

MAINTENANCE MANUAL
BUFFER BOARD 19C336920G1 & G3
EDACS VOTER APPLICATIONS

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CIRCUIT ANALYSIS

BUFFER BOARD (G1)

The Buffer board 19C336920G1 is used in the EDACS voter system at the satellite receiver site. The board accepts data inputs from up to two control channel mobile monitor receivers and provides a serial data stream to each of the channel GETCs at the satellite site. Alarm outputs are also available for detection of loss of one or both of the control-channel monitor data streams. In the event of a total loss of control-channel data, the Buffer board will provide a reset pulse to all GETCs at the satellite site. There are three monostable multivibrators on the board that are used as control-channel data detectors and to provide a controlled reset for the GETC boards. A block diagram of the Buffer board is shown in Figure 1.

Control-Channel Data Paths

Control-channel data (19.2 kilobaud, active low) from the first control-channel monitor receiver enters the board at J1-02 (DATA IN). The data is fed to an AND gate (U1A-2) with one input tied to U2A-6. Control-channel data is also input to the monostable multivibrator at U2A-5. The pulse time of the multivibrator is set by R7 and C1.

When U2A is initialized its Q (-) output is set high and its Q output is set low. As data is received from the control channel receiver, the Q outputs change states. These states will be retained as long as data pulses are received before the time set by C1 and R7 has expired. During reception of control-channel data, U1A-1 will be held high and U1A-2 will track the control-channel data, causing U1A-3 to also follow the control-channel data. The output from U1A-3 is fed to one input of NOR gate U4A.

The other input of the NOR gate (U4A-1) is tied to the output of AND gate U1B. This AND gate is driven by the control-channel data from the second control-channel monitor which enters at J2-2 (DATA IN) and the Q (-) output of U2A. When control-channel data is being received from control-channel monitor number one, the Q (-) output is held low preventing data from the second control-channel monitor from being input to NOR gate U4A-1. Output from the NOR gate (U4A-3) is control-channel data when both control-channel receivers are supplying data to the board. Output from the NOR gate U4A-3 is fed to AND gate U1D which gates the control-channel data with the ENABLE (-) line J4-01. When this line is held high, control channel data will appear at the DATA OUT lines (J5-3 thru J13-3) going to the trunking cards.

If there is a loss of control-channel one data (the primary data source), U1A-2 will be held high and the U2A outputs will return to their reset states causing the Q output to be held low. This causes the output of AND gate U1B to go low, holding U4A-2 low. Control-channel two data will be present on NOR gate input U4A-1 and output U4A-3. Control-channel two data will then be sent to the trunking cards through U3A and U1D as long as the ENABLE (-) line remains high.

Alarms

Control-channel data (19.2 kilobaud, active low) from the second control-channel monitor receiver enters the board at J2-02 (DATA IN) and is fed to monostable multivibrator U2B-11. This multivibrator is used to detect the presence of control-channel two data in the same manner that U2A detects control-channel one data. The Q (-) output of U2B will remain low as long as control-channel data continues within the time set up by C2 and R8. The same is true for U2A for the reception of control-channel one data. The output of the monostables (U2A-7 and U2B-9) are tied to the input of AND gate U1C and NOR gate U4B. When both control-channel data streams are being received, the inputs to both gates will be held low, causing U1C-10 to be held low and U4B-4 to be held high, which in turn keeps DS1 (MAJOR ALARM) and DS3 (MINOR ALARM) indicators off.

When data is lost from one control channel, one of the inputs to NOR gate U4B will be set high causing U4C-10 to go low lighting the MINOR ALARM indicator (DS3). The MINOR ALARM (-) line will also be held low at J4-4. The output of AND gate U1C will remain low causing the MAJOR ALARM (DS1) indicator to stay off.

If data is lost from both control-channel receivers, both inputs to U4B and U1C will be held high. In this case the output of U4B will be low causing the MINOR ALARM indicator to light and the output of U1C will be high causing the MAJOR ALARM indicator to light also.

