular repeater by removing the PE radio, the second vehicular repeater transmitter sends a short burst of Type 90 tone. This tone is received by the first vehicular repeater receiver and

detected by its Type 90 Tone decoder. The decoder output informs the logic and control circuits of the first vehicle that the second Vehicular Repeater System is assuming control and will become the priority vehicular repeater.

Repeater Transmit Enable

The Repeater Transmit Enable signal causes the transmitter in the vehicular repeater to be keyed when the REPEAT TX ENABLE lead is high.

Repeat Condition Circuitry

The majority of the logic gates on the logic board are used to determine when a condition to repeat exists.

If a portable radio is transmitting, the output of NAND gate U8D-11 will be low.

If a base station or another mobile radio is transmitting, the NAND gate U8A-3 output will be low.

These two signals are fed to AND gate U6B whose output goes low anytime a portable radio transmission or a base station transmission occurs. This establishes a condition to repeat. The output of U6B-4 is fed to inverter U16A and U16B which are connected as a one-shot to generate a five-second delay state clock enable window.

The output of NOR gate U13B-4 goes high when another repeater is repeating base-to-portable.

The output of NOR gate U13C-10 goes high when another repeater is repeating portable-to-base.

The output of OR gate U2A-3 will go high whenever any other repeater is repeating. This signal is fed to the delay state clock U10A and U14A (when the condition to repeat exists and another repeater is repeating) to prevent it from causing the delay state counter to count down.

When conditions to repeat exists, the delay state clock in the non-priority vehicular repeater will begin to count down until another repeater is heard or until the unit becomes the priority unit.

If the vehicular repeater is in the quiescent state, the delay state counter is in delay state "4". The clock pulses are gated at U17-15 in order to count down the up/down counter. Each time the clock output inverter U14A-2 goes low (after the mobile radio or the portable carrier is detected) the up/down counter is stepped one increment.

If a repeat condition exists and all the vehicular repeaters are not in priority state, the delay state clock will look every 400 milliseconds to determine if another repeater is repeating. If no other repeater is repeating the delay state counter would then count down one state and the delay state clock would start to run again. This process will continue until the vehicular repeater that was in the lowest delay state would step down to the priority state and begin repeating.

When the condition to repeat exists, a correct portable or mobile radio signal will appear at AND gate U6B-4. This will cause the one-shot to be activated. The output of U16A is fed to inverter U9C and its output (high) is applied to OR gate U2B-6. If no other vehicular repeater is repeating a low will be applied to U2B-5. The output of U2B-4 will cause the delay state clock to count down one step.

Portable Interrupt Clock Circuit

The Portable Interrupt Clock Circuit consists of two inverters U15D and U15E connected as a free-running astable circuit with a 6 millisecond, 2 second unsymmetricial time period. The 6 millisecond period is applied to AND gate U5D-13 to interrupt base-to-portable transmission thus allowing for portable priority.

Multiple Priority Clearing Circuit

The Multiple Priority Clearing Circuit consists of NOR gate U12D and AND gate U11B. If two vehicular repeaters have assumed the priority state, on a base-to-portable transmission, the first unit to interrupt will stop repeating because the input to NOR gate U12A-2 will go high (from the repeater CAS). At the conclusion of the base-to-portable transmission, the Mobile CAS and Repeater CAS leads will go low at approximately the same time since the disabled priority repeater will be listening to both sides of the base-to-portable conversations. Since both inputs to U12D are low the output will go high, feeding a clock pulse through AND gate U11B and OR gate U3D to Delay State Counter U17. This clock pulse will count up from the priority state to delay state one.

Delay State Clock Circuit

The Delay State Clock Circuit consists of a four-input NOR gate U10A and an inverter U14A which are connected as an astable circuit with three disable leads ("PRIORITY" Pin 2, "MOBILE PTT" Pin 3 and "Repeater required" Pin 4). The clock is stopped whenever the delay state counter is in the zero (priority) state, when the mobile microphone PTT is activated or whenever a repeater is not required (Pin 4 is high). If any one of these inputs is high, the clock will be turned off. The clock is set via R13 for a 400 millisecond period, which is the length of each delay state.

Delay State Counter Circuit

The Delay State Counter Circuit consists of a four-bit, binary, presettable, resettable, up/down counter Integrated Circuit U17 and a four-input NOR gate U10B. U17 stores the delay state of the vehicular repeater. Whenever the vehicular repeater is in "delay state zero" (Q1, Q2, Q3 and Q4 are low), the output of NOR gate U10B is high indicating the priority state. The output of U10B is used to enable the logic circuitry to repeat when the proper condition exist.

Carrier Control Timer Circuit

The Carrier Control Timer Circuit consist of inverters U16E and U16F and are connected as a two minute monostable circuit. Refer to NOTE 1 of Schematic Diagram for determining the conditions to activate the CCT. The Carrier Control Timer (CCT) is activated by a negative pulse on the negative side of capacitor C22. When the monostable times out, OR gates U4A and U4B and NAND gate U9A preset the delay state counter to logic state four, removing the vehicular repeater from the priority state; thus the vehicular repeater will stop transmitting.

T90 Decode Timer/Window Delay

The T90 Decode Timer Circuit consists of OR gate U1C, timing network C9, R6, R7 and NOR gates U12C and U12B.

Whenever another vehicular repeater starts transmitting (a signal on the Repeater CAS input is received), the output of U1C-10 goes low charging capacitor C9 via R6 and providing a window delay of approximately 800 milliseconds. This window delay is low at U12C-8 and if U12C-9 is low (when REPEATER TX is disabled) a high will appear on the output U12C-10; thus U12B-4 will be low enabling the T90 DECODE lead for approximately 800 milliseconds.

T90 Decode Detector Circuit

The T90 Decode Detector Circuit consists of inverters U15C, U14F, OR gates U1D, U2C, U2D and U3D and NAND gate U8B.

If during the T90 decode time period, a T90 tone is detected on the T90 DECODE lead then its signal will be routed through the Decode Detector Circuit to provide a clock pulse on the output of U3D. This will advance the logic state of the up/down delay state counter U17 by one.

The T90 decode tone is fed to inverters U15C and U14F which form a hysterisis circuit. The output of U15C-6 will go low and is fed to OR gate U1D-13. With the output low at U1C-10 (when another repeater TX is keyed), Advance Delay State will go low on U1D-11 output. The lead going to inverter U7A is not used at this time. The output of OR gate U2C-10 will go low and when OR gate U2D-13 is low (not in state 8), the U2D-11 output will go low. NAND gate U8B-6 is high (since the delay state clock is not running) producing a high transition (delay state clock) on U8B-4 output. A high pulse will appear on up/down counter U17-15 and advance the state by one.

Mobile PTT and Repeater Enable Circuit

The Mobile PTT Circuit consists of NOR gate U13D and NAND gate U9A. If the vehicular repeater is disabled or the mobile radio is transmitting, the output of U13D-11 will be low causing U9A-3 to preset the delay state counter U17 to logic state four and keep it there until the mobile radio microphone PTT is released. This will insure that the vehicular repeater will not repeat.

When the mobile radio microphone PTT is released, the vehicular repeater will again be enabled but not repeating.

Mobile Transmitter Enable Circuit

The Mobile Transmitter Enable Circuit is active when a portable radio signal is being received as indicated by the inputs of NAND gate U8D. The output of U8D-11 will be low and this signal will be inverted by U15B and applied to AND gate U5C-8. If the delay state counter U10B is in the priority state, U5C-9 will be high and this will produce a high signal on the U5C-10 output to enable the mobile transmitter.

Repeater Transmitter Enable Circuit

If a mobile radio or base transmission is being received, the output of NAND gate U12A-3 will be high. This signal will be applied to AND gate U5B-5. If the delay state counter U10B is in the priority state, U5B-6 will be high thus producing a high at U5B-4. If the input to U5D-13 is high via the Portable Interrupt clock the signal will enable the Repeater Transmitter via OR gate U3A.

T90 Encode Timer Circuit

The T90 Encode Timer Circuit consists of inverters U7E, U7F, U14C and AND gate U11C.

When the vehicular repeater is first enabled, the output of AND gate U6C-10 goes low. This low enables the 700 millisecond monostable circuit of U7E and U7F which is applied to AND gate U11C. If another vehicular repeater is not repeating portable-to-base the output of U11C-10 will be high. This high is the T90 Encode signal and is inverted by U14C providing a low on T90 ENCODE ENABLE lead. OR gate U3A will enable the repeater transmitter at the same time.

Five-Second Window Circuit

The Five-Second Window Circuit consists of inverters U16A and U16B and provides a five-second window timer which is controlled by AND gate U6B. When a carrier is present on the REPEATER CAS lead or MOBILE CAS lead the five-second window circuit controls the window for the Type 90 decode signal, and also sets the window for the count down clock.