BUFFER BOARD (G3)

The buffer Board 19C336920G3 is used as a rack inter-connect board. It operates identically to the G1 board. Jacks J1 through J4 are not present. Connections are made directly to the circuits.

TEST AND TROUBLESHOOTING

The test procedure contained in this section should be used to verify proper operation of the Buffer board. The test may also be used as an aid in troubleshooting to isolate a problem to a stage or component.

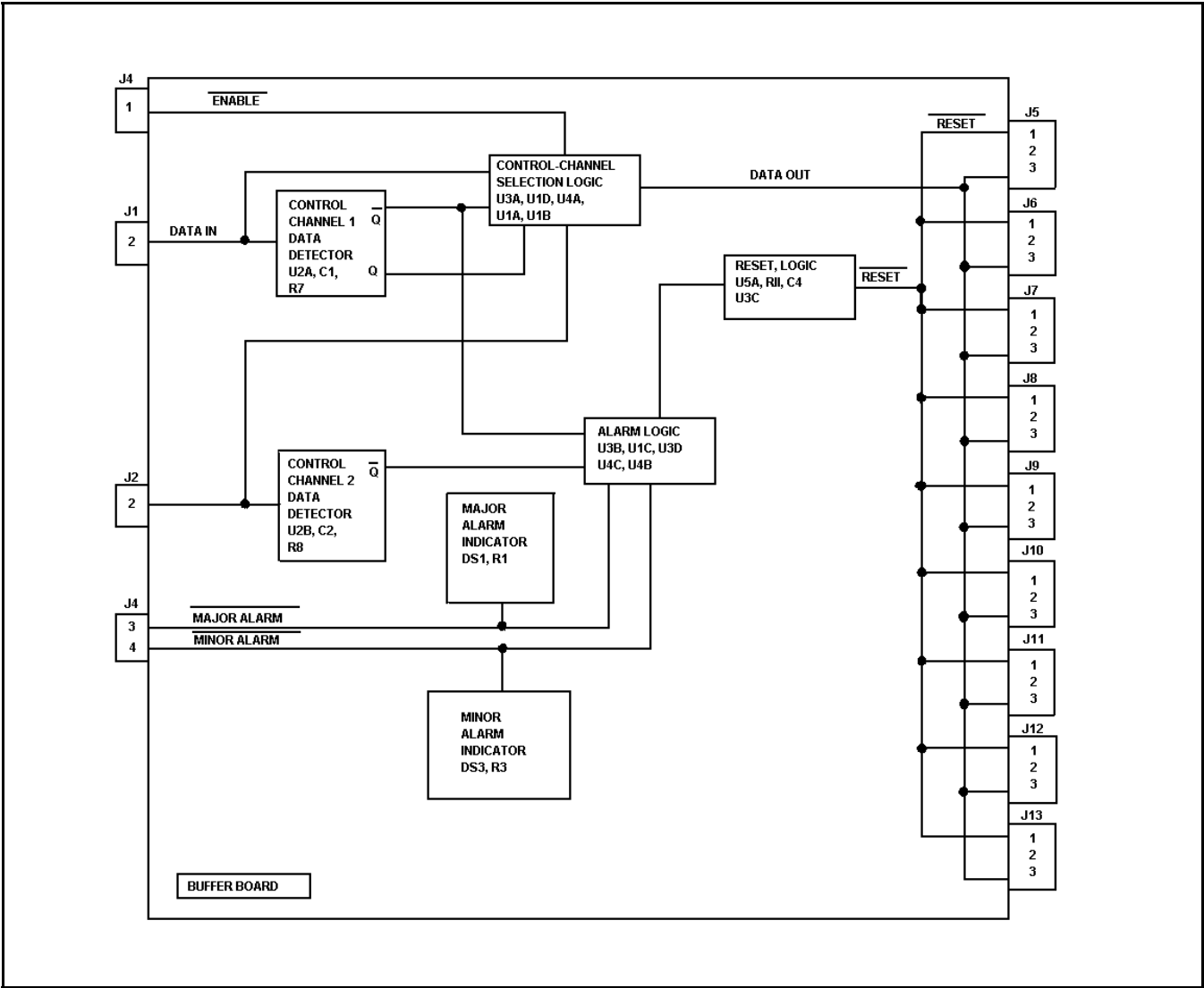


Figure 1 - Buffer Board Block Diagram

EQUIPMENT REQUIRED

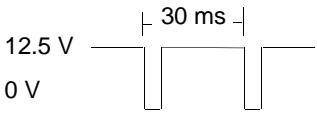
The following equipment is required for performing the test procedure.

- Power Supply, 13.8 ±0.8 Vdc, 30 mA
- Oscilloscope
- 750 Ohm, 1 Watt Resistor
- Digital Multimeter
- Pulse or Function Generator
- Jumpers

TEST PROCEDURE

Follow the test procedure in Table 1 to test the operation of the Buffer board. The Corrective Action column gives suggestions for troubleshooting if the expected test result is not achieved.

Table 1 - Test Procedure

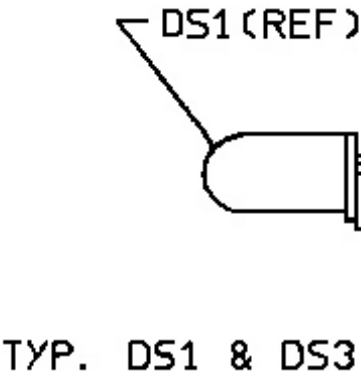
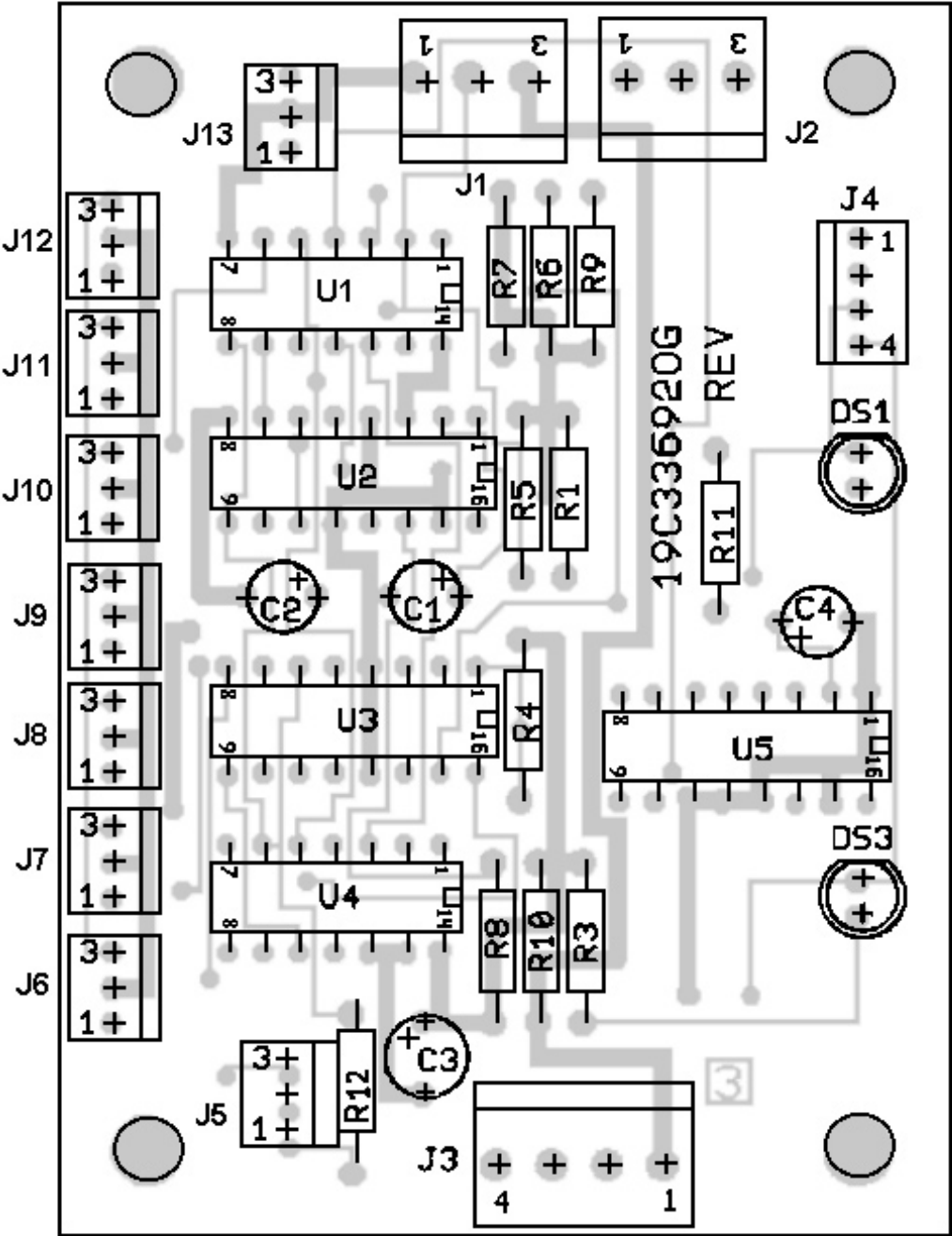
NO.	STEP	MEASUREMENT/ OBSERVATION	CORRECTIVE ACTION
1.	Connect a 750 Ohm, 1 Watt resistor from J5-1 to +13.8 Vdc.		
2.	Apply +13.8 ±0.8 Vdc to J3-1 and connect J3-4 to power supply ground.	MAJOR ALARM and MINOR ALARM indicators (DS1 & DS3) are on.	
3.	Measure power supply current.	22 ±5mA	a. Check R10 and C3. b. Check for shorts or open circuits along 13-volt bus.
4.	Apply a pulse train to J1-2 that pulses from 12.5 ±0.5 Vdc every 30 milliseconds. The 0-volt pulse width should be approximately 5 milliseconds. 	a. MAJOR ALARM indicator DS1 is off b. MINOR ALARM indicator (DS3) remains on. c. Check DS1, DS3, R1 and R3.	a. Check U2A, U2B, and associated components. b. Check U1C, U4B, U4C, U3B, and U3D.
5.	Observe the waveform at J5-3.	Similar to waveform at J1-2.	Check U1A, U1B, U4A, U1D, U3A, R4 and R9