ADJUSTMENTS

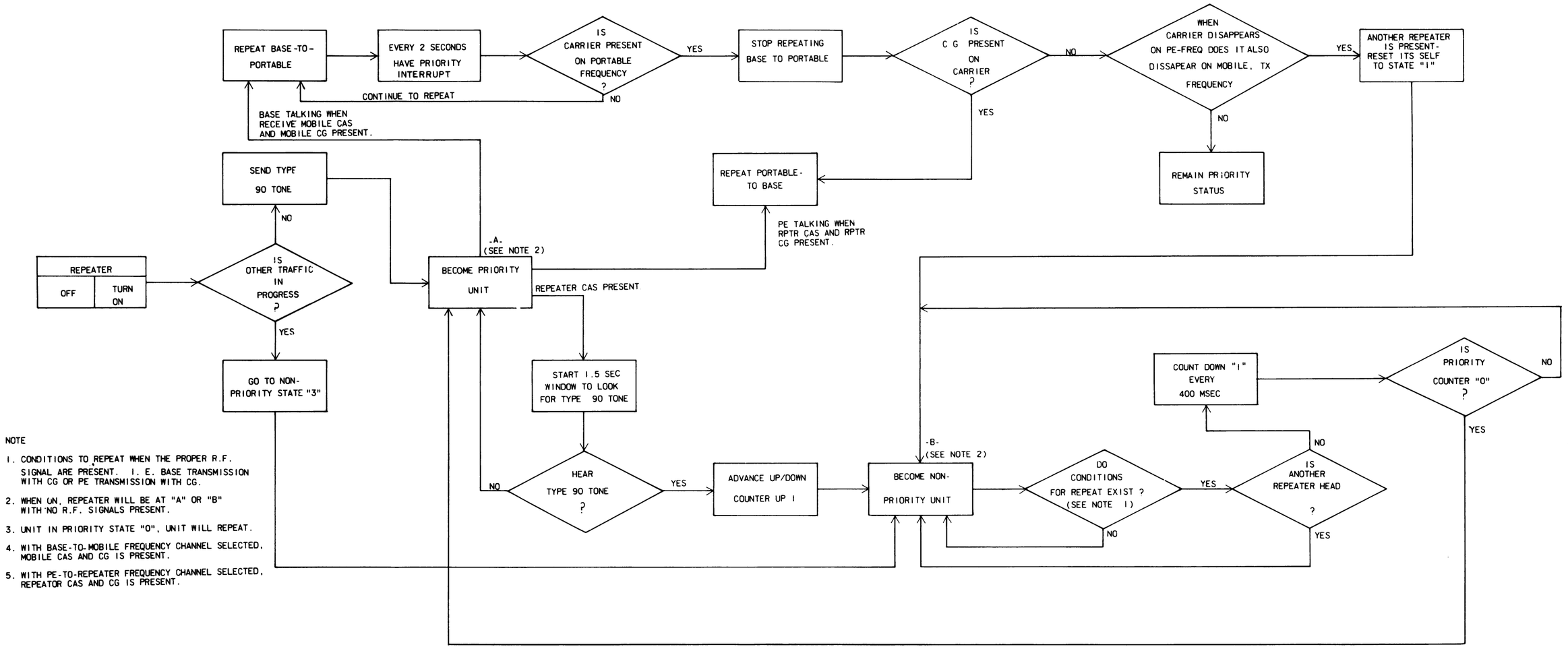
The Logic Board has only one adjustment, the Delay State Clock. This is a factory adjustment, but may be adjusted in the field should the requirement arise.

DELAY STATE CLOCK

1. Apply a ground to test point TP9.
2. Connect an oscilloscope to test point TP4.
3. Adjust resistor R13 for a delay of 400 milliseconds.
4. Remove the oscilloscope and ground from the logic board test points.

GENERAL ELECTRIC COMPANY • MOBILE COMMUNICATIONS DIVISION
WORLD HEADQUARTERS • LYNCHBURG, VIRGINIA 24502 U.S.A.

GENERAL ELECTRIC* U.S.A.