6.	Remove the signal from J1-2 and apply to J2-2.	MAJOR ALARM and MINOR ALARM indicators (DS1 & DS2) are on when signal removed. MINOR ALARM indicator (DS3) remains on when signal applied to J2-2.	a. Check U2A, U2B,and associated components. b. Check U1C, U4B, U4C, U3B, and U3D.
7.	Observe the waveform at J5-3.	Similar to waveform at J2-2.	Check U1A, U1B, U4A, U1D, U3A, R4, and R9.
8.	Connect a jumper between J2-2 and J1-2.	Both MAJOR ALARM and MINOR ALARM indicators (DS1 & DS2) should be off.	a. Check U2A, U2B, and associated components. b. Check U1C, U4B, U4C, U3B, and U3D.
9.	Connect J4-1 to ground and observe the waveform at J5-3.	Output should be steady high (approximately 13 V).	Check R9, U1D, U3A, and R4.
10.	Connect the oscilloscope to J5-1.	Output should be steady high (approximately 13 V).	Check U3C, U5A, and associated components.
11.	Remove the jumper from J2-2 to J1-2 and remove the signal from J2-2.	MAJOR ALARM and MINOR ALARM indicators (DS1 & DS2) will light.	
12.	Remove all test equipment and jumpers from the Buffer board.		