NOTE

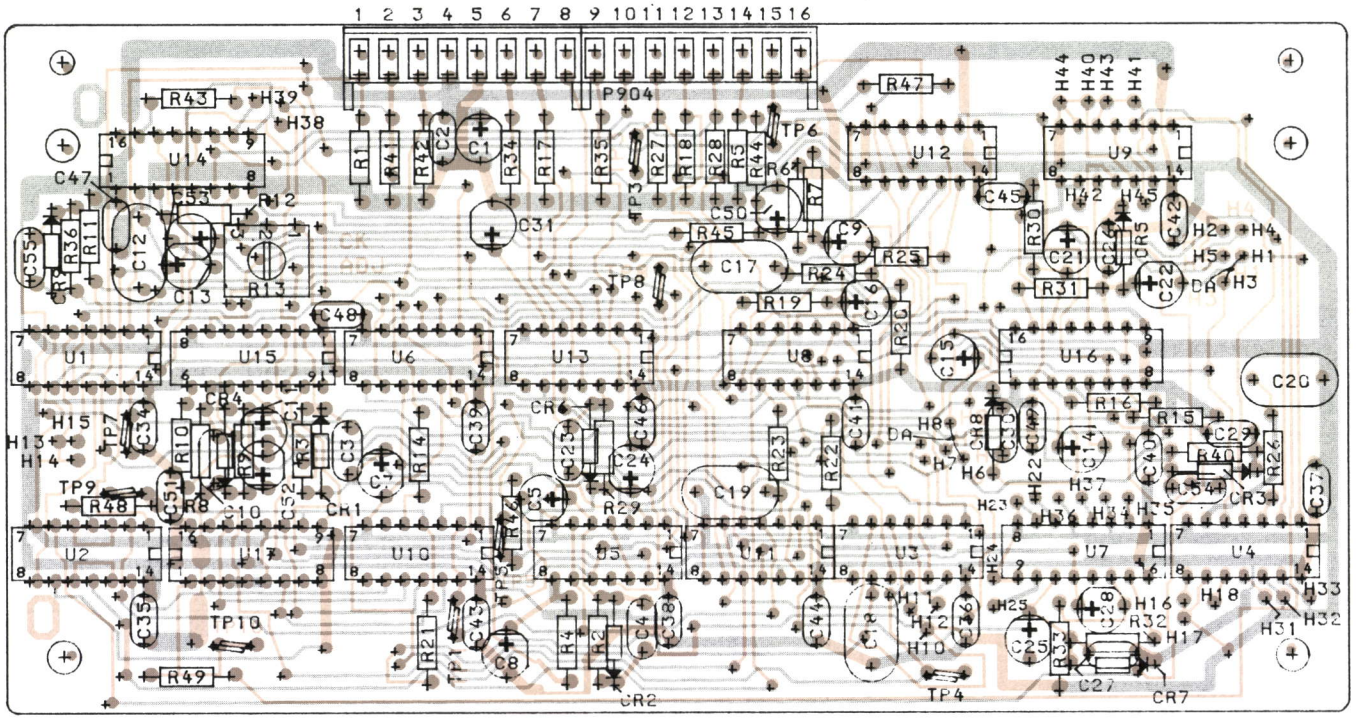
1. CONDITIONS TO REPEAT WHEN THE PROPER R.F. SIGNAL ARE PRESENT. I. E. BASE TRANSMISSION WITH CG OR PE TRANSMISSION WITH CG.
2. WHEN ON, REPEATER WILL BE AT "A" OR "B" WITH NO R.F. SIGNALS PRESENT.
3. UNIT IN PRIORITY STATE "0", UNIT WILL REPEAT.
4. WITH BASE-TO-MOBILE FREQUENCY CHANNEL SELECTED, MOBILE CAS AND CG IS PRESENT.
5. WITH PE-TO-REPEATER FREQUENCY CHANNEL SELECTED, REPEATOR CAS AND CG IS PRESENT.

RC3876

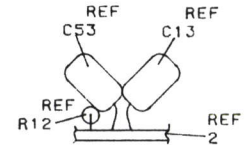
FUNCTIONAL FLOW DIAGRAM

LOGIC BOARD

PROBLEM	CONDITION	POSSIBLE CAUSE
Repeater will not repeat Base-To-Portable	Repeater is "ON" and Enabled. Signal is present on mobile frequency	Check - Mobile CAS input Mobile CG input
Repeater won't repeat Portable-To-Base	Power turned "ON" Repeater is enabled	Check - Repeater CAS input Repeater CG decode input
Repeater TX will not transmit	Repeater is first enabled	Check - Type 90 Encode Timer for 700 ms, U3A
Repeater TX will not transmit	Type 90 Encoder was present on TP6 for 700 ms	Check - Delay State Counter, should be in priority state, U17
Repeater TX will not time out	Repeater is enabled portable or mobile is keyed longer than 2.5 min	Check - Carrier Control Timer, U16E, U16F
Type 90 Encoder Enable inoperative	Repeater first enabled	Check - Type 90 Encode Timer, U14C, U6C
Type 90 Decoder Enable inoperative	Repeater enabled and receiving a signal on Repeater CAS from a portable or another repeater	Check - Type 90 window delay circuit (C9, R6, R7), U1C, U8C, U12C
Mobile TX Enable inoperative	Signal received on Repeater CAS (P904-11) and Repeater CG (P904-13)	Check - U5C, U8D, U15B, U16C, U8C
Portable PE cannot interrupt a transmission from Base-To-Mobile	Repeater Transmitter not enabled	Check - Interrupt pulse every two seconds at TP5, U15D, U15E
Test point TP10 should be "high" (state 4), but TP10 is "low"	Repeater is disabled Mobile radio keyed CCT is "ON"	Check - U9A, U4B, U4A, U16E, U16F, U13D



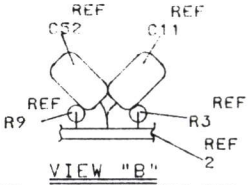
(19C328462, Rev. 0)
(19A138268, Sh. 1, Rev. 0)
(19A138268, Sh. 2, Rev. 0)



VIEW "A"
ROTATED 90 DEG. CCW
TYP. LEAD FORMING FOR
C53 & C13

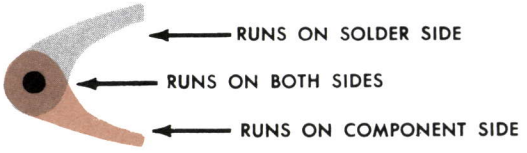
CONNECTION CHART		
FROM	TO	WIRE
H34	H35	ST22W
H36	H37	ST22W
H38	H39	ST22W
H40	H41	ST22W

SEE WIRING DIAGRAM FOR DA JUMPERS.



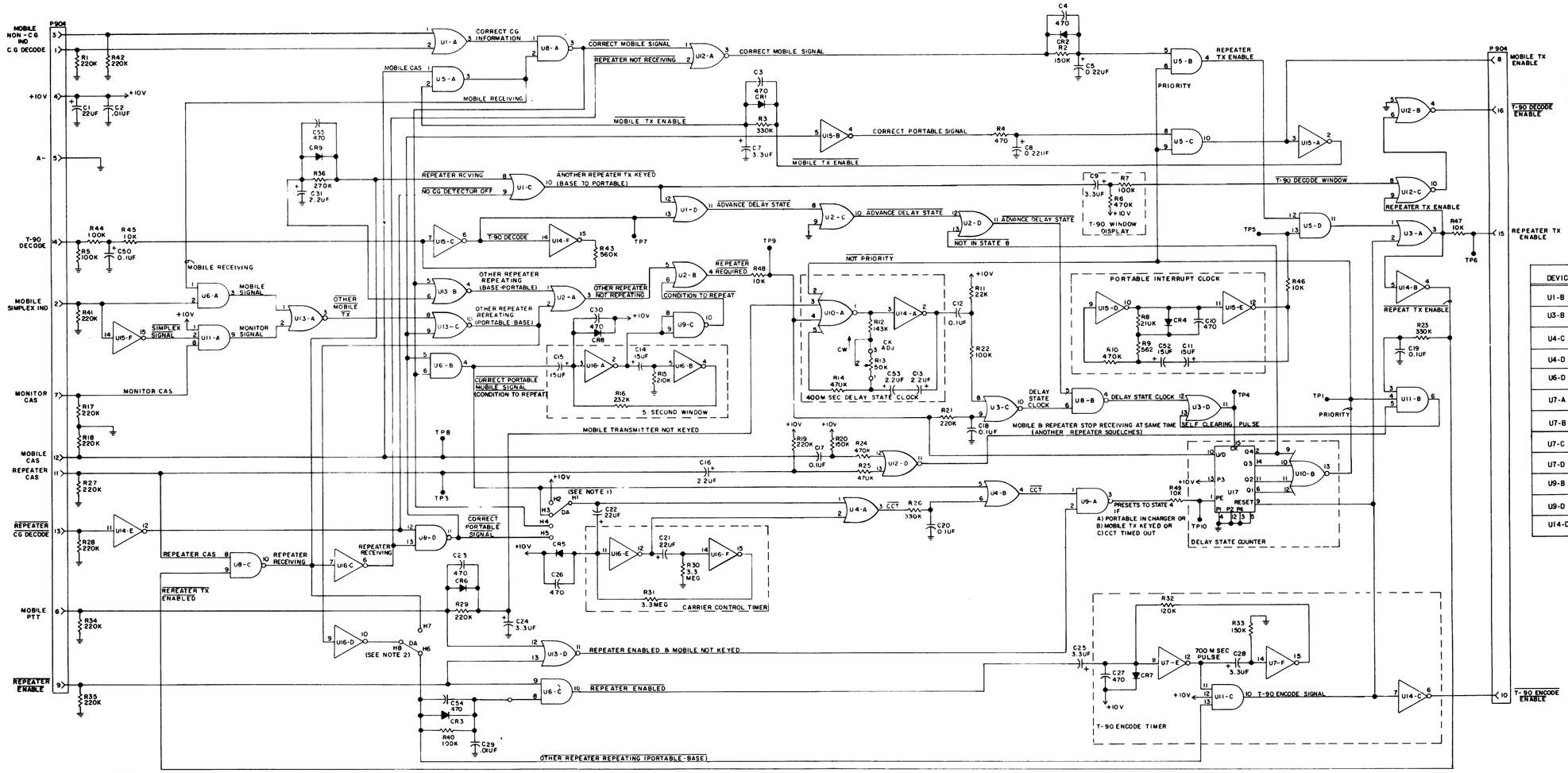
VIEW "B"
TYP. LEAD FORMING FOR
C52 & C11