VOTER BUFFER BOARD
19C336920G1 & G3
ISSUE 3

SYMBOL	PART NO.	DESCRIPTION
- - - - - CAPACITORS - - - - -		
C1 and C2	19A701534P3	Tantalum: 0.47 uF ±20%, 35 VDCW.
C3	19A701534P7	Tantalum: 1.0 uF ±20%, 16 VDCW.
C4	19A701534P3	Tantalum: 0.47 uF ±20%, 35 VDCW.
- - - - - INDICATING DEVICES - - - - -		
DS1	19A134354P1	Optoelectronic: Red LED; sim to HP 5082-4555.
DS3	19A134354P2	Optoelectronic: Yellow LED; sim to HP 5082-4555.
- - - - - JACKS - - - - -		
J1 and J2	19A116659P55	Connector, printed wiring: 3 contacts rated at 5 amps; sim to Molex 09-65-1031. (Group1).
J3	19A116659P57	Connector, printed wiring: 4 contacts rated at 5 amps; sim to Molex 09-65-1041. (Group1).
J4	19A704852P30	Printed wire: 4 contacts rated @ 2 1/2 amps; sim to Molex 22-29-2041. (Group1).
J5 thru J13	19A704852P29	Connector; sim to Molex 22-29-2031.
- - - - - RESISTORS - - - - -		
R1	H212CRP212C	Deposited carbon: 1.2K ohms ±5%, 1/4 w.
R3	H212CRP212C	Deposited carbon: 1.2K ohms ±5%, 1/4 w.
R4	H212CRP247C	Deposited carbon: 4.7K ohms ±5%, 1/4 w.
R5 and R6	H212CRP310C	Deposited carbon: 10K ohms ±5%, 1/4 w.
R7 and R8	H212CRP439C	Deposited carbon: 390K ±5%. 1/4 w.
R9	H212CRP310C	Deposited carbon: 10K ohms ±5%, 1/4 w.
R10	H212CRP010C	Deposited carbon: 10 ohms ±5%, 1/4 w.
R11	H212CRP439C	Deposited carbon: 390K ±5%, 1/4 w.
R12 *	19A700184P1	Jumper.
- - - - - INTEGRATED CIRCUITS - - - - -		
U1	19A700029P47	Digital: Quad 2-Input AND Gate; sim to 4081B.
U2	19A700029P225	Digital: Dual Retriggerable Monostable; sim to 4538B.
U3	19A116704P13	Digital: Quad Peripheral Driver; sim to DS3656N.
U4	19A700029B2	Digital: Quad 2-Input NOR Gate; sim to 4001B.
U5	19A700029P225	Digital: Dual Retriggerable Monostable; sim to 4538B.
- - - - - MISCELLANEOUS - - - - -		
	19A702279P1	Spacer, nylon sleeve.