POLARITY FOR
CR10



OUTLINE DIAGRAM

LOGIC BOARD 19C328461

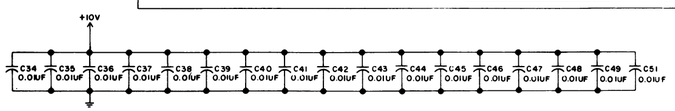


MODEL NO	REV LETTER
PLI9C328461G1	

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 PICOFARADS (EQUAL TO MICROMICROFARADS) UNLESS FOLLOWED BY UF=MICROFARADS. INDUCTANCE VALUES IN MICROHENRYS UNLESS FOLLOWED BY MH=MILLIHENRYS OR H=HENRYS.

SPARE GATES

DEVICE	INPUT (GND)	OUTPUT
U1-B	H13 (PIN 5) H14 (PIN 6)	H15 (PIN 4)
U3-B	H11 (PIN 5) H10 (PIN 6)	H12 (PIN 4)
U4-C	H16 (PIN 8) H17 (PIN 9)	H18 (PIN 18)
U4-D	H32 (PIN 12) H33 (PIN 13)	H31 (PIN 11)
U6-D	H19 (PIN 12) H20 (PIN 13)	H21 (PIN 11)
U7-A	H34 (PIN 3)	H35 (PIN 2)
U7-B	H36 (PIN 5)	H37 (PIN 4)
U7-C	H23 (PIN 7)	H22 (PIN 6)
U7-D	H24 (PIN 9)	H25 (PIN 10)
U9-B	H43 (PIN 5) H44 (PIN 6)	H45 (PIN 4)
U9-D	H40 (PIN 12) H41 (PIN 13)	H42 (PIN 11)
U14-D	H38 (PIN 9)	H39 (PIN 10)



POWER & GND CONNECTIONS		
DEVICE	V+(10V) PIN NO	GND PIN NO
U1, 2, 3, 4, 5, 6, 8, 9, 10, 11, 12, 13	14	7
U7, 14, 15, 16	1	8
U17	16	8

(19E501747, Rev. 1)

NOTES:

1. A DA JUMPER IS PRESENT BETWEEN H1 & H3 FOR TIME-OUT-TIMER OPERATION ON EITHER BASE-TO-PORTABLE OR PORTABLE-TO-BASE REPEAT PATH.
   A DA JUMPER IS PRESENT BETWEEN H1 & H4 FOR TIME-OUT-TIMER OPERATION ON THE BASE-TO-PORTABLE REPEAT PATH ONLY.
   A DA JUMPER IS PRESENT BETWEEN H1 & H5 FOR TIME-OUT-TIMER OPERATION ON THE PORTABLE-TO BASE REPEAT PATH ONLY.
   A DA JUMPER IS PRESENT BETWEEN H1 & H2 FOR NO TIME-OUT-TIMER OPERATION.
2. A DA JUMPER IS PRESENT BETWEEN H6 & H8 TO INHIBIT PRIORITY TONE BURST WHEN ANOTHER REPEATER IS REPEATING PORTABLE-TO-BASE.
   A DA JUMPER IS PRESENT BETWEEN H6 & H7 TO INHIBIT PRIORITY TONE BURST WHEN THERE IS ANY ACTIVITY ON THE PORTABLE FREQUENCY.
3. A CONDITION WITH THE BAR INDICATES A LOGIC "0" IS PRESENT.
4. A CONDITION WITHOUT THE BAR INDICATES A LOGIC "1" IS PRESENT.

SCHEMATIC DIAGRAM

LOGIC BOARD 19C328461G1

Issue 1

PARTS LIST

VEHICULAR REPEATER LOGIC BOARD
19C328461G1
ISSUE 1

SYMBOL	GE PART NO.	DESCRIPTION
		- - - - - - - - - - CAPACITORS - - - - - - - - - -
C1	19A134202P6	Tantalum: 22 µf ±20%, 15 VDCW.
C2	19A116080P1	Polyester: 0.01 µf ±20%, 50 VDCW.
C3 and C4	5494481P7	Ceramic disc: 470 pf ±20%, 1000 VDCW; sim to RMC Type JF Discap.
C5	19A134202P10	Tantalum: 680 µf ±10%, 35 VDCW.
C7	19A134202P5	Tantalum: 3.3 µf ±20%, 15 VDCW.
C8	19A134202P10	Tantalum: 680 µf ±10%, 35 VDCW.
C9	19A134202P105	Tantalum: 3.3 µf ±10%, 15 VDCW.
C10	5494481P7	Ceramic disc: 470 pf ±20%, 1000 VDCW; sim to RMC Type JF Discap.
C11	19A134202P108	Tantalum: 15 µf ±10%, 20 VDCW.
C12	19A116080P107	Polyester: 0.1 µf ±10%, 50 VDCW.
C13	19A134202P107	Tantalum: 2.2 µf ±10%, 20 VDCW.
C14 and C15	19A134202P108	Tantalum: 15 µf ±10%, 20 VDCW.
C16	19A134202P7	Tantalum: 2.2 µf ±20%, 20 VDCW.
C17 thru C20	19A116080P107	Polyester: 0.1 µf ±10%, 50 DCW.
C21 and C22	19A134202P6	Tantalum: 22 µf ±20%, 15 VDCW.
C23	5494481P7	Ceramic disc: 470 pf ±20%, 1000 VDCW; sim to RMC Type JF Discap.
C24 and C25	19A134202P5	Tantalum: 3.3 µf ±20%, 15 VDCW.
C26 and C27	5494481P7	Ceramic disc: 470 pf ±20%, 1000 VDCW; sim to RMC Type JF Discap.
C28	19A134202P5	Tantalum: 3.3 µf ±20%, 15 VDCW.
C29	19A116080P1	Polyester: 0.01 µf ±20%, 50 VDCW.
C30	5494481P7	Ceramic disc: 470 pf ±20%, 1000 VDCW; sim to RMC Type JF Discap.
C31	19A134202P7	Tantalum: 2.2 µf ±20%, 20 VDCW.
C34 thru C49	19A116080P1	Polyester: 0.01 µf ±20%, 50 VDCW.
C50	19A134202P9	Tantalum: 0.1 µf ±20%, 35 VDCW.
C51	19A116080P1	Polyester: 0.01 µf ±20%, 50 VDCW.
C52	19A134202P108	Tantalum: 15 µf ±10%, 20 VDCW.
C53	19A134202P107	Tantalum: 2.2 µf ±10%, 20 VDCW.
C54 and C55	5494481P7	Ceramic disc: 470 pf ±20%, 1000 VDCW; sim to
		- - - - - - - - - DIODES AND RECTIFIERS - - - - - -
CR1 thru CR9	19A115250P1	Silicon, fast recovery, 225 mA, 50 PIV.