*COMPONENTS ADDED, DELETED OR CHANGED BY PRODUCTION CHANGES

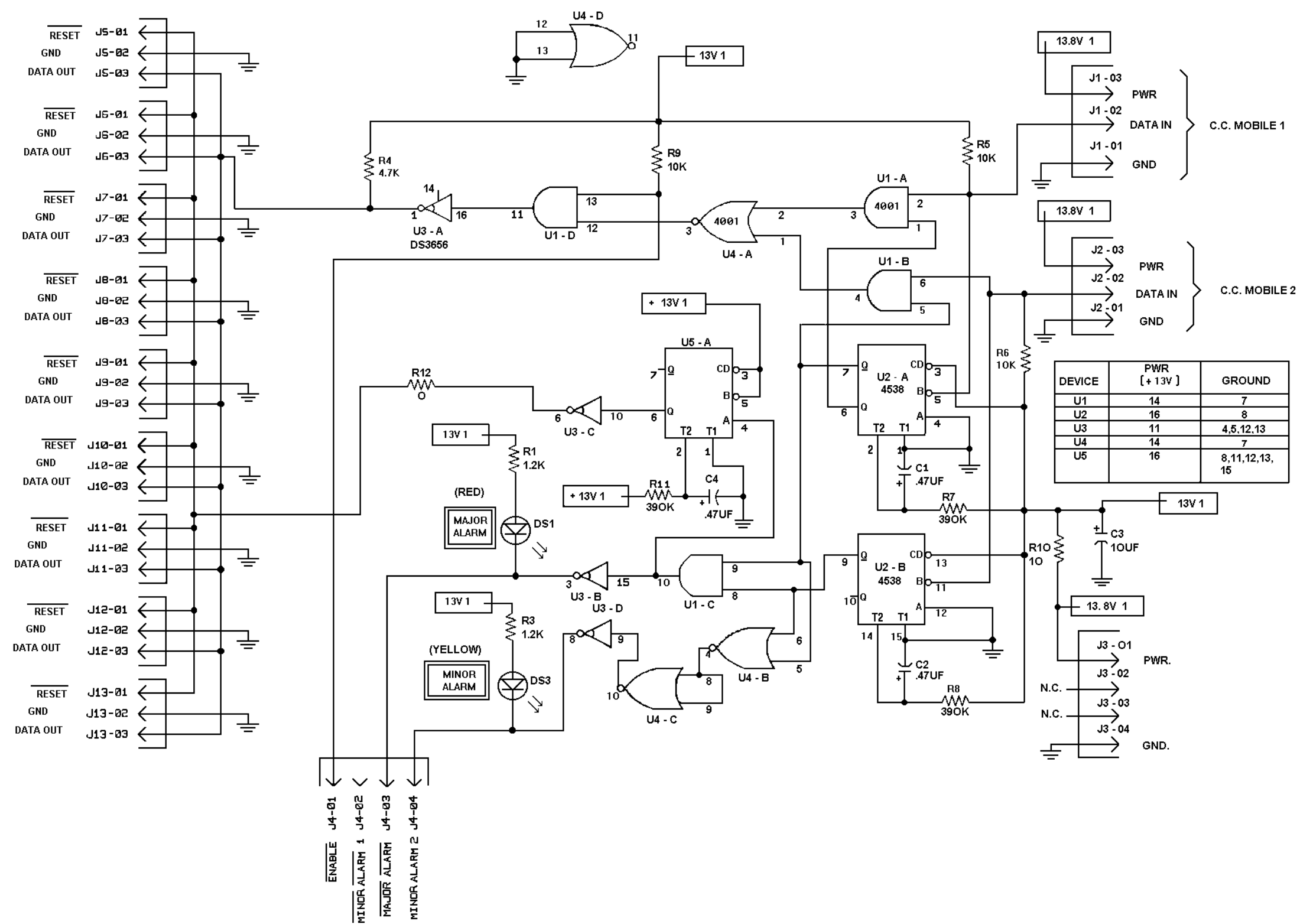
PRODUCTION CHANGES
Changes in the equipment to improve performance or to simplify circuits are identified by a "Revision Letter", which is stamped after the model number of the unit. The revision stamped on the unit includes all previous revisions. Refer to the Parts List for the descriptions of parts affected by these revisions.
REV. A - VOTER BUFFER BOARD 19C336920G1
To improve operation, removed power from U3 pin 2 and pin 7.
Also added R12 (19A700184P1 Jumper). This change prevents the board's outputs from clamping low with a loss of power.



CAUTION
OBSERVE PRECAUTIONS
FOR HANDLING
ELECTROSTATIC
SENSITIVE
DEVICES

BUFFER BOARD
19C336920G1, G3

(19C336920, Rev. 2)
(19C336919, Sh. 1, Rev. 3A)



BUFFER BOARD
19C336920G1, G3

(19C337010, Sh. 1, Rev. 3)

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