SYMBOL	GE PART NO.	DESCRIPTION
		- - - - - - - - - - PLUGS - - - - - - - - - -
P904	19A116659P3	Connector, printed wiring: 8 contacts; sim to Molex 09-52-3082.
		- - - - - - - - - - RESISTORS - - - - - - - - - -
R1	3R152P224J	Composition: 220K ohms ±5%, 1/4 w.
R2	3R152P154J	Composition: 150K ohms ±5%, 1/4 w.
R3	3R152P334J	Composition: 330K ohms ±5%, 1/4 w.
R4	3R152P474J	Composition: 470K ohms ±5%, 1/4 w.
R5	3R152P104J	Composition: 100K ohms ±5%, 1/4 w.
R6	3R152P474J	Composition: 470K ohms ±5%, 1/4 w.
R7	3R152P104J	Composition: 100K ohms ±5%, 1/4 w.
R8	19C314256P22103	Metal film: 210K ohms ±1%, 1/4 w.
R9	19C314256P25620	Metal film: 562 ohms ±1%, 1/4 w.
R10	3R152P474J	Composition: 470K ohms ±5%, 1/4 w.
R11	3R152P223J	Composition: 22K ohms ±5%, 1/4 w.
R12	19C314256P21433	Metal film: 143K ohms ±1%, 1/4 w.
R13	19A116559P108	Variable, cermet: 50K ohms ±20%, 0.5 w; sim to CTS Series 360.
R14	3R152P474J	Composition: 470K ohms ±5%, 1/4 w.
R15	19C314256P22103	Metal film: 210K ohms ±1%, 1/4 w.
R16	19C314256P22323	Metal film: 232K ohms ±1%, 1/4 w.
R17 thru R19	3R152P224J	Composition: 220K ohms ±5%, 1/4 w.
R20	3R152P154J	Composition: 150K ohms ±5%, 1/4 w.
R21	3R152P224J	Composition: 220K ohms ±5%, 1/4 w.
R22	3R152P104J	Composition: 100K ohms ±5%, 1/4 w.
R23	3R152P334J	Composition: 330K ohms ±5%, 1/4 w.
R24 and R25	3R152P474J	Composition: 470K ohms ±5%, 1/4 w.
R26	3R152P334J	Composition: 330K ohms ±5%, 1/4 w.
R27 thru R29	3R152P224J	Composition: 220K ohms ±5%, 1/4 w.
R30 and R31	3R152P335J	Composition: 3.3 megohms ±5%, 1/4 w.
R32	3R152P124J	Composition: 120K ohms ±5%, 1/4 w.
R33	3R152P154J	Composition: 150K ohms ±5%, 1/4 w.
R34 and R35	3R152P224J	Composition: 220K ohms ±5%, 1/4 w.
R36	3R152P274J	Composition: 270K ohms ±5%, 1/4 w.
R40	3R152P104J	Composition: 100K ohms ±5%, 1/4 w.
R41 and R42	3R152P224J	Composition: 220K ohms ±5%, 1/4 w.
R43	3R152P564J	Composition: 560K ohms ±5%, 1/4 w.
R44	3R152P104J	Composition: 100K ohms ±5%, 1/4 w.
R45 thru R49	3R152P103J	Composition: 10K ohms ±5%, 1/4 w.
		- - - - - - - - - TEST POINTS - - - - - - - - - -
TP1	19B211379P1	Spring (Test Point).
TP3 thru TP10	19B211379P1	Spring (Test Point).

SYMBOL	GE PART NO.	DESCRIPTION
		- - - - - - - - INTEGRATED CIRCUITS - - - - - - - -
U1 thru U4	19A134097P55	Digital, Quad 2-Input or Gate: Identification No. 4071.
U5 and U6	19A134097P56	Digital, Quad 2-Input and Gate: Identification No. 4081.
U7	19A134097P341	Digital, Hex Buffer/Converter (Inverting): Identification No. 4049 UB.
U8 and U9	19A134097P9	Digital, Quad 2-Input Nand Gate: Identification No. 4011.
U10	19A134097P3	Digital, Dual 4-Input Nor Gate: Identification No. 4002.
U11	19A134097P61	Digital, Triple 3-Input And Gate: Identification No. 4073.
U12 and U13	19A134097P2	Digital, Quad 2-Input Nor Gate: Identification No. 4001.
U14 thru U16	19A134097P341	Digital, Hex Buffer/Converter (Inverting): Identification No. 4049 UB.
U17	19A134097P208	Digital, Binary Up/Down Counter: Identification No. 4516.

*COMPONENTS ADDED, DELETED OR CHANGED BY PRODUCTION CHANGES